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(54) **A dispensing font device and dispensing system**

(57) The present invention relates to a dispensing font device (1) comprising a vertical first part (2) having a first end (3) and a second end (4); a substantially horizontal second part (5) being in fluid communication with the first part (2), the second part (4) comprising a tapping handle (6) being adapted to open and close an outlet (7) of a dispensing line (8) extending through the font device (1) during use; the first part (2) comprising a first channel (9) extending from the second end (4) to the first end (3), and a guide channel (11) in which the dispensing line (8) is adapted to be guided, thereby extending through the guide channel (11), the guide channel (11) extending in the first part (2) from the first end (3) to at least the second end (4), and the guide channel (11) having an inner diameter; and a cooling unit (12) adapted to circulate a cooling medium inside the first and second parts (2, 5). Furthermore, the invention relates to a dispensing system (100) for dispensing a beverage.

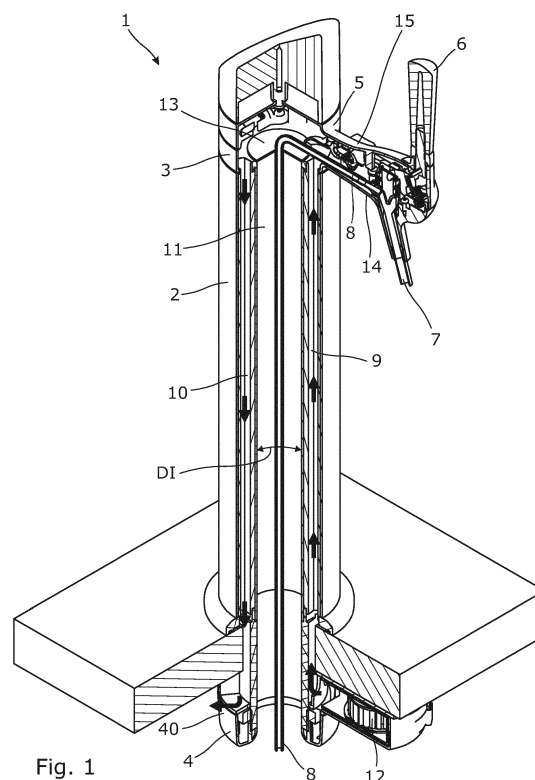


Fig. 1

Description

Field of the invention

[0001] The present invention relates to a dispensing font device and dispensing system for dispensing a beverage.

Background art

[0002] Systems for dispensing beverages requiring frequent replacement of the dispensing line are well-known. These systems have incorporated guide channels for facilitating the replacement of the dispensing line in the font. The systems are often used for dispensing beer, and cooling units for keeping the beer at a low temperature before and during dispensing are therefore incorporated. A prior solution is known from for instance WO 01/92144 A1. However, since the guide channel of this solution has a considerable size and diameter to facilitate handling, a high heat loss is often seen in the font, which sometimes renders the cooling of the beverage insufficient. As a result, the consumers' experience of the dispensed beverage may be bad and not as intended.

[0003] There is therefore a need for an improved way of cooling off the beverage dispensed from the above-mentioned dispensing systems.

Summary of the invention

[0004] 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 dispensing font device and dispensing system with improved cooling.

[0005] 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 dispensing font device comprising:

- a vertical first part having a first end and a second end,
- a substantially horizontal second part being in fluid communication with the first part, the second part comprising a tapping handle being adapted to open and close an outlet of a dispensing line extending through the font device during use,
- the first part comprising a first channel extending from the second end to the first end, and a guide channel in which the dispensing line is adapted to be guided, thereby extending through the guide channel, the guide channel extending in the first part from the first end to at least the second end, and the guide channel having an inner diameter, and
- a cooling unit adapted to circulate a cooling medium inside the first and second parts,

wherein a closing part is arranged for substantially closing off a fluid communication to the guide channel at the first end of the first part during use of the font device.

[0006] In an embodiment, a closing part may be arranged for substantially closing off a fluid communication to the guide channel at the first end of the first part during use of the font device.

[0007] Furthermore, the first part may comprise a second channel extending from the second end to the first end and being in fluid communication with the first channel at the first end.

[0008] Moreover, the guide channel may extend past the second end.

[0009] In addition, the second part may comprise a lower part and an upper part, the lower and upper parts being movable in relation to each other to allow for opening of the second part.

[0010] Also, the lower and upper parts may be displaceable, slidable or turnable in relation to each other or be hingedly connected.

[0011] Additionally, the upper part may be adapted to be moved in relation to the lower part to provide access to the guide channel from above.

[0012] Further, the tapping handle may be connected with the upper part.

[0013] Moreover, the second part may be arranged above the first part and may extend outwards in a direction horizontal from the first part.

[0014] Additionally, the second part may be provided with room along its extension to enable air circulation substantially along the section of the dispensing line being positioned in the second part during use.

[0015] Furthermore, the first channel may extend into the second part and end at an end opposite the first end of the first part.

[0016] Also, an additional closing part may be arranged for substantially closing off a fluid communication to the guide channel at the second end of the first part during use of the font device.

[0017] In addition, the closing part may be adapted to be mounted around the dispensing line.

[0018] In an embodiment, the closing part may be made of a flexible material.

[0019] Furthermore, the closing part may have an outer diameter being equal to or larger than the inner diameter of the guide channel.

[0020] Moreover, the closing part may be hingedly connected with the first part and may be movable between an open position, wherein access to the guide channel is provided, and a closed position, wherein closing part closes off the guide channel.

[0021] Additionally, the upper part may comprise the closing part, and the closing part may be arranged in a position enabling it to close off the guide channel at the first end when the upper part is positioned in relation to the lower part.

[0022] In one embodiment, the closing part may be disc-shaped, truncated, hemispherically shaped or ball-

shaped.

[0023] In addition, the closing part may comprise an opening for letting the dispensing line pass the closing part.

[0024] Further, the opening may comprise sealing means for sealing off an area around the dispensing line when the dispensing line is present in the opening.

[0025] In an embodiment, the first and second channels may be separate tubes extending on an outside face of the guide channel.

[0026] Furthermore, the first channel may be arranged concentrically outside the guide channel.

[0027] Additionally, the first channel may be divided into a longitudinal direction of the first part, thereby comprising the second channel.

[0028] Moreover, the first channel may be arranged concentrically outside the second channel, and the second channel may be arranged concentrically outside the guide channel.

[0029] Further, the first part may comprise a third channel.

[0030] Also, the first and second channels may be isolated to minimise heat loss along their extensions.

[0031] Additionally, the font device may comprise a cover arranged outside the guide channel.

[0032] Moreover, the first channel and/or the second channel may be arranged outside the cover.

[0033] In an embodiment, the cooling unit may be arranged in the second part.

[0034] Furthermore, the font device may be arranged on a housing, and the first channel and/or second channel and the guide channel may be in fluid communication with an inside of the housing.

[0035] Also, the cooling unit may be arranged in the housing.

[0036] In addition, the font device may comprise a plurality of cooling units.

[0037] Further, the cooling unit may comprise an air circulation unit, such as a blower, a fan, a ventilator and/or a pump.

[0038] In an embodiment of the invention, the second part may comprise a deflector or guide for guiding an airstream into an opposite end of the second part in relation to the first part.

[0039] Moreover, the first channel may extend past the first end of the first part and may comprise a bend so that an opening of the first channel faces the opposite end of the second part in relation to the first part.

[0040] Also, the dispensing line may be guided through the guide channel from the first end or the second end.

[0041] In addition, the cooling unit may comprise a control unit adapted to stop the circulation of air when the upper part is being moved in relation to the lower part and/or when the housing is being opened.

[0042] The first part may comprise an air guidance element arranged at the second end, the air guidance element being arranged around the guide channel and being in fluid connection with the first and second channels

and the cooling unit, and the air guidance element comprising partitioning walls dividing the air guidance element into separate sections so that the air stream from the second channel may be led away from the first channel and cooling unit, whereby the air stream coming from the second channel is not led directly into the first channel.

[0043] The present invention furthermore relates to a dispensing system for dispensing a beverage, comprising:

- a dispensing font device according to any of the preceding claims,
- a housing comprising a beverage container, and
- a dispensing line extending from the beverage container via the guide channel to the tapping handle, facilitating dispensing of cold beverage from the beverage container.

[0044] In an embodiment, the dispensing line may be exchanged at the same time as the beverage container.

