DEVICE FOR TAPPING A BEVERAGE OUT OF A REUSABLE KEG AND METHOD FOR FILLING SAID KEG

(54) Title: DEVICE FOR TAPPING A BEVERAGE OUT OF A REUSABLE KEG AND METHOD FOR FILLING SAID KEG

(57) Abstract: A device for tapping a liquid foodstuff consisting of a double-walled keg (1) and a tap installation, the keg (1) being formed by a non-deflatable outer container (28) with a deformable inner container (37) therein, which can contain the liquid foodstuff to be tapped, the inner and outer containers (37, 38) being connected gas-tight with one another and the tap installation being mounted on the outer container (28) and reaching into the interior of the inner container (37), wherein the device includes means for bringing the pressure in the space between the outer container (28) and the inner container (37) to a desired level and maintaining it without intervention from outside the keg.
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The present invention concerns a device for tapping a liquid foodstuff out of a reusable keg and a method for filling such a device.

The name liquid foodstuff is to be understood in the broadest sense in this context and includes all beverages, in particular those that are offered and distributed under gas pressure, mostly C02.

The following may be named as more specific, but not exclusive, examples of such beverages: beer, soft drinks, mineral water, sparkling wine, fruit juices, coffee, iced coffee, milk, yoghurt, chocolate milk, tea, etc.

More specifically, the invention is intended for a device for tapping a beverage out of a so-called mini-keg or keg, as are commonly used at parties, receptions, family celebrations, etc., as well as for use in households or for mobile distribution at public appearances, festivals, and the like.

In this context, a keg or a mini-keg is understood as any container of manageable dimensions, for example with a useful capacity of 3-10 litres that can be emptied under pressure.
Kegs or mini-kegs, that consist of a cylindrical container and usually are made of aluminium, steel, or wood, are already known.

Small metal barrels are mostly made by welding or rolling a suitable metal plate.

They are traditionally used for storing, transporting, or serving beer.

It is also possible to make use of kegs or mini-kegs of this kind for other carbonated or uncarbonated beverages, both alcoholic and non-alcoholic, where appropriate these beverages then themselves are also under pressure.

Kegs of this kind are not reusable and are only made as disposable packages.

In this connection, a device for beverage tapping, called KeyKeg that consists of a deformable plastic bag that is placed within a spherical polyethylene terephthalate container and which contains beer, is known.

An external pressure is exerted on the deformable bag containing the beverage by putting the space between the wall of the sphere and the plastic bag under pressure with CO2 or air from an outside source, by means of which it can then be tapped via a separate distribution device.

Thus there is no direct contact of the beverage with the gas under pressure except, over a longer period, by
diffusion of the gas through the plastic bag, which can be supplied in different sorts and qualities.

The plastic bag may be metal-coated in order to prevent the diffusion of air, in particular atmospheric oxygen, as much as possible.

A disadvantage of this is that metal-coated plastic bags of this kind are quite vulnerable and in case of wrinkles or folds have a tendency to crack or to form weak spots that threaten to nullify the favourable effect obtained from metal-coating, by means of which the beverage runs out of the bag and is contaminated, and the system ultimately becomes unusable.

It is also a great disadvantage that cooling the beverage is difficult, since it can be performed only via external installations and the external upper surface of the spherical container and the heat conductivity of the air, the CO2, and the internal plastic bag are quite low, reduced more by the cardboard package in which the KeyKeg is marketed in order to be able to hold it upright.

A further large disadvantage is that the entire device is not reusable and thus is difficult to recycle because of the different components, which is not environmentally friendly, and is energy-consuming.

It also does not include fittings with which the tapping process can be controlled or the foam head can be influenced.
It is used only namely for a tripartite double tap system enclosed in a standard fibreglass reinforced closure that permits bringing air or a gas under pressure into and out of the space between spherical container and internal plastic bag at respectively the time of emptying and/or filling of the keg.

In the case of kegs of this type, in general it is possible to make use of two types of pumps: a so-called party pump and a pump that provides the gas under pressure.

A party pump also uses ambient air in order to put the plastic bag under pressure, for the most part by making use of a manually operated system.

A disadvantage is that with this, in addition to bacteria and moisture, atmospheric oxygen also is brought into the keg.

This results in the beer acquiring a so-called "cardboard" taste as a result of oxidation over time, which naturally will be less appreciated by the user.

The beer from kegs of this type, whenever a party pump is used as a distribution system, is best consumed within 18-24 hours.

On the other hand, if a gas pump that supplies C02 is used, this effect does not take place, since C02 does not have oxidative properties.
However, for the most part, the gas pumps are externally connected with a CO2 pressure tank, thus are more expensive than a party pump and require additional control and a connection apparatus and additional safety provisions.

Some brewers also recommend using a mixture of other gases in place of air.

Thus, for example, Guinness calls for a mixture that consists of 25% CO2 and 75% nitrogen.

A pressure control reduction valve for use in kegs of this kind, that works together with a tap system, the pressure being built up by a pressure cartridge that is mounted inside the keg, immersed in the beverage, and suspended on the cover, is also known, for example from US 2008/0203118.

A disadvantage of this is that the pressure container is not refillable and that the protective casing that is mounted around the pressure container and the gas under pressure both directly come in contact with the beverage.

A beverage tapping device also is known from NL 1 020 202 of Heineken Technical Services BV, which uses a valve system that blows gas under pressure into a closed container in order to push out the beverage to be tapped by pressing down on a pressure unit with a handle.

