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(54) BEVERAGE DISPENSING TAP FOR FOAM CONTROL

(57) Beverage dispensing unit 1 comprising a dispensing line 2 having a first end 3 for connection with a beverage container and a second end 4 for connection with a dispensing valve 5. The dispensing valve has an outer face 6 and an outer diameter OD and comprises a valve housing 7 having an inner face 8 and a longitudinal extension L, the valve housing providing a valve chamber 11 and having a radial inlet 12 in relation to the longitudinal extension and an outlet 13 arranged in the longitudinal extension, a valve piston 14 movable in the longitudinal extension in the valve chamber and being configured to open and close the outlet by moving the valve piston between a first open position and a second closed position of the dispensing valve, the valve piston having a first end 15 and a second end 16 and a body 17 extending therebetween, the first end 15 of the valve piston being connectable with an actuating element for moving the valve piston between the first and the second position, wherein the first chamber diameter CD1 is larger than the piston diameter in order to provide a flow passage 19 between the outer piston face 18 and the inner face of the valve housing in the first position of the valve piston.

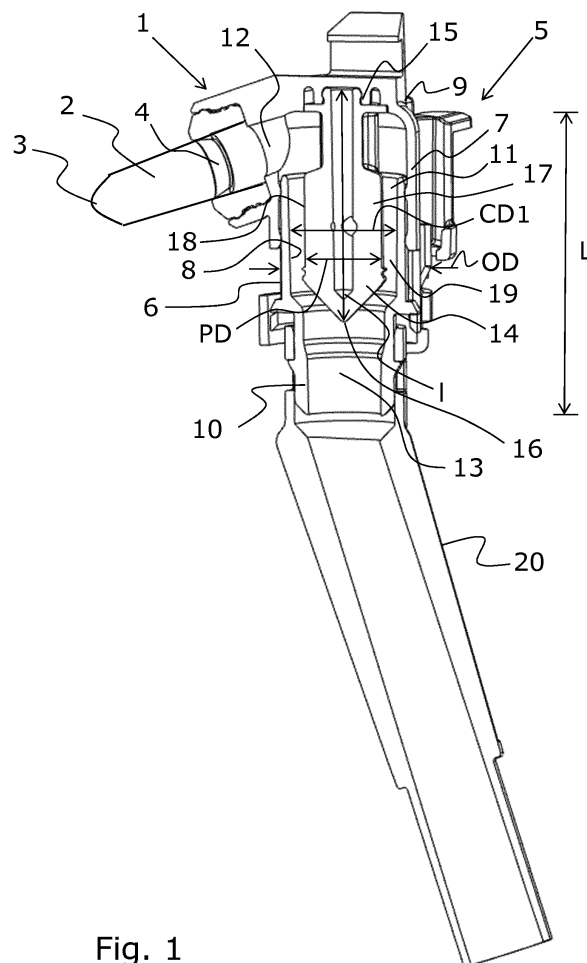


Fig. 1

Description

Field of the invention

[0001] The present invention relates to a beverage dispensing unit for a beverage dispensing system and to a dispensing device for dispensing beverage comprising a beverage dispensing unit according to the present invention.

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. Often the dispensing lines have a dispensing valve cooperating with a handle of a tapping head, so that the dispensing line may be open during dispensing and closed when not dispensing. Many different dispensing valve designs are known. Some of them have a radial inlet in relation to the outlet of the dispensing valve. In this design of the dispensing valve, it has been observed that the flow of the beverage out of the dispensing valve is not always as intended. Hence, there is a need for a solution which improves the flow of beverage out of the dispensing valve having a radial inlet.

Summary of the invention

[0003] 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 an improved beverage dispensing unit having improved beverage flow through the dispensing unit.

[0004] 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 unit for a beverage dispensing system, comprising

- a dispensing line having a first line end and a second line end, the first line end being configured to be connected with a beverage container and the second line end being configured to be connected with a dispensing valve,
- the dispensing valve having an outer face and an outer diameter and comprising
 - a valve housing having an inner face and a longitudinal extension, the valve housing having a first housing end and a second housing end, the valve housing providing a valve chamber, the valve chamber having a first chamber diameter, the valve housing having a radial inlet in relation to the longitudinal extension and an outlet arranged in the longitudinal extension,

- a valve piston movable in the longitudinal extension in the valve chamber, the valve piston being configured to open and close the outlet by moving the valve piston between a first position being the open state of the dispensing valve and a second position being the closed state of the dispensing valve, the valve piston having a first piston end and a second piston end and a body extending between the first piston end and the second piston end, the body having a length and an outer piston face, the first end of the valve piston being configured to be connected with an activation element for moving the valve piston between the first position and the second position, the valve piston having a piston diameter,

wherein the first chamber diameter is larger than the piston diameter in order to provide a flow passage between the outer piston face and the inner face of the valve housing in the first position of the valve piston.

[0005] The length may be between 10 and 30 mm.

[0006] Moreover, the flow passage may have a width of between 3 and 10 mm.

[0007] Also, one or more guiding fin(s) may be arranged in connection with the valve piston opposite the radial inlet for guiding the beverage from the inlet towards the outlet.

[0008] Further, the valve piston may taper at the second end.

[0009] Additionally, the valve chamber may have a second chamber diameter arranged downstream the first chamber diameter, the second chamber diameter being smaller than the first chamber diameter.

[0010] A first transition face may be provided between the first and second chamber diameters, the first transition face being inclined.

[0011] Furthermore, the valve piston may have a diameter which is larger than the second chamber diameter.

[0012] Also, the first transition face may be a valve seat for the valve piston in the second position.

[0013] The valve chamber may have a third chamber diameter arranged downstream the second chamber diameter.

[0014] Further, a second transition face may be provided between the second and third chamber diameters, the second transition face being inclined.

[0015] Moreover, the valve piston diameter at the second piston end may be substantially equal to the second chamber diameter.

[0016] Additionally, the valve piston may have a first circumferential projection or sealing at the second end, the projection or sealing being configured to close the outlet by abutting the inner wall of the valve housing.

[0017] Also, a spout may be arranged in fluid communication with the outlet.

[0018] An opening may be provided in the valve housing and/or the spout downstream the outlet, so that the

spout can be vented and thereby emptied for beverage when the dispensing valve is closed.

[0019] In addition, the valve housing may comprise a first part and a second part, the first part being movable in relation to the second part.

[0020] The radial inlet may be arranged in the first part.

[0021] Moreover, the radial inlet may be movable in the longitudinal extension with the first part.

[0022] Further, sealings may be arranged between the first and second parts.

[0023] Additionally, the first piston end may be connected with the first part.

[0024] Also, the first part may have a first outer face and the second part may have a second outer face.

[0025] Furthermore, the dispensing valve may comprise a movable part, which in a first leg end is connected to the outer face of the dispensing valve, the first outer face of the first part comprising a projecting element, the projecting element being configured to radially displace a second leg end of the movable leg in a direction away from outer face when the valve piston is being moved from the first position to the second position, so that the projection of the second leg end increases the outer diameter of the dispensing valve in the second position.

[0026] The first part may comprise two radially extending arms.

[0027] Moreover, the valve piston may have a third position being a foam creating position, in which third position a second flow passage between the valve piston and the inner face may be arranged, the second flow passage being less than 25% of the flow passage of the first position.

[0028] Further, the valve piston may have a second circumferential projection or sealing at the second end, the second projection being arranged at a distance from the first projection providing an annular groove between them.

[0029] In addition, the second circumferential projection may have a smaller radial extension than the first circumferential groove.

[0030] Furthermore, the third position may be when the second circumferential projection is arranged opposite the second chamber diameter.

[0031] The present invention also relates to a dispensing device for dispensing beverage comprising a beverage dispensing unit as described above.

Brief description of the drawings

[0032] 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

Figs. 1-2 show, in cross-sectional views, a dispensing valve in an open position and in a closed position,

Fig. 3 shows an enlarged cross-sectional view of the valve housing,

Fig. 4 shows the valve housing of Fig. 3 in a top view,

Figs. 5-8 show a venting function of the spout,

Figs. 9-20 show different embodiments of a foaming function,

Fig. 21 shows an embodiment of the beverage dispensing unit in a cross-sectional view,

Fig. 22 shows an embodiment of the beverage dispensing unit,

Fig. 23 shows the beverage dispensing unit being positioned in a tapping head,

Figs. 24-30 show the beverage dispensing unit of Fig. 22,

Figs. 31-33 show another embodiment of a beverage dispensing unit, and

Fig. 34 shows a beverage dispensing device.

[0033] 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

[0034] Fig. 1 shows a beverage dispensing unit 1 comprising a dispensing line 2 having a first line end 3 and a second line end 4, the first line end being configured to be connected with a beverage container (not shown) and the second line end 4 being configured to be connected with a dispensing valve 5.

[0035] The dispensing valve 5 has an outer face 6 and an outer diameter OD. The dispensing valve comprises a valve housing 7 having an inner face 8 and a longitudinal extension L, the valve housing 7 having a first housing end 9 and a second housing end 10. The valve housing 7 provides a valve chamber 11 and the valve chamber 11 has a first chamber diameter CD1. In addition, the valve housing 7 has a radial inlet 12 in relation to the longitudinal extension L and an outlet 13 arranged in the longitudinal extension.

[0036] Furthermore, a valve piston 14 is movable in the longitudinal extension L in the valve chamber 11. The valve piston 14 is configured to open and close the outlet 13 by moving the valve piston 14 between a first position being the open state of the dispensing valve 5, i.e. the position shown in Fig. 1, and a second position being the closed state of the dispensing valve 5, i.e. the position shown in Fig. 2.

[0037] The valve piston 14 has a first piston end 15 and a second piston end 16 and a body 17 extending between the first piston end and the second piston end. The body 17 has a length l and an outer piston face 18, the first end 15 of the valve piston is configured to be connected with an activation element for moving the valve piston 14 between the first position and the second position, and the valve piston 14 has a piston diameter PD.

[0038] The first chamber diameter CD1 is larger than the piston diameter PD in order to provide a flow passage 19 between the outer piston face 18 and the inner face 8 of the valve housing 7 in the first position of the valve piston 14. Hereby it is obtained that when the beverage is entering the valve chamber and is led through the flow passage between the valve piston and the inner face of the valve housing, the flow passage will function as flow compensator calming the beverage, so that a more steady flow with less turbulence may be dispensed out of the dispensing valve.

[0039] In Fig. 2, the dispensing valve 5 is shown in the second position of the valve piston 14, in which the valve piston 14 is moved downwards in the valve chamber 11, thereby closing the outlet 13 so that no dispensing is possible.

[0040] In addition, a spout 20 is arranged in fluid communication with the outlet downstream of the outlet 13.

[0041] The length l of the body may be between 10 and 30 mm in order to obtain the provision of compensation of the turbulence in the beverage along the body. The flow passage may have a width of between 3 and 10 mm.

[0042] In Fig. 3, the valve housing 7 is shown in an enlarged view. In this embodiment, the valve housing 7 comprises a first part and a second part which will be described further below.

[0043] A plurality of guiding fins 21 are arranged in connection with the valve piston 14 opposite the radial inlet 12 for guiding the beverage from the inlet towards the outlet 13. The guiding fins 21 have the function of calming the beverage and minimising the turbulence in the beverage flow through the valve housing. In Fig. 4, a part of the valve housing is shown in a top view in which the four guiding fins 21 are arranged opposite the radial inlet 12.

[0044] In addition, as shown in Fig. 3, the valve piston 14 tapers at the second end 16.

[0045] The valve chamber 11 has a second chamber diameter CD2 arranged downstream the first chamber diameter CD1, the second chamber diameter CD2 being smaller than the first chamber diameter CD1. A first transition face 22 is provided between the first and second chamber diameters CD1, CD2, the first transition face 22 being inclined. Hereby it is obtained that a flow area of the dispensing valve is kept substantially equal from the inlet to the outlet.

