(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 151 414 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.02.2010 Bulletin 2010/06

(51) Int Cl.:
B67D 1/04 *(2006.01)* ***B67D 1/08*** *(2006.01)*

(21) Application number: **08425551.2**

(22) Date of filing: **07.08.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **ELECTROLUX PROFESSIONAL S.p.A.**
33170 Pordenone (IT)

(72) Inventors:
- **Longo, Deny**
  33170 Pordenone (IT)
- **Pacorich, Massimo**
  33170 Pordenone (IT)
- **Robles, Antonio**
  33170 Pordenone (IT)

(74) Representative: **Markovina, Paolo**
Electrolux Italia S.p.A.
Corso Lino Zanussi 30
33080 Porcia (PN) (IT)

(54) **Modular beverage dispensing assembly**

(57) A modular beverage dispensing assembly (1) having a number of beverage storage units (2), each for supplying a pressurized beverage and in turn having an airtight pressure container (3) housing a collapsible removable cartridge (4) containing the beverage; and an electric compressor (5) for feeding pressurized gas into the pressure container (3) of each beverage storage unit (2), to crush the removable cartridge (4) inside the pressure container; the pressure container (3) having two bell-shaped monolithic shells (15, 16) made of plastic material, aligned along the same longitudinal axis (L) with their concavities facing, and which rest one on the other to form a closed shell; and each bell-shaped monolithic shell (15, 16) having a substantially cylindrical, externally corrugated lateral wall (15a, 16a).

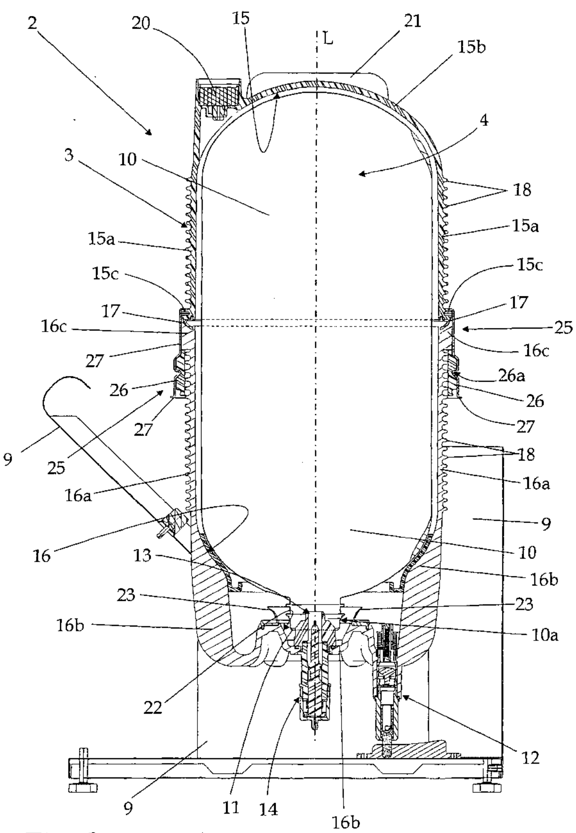

Fig. 3

EP 2 151 414 A1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a modular beverage dispensing assembly.

[0002] More specifically, the present invention relates to a modular beer dispensing assembly, to which the following description refers purely by way of example.

[0003] PCT Patent Application WO2007019848 discloses an easy-carry cooled-beer dispensing assembly substantially comprising an undeformable, substantially cylindrical outer pressure container made of plastic and fitted with a removable airtight bottom cap for access to the inside; an electric reciprocating compressor for maintaining the air inside the pressure container at higher than atmospheric pressure; and a removable cartridge inserted inside the pressure container and in turn comprising a substantially bottle-shaped collapsible container designed to fit inside the pressure container, with its neck facing the removable bottom cap of the pressure container, and which is originally filled completely with beer or other beverage.

[0004] More specifically, the pressure container bottom cap is fitted with a central cylindrical sleeve, which projects towards the centre of the pressure container, coaxially with the longitudinal axis of the pressure container, and communicates with the outside through a central hole formed through the wall of the bottom cap; and the neck of the collapsible container is designed to fit inside the cylindrical sleeve, so the base of the neck rests on the distal end of the sleeve, compressing annular seals on the sleeve. The annular seals are designed to prevent compressed-air leakage from the pressure container when the neck of the collapsible container is inserted fully inside the cylindrical sleeve of the bottom cap.

[0005] In addition to the collapsible container, the removable inner cartridge also comprises a sealing cap for airtight sealing the opening in the neck of the collapsible container; and an outflow hose connected at one end to the sealing cap of the cartridge, and extending outwards of the pressure container through the cylindrical sleeve in the pressure container bottom cap.

[0006] Finally, the easy-carry beer dispensing assembly comprises a refrigeration compartment designed to house the outer pressure container vertically and in rocking manner; and a manually operated metering valve fitted externally to the top of the refrigeration compartment, and connected by the outflow hose to the collapsible container of the removable cartridge.

[0007] When the compressor pressurizes the air inside the pressure container, the difference in pressure deforms the collapsible container, so the liquid inside (beer or other beverage) is forced to flow under pressure along the outflow hose to the metering valve, from which it is tapped by the user.

[0008] The Applicant has realized that the above-described easy-carry beer dispensing assembly, though ensuring a much higher standard of hygiene than conventional beer tap systems (the removable cartridge is disposable), is not suitable for systems requiring a higher operating pressure, for example those systems where the pressure containers are remote from the place where the beverage is actually dispensed (and possibly cooled).

[0009] The Applicant has realized that if the overpressure inside the pressure container described in WO2007019848, which is a cylindrical plastic container with conventional smooth walls, is increased to values required to deliver the beverage to a remote dispenser, this overpressure could not be tolerated by the container, with risks of mechanical breakage. The maximum overpressure the electric compressor is capable of producing inside the pressure container of the previously-described easy-carry beer dispensing assembly, in fact, is seriously limited by the mechanical characteristics of the pressure container, and currently ranges between 0,8 and 1 bar, which is barely sufficient to compensate the load losses necessary to force beer along an outflow hose of a few metres in length to a metering valve at no more than a metre in height with respect to the removable cartridge.

