



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.03.2015 Bulletin 2015/12

(51) Int Cl.:
B67D 1/04 (2006.01) **B67D 1/00 (2006.01)**
B67D 1/12 (2006.01)

(21) Application number: **13184334.4**

(22) Date of filing: **13.09.2013**

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

(71) Applicant: **MICRO MATIC A/S**
5250 Odense SV (DK)

(72) Inventors:
• **Larsen, Morten Helvig**
5250 Odense SV (DK)
• **Dahl, Benny**
5260 Odense S (DK)
• **Nielsen, Henrik Michael**
5600 Faaborg (DK)

(74) Representative: **Hoffmann Dragsted A/S**
Rådhuspladsen 16
1550 Copenhagen V (DK)

(54) **Beverage dispensing device and a method for such beverage dispensing device**

(57) A beverage dispensing device for dispensing beverages is provided. The beverage dispensing device comprises a receptacle for a beverage container made from deformable material, said receptacle being defined by means for deforming the beverage container in order to expel liquid stored therein; a hose or pipe system connecting the beverage container and an outlet, wherein a valve is placed along said system for opening and closing of the connection between the beverage container and the outlet. The beverage dispensing device further comprises means for measuring the pressure of the liquid in the beverage container or in the hose or pipe system, the measured pressure being used for controlling the means for deforming the beverage container such that a desired pressure in the beverage container is attained.

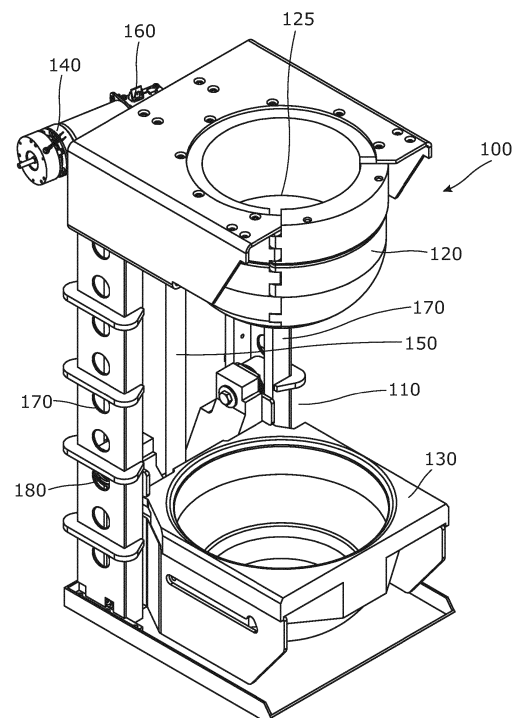


Fig. 2c

Description

Field of the invention

[0001] The present invention relates to a beverage dispensing device for dispensing beverages. The beverage dispensing device comprises a receptacle for a beverage container made from deformable material, said receptacle being defined by means for deforming the beverage container in order to expel liquid stored therein. The invention also relates to a method for controlling the deformation of a beverage container used with a beverage dispensing device according to the invention.

Background art

[0002] In pubs, cantinas, restaurants, and also in private homes, there are taps for beverages, especially beer, installed. Usually, the taps are provided in a tower or font with one or more taps for different types of beverages. Usually, a small dispensing line connects each tap to a beverage container, which is a small beverage container, most often made from steel, filled with the beverage to be tapped.

[0003] The beverage container is kept under a certain pressure, often by filling a space above the liquid with pressurized carbon dioxide; the pressure might be one to two bars over atmospheric pressure. This pressure serves to expel the liquid from the beverage container, through the dispensing line and to the tap once a valve situated along the dispensing line is opened.

[0004] However, from a quality point of view, this type of system is not entirely satisfactory; carbon dioxide let into the beverage container in order to drive the liquid out from the beverage container will dissolve in the liquid, with the risk of making the beverage more carbonated than desired. Moreover, the steel beverage containers are heavy and therefore not very convenient to use. Also, the beverage containers take up just as much space when they are empty as when they are filled; therefore, the transport of beverage containers back and forth consume a lot of energy in the form of fuel for lorries and trucks.

[0005] In order to solve the problem with increased carbonization of the beverage and to provide a lighter beverage container, a new type of deformable beverage container has been launched. The pressure used to expel the liquid from the beverage container is achieved by deforming the beverage container, either by placing the beverage container in a pressure chamber that can be pressurized, or by placing the beverage container in a device that deforms the beverage container by squeezing or pressing it. An example of the latter arrangement is found e.g. in WO 2009/062656.

[0006] The system of WO 2009/062656 works satisfactorily, but it has been found that the pressure in the beverage container may vary depending on how full the beverage container is as well as depending on the degree

of compression of a spring being situated to provide a slack between the motor and the deforming units. Another factor that may bias the pressure is the deformation of the beverage container; any force that is used to deform the beverage container will decrease the pressure in the beverage. Also, the system of WO 2009/062656 requires a spring having a relatively long stroke in order to function properly; hence, the space requirements for this system are larger than otherwise necessary.

[0007] There is thus a need for an improved beverage dispensing device for dispensing beverages.

Summary of the invention

[0008] It is an object of the present invention to wholly or partly overcome the above disadvantages and drawbacks of the prior art. More specifically, it is an object to provide a beverage dispensing device whereby the beverage to be expelled may be held at a constant pressure regardless of filling degree of the beverage container and independent of the force required to deform the beverage container.

[0009] Another object of the invention is to provide for a beverage dispensing device which is more compact than the prior art beverage dispensing devices.

[0010] The above objects, together with numerous other objects, advantages and features, which will become evident from the below description, are accomplished by a solution in accordance with the present invention by a beverage dispensing device for dispensing beverage from a beverage container to an outlet, comprising:

- a receptacle for a beverage container made from deformable material, said receptacle being defined by means for deforming the beverage container in order to expel beverage stored therein;
- a dispensing line fluidly connecting the beverage container and an outlet,
- an actuator arranged at the outlet in connection with the dispensing line adapted for opening and closing of the fluid connection between the beverage container and the outlet;

wherein means for measuring a pressure of the beverage in the beverage container and/or in dispensing line is arranged in connection with the beverage container and/or the dispensing line, the measured pressure being used for controlling the means for deforming the beverage container, so that a predetermined pressure of the beverage at the outlet is attained.

[0011] In order to provide for a solution requiring very few additional parts, the means for measuring the pressure in the beverage container may be a torque meter of a motor provided for powering the means for deforming the beverage container.

[0012] The means for measuring the pressure in the beverage container may also be a pressure gauge situated between the beverage container and a unit deform-

ing the beverage container. This gives a more direct and accurate result than measuring the torque of a motor.

[0013] Alternatively, the means for measuring the pressure in the beverage container may be a gauge measuring the compression of a spring situated between the beverage container and a unit for deforming the beverage container.

[0014] In some cases, the spring may be preferred in order to provide a slack in the connection between the motor and the deforming units.

[0015] In other embodiments, the means for measuring the pressure in the beverage container may be a thin-film pressure gauge. A thin-film pressure gauge is advantageous in that it is robust, low cost, and has good zero-stability.