A disadvantage of this is that the gas comes directly in contact with the beverage, by which impurities can be
carried along and the beverage can become overloaded with CO2, and that an external pressure system, special connections, and an external CO2 source are necessary, and that also increased safety measures have to be taken.

A further disadvantage of kegs of this type is that the useful volume is fixed as a result of its construction and cannot be easily increased or reduced by enlarging the container or by using filler pieces.

A further disadvantage is that kegs of this type can only be reopened destructively, which makes maintenance, inspection, and/or replacement of the enclosed components impossible.

A further disadvantage is that the keg has a specific form, which it maintains, as a result of which adjusting to new trends or shaping, or to additional chime apparatus cannot be performed or can only be performed with difficulty.

The object of the present invention is to offer a solution for at least one of the above-mentioned and other disadvantages, by providing a device for tapping a liquid foodstuff, that mainly consists of a double-walled keg and a tap installation, the double-walled tank being formed by a non-deformable outer container with a deformable inner container inside it, which can contain the liquid foodstuff to be tapped, the internal and outer containers being connected gas-tight with respect to each other and the tap installation being mounted on the outer container and reaching into the interior of the internal container and
being suitable for tapping the liquid foodstuff, the non-deformable outer container consisting of at least two parts that are connected with each other gas-tight, and the device includes measures for bringing the pressure in the space between the outer container and the inner container to a desired level and maintaining it without intervention from outside the keg.

An advantage of this is that the non-deformable container can be manufactured according to a wide range of production methods, that are not subject to the limitations inherent in cylindrical rolling and flat rolling of metal plate or blowing plastic kegs and, moreover, not only have much greater freedom of form, a more pronounced creative appearance, a wider choice of materials, and permissible variations of this kind, but also greater strength.

The top and bottom chime of the keg can be formed such that they can fit loosely in each other, so that it is no longer necessary to transport or store the kegs in crates: namely they can be placed stably on top of one another.

Because the top and bottom chimes can overlap over 360°, the stability of the chimes and the top and bottom edge of the keg can be optimally achieved.

At the same time, this permits making cut-outs just under the upper chime that can be used as handles without noticeably impairing the strength or stability thereof.
At the same time, the lower edge of these cut-outs, that are used as handles, can be made to run parallel with the upper surface of the keg, by means of which moisture, rain, etc., and the liquid can flow off the keg via these cut-outs or handles.

The upper edge of these kegs can be designed so that the surfaces slope downward so that any liquid flows off.

 Normally speaking, it is possible to see by means of a simple visual analysis, possibly of a cross section and by means of a microscope, whether an item, in this case a keg, is made of two parts.

In a preferred embodiment, the device includes filling devices that make it possible to bring the pressure in the space between the outer container and the inner container equal to or below the ambient pressure.

An advantage of this is that, before the inner container is filled with beverage, a vacuum can be created between the deformable inner container and the non-deformable outer container, by means of which at the time of filling the inner container, for example first with CO2 gas, then with beverage, and can completely adjust to the internal dimensions of the outer container, it can completely unfold in this way, and the empty space between inner container and outer container can be filled as well as possible.

In another preferred embodiment, the parts of the outer container are gas-tight connected with each other.
This has the advantage that the kegs can be made of detachable parts or inspected by removing the detachable parts from each other.

Another advantage is that the design of the different components and detachable parts is less subject to limitations and can be more easily adjusted to trends, specific requirements, or future designs.

It is possible here that the parts of which the outer container consists are mounted on each other with a screw connection, and/or that a spacer can be placed between the parts of which the outer container consists.

An advantage is that the useful volume of the keg can be easily increased or decreased, on the one hand by means of placing a spacing piece between the two component parts, and on the other hand by introducing a filling piece, for example in the form of a piece of plastic foam.

The external dimensions of a keg according to the invention can be easily adjusted in a similar way. Thus, for example, the total height can be easily reduced in order to let the keg take up minimum space but still allowing it to be placed stably and upright in a standard refrigerator.

In a preferred embodiment at least one of the parts of which the non-deformable container consists is produced by means of a metal or plastic injection shaping technique.
This production technique results in a particularly great freedom of form and production flexibility.

For example in this way it is possible to make the upper and lower edges out of metal, which provides a much stronger keg and the useful lifetime thereof is noticeably increased.

Also the metal injection casting process makes it possible to guarantee a flexibility of design and shaping process, it being possible to produce geometrically complex forms all at once and without additional finishing.

Details, in particular screw thread, openings, and perforations, complex bent upper surfaces, etc. can also be reproduced better and finer than with the most common techniques.

Finally, this way high-quality moulded pieces are also obtained which approximate the quality of forged metal with respect to corrosion resistance and general strength.

The injection moulding process can be successfully used in order to combine two or more simple shapes directly into one complicated moulded piece, which also can reduce assembly costs and production costs.

The possibility of directly obtaining clean forms often also eliminates secondary finishing, which saves costs and material, reduces production waste, and therefore also is more environmentally friendly.
Normally speaking by means of a microscopic analysis of a cross-section it is possible to see whether a piece has been made by means of metal injection moulding techniques, because the original particle form remains recognizable.

This also can be determined for plastic pieces.

According to a further preferred embodiment the device includes means for establishing the maximum tap flow rate.

Preferably, these means for establishing the maximum tap flow rate include an adjustable stop, by means of which the maximum degree of opening of the beverage valve can be adjusted.