[0010] Moreover, because the amount of stably dissolved carbon dioxide in the beer decreases alongside an increase in beer temperature, with an absolute pressure of no more than 1,8-2 bars inside the pressure container, performance of the easy-carry beer dispensing assembly in PCT Patent Application W02007019848 deteriorates considerably alongside an increase in beer temperature, thus making it unsuitable for medium-large-size bars and similar businesses, in which the manually operated metering valve is normally located at a height of several metres and some distance from the refrigeration compartment.

[0011] One way to solve the above problem would be that improve the stress resistance of the plastic pressure container, in particular by increasing the thickness of the lateral walls. However, current molding techniques make it impossible to produce reasonably-priced cylindrical thermoplastic containers with walls thick enough to withstand the stress produced by the increase in internal pressure.

[0012] An alternative solution would be that of using metal pressure containers. Nowadays metal pressure containers are used in some systems where the pressure containers themselves are remote from the delivery point. These systems typically comprise a cascade array of large metal drums, and a carbon dioxide cylinder for feeding high-pressure carbon dioxide into the drums to force the beer out at 4-5-bar pressure. However, the use of metal containers substantially doubles the manufacturing cost and dry weight of the equipment. Beer dispensing assemblies such as the one described in PCT Patent Application WO2007019846 would be therefore economically unfeasible.

[0013] It is an object of the present invention to provide a beer dispensing assembly designed to provide, at reasonable cost, performance comparable with that of a conventional beer tap system employing large-size metal drums, and a carbon dioxide cylinder for feeding high-pressure carbon dioxide into the drums.

[0014] According to the present invention, there is provided a modular beverage dispensing assembly as claimed in Claim 1 and preferably, though not necessarily, in any one of the Claims depending directly or indirectly on Claim 1.

[0015] In particular, the Applicant has found that by realizing a modular beverage dispensing assembly wherein the containers have a corrugated lateral wall, the system can support higher pressures, still being made of low-cost materials, such as plastic.

[0016] Advantageously, the corrugation extends over substantially the entire height of the lateral wall of the container, which is the most subject to stress due to the high pressure.

[0017] Accordingly, in a first aspect thereof, the present invention relates to a modular beverage dispensing assembly comprising:

- at least one beverage storage unit for supplying a pressurized beverage, the beverage storage unit comprising an airtight pressure container for housing a collapsible removable cartridge containing the beverage; and

- a pressurized-gas source for feeding pressurized gas into the pressure container of the at least one beverage storage unit, to compress the removable cartridge inside the pressure container;

wherein the pressure container has a corrugated lateral wall.

[0018] Advantageously, the container is made of plastic.

[0019] Preferably, the container comprises two hollow bodies aligned along the same longitudinal axis with their concavities facing, and resting one on the other to form a closed body, wherein each hollow body has a corrugated lateral wall.

[0020] The two hollow bodies may advantageously be defined by two bell-shaped monolithic shells, so that the closed body may be a closed shell.

[0021] The container is preferably cylindrical. Moreover, the container corrugation is preferably on the external part of the lateral wall. In particular, each hollow body may have a substantially cylindrical, externally corrugated lateral wall.

[0022] Preferably, the outer surface of the lateral wall of each hollow body has a number of projecting annular ribs; these ribs are preferably equally spaced along substantially the full height of the lateral wall; moreover, these ribs are preferably designed to locally increase the nominal thickness of the lateral wall by at least 50%. In particular, the projecting annular ribs may be designed so as to at least locally double the nominal thickness of the lateral wall.

[0023] In a preferred embodiment, the projecting annular ribs are arranged on the outer surface of the lateral wall so that the distance between each two adjacent projecting annular ribs substantially equals the maximum thickness of the lateral wall at said projecting annular ribs.

[0024] Moreover, in a preferred embodiment, the projecting annular ribs are designed to form, between them, a succession of annular grooves, each rounded at the bottom.

[0025] The bottom of the annular grooves preferably has a substantially constant radius of curvature.

[0026] In one possible embodiment, the two hollow bodies each comprise a respective projecting peripheral flange completely surrounding the opening at the end of the lateral wall; the peripheral flanges rest one on the other when the two hollow bodies are joined to form the closed body. One of the two hollow bodies also has an annular lip seal, which is fixed firmly to the peripheral flange and projects towards the other hollow body to seal the join between the two peripheral flanges.

[0027] The pressure container may also comprise a fastener for selectively tightening the peripheral flanges of the two hollow bodies to one another, so as to fix the hollow bodies rigidly to one another and force the annular seal to seal the join between the peripheral flanges.

[0028] The fastener may comprise a bush fitted to the lateral wall of a first hollow body, with one end of the bush resting on the peripheral flange of the first hollow body; and a substantially cup-shaped outer ring nut fitted to the lateral wall of the second hollow body, so as to project beyond the peripheral flange of the second hollow body coaxially with the longitudinal axis of the two hollow bodies, extend completely over the peripheral flange of the first hollow body, and fit directly onto said bush; the outer ring nut having at least one helical thread, which extends coaxially with the longitudinal axis and engages a corresponding helical groove formed in the outer surface of the bush.

[0029] The outer ring nut may have a flanged edge resting on the peripheral flange of the second hollow body, on the opposite side to that on which said peripheral flange rests on the peripheral flange of the first hollow body.

[0030] The pitch of the at least one helical thread and the corresponding helical groove is such that the second hollow body can be locked firmly to and released quickly from the bottom first hollow body by rotating the second hollow body by less than 360° about the longitudinal axis.

[0031] The bush may be made of self-lubricating plastic material, and the outer ring nut may be made of metal.

[0032] The removable cartridge may comprise a substantially bottle-shaped collapsible container designed to fit completely inside the pressure container, the cartridge having a neck facing the end wall of a first hollow body; and a cap, in the form of a pierceable membrane or similar, which seals the opening at the end of the neck.

[0033] The beverage storage unit may also comprise a first valve assembly for regulating pressurized-gas flow from the pressurized-gas source into the pressure container; a piercing head housed inside the pressure container, on the bottom wall of the first hollow body, and which directly faces the cap of the removable cartridge, and is designed to pierce through the cap into the collapsible container; an outflow pipe for feeding the beverage contained in the collapsible container out of the pressure container through the piercing head; and a second valve assembly for regulating beverage flow along the outflow pipe.