[0016] Further, the means for measuring the pressure in the beverage container may be a thin-film pressure gauge of the type sold under the trademark "Flexi-Force®".

[0017] Also, the means for measuring the pressure may be a bladder filled with a liquid, said bladder being situated between the beverage container and a unit for deforming the beverage container, wherein a pressure gauge is connected to measure the pressure in the liquid of the bladder. This embodiment is advantageous in that the liquid will compensate for uneven pressure exerted by the walls of the beverage container.

[0018] Alternatively, the means for measuring the pressure in the beverage container may be a strain gauge measuring a strain or a torque applied to a threaded shaft comprised in the means for deforming the beverage container.

[0019] In order to provide for a good transfer of rotative movement to a linear movement between the threaded shaft and the deforming units, the threads of the threaded shaft may be trapezoidal threads.

[0020] Furthermore, the means for measuring the pressure in the beverage container may be a strain gauge measuring a strain or a torque applied to a threaded shaft comprised in the means for deforming the beverage container.

[0021] Moreover, the means for measuring the pressure in the beverage container may be a pressure meter measuring the pressure on an outside of the dispensing line connecting the beverage container and the outlet.

[0022] In order to empty the beverage container to an as high degree as possible, two deformation units may be comprised in the means for deforming the beverage container, wherein one of the deformation units is bowl-shaped and the other deformation unit has a shape such that it fits into the bowl.

[0023] In order to enable the two deformation units to come as close to one another as possible, there may be a space between the two deformation units, said space being sufficient to house the thickness of the walls of the beverage container when the beverage container has been fully deformed, i.e. emptied.

[0024] The present invention further relates to a bev-

erage dispensing system comprising the beverage dispensing device as described above.

[0025] The present invention also relates to a method for controlling the deformation of a beverage container in a beverage dispensing device according to the above and thereby the pressure of the beverage to be dispensed, the method comprising the steps of:

- after insertion of a beverage container in a receptacle therefore, powering a motor for deformation of the beverage container;
- measuring a pressure of a beverage in the beverage container and/or the dispensing line;
- stopping the motor once a first predetermined pressure level has been reached; and
- restarting the motor if the measured pressure falls below a second predetermined pressure.

[0026] In order to enable reduction of a pressure, should the pressure get too high, the further step of: reversing the motor if the measured pressure would exceed the first predetermined pressure could be added.

Brief description of the drawings

[0027] The invention and its many advantages will be described in more detail below with reference to the accompanying schematic drawings, which for the purpose of illustration show some non-limiting embodiments and in which

Fig. 1 is a schematic drawing of a prior art beverage dispensing device for a flexible beverage container;

Fig. 2a is a front view of a beverage dispensing device according to the present invention;

Fig. 2b is a side view of the beverage dispensing device of Fig. 2b;

Fig. 2c is a perspective view of the beverage dispensing device according to the present invention,

Fig. 3 is a section view diagrammatically showing one embodiment of a pressure sensor according to the present invention,

Fig. 4 shows another embodiment of beverage dispensing device,

Fig. 5 shows a dispensing line, and

Fig. 6 shows a beverage dispensing system.

[0028] All the figures are highly schematic and not necessarily to scale, and they show only those parts which are necessary in order to elucidate the invention, other parts being omitted or merely suggested.

Detailed description of the invention

[0029] In Fig. 1, a prior art system 100 is shown. The prior art system 100 comprises a receptacle 110 for a deformable beverage container 1, upper and lower deformation units 120 and 130, an arrangement for bringing the upper and lower deformation units towards one another and means for connecting the internal volume of the beverage container to a tap 2 controlled by a valve 3. A spring 4 is situated to transfer forces between a driving arrangement comprising a threaded shaft 150, a motor (not shown) arranged to rotate the threaded shaft 150, and a nut (not shown) connecting the lower deformation unit 130 to the threaded shaft.

[0030] A tell shaft 5 is arranged such that it is indicative of a pre-tension of the spring 4, and the motor is controlled by two switches 6, 7, such that the motor will start if the tell shaft 5 is engaging the switch 6 and stop if the tell shaft 5 engages the switch 7. In this way, a relatively constant force will act on the beverage container 1, and hence, the pressure in the beverage container 1 will be relatively constant.

[0031] The arrangement according to the teachings of Fig. 1 works fairly well, but the provision of the spring 4 will make the entire arrangement a bit bulky. An aim of the present invention is to provide a solution making the entire arrangement less bulky.

[0032] In Figs. 2a, 2b and 2c, a beverage dispensing device 100 according to the present invention is shown. The beverage dispensing device 100 comprises a receptacle 110, which is located between an upper deformation unit 120 and a lower deformation unit 130. In this embodiment, the shapes of the deformation units are such that the upper deformation unit 120 will fit into a bowl-like opening in the lower deformation unit 130.

[0033] A connection arrangement 125 is situated in the upper deformation unit 120 in order to allow for connection of a beverage container (not shown) to a dispensing line connecting the beverage container to an outlet (not shown). It should be noted that the connection arrangement just as well may be provided in the lower deformation unit 130.

[0034] In order to allow for deformation of the beverage container placed in the receptacle 110, there is an arrangement comprising a motor 140 connected to an elongate threaded shaft 150 via a gearbox 160, comprising e.g. a worm gear. The motor 140 may be any kind of motor allowing for a relatively precise control, e.g. a step motor, an AC motor or a DC motor. The threaded shaft 150 may comprise ordinary threads or trapezoidal threads and may be manufactured from metal or plastic. It cooperates with a nut connected to either the upper or lower deformation unit 120, 130 such that operation of the motor 140 will rotate the threaded shaft 150 and move the upper and lower deformation units 120, 130 towards one another for deforming the beverage container, or away from one another for allowing removal of an emptied beverage container and insertion of a new beverage

container.

[0035] In one embodiment, the nut is an engagable/dis-engagable nut allowing for movement of the deformation units 120, 130 relative to one another without powering the motor and rotating the threaded shaft 150. In another embodiment the shaft may be a spindle.

[0036] In the embodiment shown in Figs. 2a, 2b and 2c, the lower deformation unit 130 is suspended on guides 170 via wheels 180, allowing for relative movement of the lower deformation unit 130 against the upper deformation unit 120 or vice versa.

[0037] In some embodiments of the invention, there might be provided for a spring resembling the spring 4 of the prior art solution shown in Fig. 1, but considerably smaller, such that there will be a "slack" between the motor 140 and the force exerted for deforming the beverage container.

[0038] As mentioned in conjunction with the description of the prior art arrangement of Fig. 1, the control of the motor 140 deforming the beverage container is achieved by turning the motor 140 on if the pre-tension of the spring 4 is too low and turn it off when the desired pre-tension is reached.

[0039] According to an embodiment, the motor 140 is, however, controlled by the pressure in the beverage container; this offers the possibility of attaining a more even pressure, and also of reducing the space occupied by the spring 4 of the prior art solution.