[0045] Furthermore, the dispensing line may be guided through the guide channel from the first end of the first part.

Brief description of the drawings

[0046] 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 shows a dispensing font device in a perspective, partly cross-sectional view,

Fig. 2 shows another embodiment of a dispensing font device in a perspective, partly cross-sectional view,

Fig. 3 shows an additional embodiment of a dispensing font device in a perspective, partly cross-sectional view,

Fig. 4 shows an enlarged part of the dispensing font device shown in Fig. 3,

Fig. 5 shows a top view of the first and second parts of the dispensing font device,

Figs. 6a-6g show different embodiments of the closing part,

Figs. 7a-7c show cross-sectional top views of different embodiments of the first part of the dispensing font device in,

Fig. 8 shows a dispensing system,

Fig. 9 shows an enlarged view of the top of the dispensing font device of the dispensing system of Fig. 8, and

Fig. 10 shows the dispensing system of Fig. 8 in a cross-sectional side view having gas cylinder.

[0047] 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

[0048] Fig. 1 shows a dispensing font device 1 according to the present invention. The dispensing font device comprises a vertical first part 2 having a first end 3 and a second end 4, and a substantially horizontal second part 5 being in fluid communication with the first end 3, the second part 5 comprising a tapping handle 6 being adapted to open and close an outlet 7 of a dispensing line 8 extending through the font device 1 during use.

[0049] The first part 2 in this embodiment comprises a first channel 9 and a second channel 10 both extending from the second end 4 to the first end 3 and being in fluid communication with each other at the first end 3. In another, not shown, embodiment, the first part may comprise only a first channel. The first and second channels 9, 10 may be separate tubes extending on an outside face of the guide channel 11.

[0050] The first part 2 also comprises a guide channel 11 in which the dispensing line 8 is adapted to be guided to extend through the guide channel 11, the guide channel 11 extending in the first part 2 from the first end 3 to at least the second end 4, and the guide channel 11 having an inner diameter D_1 .

[0051] In addition, the font device 1 comprises a cooling unit 12 adapted to circulate a cooling medium (indicated by arrows in the first and second channels) inside the first and second parts 2, 5. According to the inventive idea, a closing part 13 is arranged for substantially closing off a fluid communication to the guide channel 11 at the first end 3 of the first part 2 during use of the font device 1. In this way, cooling of the beverage in the dispensing line in the second part 5 is ensured. Studies have shown that it is important for the quality of the beverage, especially beer, and for the consumer experience that especially the section of the dispensing line arranged just before the outlet of the dispensing line is cooled properly. By closing off the fluid communication of cold air at the first end 3 of the first part 2 to the large guide channel 11, it is obtained that the circulated cooling medium, i.e. air or gases, in the font device 1 is directed to the second part 5 without substantial heat loss.

[0052] The closing part 13 may be arranged as part of the dispensing line so that when the dispensing line is being guided through the font device 1 and being connected with a beverage container and the tapping handle,

the closing part 13 is positioned in the guide channel 11 to provide an obstruction in the guide channel, whereby fluid flow into the guide channel is substantially avoided. The closing part may also be integrated with the font device and be a lid which is positioned around the dispensing line after it has been guided through the guide channel. Different embodiments of the closing part will be described further below.

[0053] Advantageously, the second part 5 may comprise a lower part 14 and an upper part 15, the lower and upper parts 14, 15 being movable in relation to each other so that the second part 5 can be opened to guide and position the dispensing line in the font device. The upper part 15 may be displaceable, slidable or turnable in relation to the lower part 14, or they may be hingedly connected. In the shown embodiments, the upper and lower parts 15, 14 are hingedly connected. Furthermore, the upper part 15 is adapted to be moved in relation to the lower part 14 to provide access to the guide channel 11 and the inside of the second part 5 from above, which facilitates handling both in relation to guiding the dispensing line but also to positioning the dispensing line in the second part.

[0054] Furthermore, the second part 5 is arranged above the first end 3 of the first part 2 and extends outwards in a horizontal direction from the first part 2. The second part 5 is provided with room along its extension for enabling air circulation substantially along the section of the dispensing line being positioned in the second part 5 during use, as described above.

[0055] In addition, the second part 5 may comprise a deflector 30, as shown in Fig. 4, or guide for guiding an airstream into an opposite end of the second part in relation to the first part. Moreover, the first channel 9 may extend past the first end of the first part and may comprise a bend so that an opening of the first channel faces the opposite end of the second part in relation to the first part. In another embodiment, the first channel extends into the second part and ends at an opposite end of the first end of the first part.

[0056] Moreover, an air guidance element 40 is arranged at the second end 4, the air guidance element 40 being arranged around the guide channel 11 and being in fluid connection with the first and second channel 9, 10 and the cooling unit 12. The air guidance element 40 comprises partitioning walls dividing the air guidance element 40 into separate sections so that the air stream from the second channel 10 may be led away from the first channel 9 and cooling unit 12, whereby the air stream coming from the second channel 10 is not led directly into the first channel 9, as shown by the arrows. In this way, the air stream from the second channel 10 returning from the top of the font device 1, thereby having a higher temperature than the air stream blown from the cooling unit 12 into the first channel, will not be directly recirculated into the first channel 9 without being cooled to a lower temperature in the cooling unit 12 first. This has the advantage that air with a higher temperature than

intended will not be recirculated in the font device, which prevents the cooling temperature from increasing and thereby the beverage from not being cooled sufficiently. Furthermore, closing off the guide channel 11 also prevents the air stream having a higher temperature from being recirculated directly up into the top of the font device 1 without first being cooled.

[0057] Fig. 2 shows another embodiment of the font device 1, wherein the closing part 13 is part of the font device 1 and is positioned at the first end 3 across from the guide channel 11. The closing part 13 is in this embodiment disc-shaped and made of a flexible material, such as plastic or rubber. The disc-shaped closing part 13 comprises a plurality of slits arranged around the periphery of the closing part, and each slit extends from the periphery towards the center of the disc. The disc may also comprise a circular opening at the center, having a diameter equal to an outer diameter of the dispensing line. During mounting of the dispensing line in the font device, the dispensing line may be pushed past the closing part 13 and be positioned in the circular opening. The slits ensure that if the dispensing line comprises elements being larger than its outer diameter, they may pass the closing part 13.

[0058] In Fig. 3, the closing part 13 is arranged in connection with the upper part 15 of the second part 5. The closing part 13 is arranged in a position enabling it to close off the guide channel 11 at the first end 3 when the upper part 15 is positioned in relation to the lower part 14 in a closed position, as shown in Fig. 3. The closing part 13 is made of a flexible material, such as rubber or foam rubber, allowing it to be pressed down against the guide channel 11, thereby closing it off. Furthermore, the dispensing line will be displaced up against the inner face of the guide channel, however, due to the flexible material of the closing part, it will not be damaged since the flexible material will be pressed together and provide room for the dispensing line and at the same time seal off around the dispensing line. In Fig. 4, the upper part 15 is open, and it is shown how the closing part 13 is lifted away from the guide channel 11 at the same time as the upper part 15 is opened.

[0059] Fig. 5 shows a top view of the first 2 and the second part 5 of the dispensing font device 1. The guide channel 11 is arranged in the centre of the first part 2 to obtain easy access. The guide channel 11 has an inner diameter D_1 being large enough to allow guidance of the dispensing line and dispensing line elements through the font device. In this embodiment, the first channel 11 terminates between the guide channel and the horizontal extension of the second part 5 to lead the cold airstream into the second part. The second channel 10 is placed on the opposite side of guide channel 11 next to the hinge 16.

[0060] An additional closing part (not shown) may be arranged for substantially closing off a fluid communication to the guide channel at the second end of the first part during use of the font device.

[0061] Figs. 6a-6g show different embodiment of the closing part 13. The embodiments shown in Figs. 6a-6e are all adapted to be part of the dispensing line. In situations where the closing part is mounted on the dispensing line, the dispensing line is preferably guided through the guide channel from the first end of the first part. In Fig. 6a, the closing part 13 is disc-shaped. In Fig. 6b, the closing part 13 has a truncated cone-shape. In Fig. 6c, the closing part 13 is hemispherically shaped. In Fig. 6d, the closing part is again disc-shaped, however, with a larger thickness than in the embodiment shown in Fig. 6a. In Fig. 6e, the closing part 13 is ball-shaped. In the different embodiments of the closing part shown, the closing part may have an outer diameter being equal to or larger than the inner diameter of the guide channel. If the guide channel has another cross-sectional design, the closing part may be adapted to correspond to that design.