[0046] In a not shown embodiment, the valve piston may have a diameter which is larger than the second

chamber diameter CD2, whereby the first transition face may be a valve seat for the valve piston in the second position.

[0047] Also as shown in Fig. 3, the valve chamber 11 has a third chamber diameter CD3 arranged downstream the second chamber diameter CD2. A second transition face 23 is provided between the second and third chamber diameters CD2, CD3, the second transition face 23 being inclined.

[0048] In Figs. 5-8 a venting function is shown. In Fig. 5, the spout 20 has a spout housing 24 partly housing the valve housing 7. In Figs. 5-6, the valve piston 14 is in the first position. Fig. 6 shows an enlarged view of the valve housing 7 and a part of the spout housing 24. An opening 25 is provided in the spout housing 24 downstream the outlet 13, so that the spout can be vented and thereby emptied for beverage when the dispensing valve is closed. In the shown embodiment, the valve housing has a projection 26 placed in front of the opening 25 in the first position so that the opening is sealed off.

[0049] In Fig. 7, the valve piston 14 has been moved to the second position in which the dispensing valve 5 is closed. In this circumstance, residue beverage may be present in the spout 20. In Fig. 8, an enlarged view is shown in which the valve piston 14 is brought into second position in which the second end abuts the inner face of the valve housing 7. During the downwards movement of the valve piston 14, the valve housing 7 has also been moved downwards within the spout housing 24, so that the opening 25 is arranged opposite a recess 27 in the valve housing 7 above the projection 26, whereby air may be led through the opening into the top of the spout, so that the spout may be vented from the top, allowing residue beverage to be emptied out of the spout.

[0050] Figs. 9-11 show a first embodiment of a foaming function of the dispensing valve 5. In Fig. 9, the valve piston 14 is in the first position in which beverage may be dispensed. In the first transition face 22, a groove 28 is arranged in the longitudinal extension. The valve piston 14 has two circumferential projections 29, 30. In Fig. 10, the valve piston 14 is moved into a third position being the foaming position. The circumferential projection 30 is arranged opposite the groove 28 on one side and is abutting the inner face on the other side, whereby a second flow passage 31 is provided. The second flow passage 31 is so small that a pressure drop in the beverage flow is created, thereby providing foam in the dispensed beverage. In Fig. 11, the valve piston is moved into the second position in which the dispensing valve 5 is closed.

[0051] Figs. 12-14 show a second embodiment of a foaming function of the dispensing valve 5. In Fig. 12, the valve piston 14 is in the first position in which beverage may be dispensed. Below the first transition face 22, a circumferential groove 32 is arranged in the inner face. The valve piston 14 has two circumferential projections 29, 30. In Fig. 13, the valve piston 14 is moved into a third position being the foaming position. The circumferential projection 30 is arranged opposite the circumferential

ential groove 32, whereby a second flow passage 31 is provided. The second flow passage 31 is so small that a pressure drop in the beverage flow is created, thereby providing foam in the dispensed beverage. In Fig. 14, the valve piston 14 is moved into the second position in which the dispensing valve 5 is closed.

[0052] Figs. 15-18 show a third embodiment of a foaming function of the dispensing valve 5. In Fig. 15, the valve piston 14 is in the first position in which beverage may be dispensed. The valve piston 14 has two circumferential projections 29, 30 and a third circumferential projection 33 arranged below the circumferential projections 29, 30 as shown in Fig. 18. The third circumferential projection 33 has a smaller radial extension than the circumferential projection 30. In Fig. 16, the valve piston 14 is moved into a third position being the foaming position. The third circumferential projection 33 is arranged below the first transition face 22 and the circumferential projection 30 is arranged opposite the first transition face 22, whereby a second flow passage 31 is provided. The second flow passage 31 is so small that a pressure drop in the beverage flow is created, thereby providing foam in the dispensed beverage. In Fig. 17, the valve piston 14 is moved into the second position in which the dispensing valve 5 is closed.

[0053] Figs. 19-20 show a fourth embodiment of a foaming function of the dispensing valve 5. The design of the valve piston 14 is substantially identical to that of Figs. 15-18. However, the third circumferential projection 33 has substantially the same radial extension as the circumferential projection 30. In addition, one or more longitudinal grooves 34 is/are arranged in the third circumferential projection 33, as shown in Fig. 20. In addition, an annular groove 35 is provided between the circumferential projection 30 and the third circumferential projection 33. In Fig. 19, the valve piston 14 is moved into a third position being the foaming position. The third circumferential projection 33 is arranged below the first transition face 22 and is abutting the inner face below the first transition face 22, and the circumferential projection 30 is arranged opposite the first transition face 22, whereby a second flow passage is provided around the circumferential projection 30 via the annular groove 34 and through the longitudinal grooves 34, as shown in Fig. 20. The second flow passage is so small that a pressure drop in the beverage flow is created, thereby providing foam in the dispensed beverage.

[0054] The dispensing valve 5 shown in Fig. 21 is in the closed position where the valve piston 14 is in the second position. The valve piston has a first circumferential projection 29 and a second circumferential projection 30 at the second end 16, the circumferential projections abutting the inner face of the valve housing 7 in the second position of the valve piston 14. By this radial sealing between the valve piston and the inner face of the valve housing, it is ensured that proper closing of the outlet is obtained, irrespective of tolerance changes of the different components of the dispensing valve 5. In

the present embodiment, the valve piston has two circumferential projections. In another embodiment, the valve piston may have a single circumferential projection configured to abut the inner face of the valve housing in the second position of the valve piston. In yet other embodiments, the valve piston may have a plurality of circumferential projections.

[0055] Furthermore, the valve housing 7 comprises a first part 40 and a second part 41, the first part 40 being movable in relation to the second part 41. The radial inlet 12 is arranged in the first part 40. The radial inlet 12 is movable in the longitudinal extension with the first part 40. Sealings 42 are arranged between the first and second parts 40, 41.

[0056] In addition, the first piston end 15 is connected with the first part 40 so that the valve piston 14 is moved along the first part 40.

[0057] In Fig. 22, the beverage dispensing unit 1 is shown in an outer view. The first part 40 of the valve housing comprises two radially extending arms 45 enabling the operator to pull the first part 40 upwards and subsequently pull the dispensing valve. "Pull" may be printed on the upper faces of the arms 45 in order to indicate their function to the operators. In Fig. 23, the beverage dispensing unit 1 has been positioned in a tapping head 46.

[0058] In Fig. 24, the beverage dispensing unit 1 is shown in an outer view from another angle. The dispensing valve 5 is in the open state, meaning that the valve piston is in the first position. In this embodiment, the dispensing valve shall be in the open position in order to be positioned in the tapping head.

[0059] As shown in Fig. 25, the first part 40 has a first outer face 47 and the second part has a second outer face. In the present embodiment, a spout housing 24 is partly surrounding first and second parts 40, 41, and the spout housing 24 has a second outer face 48.

[0060] In this embodiment, the dispensing valve comprises two movable parts 49, which in a first leg end 50 is connected to the outer face 48. In addition, the first outer face 47 of the first part 40 comprises two projecting elements 51. The projecting elements 51 have an extension in the longitudinal extension and taper towards the outer face 47 at one end 52. In the first position of the valve piston, the projecting elements 51 are positioned above the movable parts 49 and the movable parts 49 are in their retracted position. As mentioned above, in this configuration the beverage dispensing unit 1 is ready to be positioned in the tapping head.

[0061] In Fig. 26, the dispensing valve 5 is shown in the closed position in which the first part 40 has been moved downwards. Fig. 27 is an enlarged view showing that the projecting elements 51 radially displace the second leg ends 53 of the movable parts 49 in a direction away from outer face 48 when the valve piston is being moved from the first position to the second position, so that the projection of the second leg ends 53 increases the outer diameter of the dispensing valve in the second

position. This is better seen in the enlarged top view in Fig. 28 in which it can be seen that the projecting elements 51 push and thereby displace the movable parts 49 outwards, so that the movable parts 49 are in a projected position. In this position the dispensing valve is unable to be positioned in the tapping head due to the increased outer diameter at the movable parts 49.

[0062] In Fig. 29, the dispensing valve 5 is shown positioned in the tapping head 46 wherein the movable parts 49 are in their retracted position, enabling positioning in the tapping head and removal of the dispensing valve 5 from the tapping head 46. The dispensing valve 5 is in the open position.

[0063] In Fig. 30, the dispensing valve is still in the tapping head 46 and is in its closed position. As described above, the projecting elements 51 have pushed and displaced the movable parts 49 into their projected position. In this projected position, the movable parts overlap the edge 55 of the tapping head 46. Thus, if the operator would like to remove the dispensing head from the tapping head, this is not possible since the movable parts 49 would then abut the edge 55, making it impossible to pull the dispensing valve upwards. In the same manner, it would be impossible to insert the dispensing valve 5 into the tapping head in the closed position of the dispensing valve since, as mentioned above, the movable parts 49 would abut the edge from above.

[0064] In Figs. 31-33, another embodiment of the beverage dispensing unit 1 is shown. In this embodiment, a helical spring 56 is arranged for keeping the dispensing valve 5 open when it is not positioned in the tapping head. Fig. 32 shows the valve piston 14 in the second position in which the dispensing valve 5 is closed. The helical spring 56 is then pushed together. In Fig. 33, the valve piston is in its first position, i.e. the open position. The helical spring 56 assists in maintaining the valve piston in its open position when the dispensing valve is being removed from the tapping head.

[0065] In Fig. 34, a dispensing device 100 is shown in a cross-sectional side view. The dispensing device 100 comprises a housing 60 adapted to house a beverage container 61. The housing 60 is provided with a cooling unit 62 for keeping the beverage at a predetermined temperature and is further provided with circulating means for circulating the cool air in the housing 60. The housing 60 may also comprise propelling means, or propelling means may be connected to the beverage container 61 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 61. In the shown embodiment, the propelling means is a gas contained in a gas cylinder 63 which is connected via a gas line 64 to a dispense head 65 to be connected with the beverage container 61. The dispensing line 2 extends from the beverage container 61 up through the guide channel 66 of a font 67. A tapping head 46 comprises the tapping handle 6 configured to open and close the dispensing valve

5 when correctly positioned in the tapping head 46.

[0066] The dispensing line 2 may be made of a non-rigid material to facilitate handling and guiding.

[0067] 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 unit (1) for a beverage dispensing system, comprising

- a dispensing line (2) having a first line end (3) and a second line end (4), the first line end being configured to be connected with a beverage container and the second line end being configured to be connected with a dispensing valve (5),
- the dispensing valve having an outer face (6) and an outer diameter (OD) and comprising

- a valve housing (7) having an inner face (8) and a longitudinal extension (L), the valve housing having a first housing end (9) and a second housing end (10), the valve housing providing a valve chamber (11), the valve chamber having a first chamber diameter (CD1), the valve housing having a radial inlet (12) in relation to the longitudinal extension and an outlet (13) arranged in the longitudinal extension,

- a valve piston (14) movable in the longitudinal extension in the valve chamber, the valve piston being configured to open and close the outlet by moving the valve piston between a first position being the open state of the dispensing valve and a second position being the closed state of the dispensing valve, the valve piston having a first piston end (15) and a second piston end (16) and a body (17) extending between the first piston end and the second piston end, the body having a length (l) and an outer piston face (18), the first end of the valve piston being configured to be connected with an activation element for moving the valve piston between the first position and the second position, the valve piston having a piston diameter,

wherein the first chamber diameter is larger than the piston diameter in order to provide a flow passage (19) between the outer piston face and the inner face of the valve housing in the first position of the valve piston.