[0040] Measuring the pressure can be achieved in many ways:

[0041] In one embodiment, the pressure is attained by a torque gauge connected to the motor 140 or the threaded shaft 150. In such embodiment, the motor 140 is powered until the correct torque is achieved, after which the motor is shut off. As can be understood, a torque applied to the threaded shaft 150 translates to a force being translated by the assembly of the threaded shaft 150, the nut and the upper and lower deformation units 120, 130. Since the area on which the deformation units 120, 130 act is constant, the force can be translated to a pressure without any complications.

[0042] The motor torque can be measured in a number of ways, e.g. by suspending the motor 140 in a way enabling a torque meter being directly applied to measure the torque, by attaching strain gauges to the threaded shaft, and/or by measuring the current supplied to the motor (for a permanently magnetized DC motor, the drive current is proportional to the motor torque), or measuring the rotor current if an AC motor is used to power the threaded shaft 150.

[0043] This embodiment is beneficial in that the number of extra components can be kept at a minimum.

[0044] In another embodiment of the invention, the pressure, or rather the force exerted by the upper and lower deforming units 120, 130, of the beverage in the beverage container is measured by measuring the strain in the guides 170.

[0045] In still another embodiment, the pressure is

measured by attaching strain gauges to the spring 4.

[0046] One preferred embodiment is to measure the pressure in the dispensing line. As persons skilled in the art are well aware, the dispensing lines connecting the beverage container and the outlet should be exchanged on a regular basis in order to avoid bacterial growth and extensive cleaning. This makes the use of an ordinary pressure gauge less preferable, since the pressure gauge if in contact with the beverage also will need replacement or cleaning. One possible way to measure the fluid pressure is therefore to measure the force exerted by the dispensing line if it is clamped slightly. In case of a pressure increase, the force exerted by the dispensing line in the clamp will increase. One problem with such a measurement is that the dispensing line itself has a certain stiffness. This problem could be largely overcome by using a dispensing line with a very low stiffness where it is meant to be clamped. For example, the dispensing line may be made from foodstuff grade silicone, which is a very flexible and agile material for a dispensing line. A silicone dispensing line made from silicone is, however, not well adapted to handle the necessary pressure levels, a problem that can be overcome by providing the dispensing line within an outer hose, the inner diameter of which being slightly larger than the outer diameter of the silicone dispensing line. When the silicone dispensing line is subjected to an internal pressure, its diameter will increase so that the outer walls thereof will contact the inner walls of the hose in which it is placed, much like the inner tube of a bicycle wheel being able to hold the pressure supported by the tire. It is of course possible to use a soft hose quality on only a part of the dispensing line connecting the beverage container and the outlet.

[0047] With reference to Fig. 3, in still another embodiment of the invention, a button-like device 300 is arranged on any of the deforming units 120, 130, so that the button extends slightly above a surface 310 in contact with the beverage container. The button 300 may be urged against the extended position by means of e.g. an extra spring 10. When a flexible beverage container 1 is placed in contact with the deforming unit 120, 130, and hence the button-like device 300, the button-like device 300 may be used for measuring the pressure in the beverage container.

[0048] In one embodiment, the spring 10 may be pre-tensioned such that the button-like device 300 does not move until the correct pressure in the beverage container has been reached. By such an arrangement, the motor 140 may be controlled in a way resembling the prior art arrangement, namely in such a way that the motor is powered to deform the beverage container when the button-like device 300 is in its position in which it extends above the surface of the deforming unit 120, 130, and in which the motor 140 is shut off when the button-like device 300 has been moved outwards by the pressure exerted by the beverage container and the liquid stored therein.

[0049] In an embodiment resembling the embodiment

disclosed with reference to Fig. 3, there is no spring 10 situated below the button-like device 300. Instead, a bladder (not shown) filled with a preferably incompressible medium is provided under the button-like device 300 (the bladder may also entirely replace the button-like device 300). The preferably incompressible medium may then be connected to a pressure gauge measuring the pressure of the incompressible medium, a pressure that roughly corresponds to the pressure in the beverage container.

[0050] In still another embodiment of the invention, an electronic pressure meter or force meter is provided between the beverage container and any of the deforming units. The force or pressure meter may be any kind of pressure meter that fits between the beverage container and the deformation unit, but advantageous results have been achieved with a type of pressure meter sold under the trademark "Flexi-force". Such pressure meters comprise a thin elongate film substrate made from e.g. polyester (Mylar®) and have a pressure sensitive area at one end and electrical connections at one end.

[0051] The basic design of the "Flexi-force" pressure meter is disclosed in US-A-6,272,936. A brief description of the design will, however, also be given below:

[0052] A "Flexi-force" pressure meter comprises a first elongate polyester film provided with a line of silver coating in order to provide for an electric connection between portions of the elongate polyester film. At one end, the silver is connected to an electric terminal and at the other end, it is widened or narrowed down to a size corresponding to the desired pressure sensing area. Thereafter, the desired pressure sensing area is covered with an ink whose resistance changes depending on pressure. A second elongate polyester film having a corresponding silver coated area with regard to the pressure sensitive area and a line of silver coating providing for electric connection of the pressure sensitive area, and a second electric terminal is then laminated on top of the first elongate polyester film.

[0053] The result is a thin, flexible pressure meter, the resistance of which being such that $1/R$ is proportional to the pressure exerted on the pressure sensitive area.

[0054] Fig. 4 shows a cross-sectional view of another embodiment of the beverage dispensing device 100 having a beverage container 1 arranged between the upper and lower deforming units 120, 130. Inside the upper deforming unit 120 a guide for the dispensing line is arranged, which ensures that the dispensing line is aligned with the beverage container after the beverage container has been placed in the device. The dispensing line may comprise a connecting device having piercing means adapted to pierce the beverage container 1 when the upper and lower deforming units 120, 130 are moved towards each other, thereby fluidly connecting the beverage container 1 with the outlet.

[0055] In Fig. 5, a dispensing line 11 comprising a tube section 12 having an inlet end 13 and an outlet end 14, the inlet end 13 being connected with a connecting device

15 having the piercing means. Furthermore, the outlet end may be connected with a spout and/or a valve 16 to be operated by an actuator.

[0056] In Fig. 6, a beverage dispensing system 200 according to the invention is shown in a cross-sectional view. The system 200 comprises a beverage container 1 having a beverage and propelling means for forcing the beverage out of the container into a dispensing line 11. The dispensing line 11 and the beverage container 1 are connected via the connecting device 15. The propelling means is mechanical pressure means as described above having upper and lower deforming units 120, 130. Furthermore, the beverage container 1 comprises a cap 17 arranged in connection with an opening in the beverage container, the cap 17 comprising a membrane to be pierced by the piercing means of the connecting device.

[0057] Furthermore, the propelling means and the beverage container 1 are placed inside a cabinet 18. The cabinet 18 may comprise cooling means for keeping the beverage in the beverage container 1 at a predetermined cold temperature. Furthermore, a font 19 having the tapping head 20 and a guide channel 21 is arranged on top of a cabinet 18 having a chamber 22 which is in fluid communication with the guide channel 21. The dispensing line (not shown) may be guided down through the font via the guide channel 21 to the chamber 22, wherein the connecting device 15 may be positioned in the guide in the upper deforming unit 120 to be connected with beverage container 1. The tapping head 35 comprises an actuator 23 adapted to open and close an outlet 24. The beverage is being dispensed from said outlet 24.