[0034] The beverage storage unit may also comprises a frame, to which the pressure container is fixed with the longitudinal axis of the two hollow bodies positioned substantially vertically, and so as to oscillate freely on said frame about a horizontal axis of rotation.

[0035] The assembly may comprise a number of independent beverage storage units as previously described; in this case the pressurized-gas source may feed pressurized gas into the pressure container of each beverage storage unit to compress the removable cartridge inside the pressure container.

[0036] The pressurized-gas source may be an electric compressor.

[0037] The assembly may also comprise at least one hand-operated metering valve; and a corresponding connecting pipe connecting the outflow pipe of the at least one beverage storage unit to the metering valve.

[0038] The assembly may also comprise at least one refrigeration unit located along the connecting pipe to cool the beverage flowing along said connecting pipe.

[0039] The present invention also relates to an airtight pressure container for housing a collapsible removable cartridge containing a beverage, having a corrugated lateral wall, and to a beverage storage unit comprising such an airtight pressure container for supplying a pressurized beverage.

[0040] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic view, with parts removed for clarity, of a modular beverage dispensing assembly in accordance with the teachings of the present invention;
Figure 2 shows a view in perspective, with parts removed for clarity, of a component part of the Figure 1 modular beverage dispensing assembly;
Figure 3 shows a section of the Figure 2 component part;
Figure 4 shows a larger-scale view, with parts removed for clarity, of a detail of the Figure 2 and 3 component part.

[0041] With reference to Figures 1, 2 and 3, number 1 indicates as a whole a modular beverage dispensing assembly, particularly suitable for dispensing cooled beer or other beverage, possibly containing dissolved carbon dioxide.

[0042] The modular beverage dispensing assembly comprises: a number of (in the example shown, four) fully independent beverage storage units 2, each for supplying a stream of pressurized beer at ambient temperature, and each substantially defined by an airtight, substantially undeformable outer pressure container (or chamber) 3 housing a removable cartridge 4 containing pressurized beer; an electric reciprocating compressor 5 for feeding compressed air, on command, into pressure container 3 of each beverage storage unit 2 connected to it, so as to compress, i.e. to crush, the removable cartridge 4 inside the pressure container; an external, preferably, though not necessarily, manually operated metering valve 6; and a connecting pipe 7 for feeding beer from individual beverage storage units 2 to metering valve 6.

[0043] Preferably, though not necessarily, the modular beverage dispensing assembly also comprises a preferably, though not necessarily, heat-pump-type external refrigeration unit 8 located along pipe 7 to cool the beer flowing along pipe 7 to metering valve 6, so that beer comes out of metering valve 6 at lower than ambient temperature, and preferably, though not necessarily, at a temperature ranging between +5°C and +18°C.

[0044] More specifically, with reference to Figures 2, 3 and 4, in the example shown, pressure container 3 of each beverage storage unit 2 is substantially cylindrical, rests on a supporting frame 9 with the longitudinal axis L of the pressure container preferably, though not necessarily, positioned substantially vertically, and can oscillate freely, on supporting frame 9, about a horizontal axis of rotation A. Removable cartridge 4 substantially comprises a collapsible, substantially bottle-shaped container 10, which is originally filled completely with beer or other beverage, and is designed to fit, upside down, completely inside pressure container 3, with its neck 10a facing downwards and resting on the substantially semispherical bottom of pressure container 3; and a cap 11, in the form of a pierceable membrane or similar, sealing the opening at the end of neck 10a.

[0045] In the example shown, collapsible container 10 has a capacity of a few tens of litres, and is made of polyethylene terephthalate (PET); whereas pressure container 3 is preferably, though not necessarily, approximately 610 millimeters high, and the internal diameter of pressure container 3 is preferably, though not necessarily, equal to approximately 250 millimeters.

[0046] In addition to pressure container 3 and frame 9, each beverage storage unit 2 also comprises: a first valve assembly 12 for regulating compressed-air flow from compressor 5 into pressure container 3; a piercing head 13 housed inside the bottom of pressure container 3, directly facing cap 11 of removable cartridge 4, and designed to pierce through cap 11 into collapsible container 10; an outflow pipe (not shown) connecting piercing head 13 to connecting pipe 7 to feed beer from collapsible container 10 to pipe 7; and a second valve assembly 14 for regulating beer outflow along the outflow pipe (not shown) to pipe 7.

[0047] In the example shown, the outflow pipe of each beverage storage unit 2 is preferably, though not necessarily, connected to connecting pipe 7 with the interposition of an electrically or manually controlled on/off valve (not shown) for isolating the corresponding beverage storage unit 2 from pipe 7 to metering valve 6.

[0048] Obviously, the on/off valves as a whole may be replaced by a hydraulic distributor, to which all the outflow pipes are connected, and from which connecting pipe 7 extends.

[0049] With reference to Figure 3, in the example shown, valve assembly 14 is preferably, though not necessarily, inserted through the bottom of pressure container 3, directly below piercing head 13, and is interposed between piercing head 13 and the outflow pipe (not shown).

[0050] With reference to Figures 2, 3 and 4, unlike the pressure container described in PCT Patent Application WO2007019848, pressure container 3 substantially comprises two hollow bodies, in particular two bell-shaped monolithic shells 15, 16 made of plastic - preferably, though not necessarily, a thermoplastic material - and each having an externally corrugated, substantially cylindrical lateral wall 15a, 16a, and a substantially semispherical end wall 15b, 16b. Bell-shaped monolithic shells 15, 16 are aligned one over the other, with their concavities facing, along the longitudinal axis L of pressure container 3, and rest one on the other to form a closed shell. The bottom bell-shaped monolithic shell 16 is hinged to frame 9 at lateral wall 16a to oscillate freely about axis A, and the end wall 16b of bottom monolithic shell 16 therefore defines the bottom of pressure container 3 fitted with valve assemblies 12, 14 and piercing head 13.

[0051] Each bell-shaped monolithic shell 15, 16 has a flange or peripheral projection 15c, 16c surrounding the whole opening at the end of lateral wall 15a, 16a. The two peripheral flanges 15c, 16c rest one on top of the other when bell-shaped monolithic shells 15, 16 are joined to form the closed shell, and the top bell-shaped monolithic shell 15 also comprises an annular lip seal 17 fixed firmly to peripheral flange 15c and projecting towards bell-shaped monolithic shell 16 underneath to engage a corresponding annular groove formed in peripheral flange 16c of shell 16, and adhere to the inner surface of shell 16 to seal the join between the two peripheral flanges 15c, 16c.