2. A beverage dispensing unit according to claim 1, wherein the length is between 10 and 30 mm.
3. A beverage dispensing unit according to claims 1-2, wherein the flow passage has a width of between 3 and 10 mm. 5
4. A beverage dispensing unit according to any of the claims 1-3, wherein one or more guiding fin(s) (21) is/are arranged in connection with the valve piston opposite the radial inlet for guiding the beverage from the inlet towards the outlet. 10
5. A beverage dispensing unit according to any of the claims 1-4, wherein the valve chamber has a second chamber diameter (CD2) arranged downstream the first chamber diameter, the second chamber diameter being smaller than the first chamber diameter. 15
6. A beverage dispensing unit according to claim 5, wherein the valve piston diameter at the second piston end is substantially equal to the second chamber diameter. 20
7. A beverage dispensing unit according to any of the claims 1-6, wherein the valve piston has a first circumferential projection (30) or sealing at the second end, the projection or sealing being configured to close the outlet by abutting the inner wall of the valve housing. 25
30
8. A beverage dispensing unit according to any of the claims 1-7, wherein a spout (20) is arranged in fluid communication with the outlet. 35
9. A beverage dispensing unit according to claim 8, wherein an opening (25) is provided in the valve housing and/or the spout downstream the outlet, so that the spout can be vented and thereby emptied for beverage when the dispensing valve is closed. 40
10. A beverage dispensing unit according to any of the claims 1-9, wherein the valve housing comprises a first part (40) and a second part (41), the first part being movable in relation to the second part. 45
11. A beverage dispensing unit according to claim 10, wherein the first part has a first outer face and the second part has a second outer face. 50
12. A beverage dispensing unit according to claim 11, wherein the dispensing valve comprises a movable part (49), which in a first leg end (50) is connected to the outer face of the dispensing valve, the first outer face of the first part comprising a projecting element (51), the projecting element being configured to radially displace a second leg end (53) of the movable leg in a direction away from outer face when the valve piston is being moved from the first position to the second position, so that the projection of the second leg end increases the outer diameter of the dispensing valve in the second position. 55
13. A beverage dispensing unit according to any of the claims 10-12, wherein the first part comprises two radially extending arms.
14. A beverage dispensing unit according to any of the claims 1-13, wherein the valve piston has a third position being a foam creating position, in which third position a second flow passage (31) between the valve piston and the inner face is arranged, the second flow passage being less than 25% of the flow passage of the first position.
15. A dispensing device (100) for dispensing beverage comprising a beverage dispensing unit (1) according any of the preceding claims.