[0058] The invention also relates to methods for controlling the motor of a beverage dispensing device according to the present invention.

[0059] All the methods comprise the steps of:

- after insertion of a beverage container in a receptacle therefore, powering a motor for deformation of the beverage container;
- measuring a pressure of a beverage in the beverage container;
- stopping the motor once a first predetermined pressure level has been reached; and
- restarting the motor if the measured pressure falls below a second predetermined pressure.

[0060] In some embodiments, the method may comprise the further step of reversing the motor if the measured pressure would exceed the first predetermined pressure.

[0061] Although the above description has been made mostly with reference to a beverage dispensing device for carbonated drinks such as beer, it should be readily understood that the general principle of the beverage dispensing device is applicable for various different liquids such wine, soft drinks, lemonade, etc.

[0062] Although the invention has been described in

the above in connection with preferred embodiments of the invention, it will be evident for a person skilled in the art that several modifications are conceivable without departing from the invention as defined by the following claims.

Claims

1. A beverage dispensing device (100) for dispensing beverage from a beverage container to an outlet, comprising:

- a receptacle (110) for a beverage container (1) made from deformable material, said receptacle (110) being defined by means (120, 130, 140, 150, 160) for deforming the beverage container (1) in order to expel beverage stored therein;
- a dispensing line (11) fluidly connecting the beverage container (1) and an outlet (24),
- an actuator (23) arranged at the outlet in connection with the dispensing line (11) adapted for opening and closing of the fluid connection between the beverage container (1) and the outlet (24);

wherein means for measuring a pressure of the beverage in the beverage container (1) and/or in dispensing line (11) is arranged in connection with the beverage container and/or the dispensing line, the measured pressure being used for controlling the means (120, 130, 140, 150, 160) for deforming the beverage container (1), so that a predetermined pressure of the beverage at the outlet (24) is attained.

2. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure in the beverage container is a torque meter of a motor (160) provided for powering the means (120, 130, 140, 150, 160) for deforming the beverage container (1).
3. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure in the beverage container is a pressure gauge situated between the beverage container (1) and a unit (120; 130) deforming the beverage container (1).
4. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure in the beverage container (1) is a gauge measuring the compression of a spring (10) situated between the beverage container (1) and a unit for deforming the beverage container (1).
5. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure in the beverage container (1) is a thin-film pres-

sure gauge.

6. A beverage dispensing device (100) according to claim 5, wherein the means for measuring the pressure in the beverage container (1) is a thin-film pressure gauge of the type sold under the trademark "Flexi-Force®". 5
7. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure is a bladder filled with a liquid, said bladder being situated between the beverage container (1) and a unit (120; 130) for deforming the beverage container (1), wherein a pressure gauge is connected to measure the pressure in the liquid of the bladder. 10
8. A beverage dispensing device (100) according to claim 1, wherein the means for measuring the pressure in the beverage container (1) is a strain gauge measuring a strain or a torque applied to a threaded shaft (150) comprised in the means (120, 130, 140, 150, 160) for deforming the beverage container (1). 15
9. A beverage dispensing device according to claim 1, wherein the means for measuring the pressure in the beverage container is a pressure meter measuring the pressure on an outside of the dispensing line (11) connecting the beverage container (1) and the outlet (24). 20
10. A beverage dispensing device according to claim 9, wherein the dispensing line (11) is made from a flexible material where the pressure on the outside thereof is measured. 25
11. A beverage dispensing device (100) according to claim 1, wherein two deformation units (120, 130) are comprised in the means (120, 130, 140, 150, 160) for deforming the beverage container (1), wherein one of the deformation units (130) is bowl-shaped and the other deformation unit (120) has a shape such that it fits into the bowl. 30
12. A beverage dispensing device (100) according to claim 11, wherein there is a space between the two deformation units, said space being sufficient to house the thickness of the walls of the beverage container (1) when the beverage container (1) has been fully deformed. 35
13. A beverage dispensing system (200) comprising the beverage dispensing device (100) according to any of the preceding claims. 40
14. A method for controlling the deformation of a beverage container (1) in a beverage dispensing device according to any of the claims 1-12 and thereby the pressure of the beverage to be dispensed, the meth- 45

od comprising the steps of:

- after insertion of a beverage container (1) in a receptacle (110) therefore, powering a motor (160) for deformation of the beverage container (1);
- measuring a pressure of a beverage in the beverage container (1) and/or the dispensing line;
- stopping the motor once a first predetermined pressure level has been reached; and
- restarting the motor (160) if the measured pressure falls below a second predetermined pressure.

15. A method according to claim 14, comprising the further step of:

- reversing the motor if the measured pressure would exceed the first predetermined pressure.