[0052] As for the corrugated profile of substantially cylindrical lateral walls 15a, 16a, as shown particularly in Figures 3 and 4, the outer surface of lateral wall 15a, 16a of bell-shaped monolithic shell 15, 16 comprises a number of projecting annular ribs 18 equally spaced along substantially the full height of lateral wall 15a, 16a, and shaped to form, in between, a succession of rounded-bottomed annular grooves 19. In the example shown, each projecting annular rib 18 is preferably, though not necessarily, also rounded at the top.

[0053] More specifically, projecting annular ribs 18 are shaped to locally increase the thickness of lateral wall 15a, 16a by at least 50%, and are equally spaced along the outer surface of lateral wall 15a, 16a, so that the distance d between each two adjacent projecting annular ribs 18 substantially equals the maximum thickness S_{max} of lateral wall 15a, 16a at the annular ribs.

[0054] More specifically, in the example shown, projecting annular ribs 18 are preferably, though not necessarily, shaped to at least locally double the thickness of lateral wall 15a, 16a, and to form annular grooves 19 with a substantially constant bottom radius of curvature r_1 greater than the radius of curvature r_2 of the rounded top of each projecting annular rib 18.

[0055] In other words, lateral wall 15a, 16a of bell-shaped monolithic shell 15, 16 has a predetermined minimum thickness S_{min}, and projecting annular ribs 18 project from the main body of the wall to a maximum height h equal to or greater than the minimum thickness S_{min} of lateral wall 15a, 16a. At projecting annular ribs 18, lateral wall 15a, 16a therefore reaches a maximum thickness S_{max} equal to at least twice the minimum thickness S_{min} of the wall.

[0056] More specifically, in the example shown, lateral wall 15a, 16a of bell-shaped monolithic shell 15, 16 has a minimum thickness S_{min} of 3 to 5 millimetres and preferably, though not necessarily, of about 4 millimetres; and projecting annular ribs 18 project from the main body of lateral wall 15a, 16a to a maximum height h of 4 to 6 millimetres and preferably, though not necessarily, of about 5 millimetres, so that the maximum thickness S_{max} of lateral wall 15a, 16a at projecting annular ribs 18 is 7 to 11 millimetres and preferably, though not necessarily, about 9 millimetres.

[0057] Projecting annular ribs 18 are also shaped so that the radius of curvature r_1 at the bottom of annular grooves 19 is 2 to 4 millimeters and preferably, though not necessarily, about 3 millimeters; whereas radius of curvature r_2 of the top of projecting annular ribs 18 is 0,5 to 3 millimeters.

[0058] In the example shown, the minimum thickness S_{min} of lateral wall 15a, 16a of bell-shaped monolithic shell 15, 16 preferably, though not necessarily, equals the nominal thickness of the corresponding end wall 15b, 16b.

[0059] With reference to Figures 3 and 4, the top bell-shaped monolithic shell 15 is preferably, though not necessarily, also fitted with a gauge 20 for measuring the pressure inside pressure container 3. In the example shown, gauge 20 is housed in a seat formed in end wall 15b of shell 15, between two handles 21 projecting upwards on opposite sides of shell 15 for easy, firm grip by the user.

[0060] With reference to Figure 3, end wall 16b of bell-shaped monolithic shell 16 comprises a substantially funnel-shaped dead seat 22 tapering downwards, extending coaxially with the longitudinal axis L of shell 16 and pressure container 3, and facing inwards of shell 16 to receive neck 10a of collapsible container 10; and an annular lip seal 23 fixed firmly to end wall 16b to surround the whole of the mouth of dead seat 22. Dead seat 22 houses piercing head 13 for piercing the membrane cap 11 sealing neck 10a. The annular lip seal 23 projects towards the top opening of bell-shaped monolithic shell 16 to adhere to collapsible container 10, at the base of neck 10a, and airtight seal the inside of dead seat 22, so that, when neck 10a of collapsible container 10 fully engages dead seat 22, the compressed air pumped into pressure container 3 by compressor 5 is prevented from leaking into collapsible container 10.

[0061] Valve assembly 14 is fixed to end wall 16b of bell-shaped monolithic shell 16, directly beneath dead seat 22, projects downwards, outside shell 16 and pressure container 3, and is locally substantially coaxial with longitudinal axis L of the container; whereas valve assembly 12 is located alongside valve assembly 14, but outside the perimeter of dead seat 22, so as to communicate directly with the inside of bell-shaped monolithic shell 16, outside annular seal 23. Like valve assembly 14, valve assembly 12 is fixed to end wall 16b of bell-shaped monolithic shell 16, projects downwards, outside shell 16 and pressure container 3, and is locally substantially parallel to the longitudinal axis L of the container.

[0062] With reference to Figures 2 and 3, pressure container 3 comprises a fastener 25 for selectively tightening peripheral flanges 15c, 16c of bell-shaped monolithic shells 15, 16 to each other, so as to fix bell-shaped monolithic shells 15, 16 rigidly to each other and force annular seal 17 to seal the join between peripheral flanges 15c and 16c.

[0063] In the example shown, fastener 25 substantially comprises a bush 26 made of preferably, though not necessarily, self-lubricating plastic (such as Teflon), and which is fitted to lateral wall 16a of bottom bell-shaped monolithic shell 16, over projecting annular ribs 18, with its top end resting on peripheral flange 16c; and a substantially cup-shaped metal outer coupling belt or ring nut 27 fitted to lateral wall 15a of top bell-shaped monolithic shell 15, and projecting beyond peripheral flange 15c, coaxially with the longitudinal axis L of shell 15 and pressure container 3.