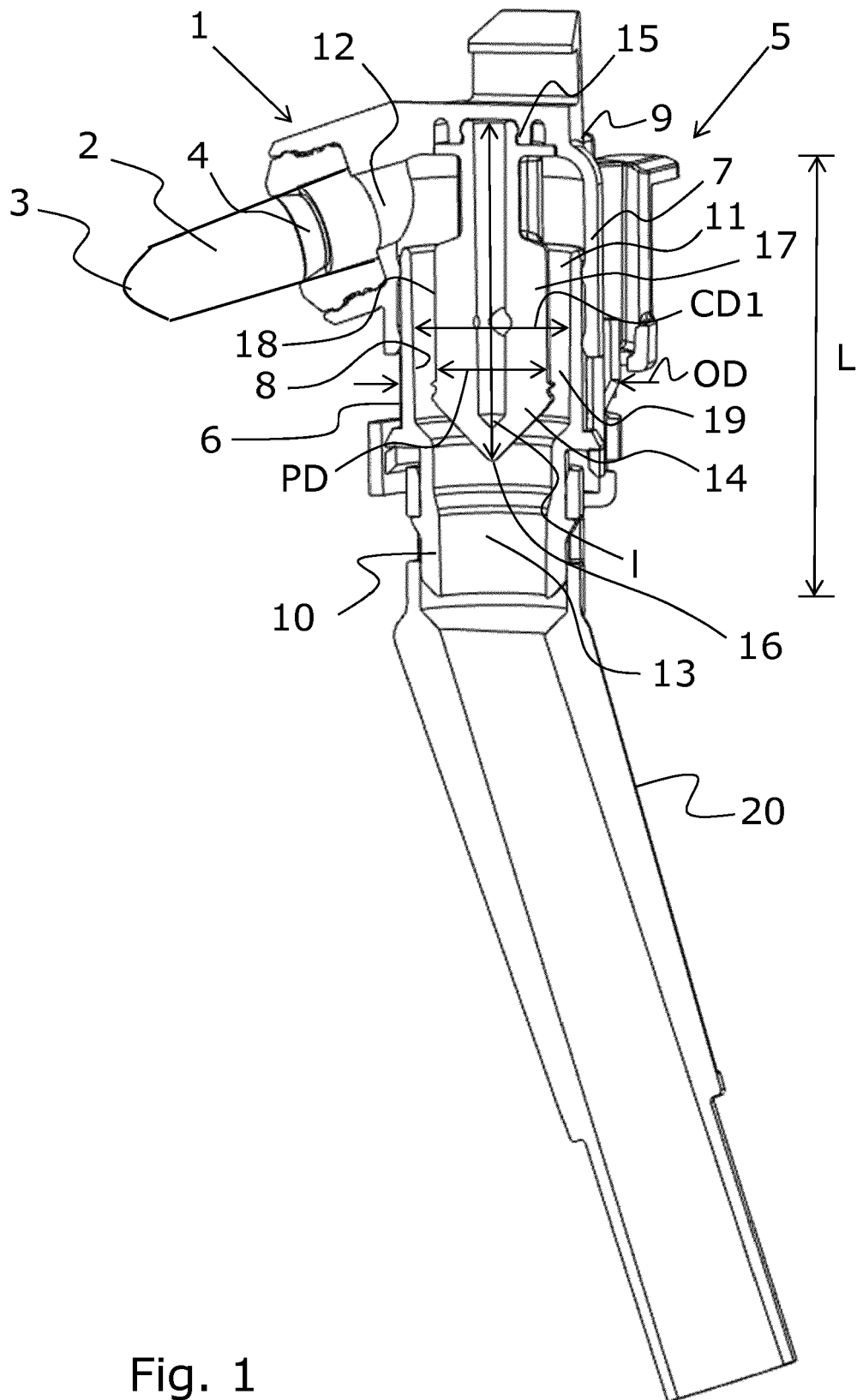


Fig. 1

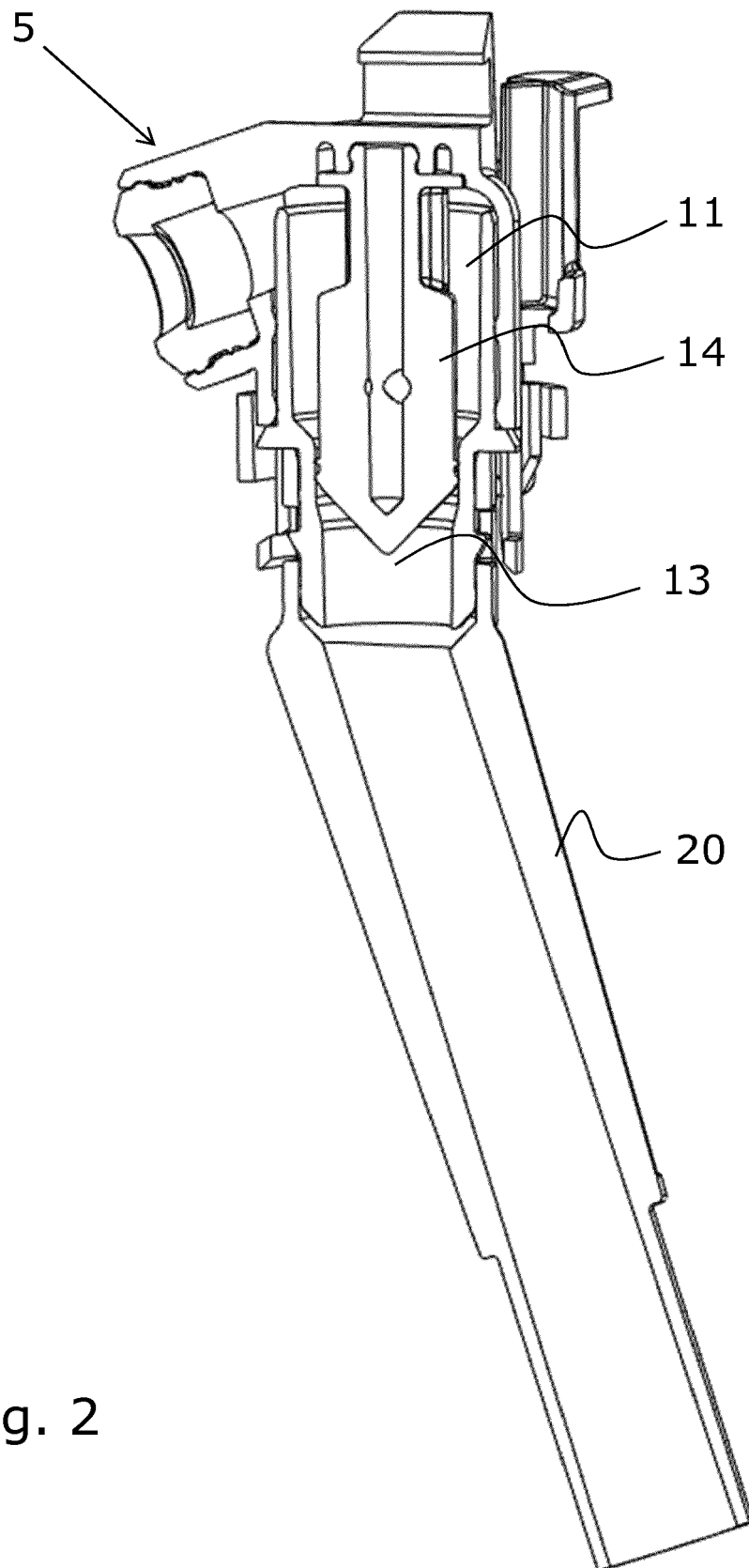


Fig. 2

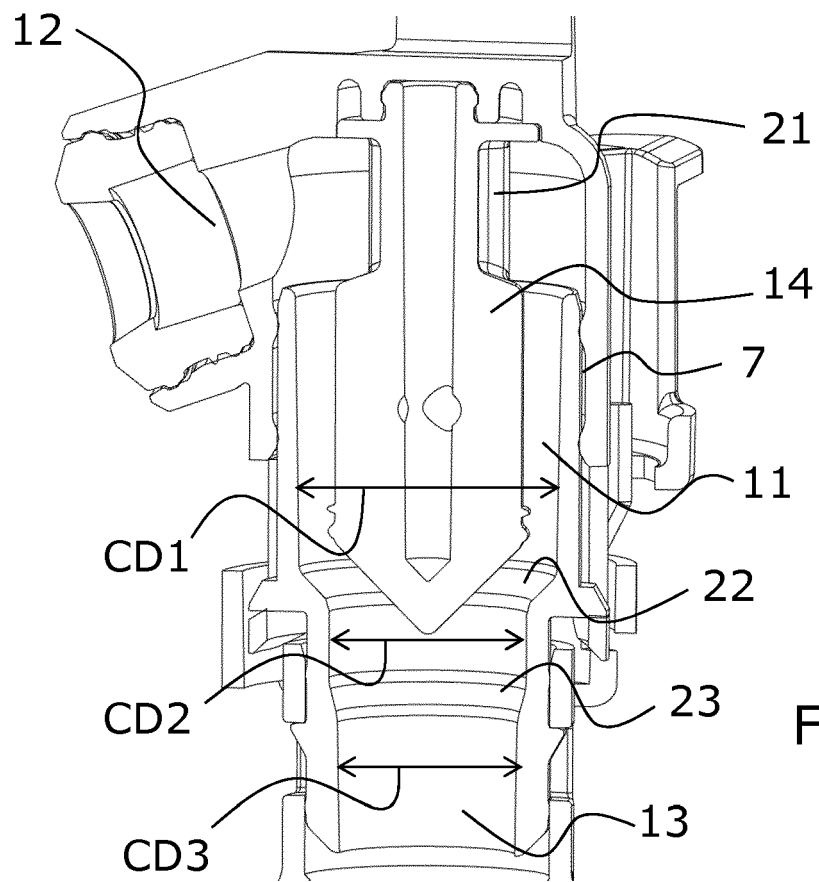


Fig. 3

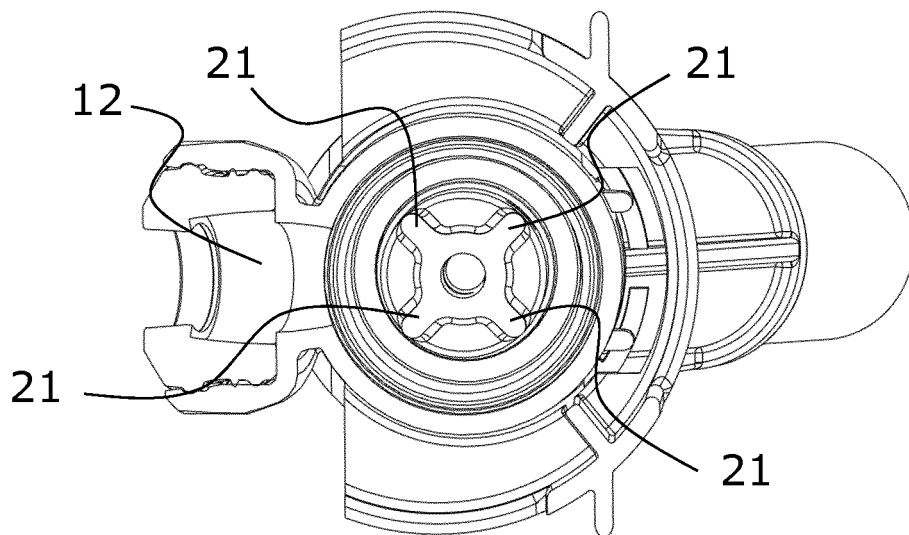


Fig. 4

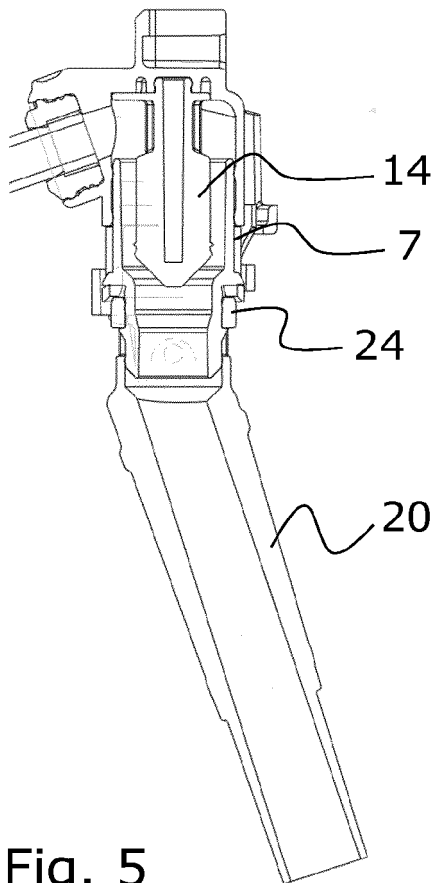


Fig. 5

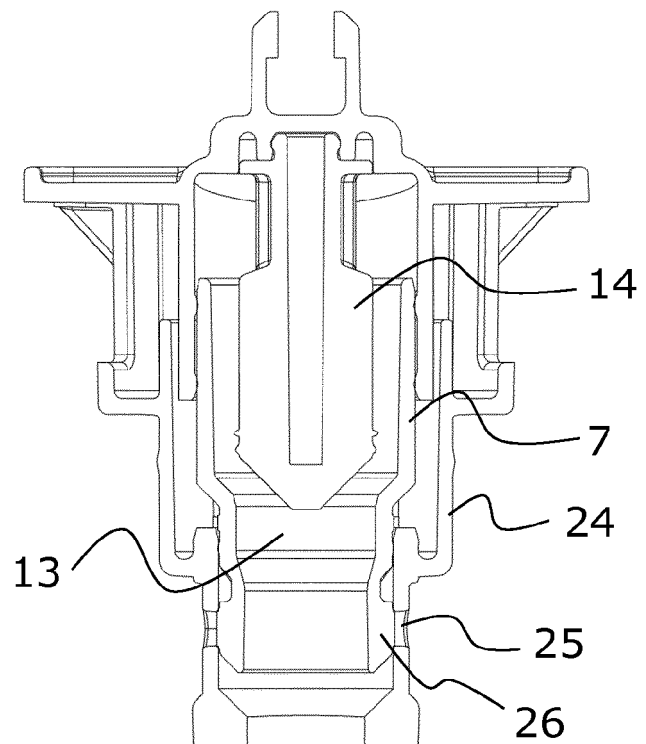
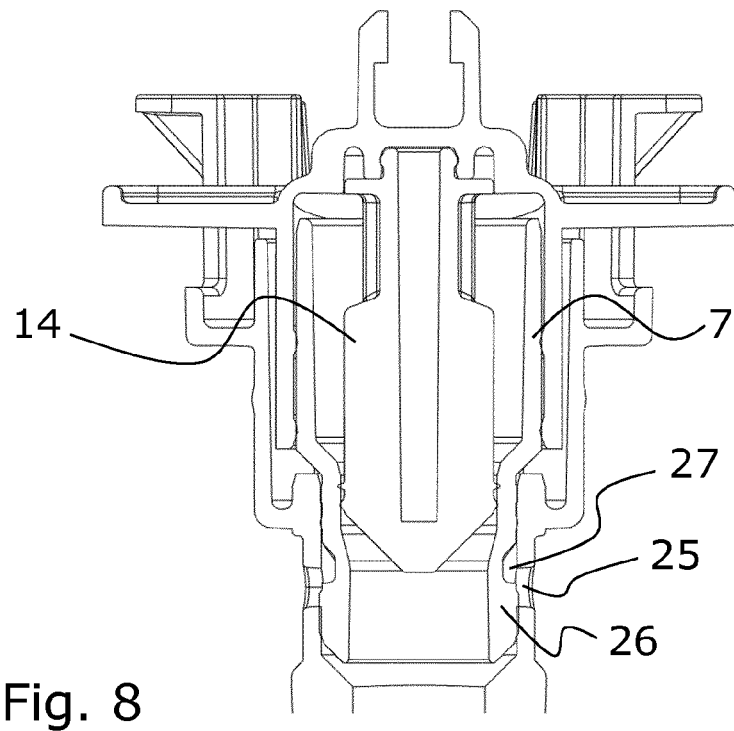
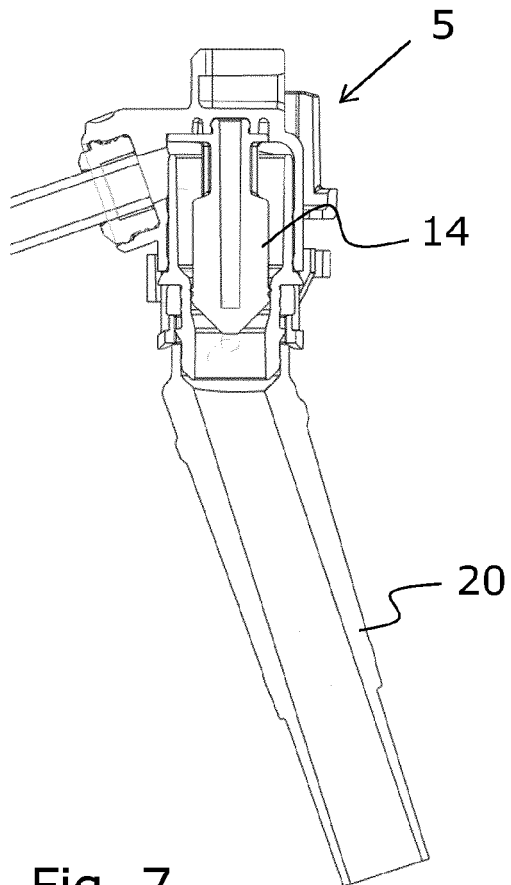