Because some products, especially beverages, produce more foam than others, and a user wants a specific amount of foam or a producer advertises a specific amount of foam, this has the advantage that in this way the amount of foam can be regulated. In this way the device is more suited for being used with many different sorts of beverages or making the same beverages easy to draft at different temperatures.

In a preferred embodiment the means for maintaining and regulating the pressure in the space between the outer container and the inner container, without intervention from outside the keg, to a desired level include a cartridge with a gas under pressure, provided with an automatic control valve.
The advantage of this is that a constant positive pressure is placed on the liquid and that the gas can be adjusted to the liquid.

In a further preferred embodiment the desired level of the pressure in the space between the outer container and the inner container can be adjusted by making the automatic control valve replaceable.

In this way during a stage in assembling the device, or during a refilling process, the pressure can be easily adjusted to what is ideal for the liquid foodstuff concerned.

That may be a low pressure for certain products, such as fruit juice, a higher pressure for beer, it being possible for different kinds of beer also to require different pressures, and an even higher pressure for viscous products such as yoghurt or oil.

In a preferred embodiment the cartridge is filled with food-safe CO2 gas under pressure.

The use of CO2 as pressure means has, among other things, the following consequences and advantages:

- the inner container no longer has to be metal-coated in order to reduce the permeability thereof with respect to oxygen.
- the storage life of the beverage is appreciably lengthened since oxygen can no longer come in contact with the beverage,

- the cost price of the inner container goes down appreciably because no expensive metal coating is necessary,

- the strength of the inner container, in particular the resistance against deformation due to tensile loading, goes up appreciably, often even by a factor of 3,

- cracks no longer appear in the inner container as a result of sharp edges and/or folding of the metal, mostly consisting of aluminium,

- since the inner container no longer needs to be metal-coated, it is possible to use an inner container that unfolds much better and easier, by means of which a better setting of this inner container in the keg and a higher degree of fill is achieved.

In a preferred embodiment, the filling means including a closable passage along which gas can be drawn from the space between the outer container and the inner container allowing the pressure in the space to be brought equal to or below the ambient pressure.

This makes it possible to easily set up the device via an external vacuum source.
In a further preferred embodiment, the means for bringing the pressure in the space between the outer container and the inner container to a desired level and maintaining it without intervention from outside the keg are attached to a neck that includes the valve system.

In a preferred embodiment, the deformable inner container is also attached to the neck.

This way these means, thus for example a CO2 cartridge with an automatic control valve together with the inner container and the inner container attached to it, are easily pushed through an opening in the outer container. This makes filling, both for the first time and for reuse, much easier.

In a further preferred embodiment, the device is provided with an electronic circuit, for example in the form of a chip or the like.

This makes it easy for the supply manager to work or to monitor market cycles.

In a preferred embodiment at least a part of the sections of the device that can come in contact with the liquid foodstuff are made of silicone rubber.

This has the advantage that it is hydrophobic, by means of which it is self-cleaning with respect to most beverages, whereby a much more hygienic use is obtained.
In one more preferred embodiment, the tap installation does not require free space above it in order to operate it and it can be operated from a side edge of the device.

This permits placement in a refrigerator, while, with the tap installation turned toward the user, it can still always be operated. This increases the usefulness for the user.

The invention also includes a method for filling a device according to one of the preceding claims with a liquid foodstuff, that includes a step in which the space between inner and outer container is put under a vacuum, before or during the filling.

In order to better illustrate the features of the invention, a preferred embodiment of a device for tapping a beverage according to the invention is described below as an example, without any limiting nature, with reference to the appended drawings, in which:

- Fig. 1 shows the device according to the invention schematically and in perspective;
- Fig. 2 shows a version of the device from Fig. 1 schematically and in perspective;
- Fig. 3 shows another version of a section of the device according to the invention schematically and in perspective;
- Fig. 4 shows a cross-section of the device of Fig. 2 along the line II-II;
Fig. 5 shows a cross-section of an alternative embodiment of the device according to the invention schematically and in perspective; Fig. 6 shows a further alternative embodiment of the device according to the invention schematically and in perspective.

A device according to the invention, among other things consisting of a keg 1, is shown schematically and in perspective in Fig. 1.

Keg 1 as the case may be consists of two parts, a top half 2 and a bottom half 3, together with a spacer 4, placed between the top half 2 and the bottom half 3, that are mutually fastened with a screw connection (not shown) on each one and for example by means of sealing rings (not depicted) are connected air- and gas-tight with each other in order to form a non-deformable outer housing of the keg 1.

A plastic strip 5, that makes it possible to recognizably mark the keg, as the case may be, is attached along the outside edge on the spacer 4.

A fitted medallion 8, possibly provided with an electronic circuit, is also mounted on the side edge of keg 1.

In this way an electronic circuit can be attached, for example under the medallion 8, and therefore not visible and well protected (not depicted).
Keg 1 is further provided with an appropriate contour 9, both on the top chime 6 and on the bottom chime 7 (not visible, but shown in Fig. 4), that allows the kegs to be placed stably on each other, both contours of the top 6 and bottom 7 chime being made so that they fit into each other in a loose connection.

An interchangeable pressure unit 10, that is provided with a movable hand grip 17, working together with a connecting piece 12 capable of moving up and down, a valve system installed inside keg 1, and a dip tube (both not visible on the drawing, but shown in Fig. 4), is mounted on the top half 2 of keg 1, with which, when the pressure unit 10 is pushed down in the direction of the arrow A, but is limited in its motion by the stop 13, the spear can be moved vertically up and down over a predetermined or adjusted distance, by means of which the beverage valve (not visible, but shown in Fig. 4) working together with it can be opened or closed, and the beverage can be tapped out of it.