[0064] Outer ring nut 27 is preferably, though not necessarily, fixed rigidly to peripheral flange 15c of bell-shaped monolithic shell 15; has a radially inward flanged edge resting on peripheral flange 15c, on the opposite side to annular seal 17 and on the opposite side to that on which peripheral flange 15c rests on peripheral flange 16c; and is of such a height as to extend completely over peripheral flange 16c of bell-shaped monolithic shell 16, when peripheral flange 15c of bell-shaped monolithic shell 15 rests on peripheral flange 16c of bell-shaped monolithic shell 16, and to fit directly onto bush 26. Outer ring nut 27 has two opposite helical drawings or ridges 27a extending along the wall, coaxially with the longitudinal axis of the bush/ring nut, i.e. with longitudinal axis L of the pressure container, and which engage respective helical grooves 26a formed on the outer surface of bush 26. The pitch of helical ridges 27a and helical grooves 26a is such that top bell-shaped monolithic shell 15 can be locked firmly to and released quickly from bottom bell-shaped monolithic shell 16 by rotating bell-shaped monolithic shell 15 by less than 360° about longitudinal axis L.

[0065] Operation of modular beverage dispensing assembly 1 is clear from the above description, with no further explanation required.

[0066] The present invention renders it possible to realize a simple and low-cost modular beverage dispensing assembly.

[0067] The advantages of the design of modular beverage dispensing assembly 1 are evident: given the possibility of varying the number of beverage storage units 2, modular beverage dispensing assembly 1 can be adapted quickly and easily to the demands of any, even the largest, bar.

[0068] The design of pressure container 3 of each beverage storage unit 2 has major advantages. The corrugated profile formed by projecting annular ribs 18 on lateral walls 15a, 16a of bell-shaped monolithic shells 15, 16 provides for evenly distributing the mechanical stress caused by the difference in pressure, thus imparting to pressure container 3 sufficient structural rigidity to enable it to withstand pressures of even over 4-5 bars with no appreciable deformation.

[0069] The external corrugation provides also a protection for the container 3 against accidental strokes or impacts.

[0070] Moreover, providing peripheral flanges 15c, 16c, bush 26, and outer ring nut 27 on the part of pressure container 3 subjected to the greatest mechanical stress aids in locally reinforcing, and further improving the high-pressure resistance of, pressure container 3.

[0071] Dividing pressure container 3 into two bell-shaped monolithic shells also makes it easier for the user to insert and remove removable cartridges 4.

[0072] Clearly, changes may be made to modular beverage dispensing assembly 1 as described herein without, however, departing from the scope of the present invention.

[0073] In a possible embodiment, the pressure container may comprise two hollow bodies of different dimensions, in particular one main hollow body defining a substantial part of the extension of the container, and a shorter hollow body, which can possibly be simply a cover. In that case the corrugation could also be made only in the main hollow body. In other words, the important feature of the present invention is that the lateral wall of the container is corrugated, independently on the dimensions and shape of the single parts forming it, although the illustrated solution with two bell-shaped monolithic shells is to be considered as a preferred embodiment.

[0074] For example, modular beverage dispensing assembly 1 may comprise only one beverage storage unit 2, or a number of connecting pipes 7, each to a respective hand-operated metering valve 6. In which case, the various beverage storage units 2 (or, rather, removable cartridges 4) may contain different types of beer, and each connecting pipe 7 may be connected solely to the beverage storage units 2 containing the same type of beer.

[0075] The modular beverage dispensing assembly may also comprise a number of independent refrigeration units 8, each located along a respective connecting pipe 7.

[0076] Finally, in a different embodiment, bell-shaped monolithic shells 15 and 16 are made of metal, or of a thermoplastic or thermosetting plastic material filled with glass fibers or similar strengthening materials.

Claims

1. A modular beverage dispensing assembly (1) comprising:

- at least one beverage storage unit (2) for supplying a pressurized beverage, said beverage storage unit (2) comprising an airtight pressure container (3) for housing a collapsible removable cartridge (4) containing the beverage; and
- a pressurized-gas source (5) for feeding pressurized gas into the pressure container (3) of said at least one beverage storage unit (2), to compress the removable cartridge (4) inside the pressure container; the modular beverage dispensing assembly (1) being **characterized in that** said pressure container (3) has a corrugated lateral wall (15a, 16a).

2. A modular beverage dispensing assembly as claimed in Claim 1, **characterized in that** the container is a closed body formed by two hollow bodies aligned along the same longitudinal axis with their concavities facing and resting one on the other, wherein each hollow body has a corrugated lateral wall.

3. A modular beverage dispensing assembly as claimed in Claim 1, **characterized in that** the container is made of plastic.

4. A modular beverage dispensing assembly as claimed in Claim 2, **characterized in that** the two hollow bodies are two bell-shaped monolithic shells, and the closed body is a closed shell.

5. A modular beverage dispensing assembly as claimed in Claim 2, **characterized in that** each hollow body (15, 16) has a substantially cylindrical, externally corrugated lateral wall (15a, 16a).

6. A modular beverage dispensing assembly as claimed in Claim 2, **characterized in that** the outer surface of the lateral wall (15a, 16a) of each hollow body (15, 16) has a number of projecting annular ribs (18) equally spaced along substantially the full height of the lateral wall (15a, 16a), and designed to locally increase the nominal thickness (S_{min}) of the lateral wall (15a, 16a) by at least 50%.

7. A modular beverage dispensing assembly as claimed in Claim 6, **characterized in that** said projecting annular ribs (18) are designed to at least locally double the nominal thickness (S_{min}) of the lateral wall (15a, 16a).

8. A modular beverage dispensing assembly as claimed in Claim 6, **characterized in that** said projecting annular ribs (18) are arranged on the outer surface of the lateral wall (15a, 16a) so that the distance (d) between each two adjacent projecting annular ribs (18) substantially equals the maximum thickness (S_{max}) of the lateral wall (15a, 16a) at said projecting annular ribs (18).

9. A modular beverage dispensing assembly as claimed in Claim 6, **characterized in that** said projecting annular ribs (18) are designed to form, between them, a succession of annular grooves (19), each rounded at the bottom.

10. A modular beverage dispensing assembly as claimed in Claim 2, **characterized in that** the two hollow bodies (15, 16) each comprise a respective projecting peripheral flange (15c, 16c) completely surrounding the opening at the end of the lateral wall (15a, 16a); said peripheral flanges (15c, 16c) resting one on the other when the two hollow bodies (15, 16) are joined to form the closed body; and one (15) of the two hollow bodies (15, 16) also having an annular lip seal (17), which is fixed firmly to the peripheral flange (15c) and projects towards the other hollow body (16) to seal the join between the two peripheral flanges (15c, 16c).