Fig. 6



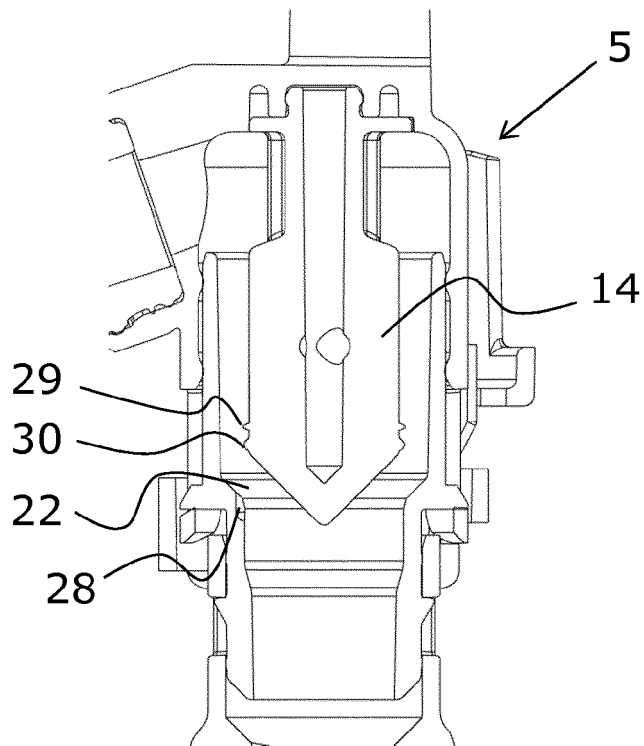


Fig. 9

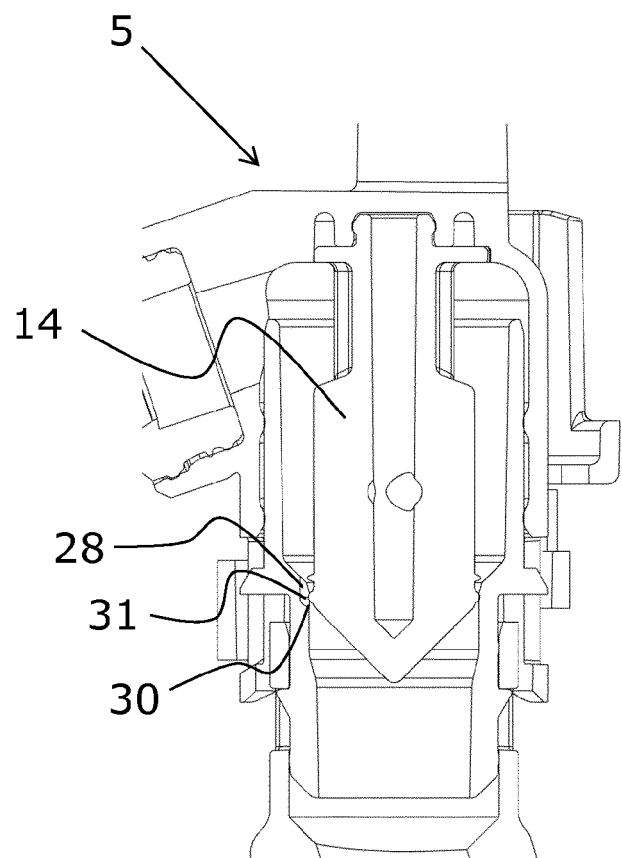


Fig. 10

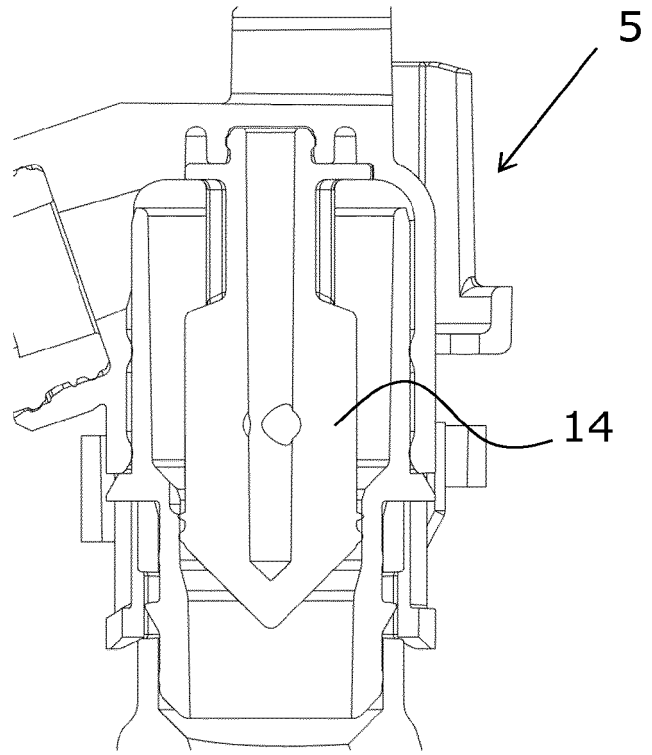


Fig. 11

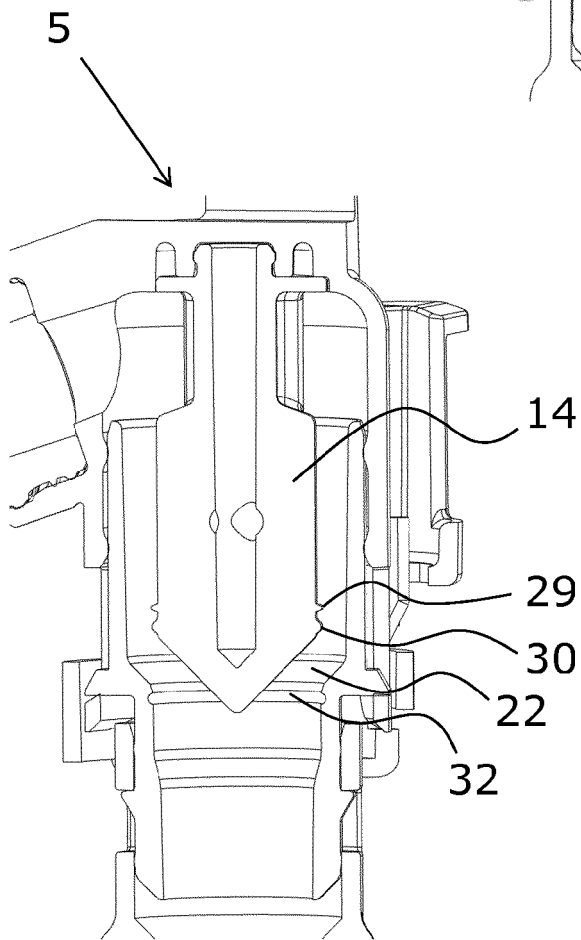


Fig. 12

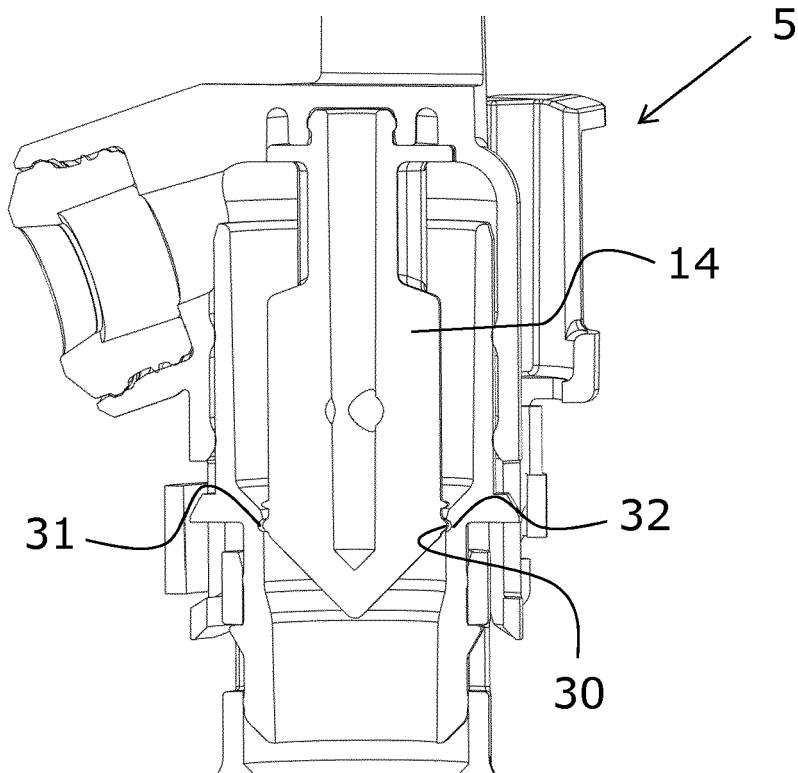


Fig. 13

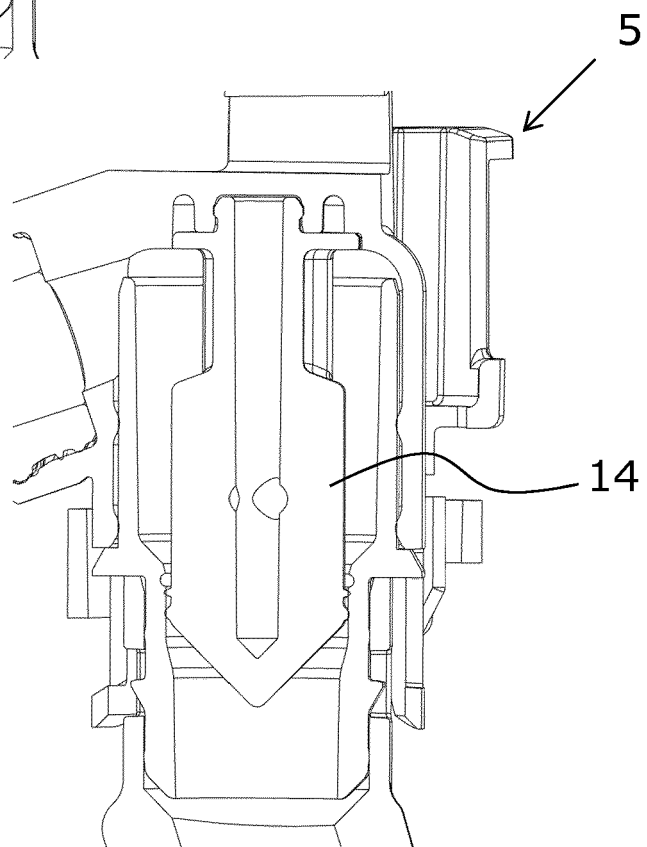


Fig. 14

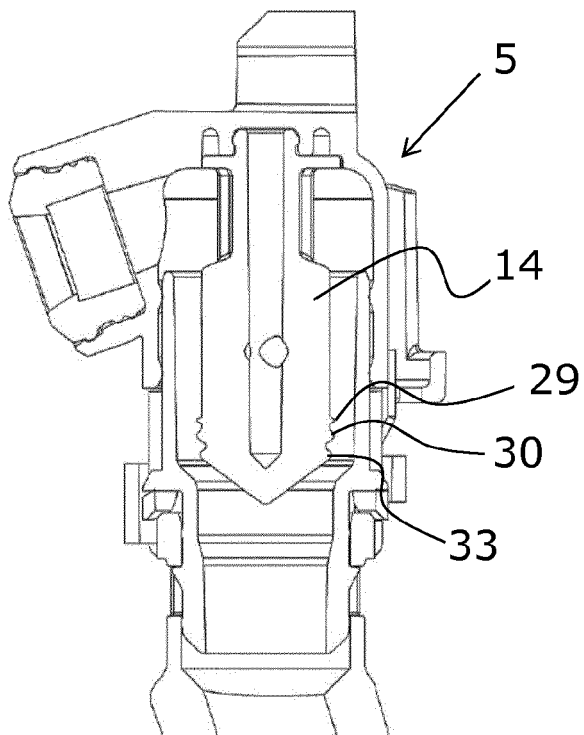


Fig. 15

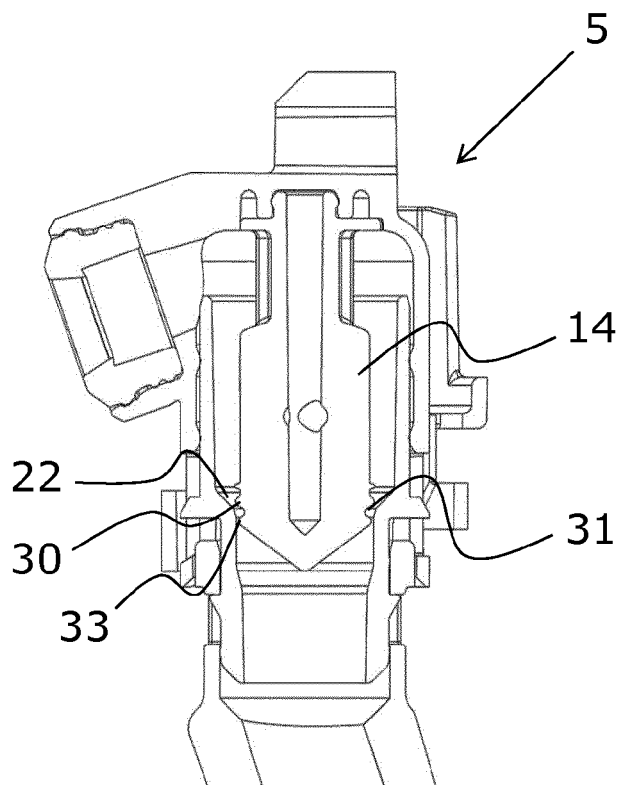


Fig. 16

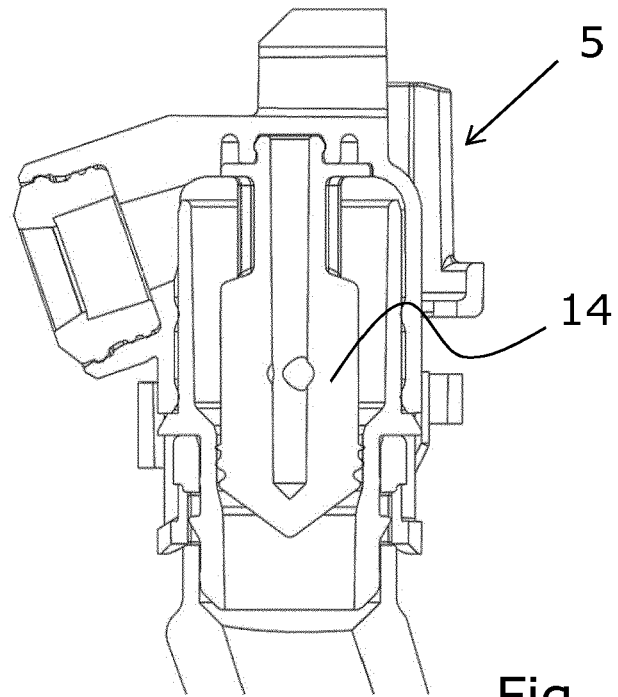


Fig. 17

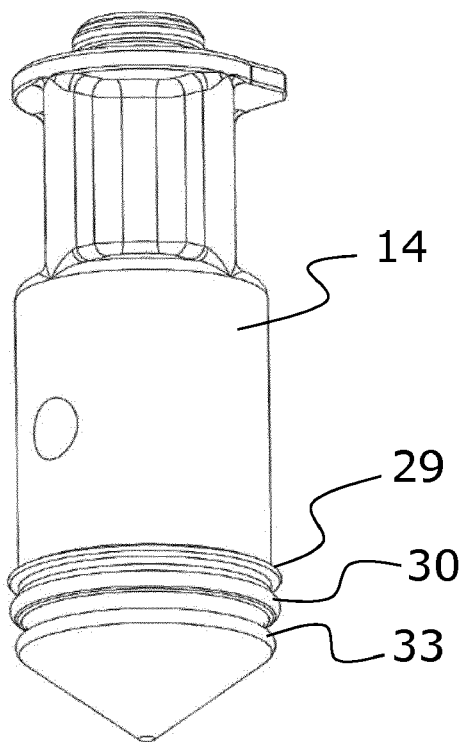


Fig. 18

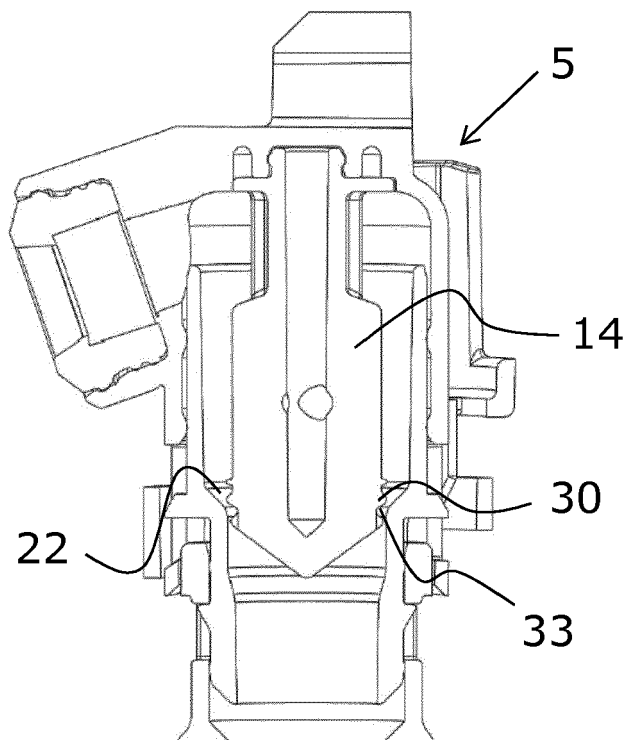


Fig. 19

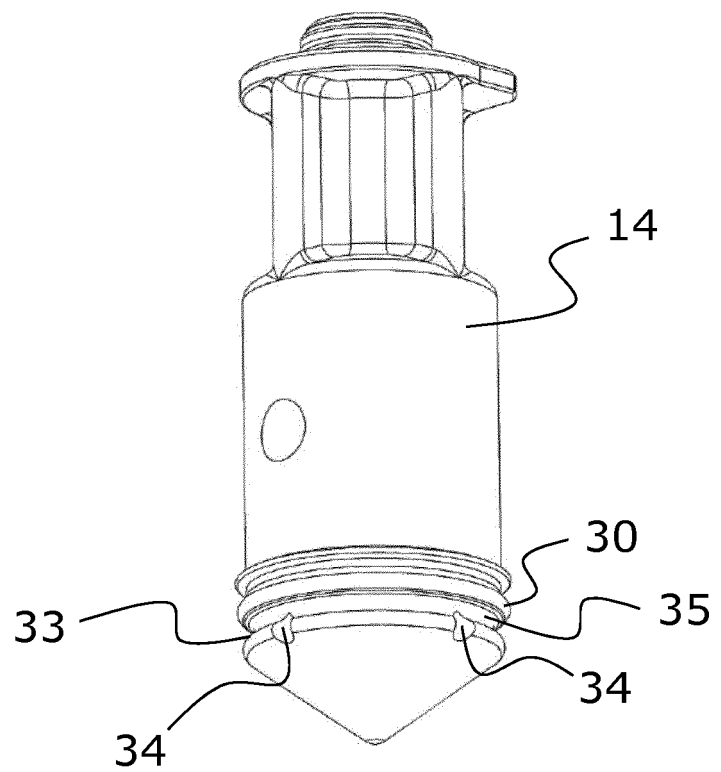


Fig. 20

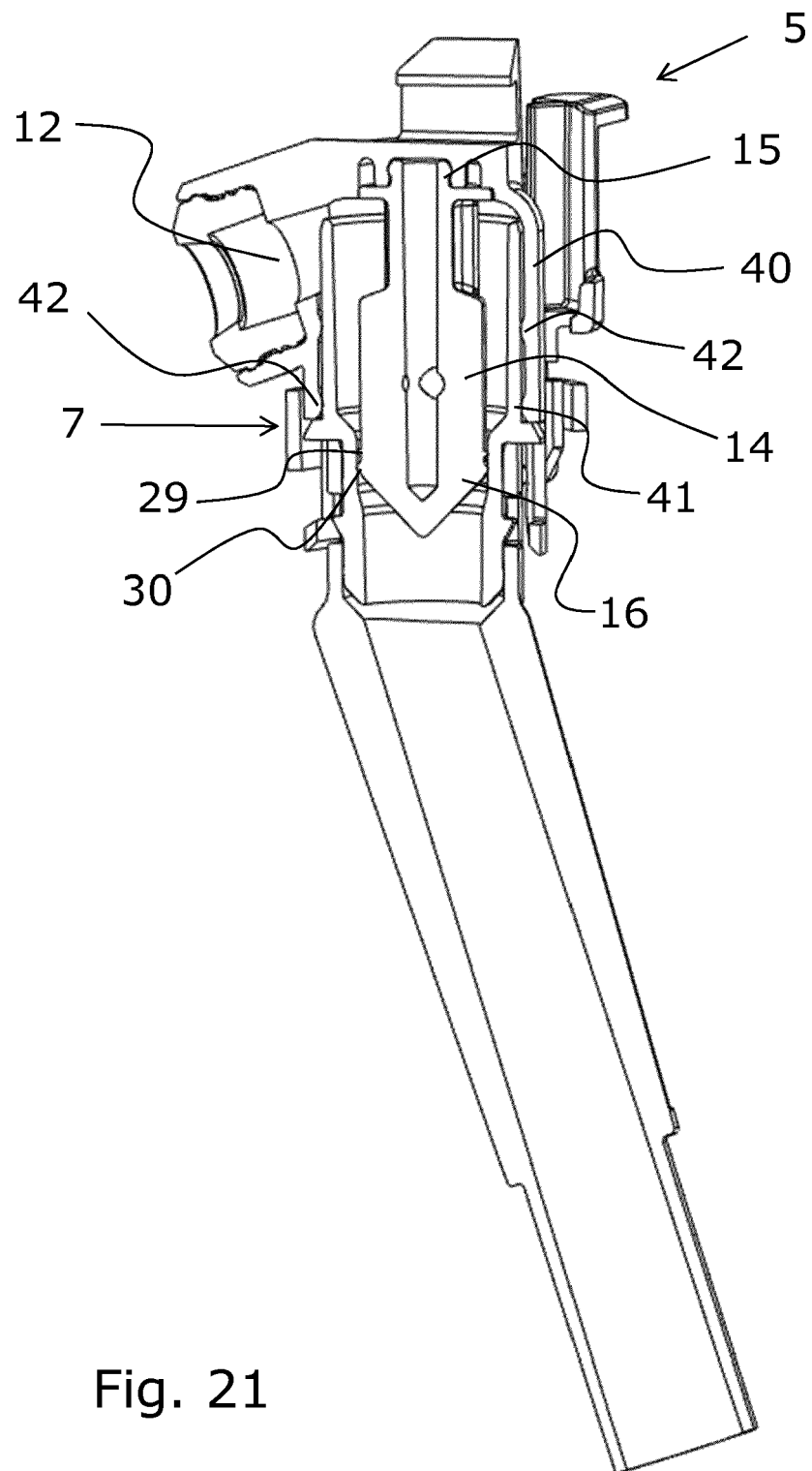


Fig. 21

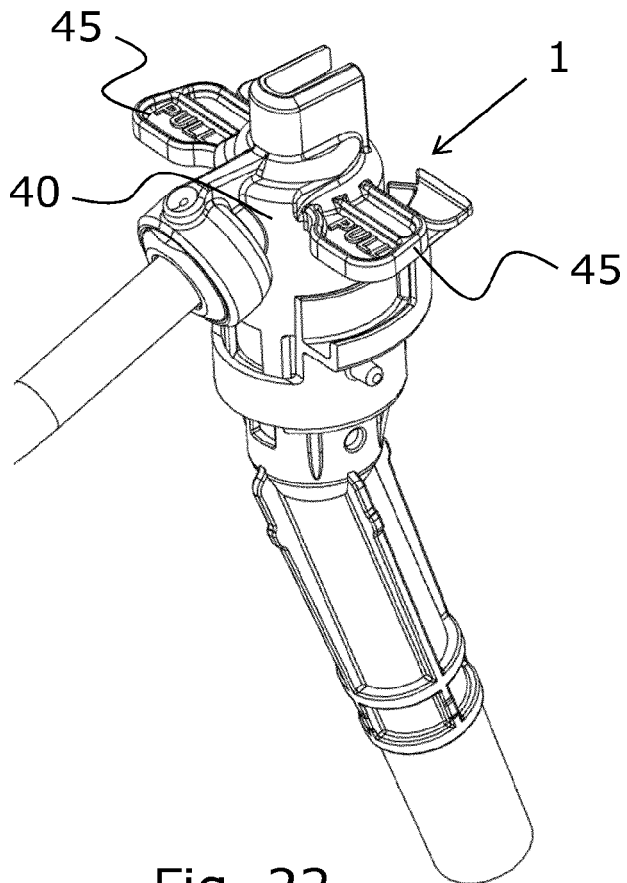


Fig. 22

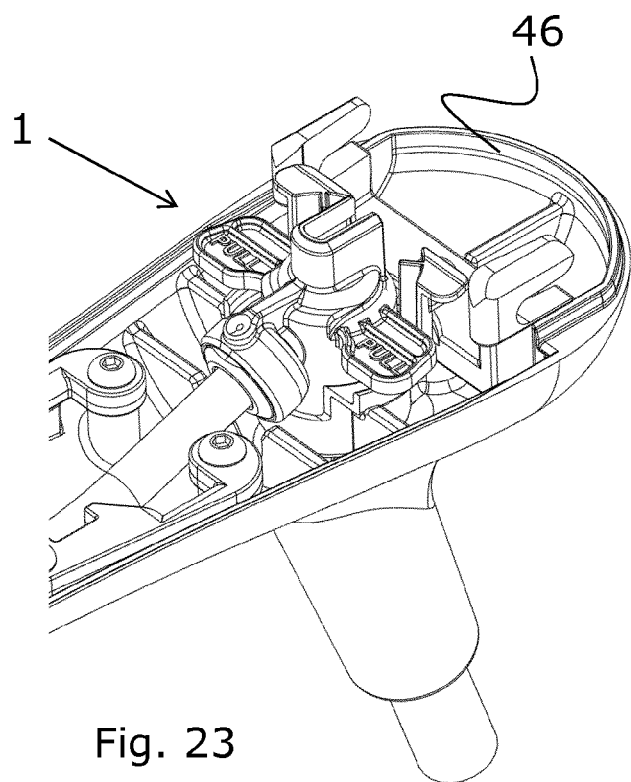


Fig. 23

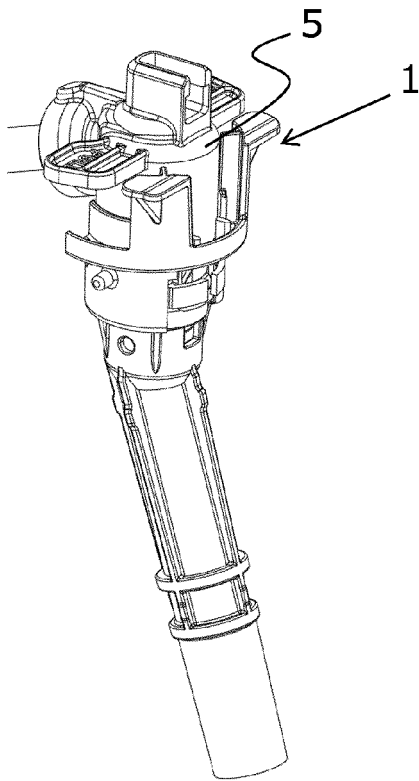


Fig. 24

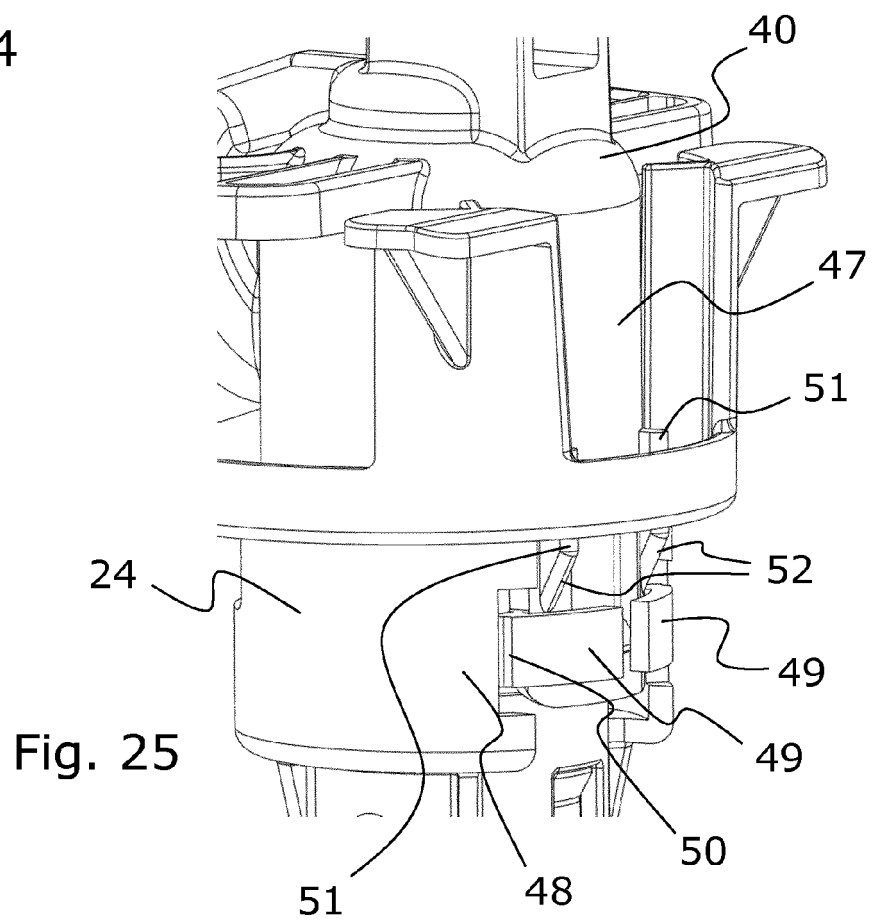


Fig. 25

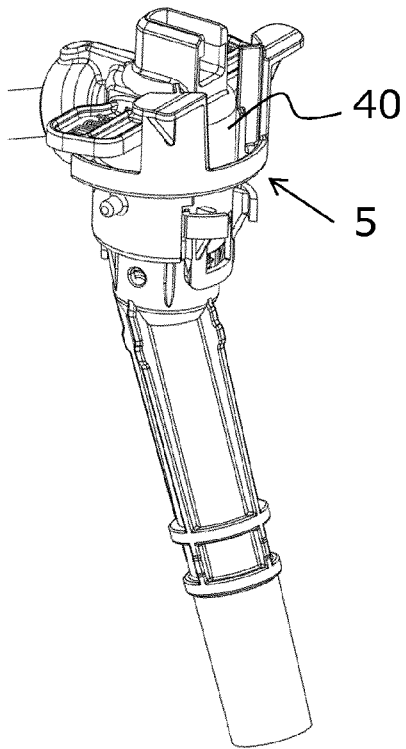