Prior Art

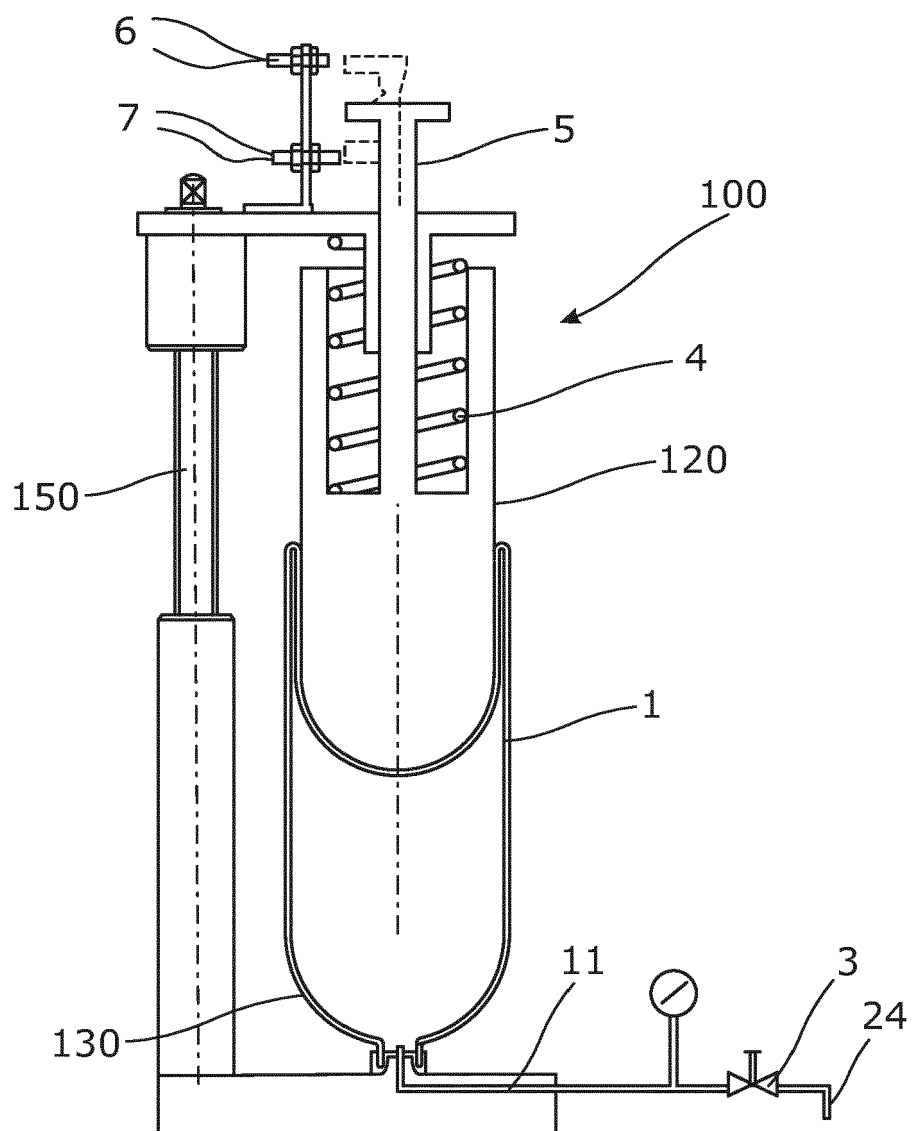


Fig. 1

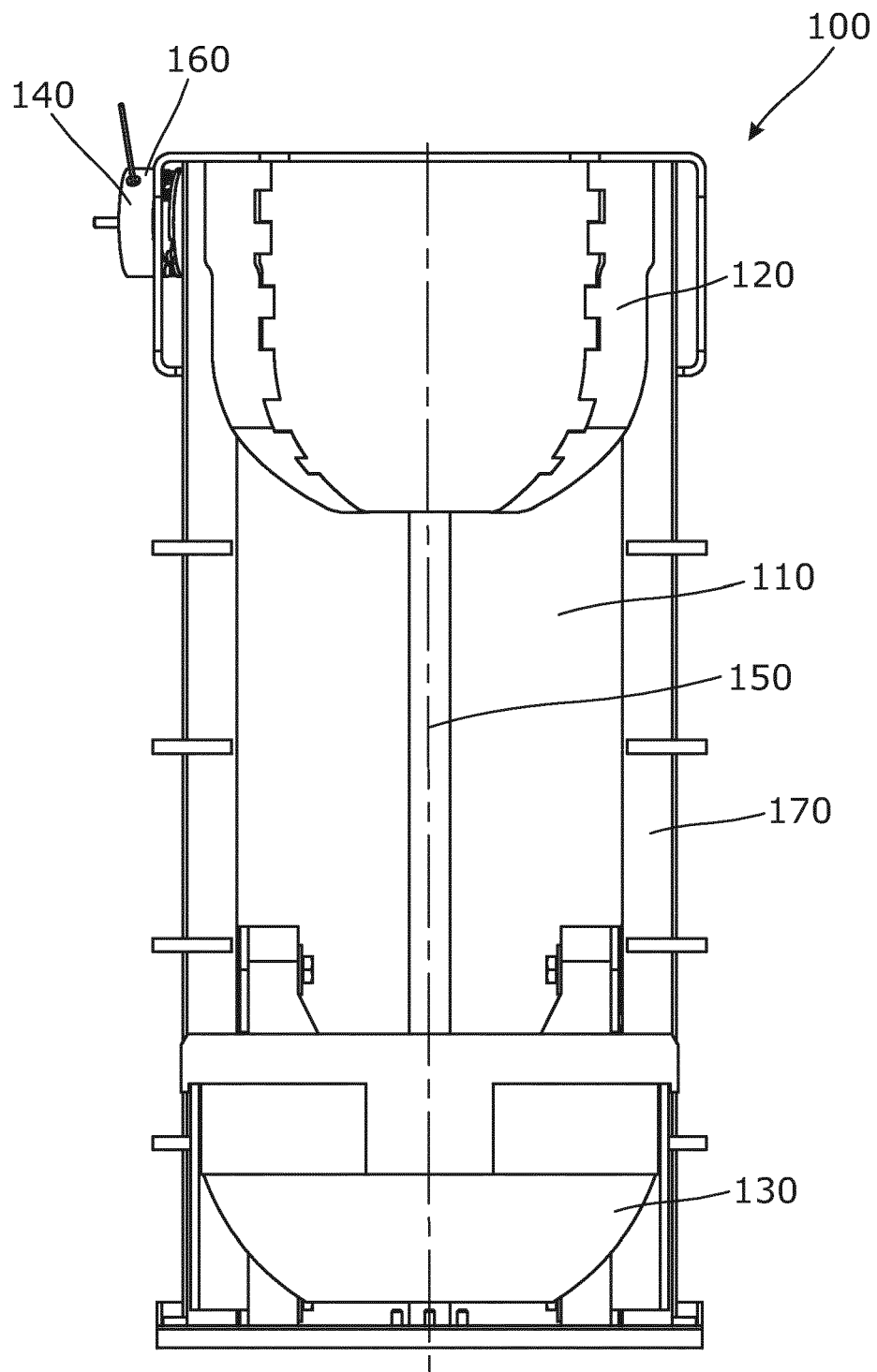


Fig. 2a

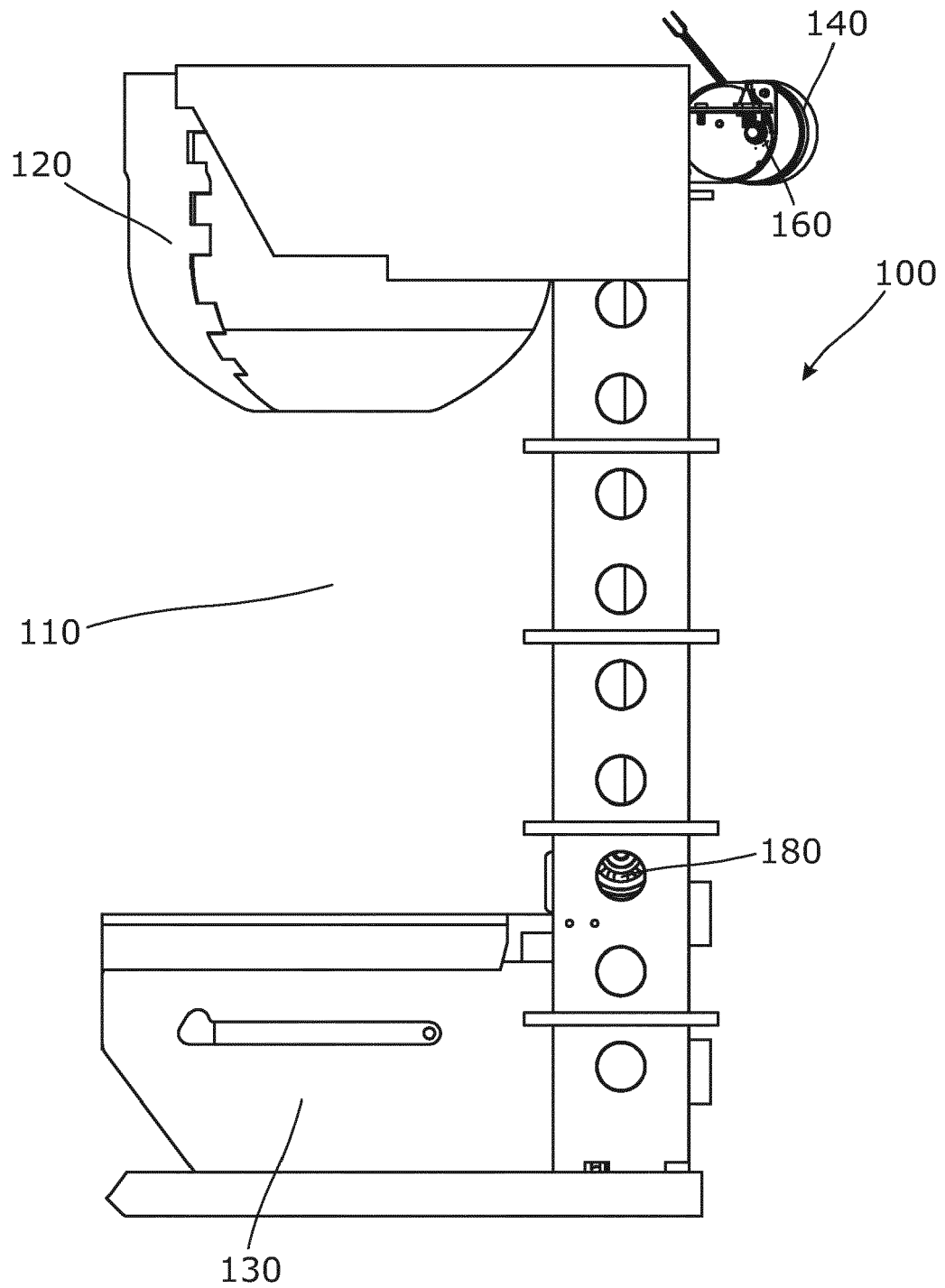


Fig. 2b

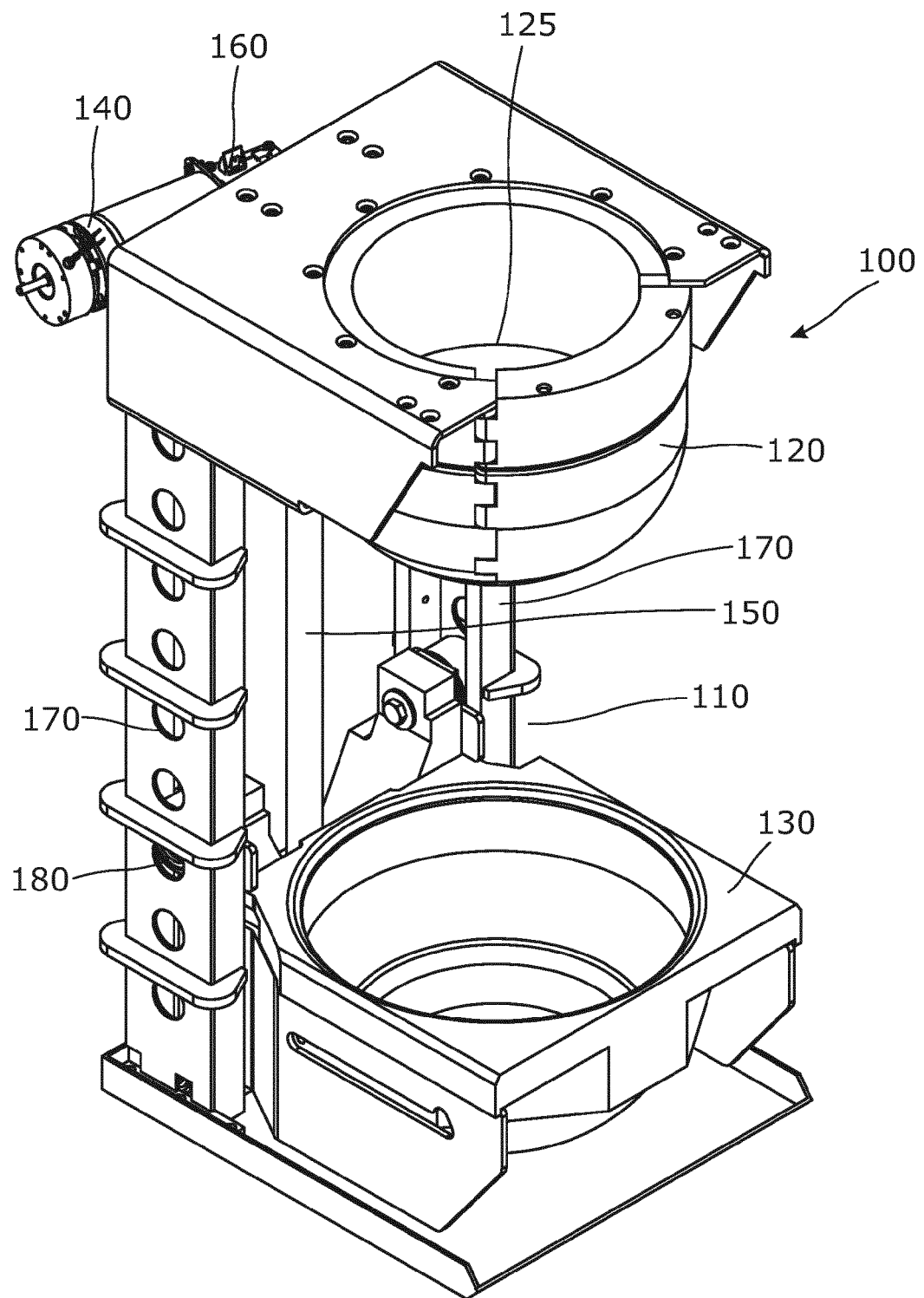


Fig. 2c

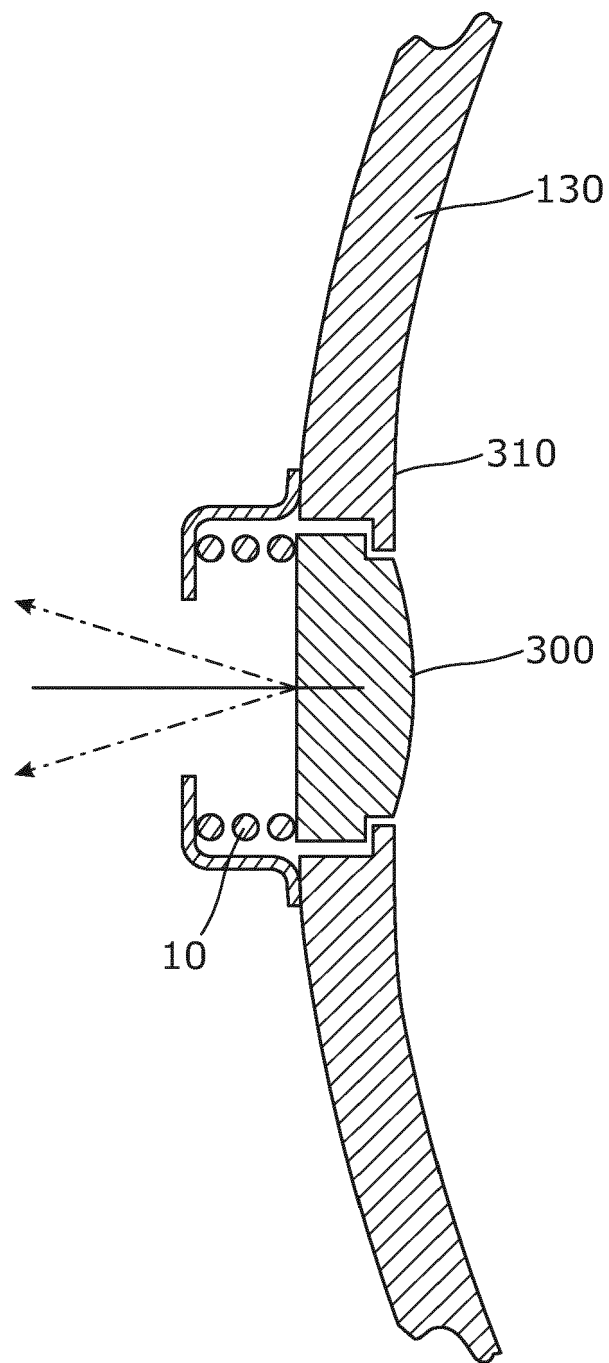


Fig. 3

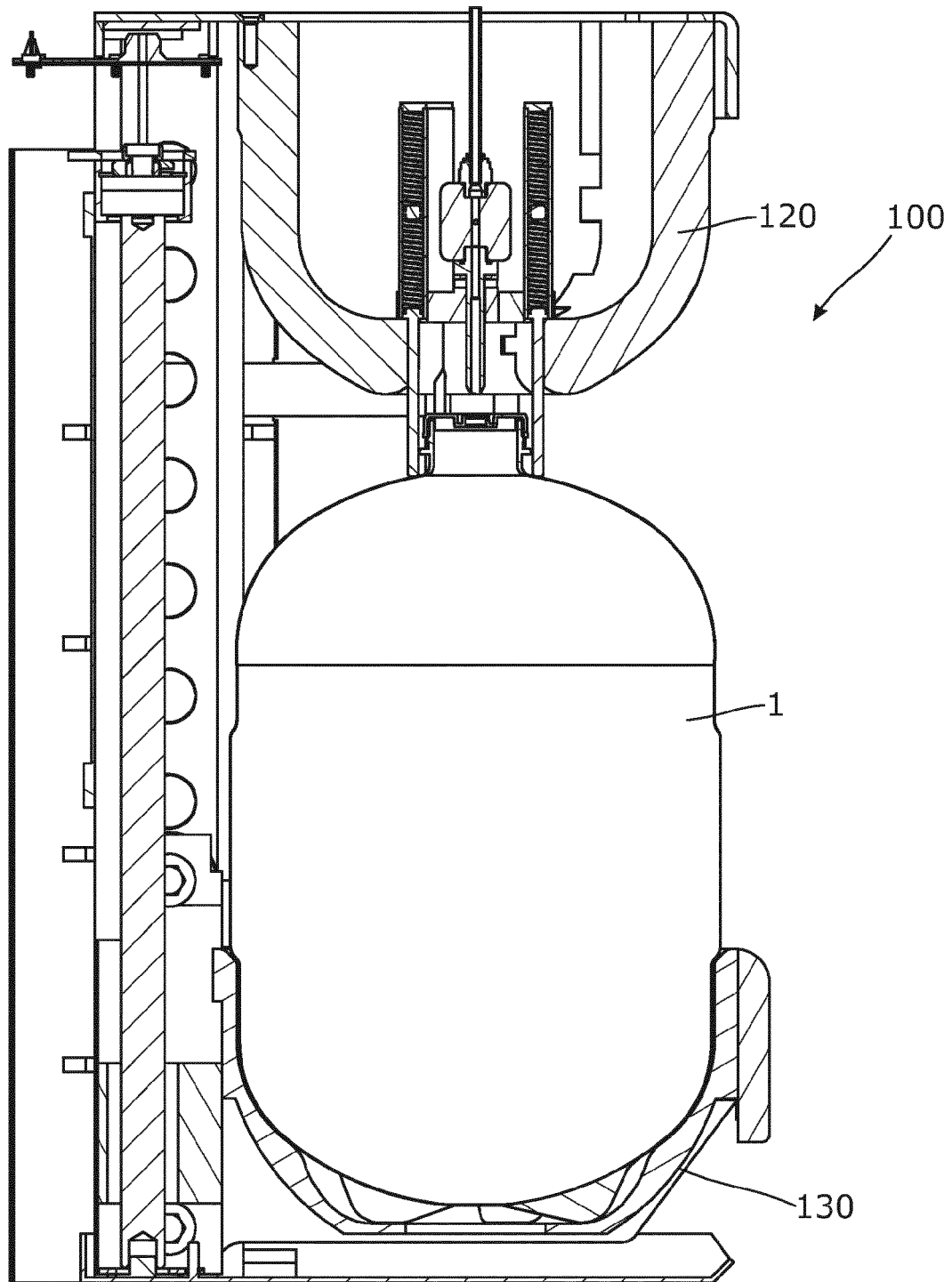


Fig. 4

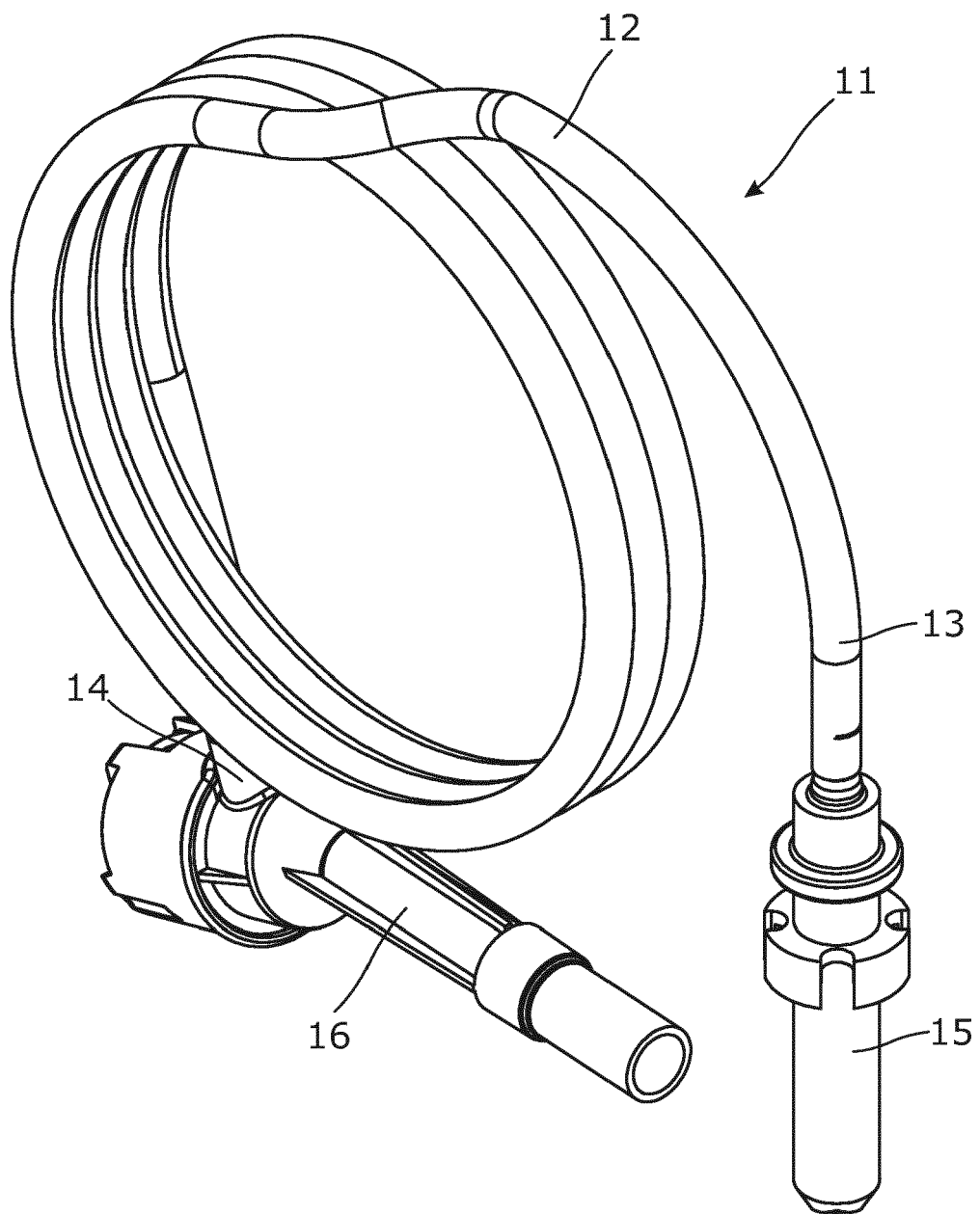