[0062] Figs. 6f-6g show two embodiments of the closing part 13, wherein the closing part 13 may be part of the font device. In Fig. 6f, the embodiment of the closing part 13 shown in connection with Fig. 2 is shown. The disc-shaped closing part 13 comprises a plurality of slits 17 arranged around the periphery 18 of the closing part 13, and each slit 17 extends from the periphery 18 towards the center of the closing part 13. The closing part 13 also comprises a circular opening 19 at the center, having a diameter being equal to an outer diameter of the dispensing line. The opening 19 is adapted to let the dispensing line pass the closing part. The closing part 13 of Fig. 6f may be securely fastened across from the guide channel at the first end.

[0063] In Fig. 6g, another embodiment of the closing part 13 is shown. The closing part 13 is hingedly connected with the first part and is movable between an open position, wherein access to the guide channel is provided, and a closed position, wherein the closing part closes off the guide channel. The closing part 13 comprises two semicircles 20, 21 overlapping each other at the center. Each semicircle comprises a hinge 22. In the center of the closing part 13, an opening 23 is provided which may comprise sealing means (not shown) for sealing off an area around the dispensing line when the dispensing line is present in the opening.

[0064] Figs. 7a-7c show cross-sectional top views of different embodiments of the first part 2 of the dispensing font device 1. In Fig. 7a, the guide channel 11 is positioned in the centre of the first part 2. The first and second channels 9, 10 surround the guide channel 11 in that a single tubular is divided into the two channels. In Fig. 7b, another embodiment is shown. Again, the guide channel 11 is arranged at the centre of the first part 2, and a tubular is arranged concentrically around the guide channel 11. In this embodiment, the tubular is divided into four sections, two of which comprise the first and second channels 9, 10. The two remaining sections may also be used as channels for circulating air in the font device.

[0065] In Fig. 7c, the first channel 9 is arranged con-

centrically outside the second channel 10 and the second channel is arranged concentrically outside the guide channel 11. In situations where the font device only comprises a first channel, the first channel may be arranged concentrically outside the guide channel. Furthermore, the font device may comprise a cover arranged outside the guide channel. The first channel and/or the second channel may be arranged outside the cover.

[0066] In addition, the first and second channels may be isolated to minimise heat loss of the circulating cold air stream.

[0067] The cooling unit may be arranged in the second part to provide cold air circulation in the second part. Moreover, the font device is arranged on a housing 24, and the first channel and/or second channel and the guide channel are in fluid communication with an inside of the housing 24. The cooling unit 12 is arranged in the housing 24. The font device 1 may comprise a plurality of cooling units 12. Furthermore, the housing 24 may function as a fridge for keeping the temperature of a beverage contained in a beverage container in the housing low.

[0068] The cooling unit 12 comprises an air circulation unit, such as a blower, a fan, a ventilator and/or a pump, for creating an air flow. A blower may be connected with the first channel 9 for blowing air into the channel. The cooling unit 12 may also comprise a control unit adapted to stop the circulation of air when the upper part is being moved in relation to the lower part and/or when the housing is being opened.

[0069] The invention also relates to a dispensing system 100 for dispensing a beverage, as shown in Figs. 8 and 9. The system 100 comprises a dispensing font device 1 as described above, a housing 24 comprising a beverage container 25, and a dispensing line 8 extending from the beverage container 25 via the guide channel 11 to the tapping handle 6, facilitating dispensing of cold beverage from the beverage container 25.

[0070] Advantageously, the dispensing line 8 is exchanged at the same time as the beverage container 25. The dispensing line may be guided through the guide channel 11 from the first end of the first part, however, it may also be guided through the guide channel from the second end.

[0071] In Fig. 10, the dispensing system 100 is shown in a cross-sectional side view. The dispensing system 100 comprises the housing 24 adapted to house the beverage container 25. The housing 24 is provided with a cooling unit 12 for keeping the beverage at a predetermined temperature and is further provided with circulating means for circulating the cool air in the housing 24. The housing 24 may also comprise propelling means, or propelling means may be connected to the beverage container 25 in the housing. The propelling means may be a gas, such as CO₂, or it may be a pressure chamber utilising a pneumatic or mechanical pressure means to force the beverage out of the beverage container 25. In the shown embodiment, the propelling means is a gas

contained in a gas cylinder 31 which is connected via a gas line 32 to a dispense head 33 to be connected with the container 25. The dispensing line 8 extends from the beverage container 25 up through the guide channel 11 to the second part 5 of the font device 1 where the dispensing line 8 terminates at the outlet 7. The second part 5 furthermore comprises the tapping handle 6. The guide channel 11 is in this embodiment closed off at the top by the closing part 13 according to the inventive idea.

[0072] The dispensing line may be made of a non-rigid material to facilitate handling and guiding. The dispensing line may comprise a valve at the outlet end, which valve is adapted to be opened and closed by the tapping handle when the dispensing line and valve is positioned in the second part. Instead of a valve, the dispensing valve may comprise a section made of flexible material, such as rubber or silicone. The section is positioned opposite a pinch device arranged in the second part in connection with the tapping handle. The pinch device is adapted to pinch the section of the dispensing line and thereby close off the dispensing line.

[0073] 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 dispensing font device (1) comprising:

- a vertical first part (2) having a first end (3) and a second end (4),
- a substantially horizontal second part (5) being in fluid communication with the first part (2), the second part (5) comprising a tapping handle (6) being adapted to open and close an outlet (7) of a dispensing line (8) extending through the font device (1) during use,
- the first part (2) comprising a first channel (9) extending from the second end (4) to the first end (3), and a guide channel (11) in which the dispensing line (8) is adapted to be guided, thereby extending through the guide channel, the guide channel (11) extending in the first part (2) from the first end (3) to at least the second end (4), and the guide channel (11) having an inner diameter (D₁), and
- a cooling unit (12) adapted to circulate a cooling medium inside the first and second parts (2, 5), wherein a closing part (13) is arranged for substantially closing off a fluid communication to the guide channel (11) at the first end (3) of the first part (2) during use of the font device.

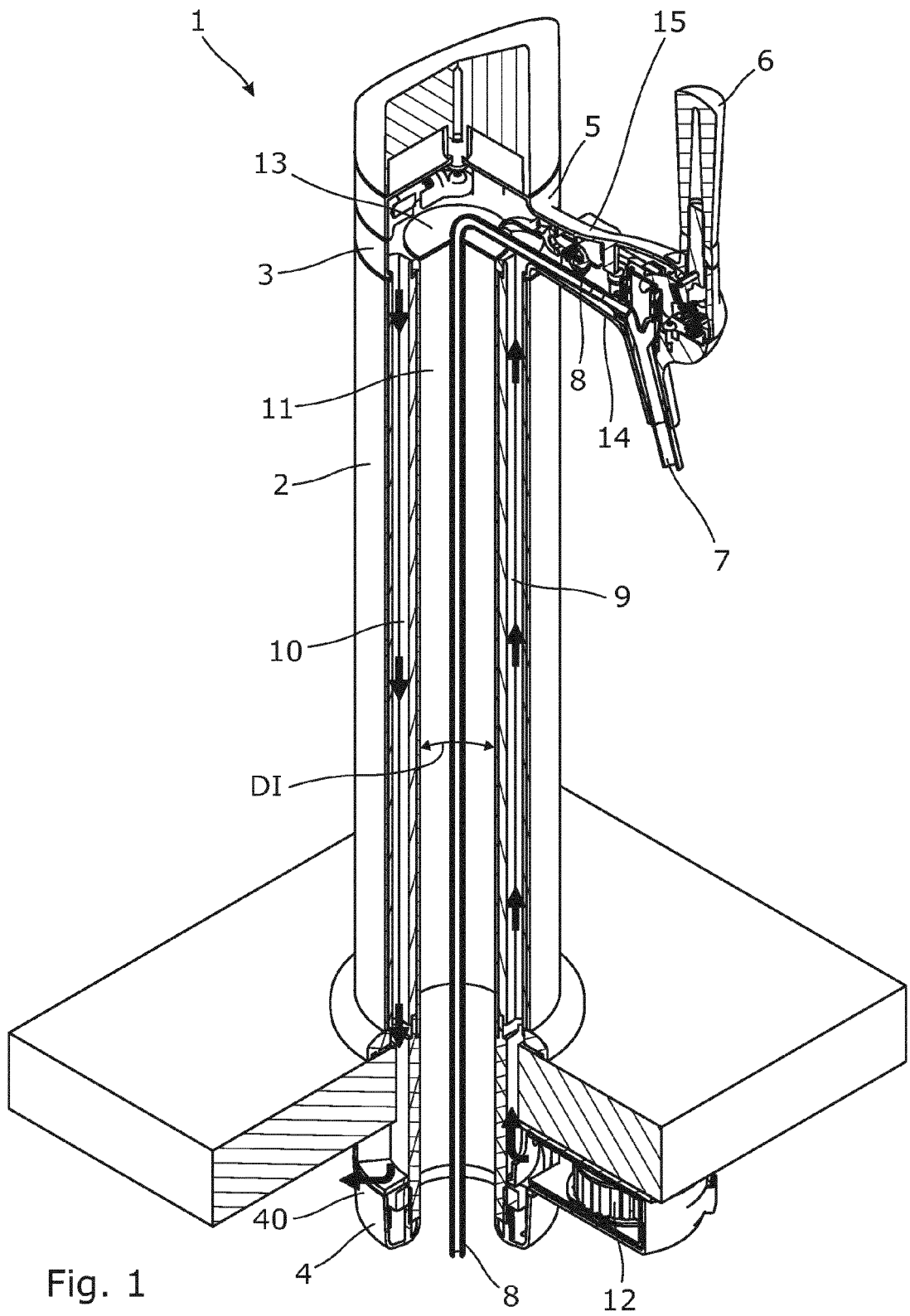
2. A dispensing font device (1) according to claim 1,