11. A modular beverage dispensing assembly as claimed in Claim 10, **characterized in that** the pressure container (3) also comprises a fastener (25) for selectively tightening the peripheral flanges (15c, 16c) of the two hollow bodies (15, 16) to one another, so as to fix said hollow bodies (15, 16) rigidly to one another and force the annular seal (17) to seal the join between said peripheral flanges (15c, 16c).

12. A modular beverage dispensing assembly as claimed in any one of the foregoing Claims, **characterized in that** the removable cartridge (4) comprises a substantially bottle-shaped collapsible container (10) designed to fit completely inside the pressure container (3), having a neck (10a) facing the end wall (16b) of a first hollow body (16); and a cap (11), in the form of a pierceable membrane or similar, which seals the opening at the end of the neck (10a).

13. A modular beverage dispensing assembly as claimed in Claim 12, **characterized in that** said beverage storage unit (2) also comprises a first valve assembly (12) for regulating pressurized-gas flow from the pressurized-gas source (5) into the pressure container (3); a piercing head (13) housed inside the pressure container (3), on the bottom wall (16b) of the first hollow body (16), and which directly faces the cap (11) of the removable cartridge (4), and is designed to pierce through the cap (11) into the collapsible container (10); an outflow pipe for feeding the beverage contained in the collapsible container (10) out of the pressure container (3) through the piercing head (13); and a second valve assembly (14) for regulating beverage flow along the outflow pipe.

14. A modular beverage dispensing assembly as claimed in any one of the foregoing Claims, **characterized by** comprising a number of independent beverage storage units (2); and in that said pressurized-gas source (5) is configured to feed pressurized gas into the pressure container (3) of each said beverage storage unit (2) to compress the removable cartridge (4) inside the pressure container.

15. An airtight pressure container (3) for housing a collapsible removable cartridge (4) containing a beverage; said container being **characterized in that** it has a corrugated lateral wall (15a, 16a).