Further, keg 1 is provided with a replaceable distributing line 14, along which the tapped beverage can be distributed.

The replaceable pressure unit 10 is further detachably mounted on a screw cap 15, provided with a counter flange 16, a neck part (not visible, that will be discussed further in greater detail concerning Fig. 4).
The top chime 6 of keg 1 is further outfitted with two cut-outs 17, 18, and reinforcements 19, 20 working together with them, by means of which in fact two hand grips lying opposite one another are formed, which allow keg 1 to be easily gripped with one or both hands, in order to lift or shift it.

A version of the keg from Fig. 1 is shown schematically and in perspective in Fig. 2.

Here the detachable pressure system 10 from Fig. 1 is replaced by a metal pressure system 21 that also is mounted detachably on the neck and the neck system (both not visible in Fig. 2) of keg 1, and is provided with a movable handle 22, that when pressed down in the direction of arrow B opens the beverage valve and taps the beverage out of keg 1, and further distributes it via the replaceable distributing line 14.

A recognition marking (logo, trademark, or the like) is mounted under a transparent plate 26 above handle 22.

Finally, the metal pressure system 21 is provided with an adjustment capability in the form of a small wheel 23 that can be turned externally, which works together with an internal, not visible, device, by means of which the maximum vertical movement of pressure unit 21 is limited together with a maximum opening of the beverage valve connected therewith, along which the beverage is tapped (not depicted, but discussed in detail in fig. 4), by which it can be adjusted.
Fig. 3 shows another version of the keg shown in Figs. 2 and 3 schematically and in perspective.

In this case, in place of the pressure system, an adapter 27 is detachably mounted on the neck (both not visible).

This adapter 27 allows keg 1 according to the invention to be used in other tap systems that are on the market, for example the Philips Perfect Draft system.

In this case no detachable pressure unit 11 or 21 is mounted on keg 1, but the tap system that is an integral component of the Perfect Draft system, and with which keg 1 can be detachably connected via the adapter 27, is utilized.

Fig. 4 shows a cross-section of the keg depicted in Fig. 2, made along the line II-II.

Keg 1 contains a rigid outer housing 28 consisting of two parts 2 and 3 that are screwed to one another via a connecting or spacing piece 4 and are connected with each other by means of two sealing rings 29 and 30 air- and gas-tight with respect to the outside air.

Along the underside there is an opening 31 along which a CO2 cartridge 32 can be mounted within the rigid housing 28, formed by the two parts 2 and 3, and in a given case can also be exchanged.
The C02 cartridge is further provided with a bottom valve 33, through which, as the case may be, C02 can be added or removed, or through which then a vacuum can be produced, and a control valve 34 that allows the C02 gas pressure within the rigid outer container to be set at a predetermined value and kept constant, by appropriately opening or closing the top valve 35.

The control valve 34 here can consist both of a balanced valve operating under gas pressure and of a valve operating under spring pressure.

If a vacuum is drawn, this vacuum is created via the top valve 35 that then is in the open position by closing control valve 34, and also continues into the space 36 formed between the deformable inner container 37 and the rigid outer container 28.

Further, keg 1 contains a deformable inner container 37 that is mounted air- and gas-tight on the neck 38, provided with a double screw system, and into which the beverage to be tapped is introduced.

The double screw system is made such that, on the one hand, the deformable inner container 37 in the empty condition can be introduced into the top half 2 of the opened keg 1 or can be removed from it, and that on the other hand, the part of the spear that reaches inside the deformable inner container 37 and consists of a dip tube 39, a valve system consisting of a combined beverage valve 40 and a C02 degassing valve 41, and a neck 42 also can be mounted or
removed, all components that come in contact with the beverage to be tapped are intended for one-time use and thus are made of disposable material and/or of recyclable material.

These components such as, for example the movable handle 11, the connecting piece 12, the stop 13, the distribution line 14, the screw top 15, and the like, are always delivered to the customer pre-packed with the keg.

In this way the consumer always is provided with the necessary clean components in the form of a set in order to safely and hygienically tap the beverage, both with the simple replaceable pressure unit 10, and with the more sophisticated metal pressure unit 21.

The combined valve system 40, 41 here too is made such that the height of the column above or outside the valve system 40, 41 is maximally limited, so that large amounts of beverage can never remain standing or possibly dry up in it, which could form a breeding place for bacteria, especially when the consumer lets an interval of a few weeks pass between different sequential consumption times.

The assembly of the device and its operation at the time of tapping beverage out of the reusable keg 1 is simple and as follows.

Starting from the two separate parts 2 and 3 of the keg, first the neck 38, which is provided inside and outside with a screw thread and an internal flange 43, on which the
inner container 37 is mounted air- and gas-tight, along the lower edge (the future upper edge of the keg) is mounted on the top half 2, and along the outside edge (the future upper edge of the keg) is attached with the screw top 15, which in turn is provided with a counter flange 16.

One or more sealing rings mounted in accordance with the present technique here provide an air- and gas-tight attachment of the neck 38, the screw top 15 and the counter flange 16 on the top half 2 of the future keg.

In a given case, before the screw top 15 is screwed tight onto the neck 38, a thin plastic or cardboard under layer, provided with an advertising message or other information, can be clamped under it in the brewery.

Then the two parts 2 and 3 are screwed onto each other in order to form the outer container 28 of keg 1, in which, as just described, the inner container 37 is mounted in the top part 2.