wherein the first part (2) comprises a second channel (10) extending from the second end (4) to the first end (3) and being in fluid communication with the first channel (9) at the first end (3).

3. A dispensing font device (1) according to any of the preceding claims, wherein the second part (5) comprises a lower part (14) and an upper part (15), the lower and upper parts (14, 15) being movable in relation to each other to allow for opening of the second part (5). 10
4. A dispensing font device (1) according to any of the preceding claims, wherein the second part (5) is provided with room along its extension to enable air circulation substantially along a section of the dispensing line (8) being positioned in the second part (5) during use. 15
5. A dispensing font device (1) according to any of the preceding claims, wherein the closing part (13) is adapted to be mounted around the dispensing line (8). 20
6. A dispensing font device (1) according to any of the preceding claims, wherein the closing part (13) is made of a flexible material. 25
7. A dispensing font device (1) according to any of the claims 1-4, wherein the closing part (13) is hingedly connected with the first part (2) and is movable between an open position, wherein access to the guide channel (11) is provided, and a closed position, wherein closing part (13) closes off the guide channel (11). 30 35
8. A dispensing font device (1) according to claim 3, wherein the upper part (15) comprises the closing part (13), and the closing part (13) is arranged in a position enabling it to close off the guide channel (11) at the first end (3) when the upper part (15) is positioned in relation to the lower part (14) so that the second part (5) is closed. 40
9. A dispensing font device (1) according to claim 2, wherein the first and second channels (9, 10) are separate tubes extending on an outside face of the guide channel (11). 45
10. A dispensing font device (1) according to any of the preceding claims, wherein the cooling unit (12) is arranged in the second part (5). 50
11. A dispensing font device (1) according to any of the preceding claims, wherein the font device (1) is arranged on a housing (24), and the first channel (9) and/or second channel (10) and the guide channel (11) are in fluid communication with an inside of the

housing.

12. A dispensing font device (1) according to claim 11, wherein the cooling unit (12) is arranged in the housing (24). 5
13. A dispensing font device (1) according to any of the preceding claims, wherein the second part (5) comprises a deflector or guide for guiding an airstream into an opposite end of the second part in relation to the first part. 10
14. A dispensing font device (1) according to any of the preceding claims, wherein the cooling unit (12) comprises a control unit adapted to stop the circulation of air when the upper part (15) is being moved in relation to the lower part (14) and/or when the housing (24) is being opened. 15
15. A dispensing system (100) for dispensing a beverage, comprising: 20
 - a dispensing font device (1) according to any of the preceding claims,
 - a housing (24) comprising a beverage container (25), and
 - a dispensing line (8) extending from the beverage container (25) via the guide channel (11) to the tapping handle (6), facilitating dispensing of cold beverage from the beverage container (25). 25 30 35 40 45 50 55