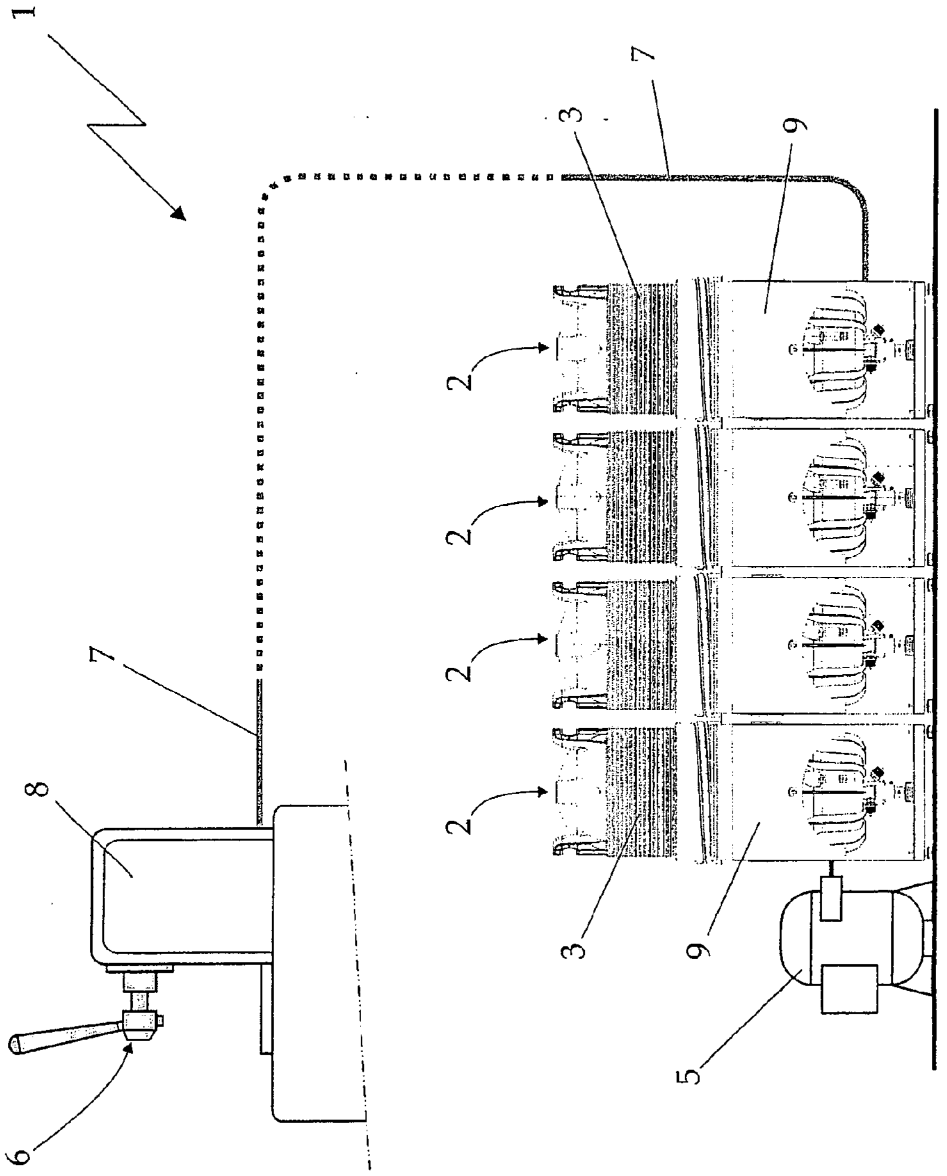

Fig. 1

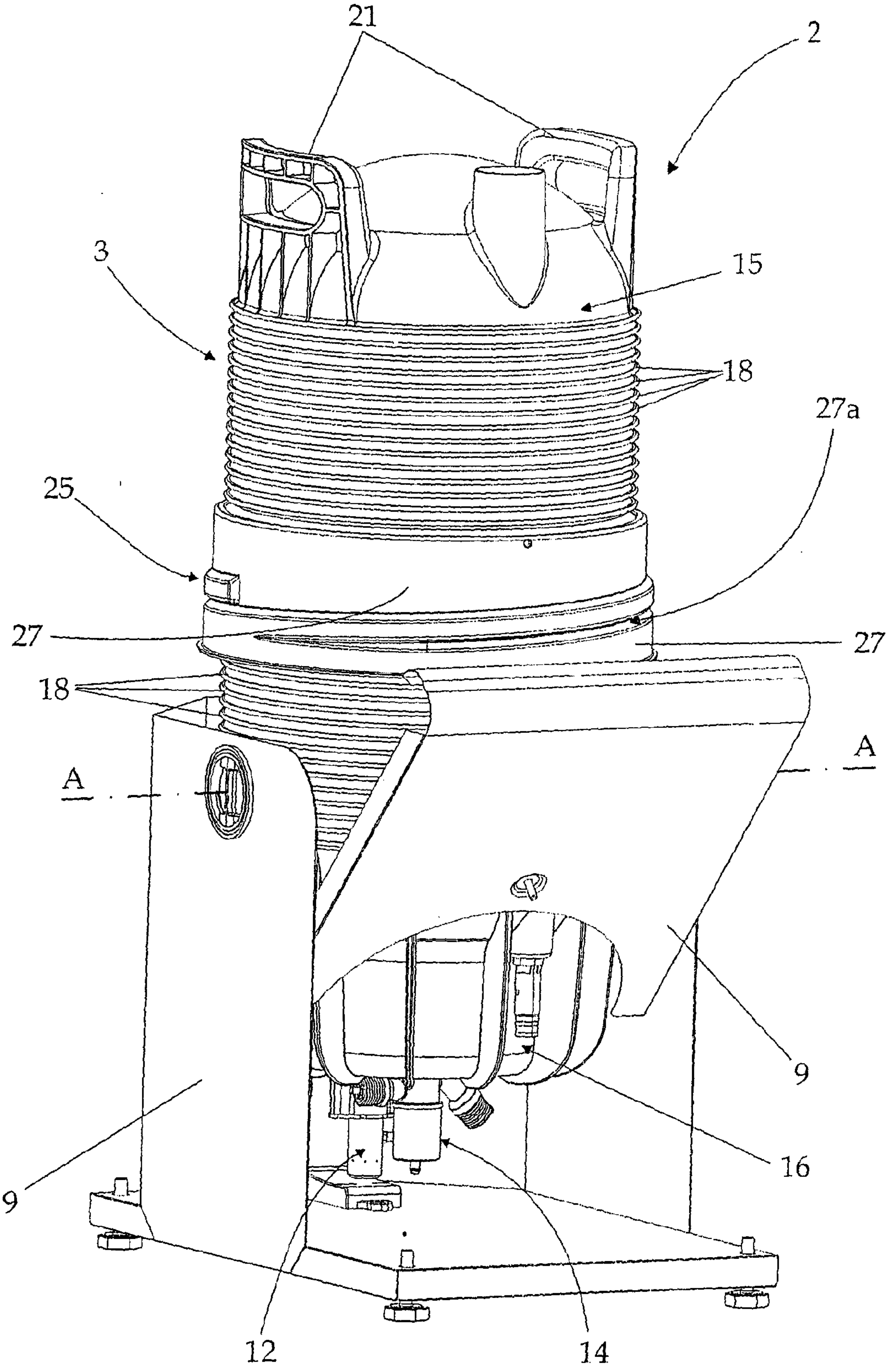

Fig. 2

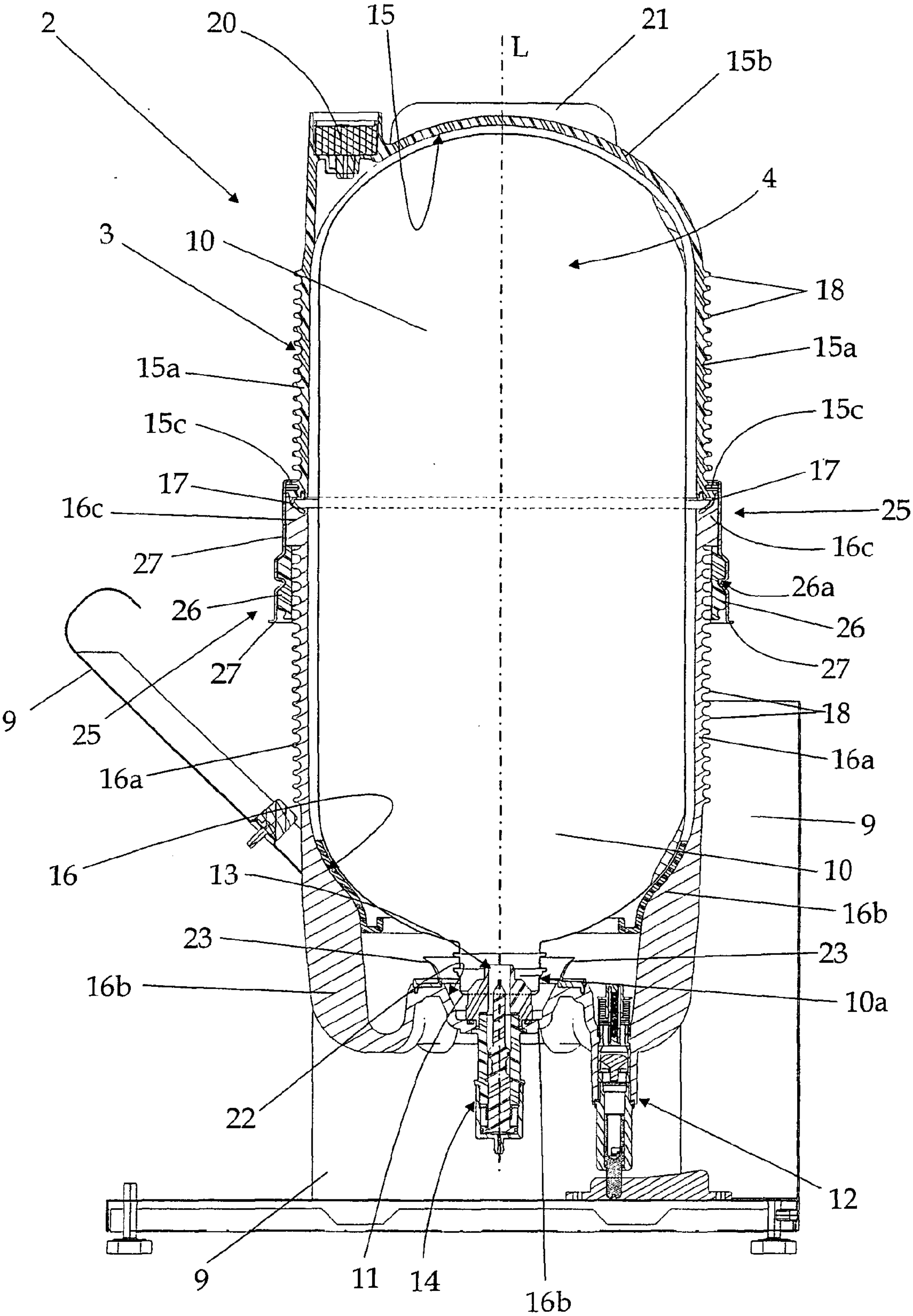
2
20
15
L
21
15b
4
3
10
18
15a
15a
15c
15c
17
17
16c
25
16c
27
26a
26
26
27
27
9
25
18
16a
16a
9
16
10
13
16b
23
23
16b
10a
22
12
9
11
14
16b