By screwing the two parts 2 and 3 together in this way a new air- and gas-tight space 36, which is created by the inner edge of the rigid outer container 28 of the newly formed keg 1 and the outer edge of the deformable inner container 37, is created along the inner edge.

The gas-tight sealing between the two parts 2 and 3 is formed by applying two sealing rings 19 and 30 in accordance with the present technique.
An empty CO2 cartridge 32, provided with its control valve 34 that works together with an upper valve 35 is then mounted in the keg via the bottom opening 31 provided for this.

Depending on the type of beverage, there is an optimal pressure by which it is to be tapped. During the assembly of the device, the control valve 34 can be chosen in order to control a pressure that is optimal for the type of beverage with which the device is to be filled. This can be adjusted at the time of recycling the device by choosing another control valve 34.

Then the combined valve system 40, 41 together with the dip tube 39 first is mounted in the neck 42, which is provided with an external screw thread, by means of which it is screwed gas tight into the internal screw thread of the neck.

Via the bottom valve 33 of the CO2 cartridge 32 and a fast coupling fitting on it, a vacuum then is created in the empty CO2 cartridge 32, a vacuum that advances into the space 36 formed between the deformable inner container 37 and the rigid outer container 28 via the upper valve 35, that under these circumstances is in the open state as a result of working with the control valve 34.

The following step consists in filling the deformable inner container 37 with CO2 via the combined valve system 40, 41, for example via the beverage valve 40, this container 37, which is made in the form of a plastic bag, enabling the...
empty space 36 between the two containers 28 and 37, helped by the vacuum created, to be filled as well as possible.

The beverage valve 40 here is opened by pushing it in over a predetermined distance.

Then the combined beverage and C02 out gassing valve 40, 41 is completely pushed in, which simultaneously creates a passage for the delivery of the beverage into the deformable inner container 37 which is filled with beverage in this way from the outside, and at the same time opens a passage to the outside air for the escape of the C02 gas, with which the empty inner container 37 was previously filled, to the outside air.

In this way thus the inflowing beverage drives out the C02 gas with which the inner container 37 was previously filled.

After filling with beverage, the combined valve system 40, 41 is again closed by returning it to its rest position, both the beverage valve 40 and the C02 degassing valve 41 being closed.

Then the C02 cartridge 32 is 70% filled with C02 via the bottom valve 33 and a suitable fast coupling, by means of which the supercritical phase of C02 gas does not create problems at temperatures above 31°C.

After uncoupling this fast coupling from the bottom valve 33 of the C02 cartridge 32, this valve 33 automatically
closes by the internal pressure, and the system is then stabilized in an equilibrium state by closing the control valve 34 and along with this appropriately opening or closing the upper valve 35 of the CO2 cartridge 32, a preliminarily established CO2 pressure between the rigid outer container 28 and the deformable inner container 37 of the keg 2 is established and maintained. A pressure that also is exerted advances to the inner container 37 filled with beverage and the beverage introduced therein.

As the last step the bottom opening 31 under the CO2 cartridge 32 is closed with a matching cover 45.

In order to protect the valve system from dust and other particles that can influence the quality of the beverage during storage and transport, the valve system is provided with a dust cap, which is to be easily but destructively removed by the consumer before the tap valve can be mounted.

Then in a given case the loose and disposable components of the tap device such as the pressure unit 10, connecting piece 12, and distribution line 14 on top of the filled keg 1, for example packed together in a blister pack and offered as a set, can be placed on top of the filled keg 1 in order to be offered for sale together with keg 1.

Another measure for promoting hygienic use is that parts that come in contact with the beverage, for example, and components of the tap installation, such as the distribution line 14, are made out of silicone rubber as
much as possible. Because silicone rubber is hydrophobic, it does not absorb any beverage, so that there is less chance of deterioration and growth of microorganisms. This is particularly important for components that sit outside the closed outside container 29 and therefore can come in contact both with air and with beverage.

Seals between the different components also are preferably made of silicone rubber, because in this way the hardness of the seals and thus their sealing quality can be very easily adjusted.

Thus in this way, as already previously indicated, the consumer always has the necessary proper components for safely and hygienically tapping the beverage available, both with a simple replaceable pressure unit 10, and with the more sophisticated metal pressure unit 21. In order to be able to tap the beverage, connecting piece 12, distributing line 14, and pressure unit 11 or 21 are mounted on top of the neck 42 of keg 1, via appropriate connections.

This last allows the connecting piece 12 (with the distributing line 14 attached to it) to move downward over a fixed distance, by means of which the beverage valve 40 connected with it is opened and to press the beverage out of the deformable inner container 37, which is under pressure, through the dip tube 39, the beverage valve 40, the connecting piece 12, and the distributing line 14 and in this way to tap the beverage.
The tapped volume of beverage is compensated by appropriate deformation of the inner container 37 under the influence of the CO2 pressure which is applied between the rigid outer container 28 and the deformable inner container 37, and which is held at a fixed value by opening or closing the upper valve 35 of the CO2 cartridge 32, under the action of the control valve 34 that works together with it.

A pressure unit 21, for the most part made of metal, and provided with an adjusting device 23 for determining the maximum distance over which the connecting piece 12 can be pressed down vertically, coupled with a maximum opening of the beverage valve 40, can be used in a given case here.

This has the advantage that the maximum tap flow rate can be adjusted in this way, which, preferably at the time of tapping the beer, is of great importance for controlling and achieving a desired foam head. Some sorts and brands of beer in particular deliver their optimal amount of foam with a higher flow rate, while other sorts and brands deliver the optimal amount of foam with a lower flow rate.