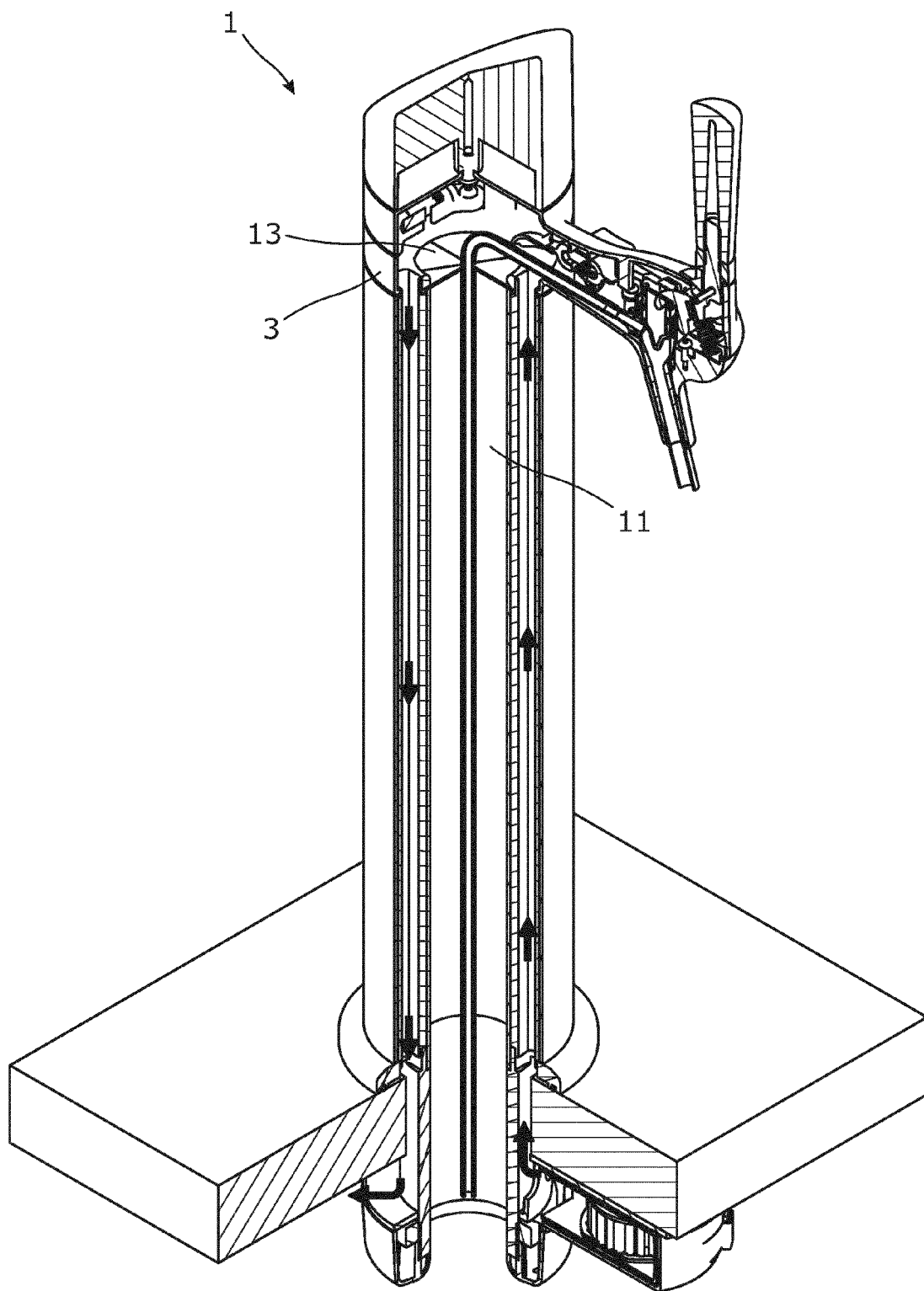


Fig. 2

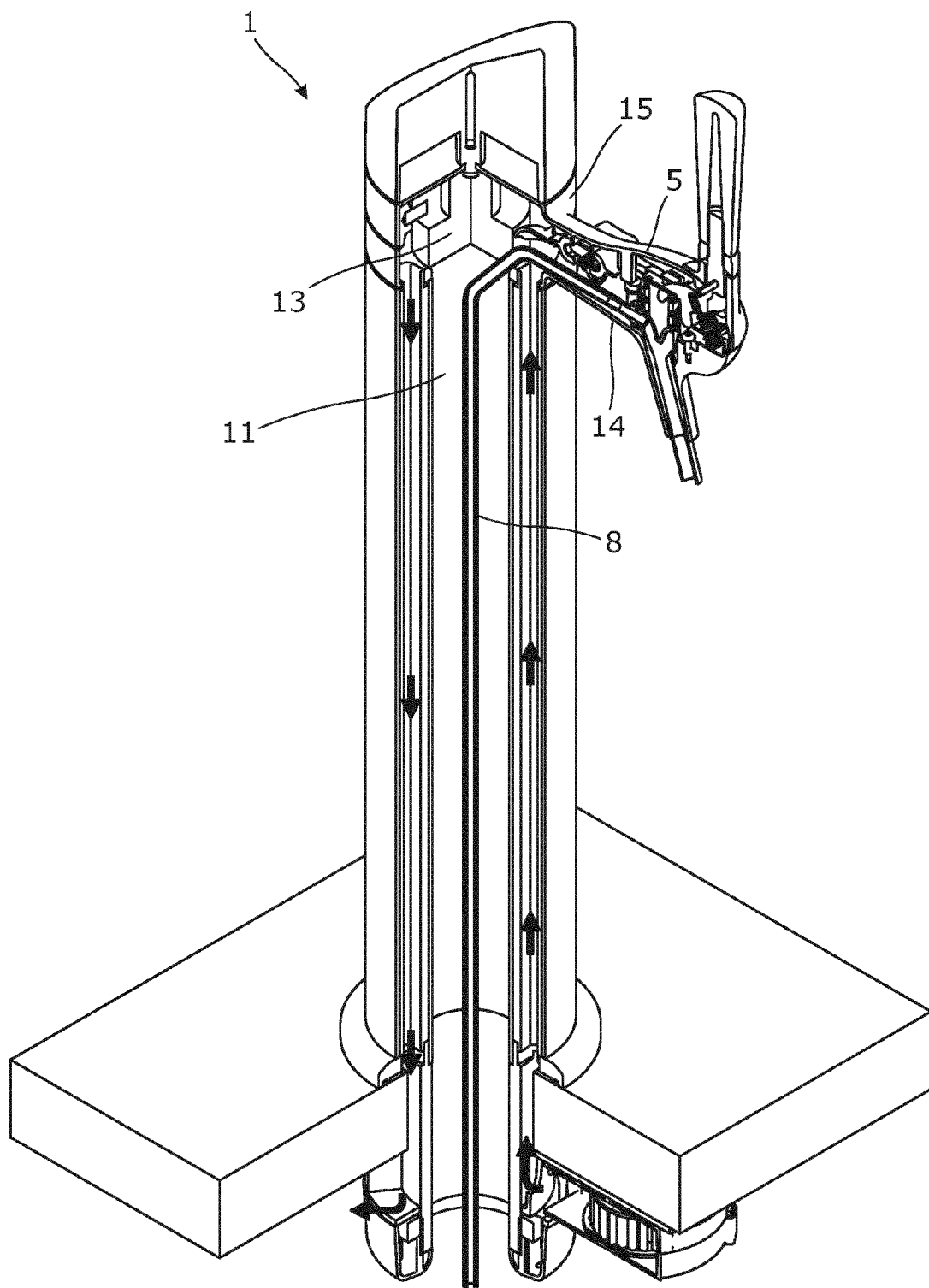


Fig. 3

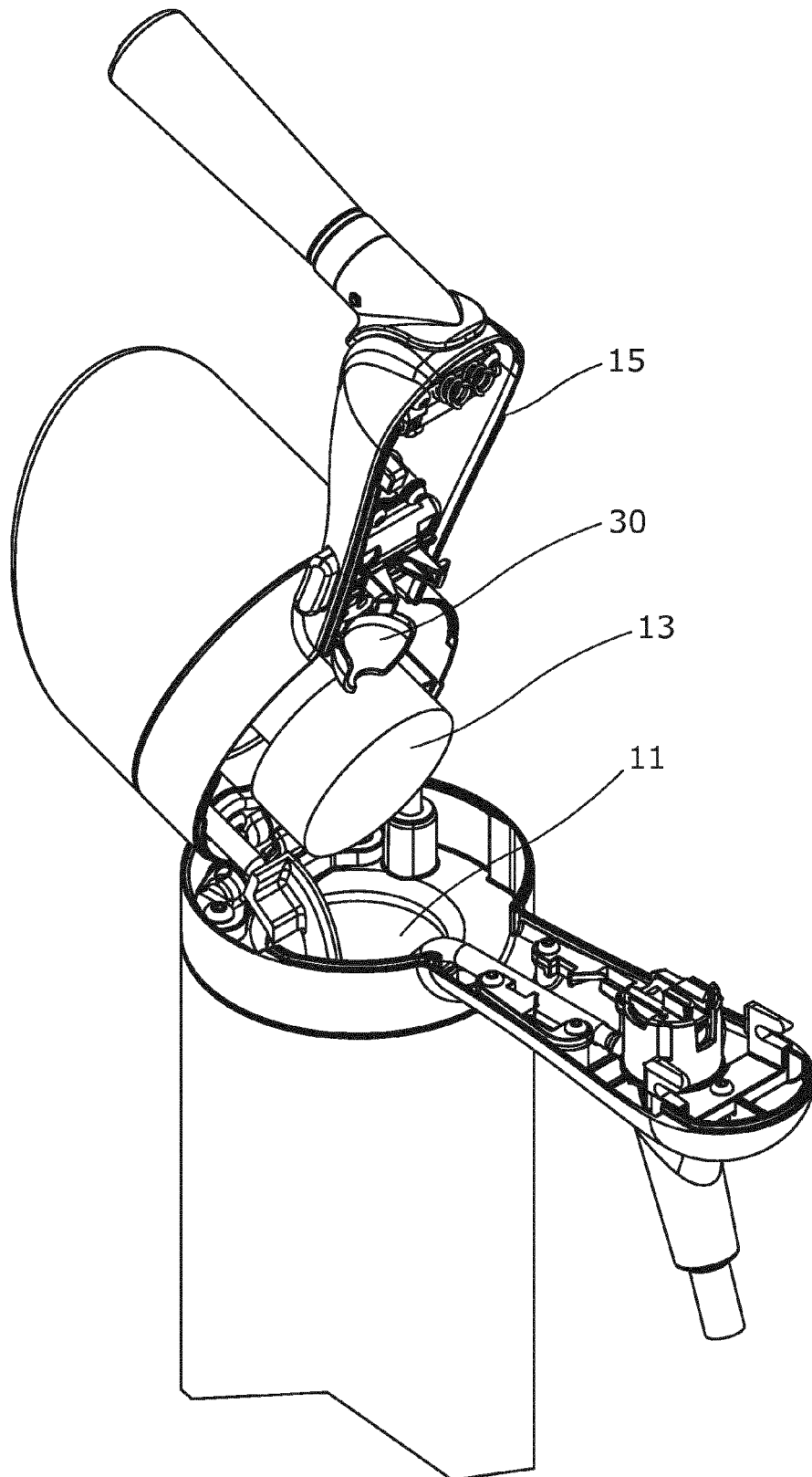


Fig. 4

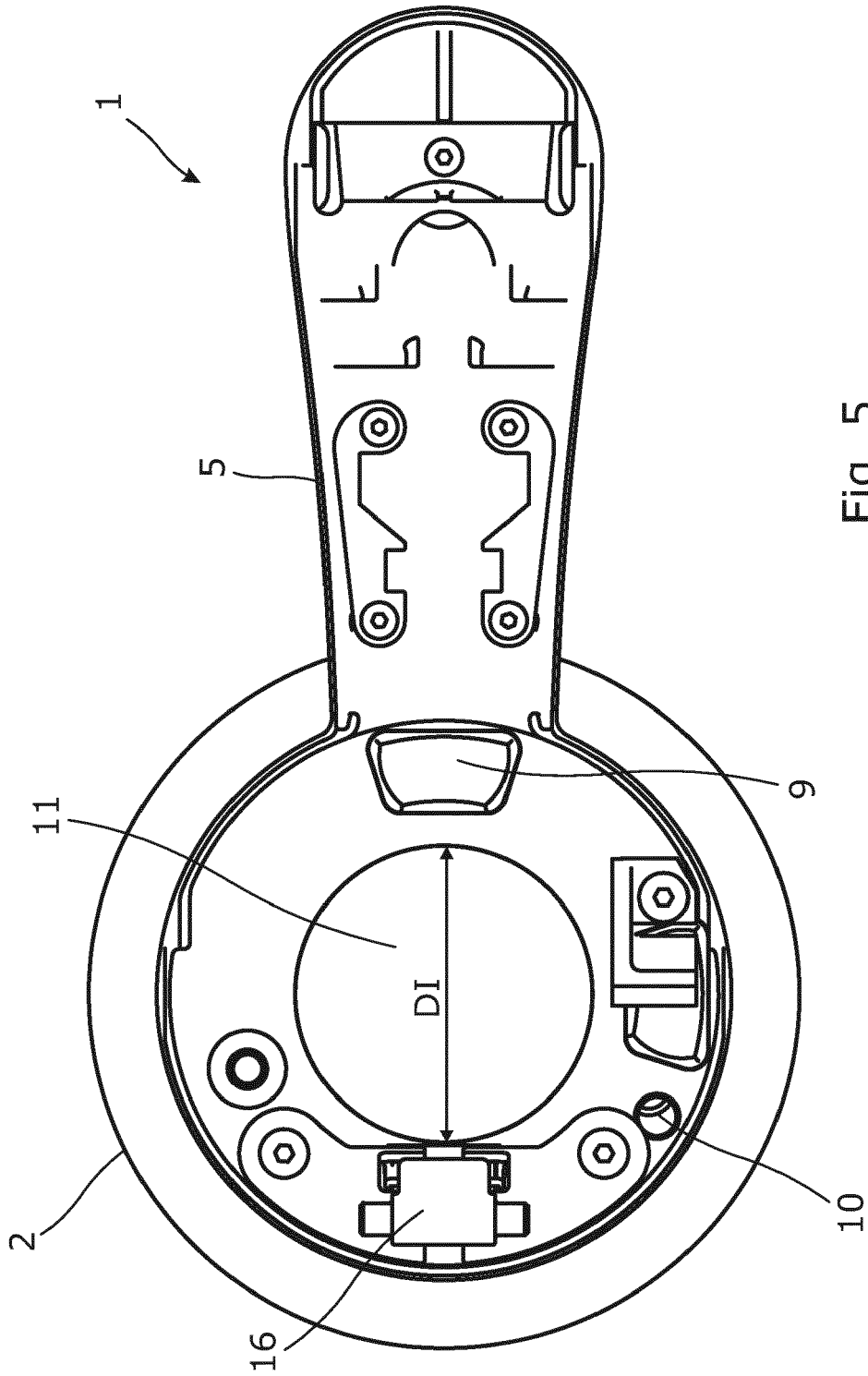


Fig. 5

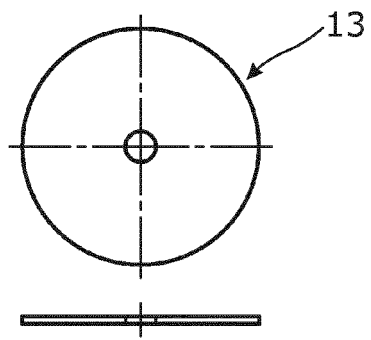


Fig. 6a