Fig. 26

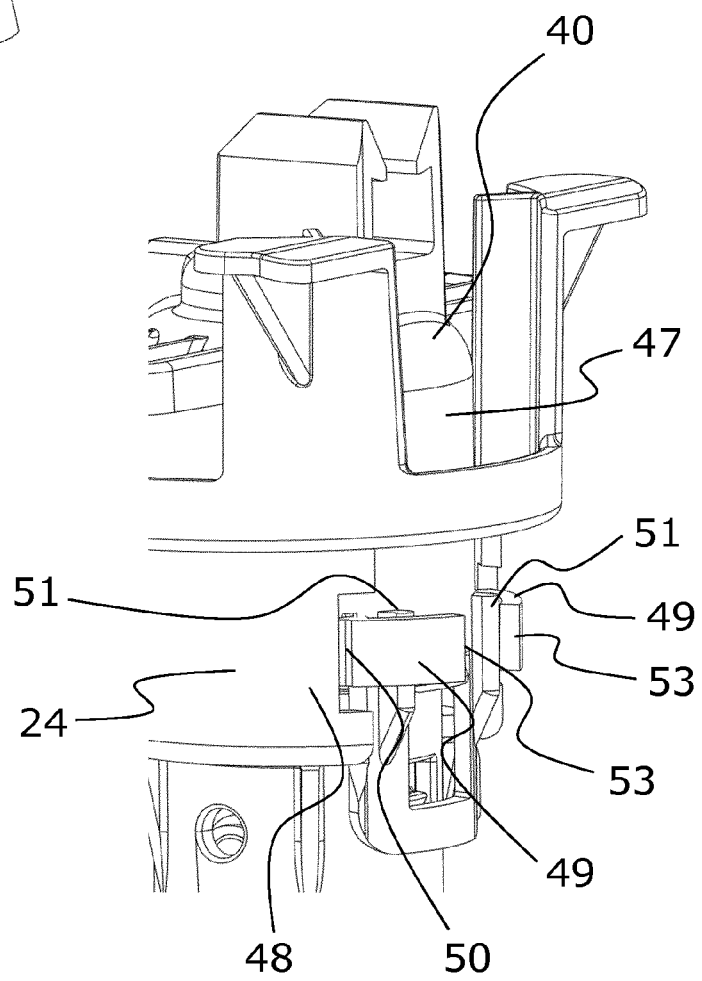


Fig. 27

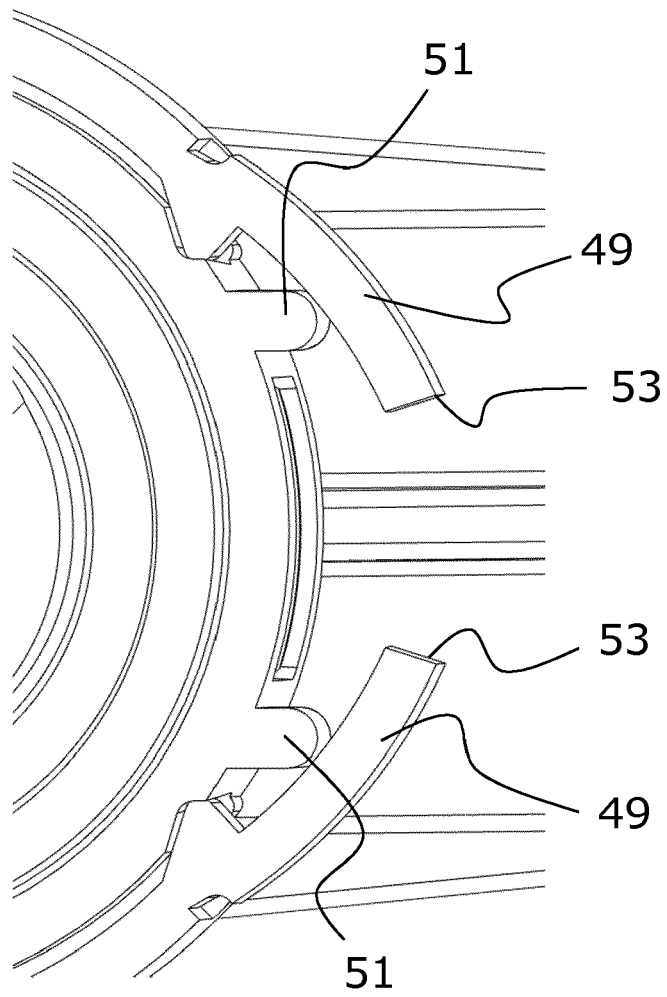


Fig. 28

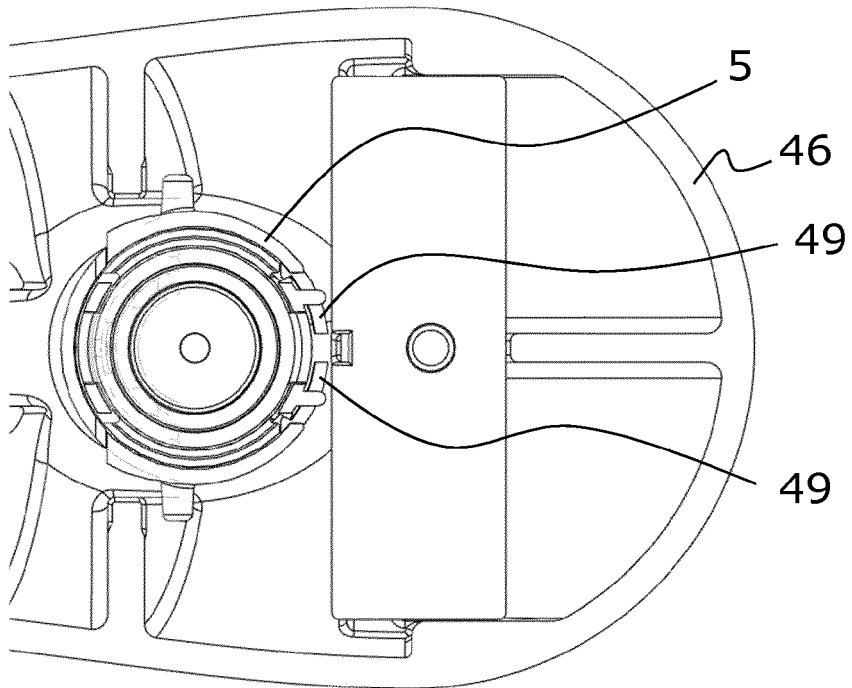


Fig. 29

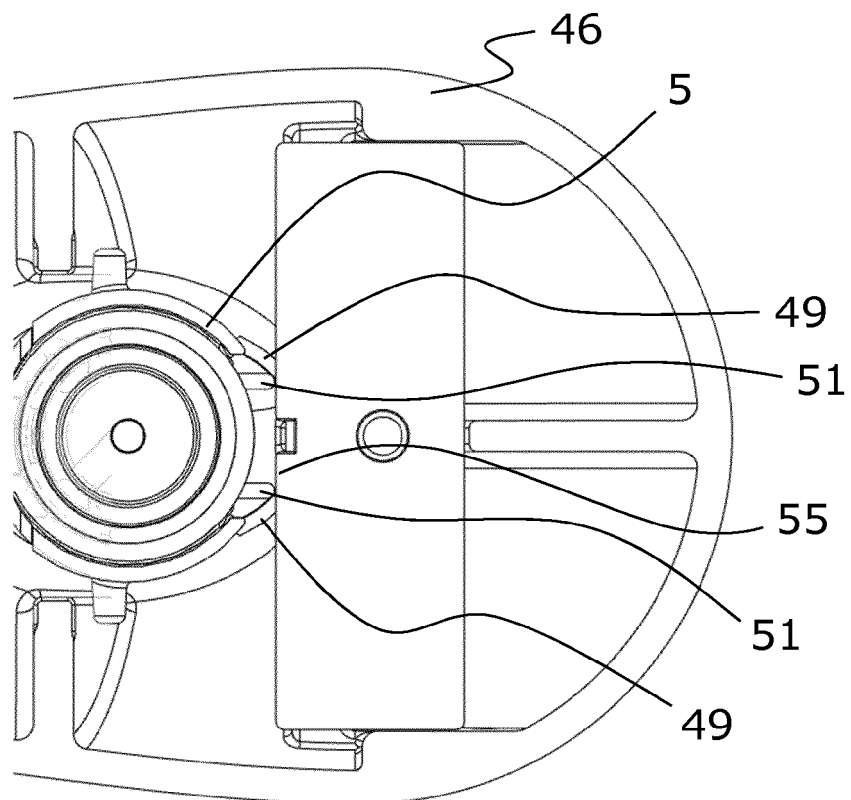


Fig. 30

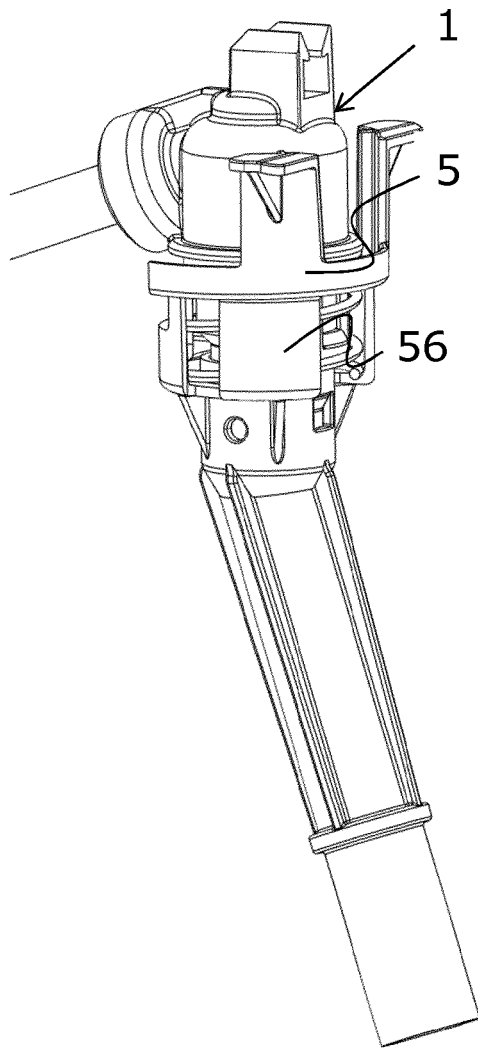


Fig. 31

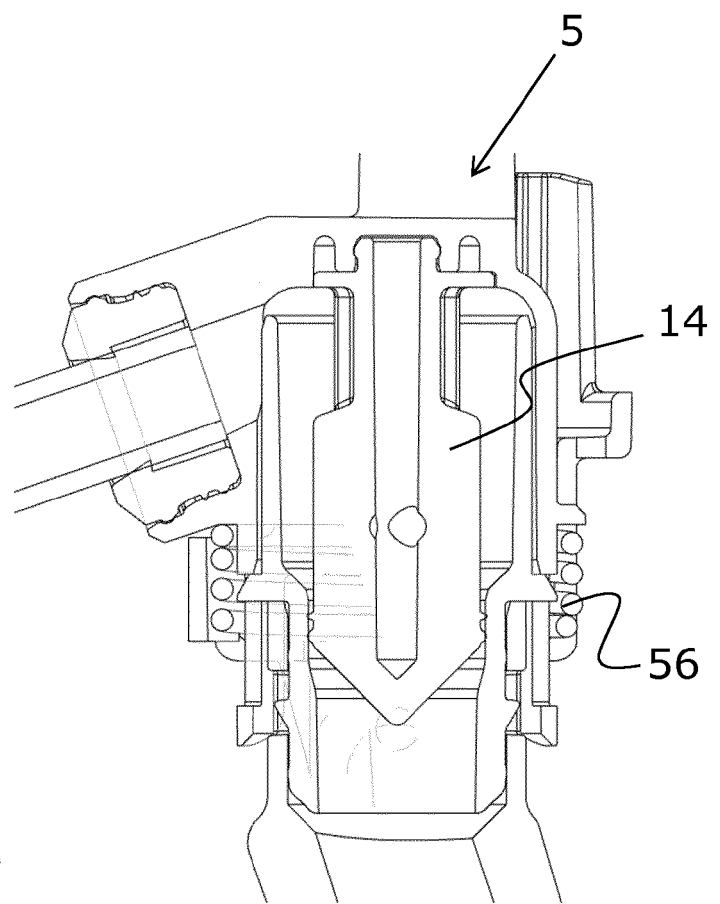


Fig. 32

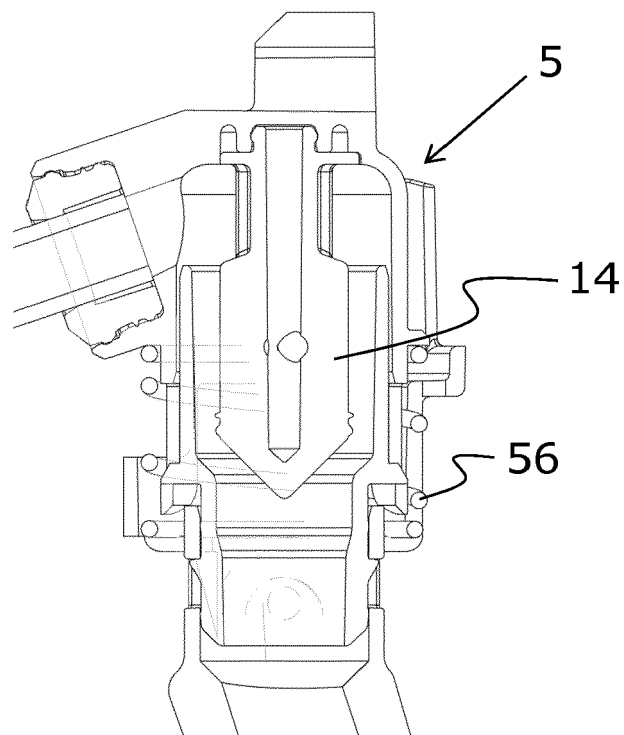


Fig. 33

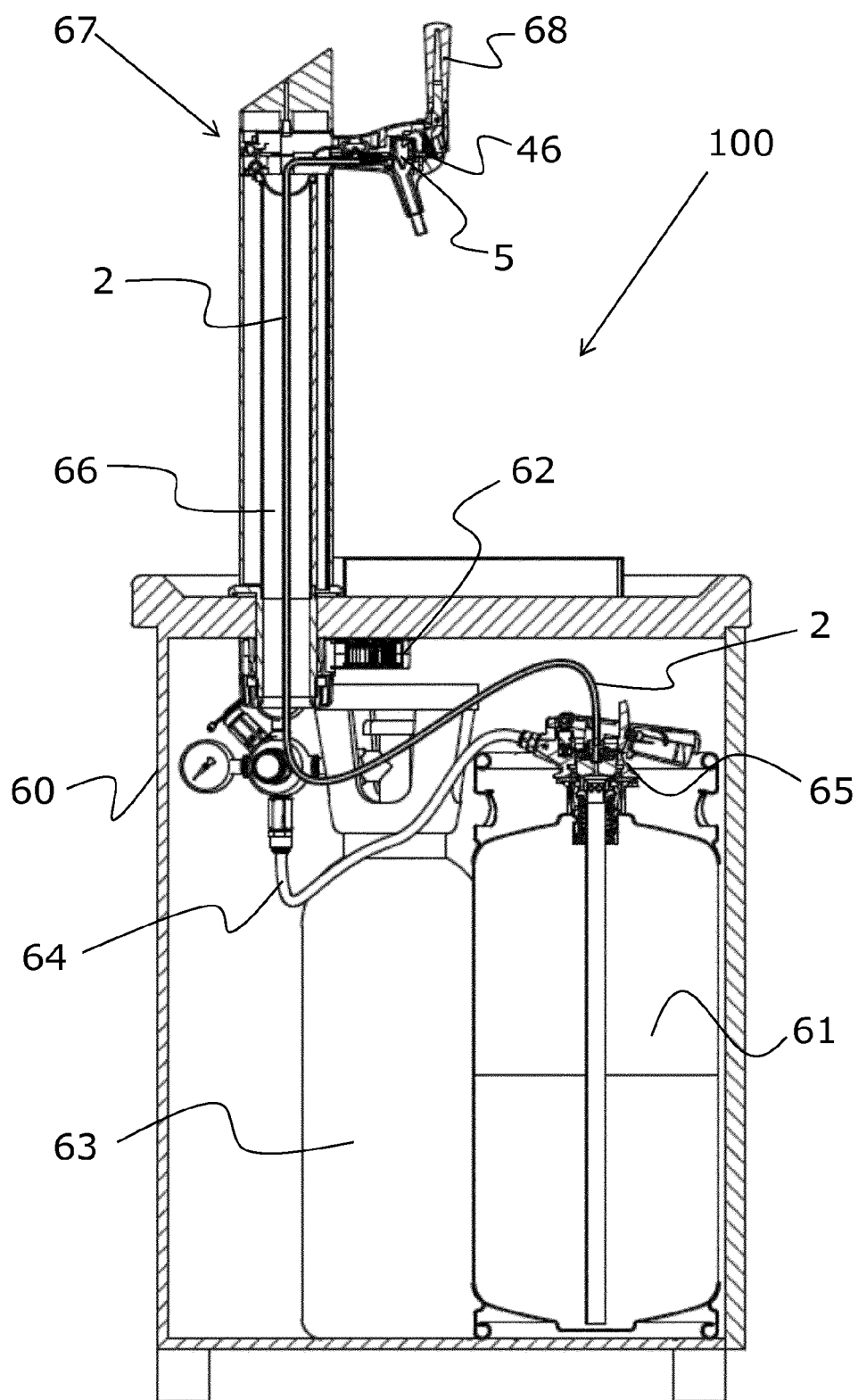


Fig. 34



EUROPEAN SEARCH REPORT

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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	AU 503 415 B2 (CARLTON & UNITED BREWERIES) 6 September 1979 (1979-09-06)	1,5,6, 14,15	INV. B67D1/14
Y	* page 12, line 24 - page 14, line 18 * * page 18, line 1 - line 11; figure 1 *	9	
Y	WO 03/101882 A1 (HEINEKEN TECH SERVICES [NL]; VLOOSWIJK JOHANNES JACOBUS THO [NL]; SILL) 11 December 2003 (2003-12-11) * page 15, line 9 - line 14; figure 8 *	8,9	