After tapping the keg empty, pressure unit 1 can be removed from the keg, and both are discarded or recycled together with the components, such as connecting piece 12 and distributing line 14 or, if a metal pressure unit 21 is used, the latter can be reused.

Whenever the empty keg 1, thus without the disposable components such as pressure unit (10), connecting piece 12,
and distributing line 14, returns to the brewery after use, one proceeds as follows.

First the possible remaining amount of beverage is pumped out of the bag by means of still remaining CO2 gas or by directly building up pressure on the beverage.

Then the CO2 cartridge 32 is completely emptied via the bottom valve 33 and a fast coupling (not depicted) fitting on it; usually the cartridge still contains a small amount of CO2.

Then keg 1 is completely returned to ambient pressure, for example by holding the bottom valve 33 of the CO2 cartridge completely pressed in.

Then the screw top 38 is unscrewed from above and the combined valve system 40, 41, together with the dip tube 39 is removed from outside of the upper edge of the keg and discarded or recycled.

After screwing open the two parts 2 and 3 of keg 1, neck 38 and the empty inner housing 37 attached to it can be removed from the top half 2 of the keg and destroyed or recycled as the case may be.

Finally, the different reusable components of the keg are steamed out in order to efficiently remove possible beverage spots or other forms of contamination, after which, for example, these components can be further drained out and completely dried.
After this, then the steps already mentioned above can be repeated for reassembling and filling keg 1.

The alternative embodiment that is shown in Fig. 5 has a CO2 cartridge with associated control valve 34 that is attached to the neck 38. The outer container 37 is fastened around it.

A combined valve system 46 that on the one hand includes the beverage valve 40, and on the other hand includes a CO2 degassing valve 41 is present in the neck 38, it also being possible to mount a vacuum connection. At the same time a valve that can close and open a connection between the control valve 34 and the space between inner container 37 and outer container 28 is provided.

In this way both the inner container 37 and the CO2 cartridge 32 can be placed via an opening in the outer container 28, both at the time of a first placement, and at the time of reuse of the device.

The action of the combined valve system 46 is such that during the filling of the device the beverage valve is opened, as is the degassing valve 41. In this way the inner container 37 can be easily filled with beverage, while at the same time the gas present in the inner container 37 can freely flow away. At the same time during this step a passage through which an external vacuum installation creates a vacuum in the space between the inner container
37 and the outer container 28 is opened, so that the filling proceeds even more easily.

During the use of the device beverage valve 41 can be opened in order to tap beverage, while a connection between the control valve 34 and the space between the inner container 37 and the outer container 28 is opened so that the space is under pressure, in order to be able to tap the beverage.

A special embodiment of the tap installation 47 is shown in Fig. 6. This is made so that it projects less above keg 1 than the contour 9, and that both the distributing line 14 and handle 22 are accessible from a side edge of the keg 1.

In this way keg 1, with handle 22 turned toward the user, can be placed in a refrigerator easily and in a space-saving fashion, and tap installation 47 can also be operated.

At the same time the invention provides a device for tapping beverage, that mainly consists of a double-walled container, formed by a non-deformable outer container with a deformable inner container in it that contains the beverage to be tapped, and in which the innermost and the outermost containers are made gas-tight with respect to one another, and have connecting pieces that allow a tap installation to be mounted on the outer container, which tap installation reaches into the interior of the inner container and is suitable for tapping the beverage from it, the non-deformable container consisting of at least two
parts that are connected with each other detachably but gas-tight, and that means are mounted between the fixed inner container and the deformable inner container in order to bring the pressure between the two containers, without intervention from outside, up to a predetermined level and held constant, or in a given case, to return it to zero.

According to a preferred embodiment the screw connection is closed gas and pressure tight by one or more sealing rings.

According to a further preferred embodiment the deformable inner container is made exclusively out of plastic.

Thus according to the invention, for example, this is not metal-coated in order to reduce the gas permeability thereof as is mostly the case with the required technique.

According to a further preferred embodiment the non-deformable outer container is made out of metal, de vormvaste buitenbehouder in metaal vervaardigd.

According to a further preferred embodiment, the non-deformable outer container possesses top and bottom edges that partly engage in each other and make it possible to stack the different kegs on each other easily and safely.

These consist, for example, of a separate beverage container, tapping valve, pump, a connecting piece, a distributing line etc that form a liquid line between the beverage container and the tapping valve, and in a given case also a cooling device.
According to a further preferred embodiment the CO2 cartridge for it is outfitted with at least two different valve systems, of which one valve system is mounted underneath the CO2 cartridge and is made so that the CO2 cartridge can be filled from outside or, as the case may be, can be emptied, and the other valve system is mounted above the CO2 cartridge and works together with a control valve, that permits CO2 gas to spread out of the CO2 cartridge between inside and outside containers and to maintain the pressure hereof up to level.

According to a further preferred embodiment the control valve is provided with a movable piston that opens the CO2 valve in the case of reduced pressure between inner and outer container in order to build up the pressure again to predetermined value, and it closes again automatically as soon as the above-mentioned pressure is reached.

According to a further preferred embodiment the closing of the control valve takes place under the action of a spring valve, while the bottom valve opens as a result of the internal pressure.

According to a further preferred embodiment the device for beverage tapping consists of at least one spear, which includes a dip tube that reaches into the interior of the container, a beverage valve, a CO2 outlet valve, a connecting piece, and a distributing line, and then a pressure unit with which the respective valves, although not simultaneously can be opened or closed.
The spear is also mounted in a neck that is provided with an external thread, with which it can be screwed into a collar that is mounted centrally on the upper edge of the keg.