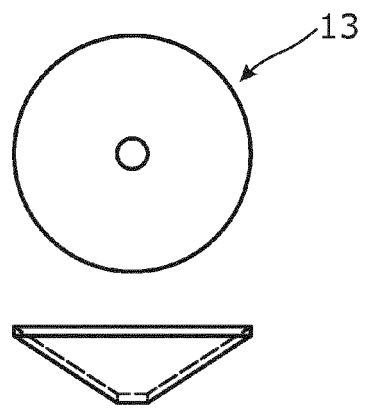


Fig. 6b

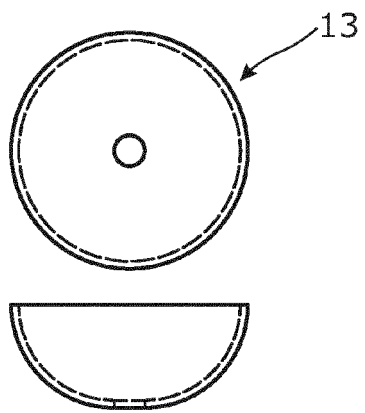


Fig. 6c

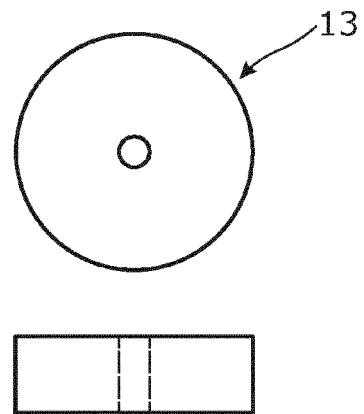


Fig. 6d

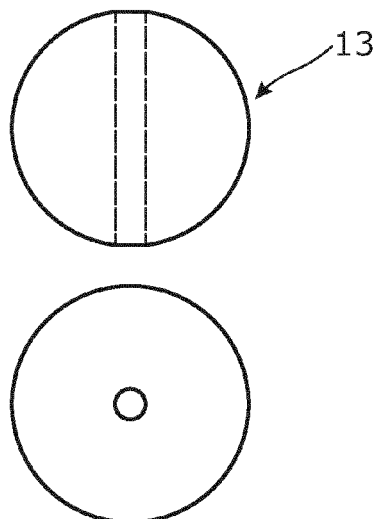
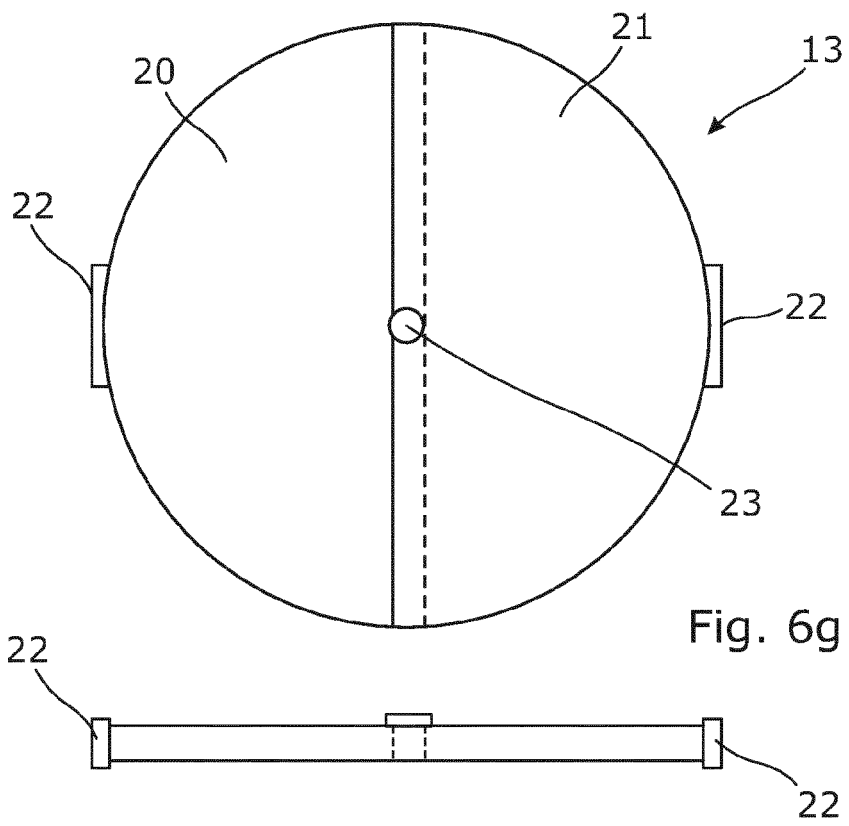
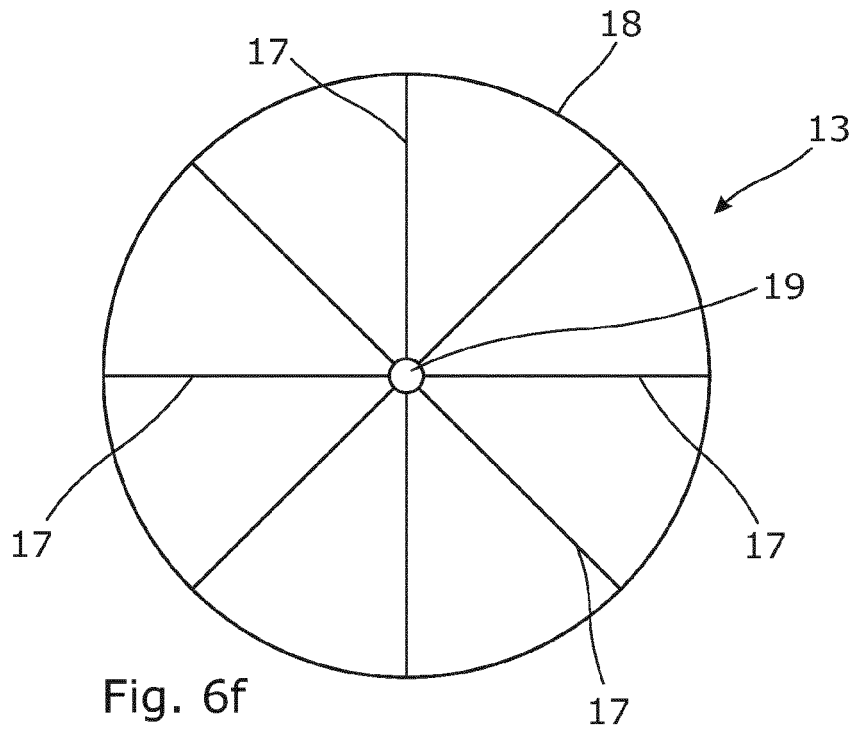