X	GB 2 231 644 A (ALUMASC LTD [GB]) 21 November 1990 (1990-11-21) * figure 1 *	1,5,6	
X	GB 2 457 434 A (IMI CORNELIUS [GB]) 19 August 2009 (2009-08-19) * figure 1 *	1,5,6,8, 15	
Y	EP 1 528 036 A2 (IMI CORNELIUS UK LTD [GB]) 4 May 2005 (2005-05-04) * paragraph [0026] - paragraph [0027] *	8,9	TECHNICAL FIELDS SEARCHED (IPC)
			B67D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 April 2016	Examiner 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			

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Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1, 2, 5, 6, 8, 9, 14, 15

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 2, 5, 6, 8, 9, 14, 15

Beverage dispensing unit with a valve piston

1.1. claims: 5, 6

Beverage dispensing unit with a valve chamber having a downstream diameter which is smaller than the upstream diameter

1.2. claims: 8, 9

Beverage dispensing unit with a valve having a spout

1.3. claim: 14

Beverage dispensing unit with a valve piston having a foam creating position

1.4. claim: 15

Dispensing device

1.5. claims: 1, 2

Beverage dispensing unit with a valve piston having a length between 10 and 30 mm

2. claim: 3

Beverage dispensing unit with a valve having a flow passage width between 3 and 10 mm

3. claim: 4

Beverage dispensing unit with a valve piston having guiding fins

4. claim: 7

Beverage dispensing unit with a valve piston having a circumferential projection

5. claims: 10-13

Beverage dispensing unit with a valve housing having a second part movable with respect to a first part thereof



**LACK OF UNITY OF INVENTION
SHEET B**

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

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

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5

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.

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