Fig. 3

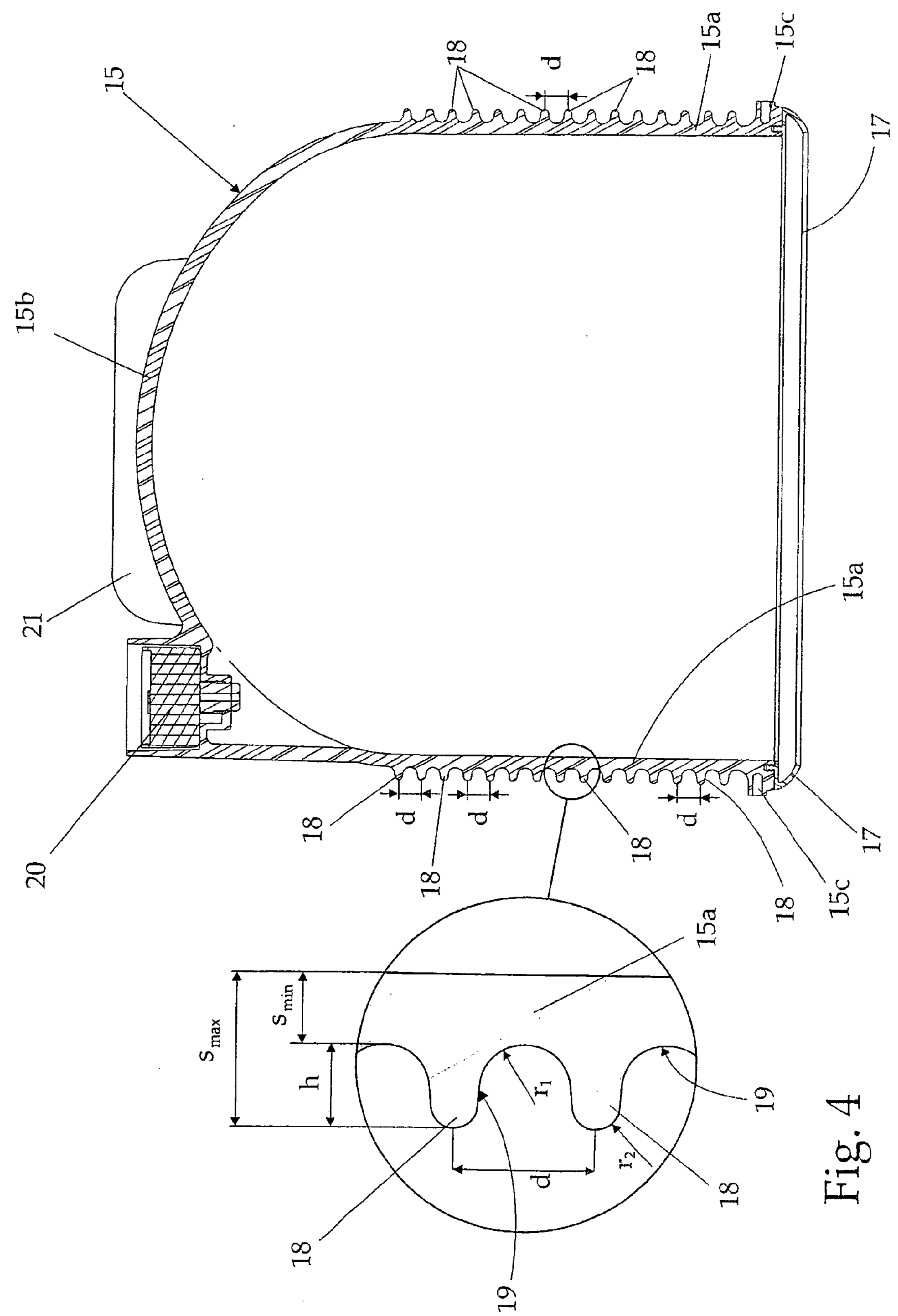

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5551

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2007/019853 A (CARLSBERG BREWERIES AS [DK]; RASMUSSEN JAN NOERAGER [DK]) 22 February 2007 (2007-02-22) * paragraphs [0078], [0130]; claim 1; figures 6,12,37 *	1-9, 12-14	INV. B67D1/04 B67D1/08
Y	US 5 556 601 A (HUVEY MICHEL [FR] ET AL) 17 September 1996 (1996-09-17) * column 1, line 56 - line 67 *	1-5,8, 12-14	
X	DE 705 744 C (MANNESMANN AG) 9 May 1941 (1941-05-09)	15	
Y	* claims 1,3 *	6,7,9	

TECHNICAL FIELDS SEARCHED (IPC)
B67D
F17C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 May 2009	Desittere, Michiel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 42 5551

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-05-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007019853 A	22-02-2007	AU 2006281791 A1	22-02-2007
		CA 2618011 A1	22-02-2007
		EP 1940727 A2	09-07-2008
		JP 2009504516 T	05-02-2009
		KR 20080041245 A	09-05-2008
US 5556601 A	17-09-1996	NONE	
DE 705744 C	09-05-1941	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2007019848 A **[0003] [0009] [0010] [0050]**
- WO 2007019846 A **[0012]**