Fig. 6e



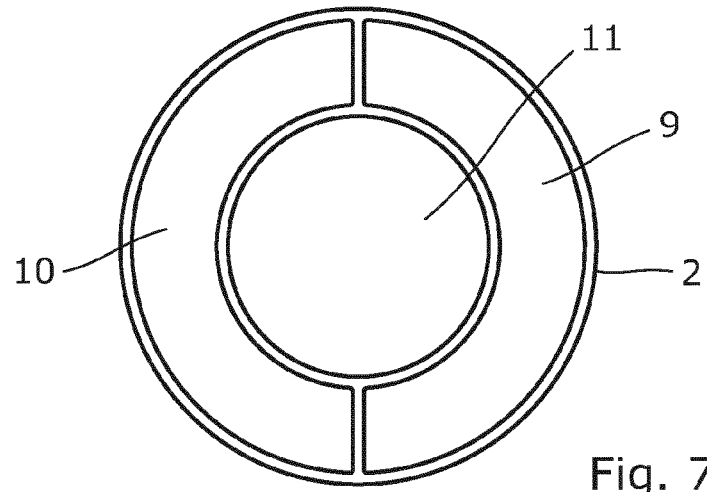


Fig. 7a

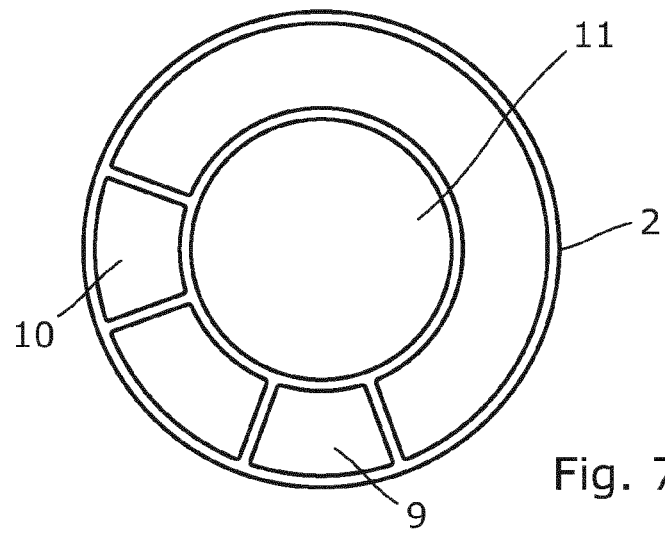


Fig. 7b

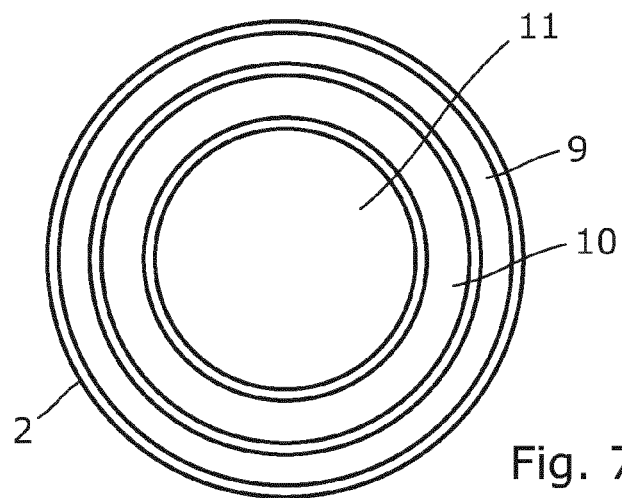


Fig. 7c

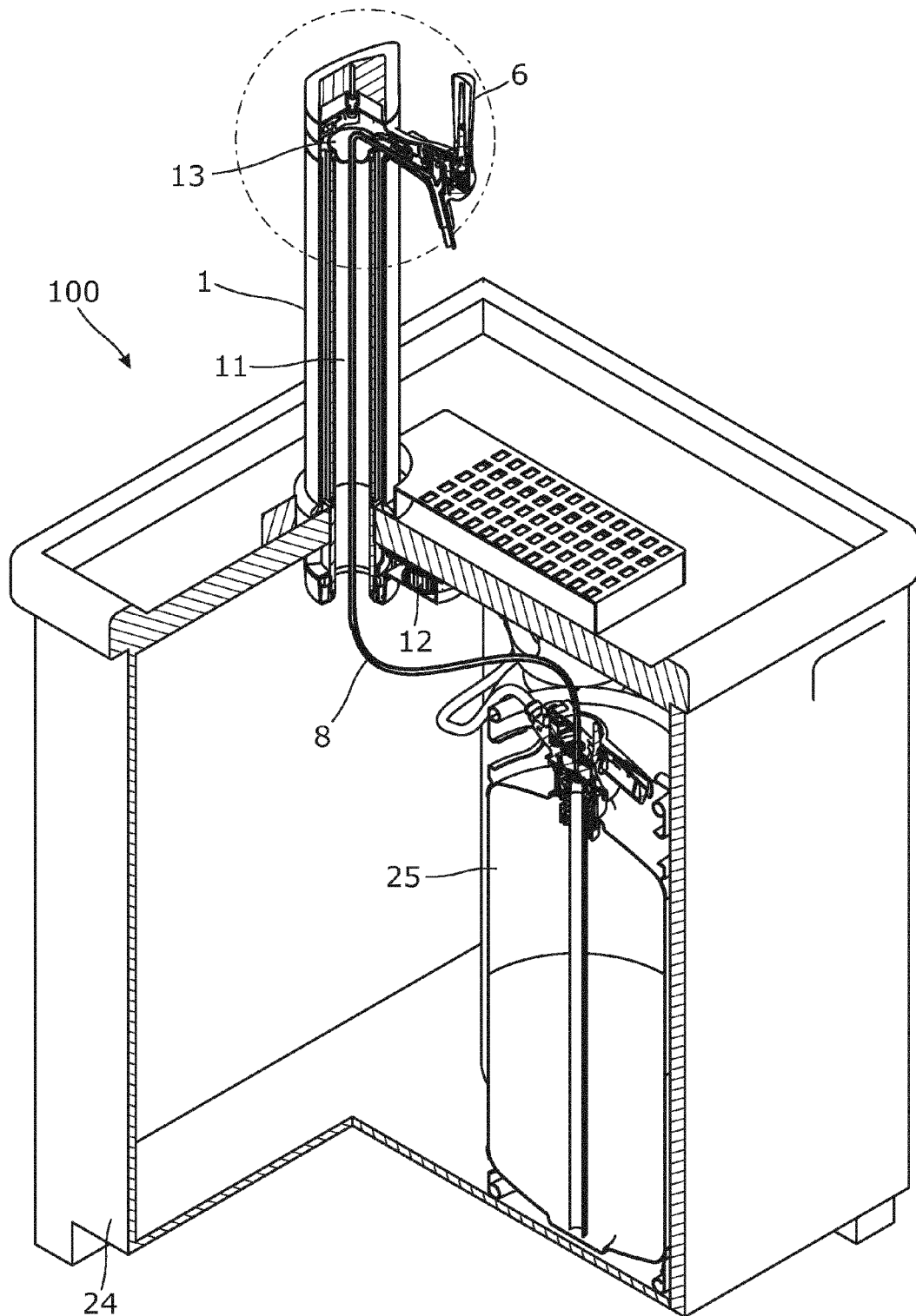


Fig. 8

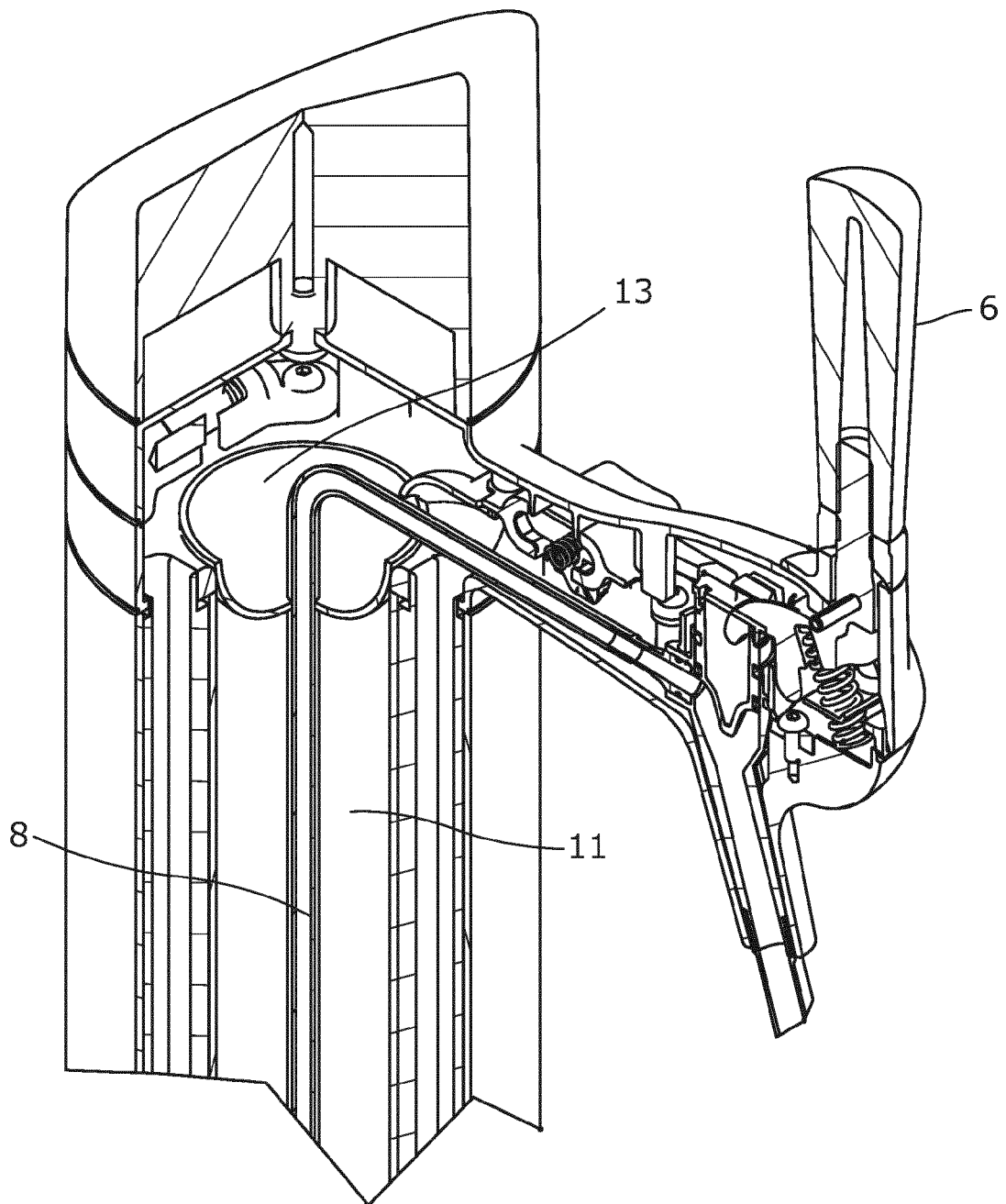