A detachable connecting device, in a given case, can be mounted on the outer edge of the keg, which contains a pressure unit for opening and closing, although not simultaneously, the beverage valve, respectively the CO2 outlet valve, by moving the spear vertically up and down over a predetermined maximum distance.

The assembly or disassembly of the three concentrically made parts takes place under control because the necessary locks on the concentric parts, as well as on the metal keg, which hold the remaining elements in their place during assembly or disassembly, are provided.

In a preferred embodiment a double valve system that combines both the beverage valve and the CO2 outlet valve in the same housing is mounted between the dip tube and the distribution line, in continuation of the dip tube and working together with the pressure unit.

When the pressure unit is completely pressed in over the maximum permitted distance, both the pressure valve, and the CO2 outlet are opened simultaneously or opened very shortly after one another.
This is performed out only if CO2 gas is blown on the empty inner container before this inner container is filled with beverage, or in the case of filling the inner container with beverage, the CO2 present being compressed by the beverage volume and being discharged to the outside air via the CO2 outlet valve.

In the case of pushing the pressure unit in less, which is limited by a mechanical stop and is the most usual form of operation, the spear is moved vertically up and down over a shorter distance, by means of which only the beverage valve is opened, and the beverage can be tapped via the connecting piece and the distributing line.

In a preferred embodiment this reduced opening of the beverage valve according to pre-adjustable steps, by means of which it is possible to regulate the maximum tap flow rate gradually and manually, which has a great effect on the foam formation of, for example, the tapped beer, depending on the sort of beer and the temperature of the beer.

In a preferred embodiment the spear is mounted with the above-mentioned neck central by means of a double screw connection in a corresponding collar on the upper edge of the keg, this collar being provided with two flanges reaching outward, a top flange with its lower edge resting on the outer edge of the keg and a bottom flange with its upper surface against the inner edge of the keg, while the edge of the deformable inner container is tightly connected with the upper edge of the bottom flange, and a gas- and
pressure-tight connection is formed between the deformable inner container, on the one hand and the rigid inner container on the other hand, and at the same time both with the neck of the keg and with both containers separately.

The use of this double screw system at the top of the keg permits an easy and simple replacement of the spear from outside by unscrewing, on the one hand, and after opening the keg, by unscrewing from inside the deformable (and used) inner container, attached gas-tight on the lower edge of the neck.

In a preferred embodiment the outermost part of the double screw connection that is stuck to the keg, and in a given case also the collar itself, are made of a fibreglass-reinforced plastic.

This allows, among other things, the spear to be disconnected from the keg in a controlled and non-destructive way and replaced, as opposed to current systems according to the present technique, resulting in damage and deformation of the replaceable components frequently occurring.

This mounting of the spear in a fixed component provided with a screw thread at the same time guarantees a leak-free, maintenance-free, and safe use of the keg under all normal use circumstances and use temperatures.

In kegs made with present technique this leaves something to be desired since the firing of the tapping system under
pressure in this case provides for all kinds of difficulties and dangers.

In a preferred embodiment, the mounting of the spear in the screw connection or removal from it along the inner edge of the collar that is fastened to the keg is facilitated because this screw connection itself should turn by locking it on the keg with an adapted click system or adapted stop.

A further advantage of an embodiment of this kind consists in the fact that by bringing the spear under the outermost screw connection and on the top edge of the keg, it is easy to attach a marking or identification label, which, by screwing the outermost screw connection tight, is simultaneously clamped tight onto a prominent place on the upper edge of the keg.

In a given case the spear is used without first attaching the detachable connecting device which contains the pressure unit before opening and closing the beverage valve, since this system already possesses this device in its own pressure and tapping system.

According to a further preferred embodiment, all components that come in contact with the beverage are made of recyclable plastic or are disposable.

According to a further preferred alternative embodiment a detachable connecting device is made of metal and suited for working together with the above-mentioned spear and connection facilities.
According to a further preferred embodiment this metal preferably is chromed and does not come in contact with the beverage to be tapped.

According to a further preferred embodiment, the pressure unit is equipped with measures that make it possible to regulate the flow rate of the tapped beverage.

According to a further preferred embodiment, these measures consist, among other things, of a series of adjustable stops made in steps, by means of which it is possible to set the maximum distance over which the spear can move up and down vertically and as a direct consequence of this the beverage valve working together with it can be opened.

According to a further preferred embodiment the detachable connecting device is equipped, along the lower edge, a locking system that makes it possible to connect it tightly onto the neck of the keg or to remove it.

According to a further preferred embodiment the component parts, connecting, transitional, and/or adjusting pieces are made easy to disassemble, maintain, replace, and/or clean.

Making gaskets and parts that come in contact with the beverage out of silicone rubber, the presence of an adjusting device for adjusting the maximum tap flow rate in the device, the possibility of making the automatic control valve for controlling the pressure exchangeable, and having a space-saving tapping device, all as described above, are
not exclusively usable in double-walled kegs according to the invention.

The aspects that lead to concrete preferred embodiments are also widely adaptable, with retention of their advantages, in devices for tapping liquid foodstuffs, even if these devices are equipped with single-walled kegs or with tapping devices of a type other than the above-mentioned one.