Fig. 5

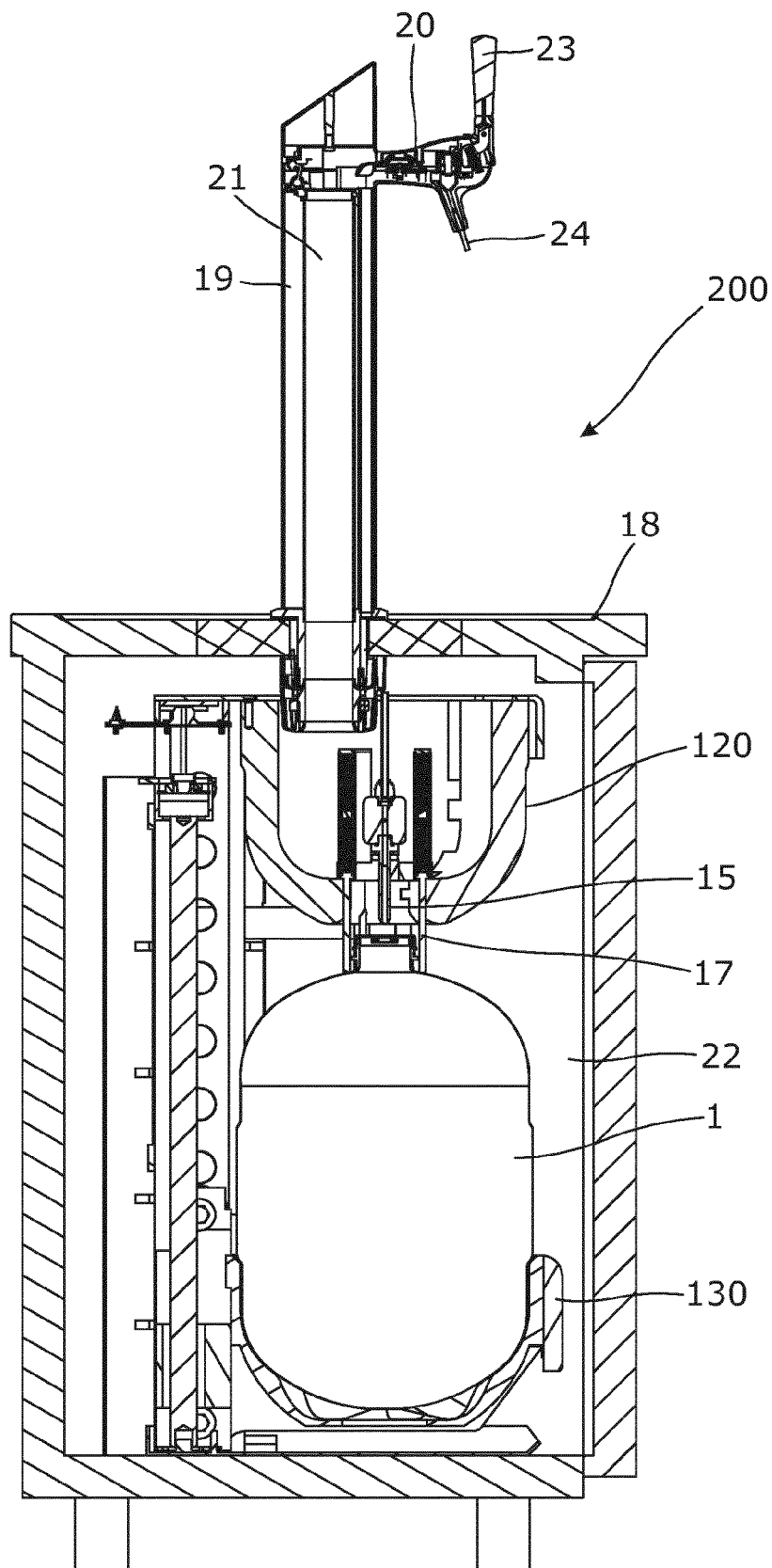


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 4334

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2012 101507 A1 (KRONES AG [DE]) 29 August 2013 (2013-08-29) * paragraphs [0019], [0023] - [0028], [0030]; figures * -----	1-15	INV. B67D1/04 B67D1/00 B67D1/12
X	DE 10 2012 101503 A1 (KRONES AG [DE]) 29 August 2013 (2013-08-29) * paragraphs [0048] - [0057]; figures * -----	1-15	
A	US 5 240 144 A (FELDMAN JOSEPH [IL]) 31 August 1993 (1993-08-31) * abstract; figures 1-6 * -----	1,14	
A	EP 0 377 195 A1 (FELDMANN JOSEPH) 11 July 1990 (1990-07-11) * abstract; figures 1-6 * -----	1,14	
A	EP 0 820 958 A1 (LUCKHARDT OHG [DE]) 28 January 1998 (1998-01-28) * abstract; figures * -----	1,14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		4 March 2014	Müller, Claus
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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 4334

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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