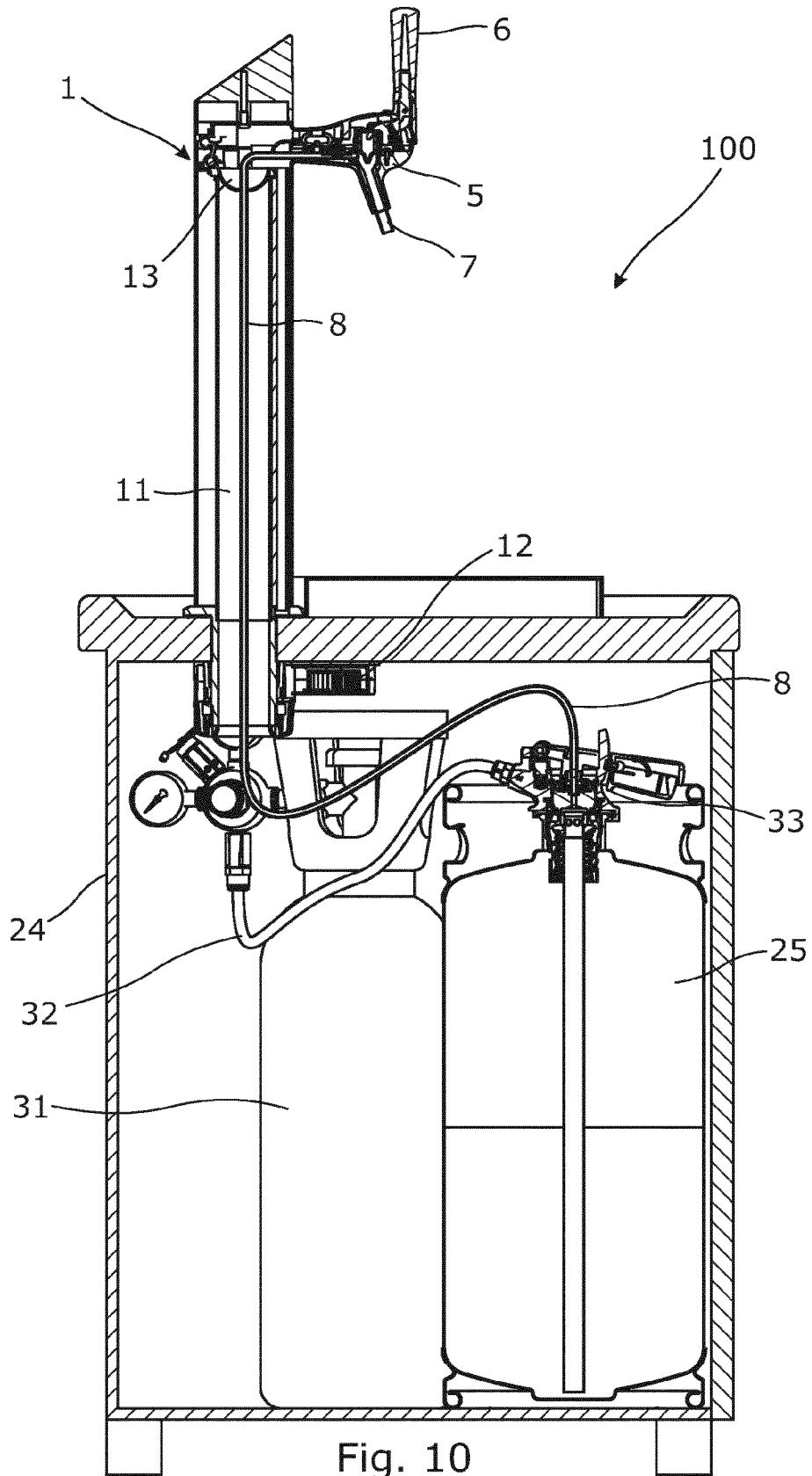


Fig. 9





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Place of search Munich		Date of completion of the search 11 November 2013	Examiner Schultz, Tom
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