The present invention is in no way limited to the embodiments and method described as an example and shown in the figures, but a device and method for beverage tapping according to the invention and a keg that is provided with this device can be realized in all kinds of shapes and dimensions without departing from the framework of the invention.
5 Claims

1. - A device for tapping a liquid foodstuff that mainly consists of a double-walled keg (1) and a tap installation, the double-walled keg (1) being formed by a non-deformable outer container (28) with a deformable inner container (37) therein, which can contain the liquid foodstuff to be tapped, the inner and outer containers (37, 38) being connected gas-tight with one another and the tap installation being mounted on the outer container (28) and reaching into the interior of the inner container (37) and is suited for tapping the liquid foodstuff there from, wherein the device includes means that make it possible to bring the beverage in the space between the outer container (28) and the inner container (37) equal to or below the ambient pressure and the device includes means for bringing the pressure in the space between the outer container (28) and the inner container (37) to a desired level and maintaining it without intervention from outside the keg.

2. - The device according to conclusion 1, wherein the non-deformable outer container (28) consists of at least two parts (2,3) that are connected gas-tight with each other.

3. The device according to conclusion 2, wherein the parts (2,3) of which the outer container (28) consists are detachably connected gas tight with each other.
4. - The device according to conclusion 2 or 3, wherein the parts (2,3) of which the outer container consists are mounted on each other with a screw connection.

5. - The device according to one of conclusions 2-4, wherein a spacer (4) can be mounted between the parts (2,3) of which the outer container (28) consists.

6. - The device according to one of the conclusions 2-5, wherein at least one of the parts (2,3) of which the non-deformable container (28) consists is produced with a metal or plastic injection moulding technique.

7. - The device according to one of the preceding conclusions, wherein it includes means for setting the maximum tap flow rate.

8. - The device according to conclusion 7, wherein the means for setting the maximum tap flow rate include an adjustable stop, by means of which the maximum degree of opening of the beverage valve (40) can be set.

9. - The device according to one of the preceding conclusions, wherein the inner container (37) is made replaceable.

10. - The device according to one of the preceding conclusions, wherein the non-deformable outer container (28) possesses an upper (6) and a lower (7) that are made so that the upper edge (6) of one keg (1) partly fits into the lower edge (7) of a similar keg (1).
11. The device according to one of the preceding conclusions, wherein the outer container (28) is provided with one or more parallel cross bands or reinforcing rings that are capable of absorbing shocks and limiting permanent deformations.

12. - The device according to one of the preceding conclusions, wherein the means for maintaining and controlling the pressure in the space between the outer container (28) and the inner container (37, 38) without intervention from outside the keg (1) include a cartridge (32) with a gas under pressure, provided with an automatic control valve (34).

13. - The device according to one of the preceding conclusions, wherein the desired level of the pressure in the space between the outer container (28) and the inner container (37) can be adjusted by making the automatic control valve (34) replaceable.

14. - The device according to one of the preceding conclusions, wherein the cartridge with gas under pressure (32) is filled with CO2.

15. - The device according to one of the preceding claims, wherein the means that make it possible to bring the pressure in the space between the outer container (28) and the inner container (37) equal to or under the ambient pressure include a closable passage, along which gas can be drawn from the space.
16. - The device according to one of the preceding claims, wherein the tap installation consists of at least one pressure unit (10, 21), a valve system (46), a distributing line (14), and a dip tube (39), that reaches to below the deformable inner container (37) and this is removable from the outer container (37).

17. - The device according to claim 16, wherein the means that make it possible to bring the pressure in the space between the outer container (28) and the inner container (37) equal to or under the ambient pressure are part of the valve system (46).

18. - The device according to one of the preceding conclusions, wherein the means for bringing the pressure in the space between the outer container (28) and the inner container (37) without intervention from outside the keg (1) to a desired level and maintaining it are attached to a neck (38) that includes the valve system.

19. - The device according to conclusion 18, wherein the deformable inner container (37) is attached to the neck (38).

20. - The device according to one of the preceding conclusions, wherein the keg (1) is provided with an electronic circuit, for example in the form of a chip or the like.
21. - The device according to one of the preceding conclusions, wherein at least one part of the components of the device that can come in contact with the liquid foodstuff is made of silicone rubber.

22. - The device according to one of the preceding conclusions, wherein the tap installation does not require open space above it in order to operate it, and it must be able to be operated from a side edge of the device.

23. - The device according to conclusion 22, wherein the keg includes a protective contour (9) and the tap installation sticks out less above the fixed outer container (28) than the protective contour (9).

24. - The device according to one of the preceding conclusions, wherein the liquid foodstuff is a beverage.

25. - The device according to conclusion 24, wherein the liquid foodstuff is a beverage that contains fruit juice.

26. - The device according to conclusion 24, wherein the liquid foodstuff is a beverage that contains milk or a milk product.

27. - The device according to conclusion 24, wherein the liquid foodstuff is a soft drink.

28. - The device according to conclusion 24, wherein the liquid foodstuff is beer.
29. - The device according to conclusion 24, wherein the liquid foodstuff is alcohol-free beer.

30. - A method for filling a device according to one of the preceding conclusions with a liquid foodstuff, wherein it includes the step of creating a vacuum in the space between the inner container (37) and the outer container (38), during or before filling.
## INTERNATIONAL SEARCH REPORT

### A. CLASSIFICATION OF SUBJECT MATTER

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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)

- B67D
- B65D

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

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

- EPO-Internal

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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 Further documents are listed in the continuation of Box C. ❌ See patent family annex.

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Date of mailing of the international search report: 14/02/2011

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) 340-3016

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