

(51) International Patent Classification:
F17C 13/04 (2006.01)(21) International Application Number:
PCT/EP2016/081201(22) International Filing Date:
15 December 2016 (15.12.2016)

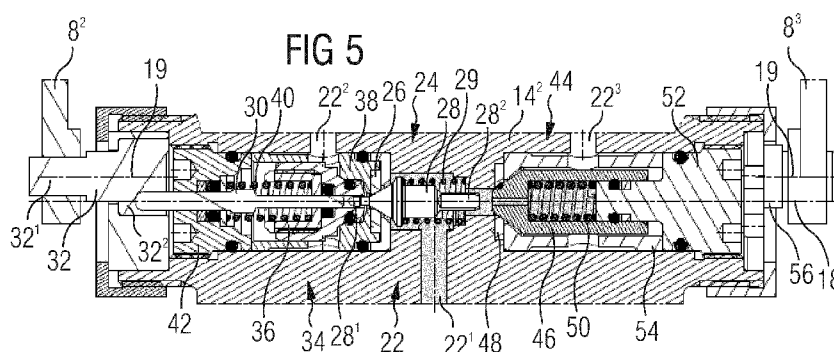
(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
LU92937 31 December 2015 (31.12.2015) LU(71) Applicant: LUXEMBOURG PATENT COMPANY
S.A. [LU/LU]; 24, route de Diekirch, 7440 Lintgen (LU).(72) Inventors: BROECHLER, Johan; 4, rue Saint Exupéry,
57390 Russange (FR). CHIR, Pascal; 14, rue des lilas,
57950 Montigny-lès-Metz (FR). SCHMITZ, Jean-
Claude; 51, rue de la Forêt Verte, 7340 Heisdorf (LU).(74) Agent: LECOMTE & PARTNERS; P.O. Box 1623,
1016 Luxembourg (LU).(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN,
KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA,
MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG,
NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS,
RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY,
TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN,
ZA, ZM, ZW.(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,
TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).**Published:**

— with international search report (Art. 21(3))

(54) Title: TAP ASSEMBLY FOR GAS CYLINDER WITH OPERATING LEVER AND COVER

(57) Abstract: The invention is directed to a tap (12) for gas cylinder, comprising a body (14) with a threaded gas inlet extending along a longitudinal axis (16) and adapted to be connected to a collar of the gas cylinder, a gas outlet (10) and a gas delivery passage interconnecting said inlet and outlet; a shut-off device of the passage, said device comprising a seat in the delivery passage and a shutter extending through and cooperating with said seat; and a lever (82) adapted for moving the shutter against a delivery flow direction in the delivery passage from the inlet towards the outlet, in order to open the shut-off device. The lever (8²) is rotatable around a transversal axis (19) that is perpendicular to the longitudinal axis (16) or that forms an angle with said perpendicular that is less than 30°, preferably less than 20°, more preferably less than 10°.

Description**TAP ASSEMBLY FOR GAS CYLINDER WITH OPERATING LEVER AND COVER****Technical field**

[0001] The invention is directed to the field of taps for gas cylinder, more particularly to taps for compressed industrial and/or medical gases.

Background art

[0002] Prior art patent document published FR 2 865 263 A1 discloses a cover for a tap mounted on a gas cylinder. The cover comprises a general ball-shaped shell housing the cylinder tap. The shell comprises an opening for an outlet connector, and a lever for actuating a lid that closes and opens said opening. The main goal of this lid is to protect the connector from dust pollution by the ambient air. The opening of the tap is made by pre-setting the pressure reducer. This construction fails to provide a reliable and ergonomic shut-off device.

[0003] Prior art patent document published FR 2 502 290 A1 discloses a tap for a gas cylinder that provides a reserve position. The tap comprises a shutter that is urged by a spring towards a seat in a direction opposite to the normal gas flow, i.e. when being delivered from the cylinder to a user. When the pressure inside the cylinder decreases down to a level that is predetermined by the shutter and its spring, the pressure of the gas is not able anymore to move the shutter against the spring force. The tap remains therefore closed. A lever mounted on the tap body can be actuated for moving the shutter in an open position and thereby allowing the reserve amount of gas to be used. The function of this tap is limited to providing a reserve of gas.

[0004] Prior art patent document published WO 2015/132092 A2 discloses a cover for a gas cylinder tap. The cover comprises a shell for housing the tap and a hook pivotally mounted on the shell, the hook being configured for securing the gas cylinder to a horizontal bar, like a bar of a hospital bed. The shell comprises reservations on its external surface configured for receiving the hook in a folded position so as to generally conform to said external surface. The invention is also directed to a gas storage

assembly comprising a gas cylinder, a tap and a cover. The shell comprises an upper half-shell and a lower half-shell joined together. The tap comprises a rotatable wheel for actuating a flow selector, said wheel being on the upper half-shell. The tap fails to provide a shut-off device distinct from the flow selector.

- [0005] Prior art patent document published FR 2 244 123 A1 discloses a tap for gas cylinder with a rotating lever that permits to purge the outlet and the circuit connected thereto. To that end, the rotating lever comprises a slope contact surface that slides on the stems of two shutters cooperating with corresponding seats in the tap body. That gas cylinder tap addresses a particular problem and fails to be particularly compatible with a protective cover that becomes nowadays a standard for reasons of ergonomics, security and aesthetic. This is particularly true when the cover comprises a gripping handle at the top which prevents a convenient operation of the operating lever.

Summary of invention

Technical Problem

- [0006] The invention has for technical problem to provide a tap for gas cylinder with a shut-off valve whose operation is convenient and reliable. More particularly, the invention has for technical problem to provide a tap with a shut-off valve whose operation is compatible with a protective cover for said tap.

Technical solution

- [0007] The invention is directed to a tap for gas cylinder, comprising: a body with a threaded gas inlet extending along a longitudinal axis and adapted to be connected to a collar of the gas cylinder, a gas outlet and a passage interconnecting said inlet and outlet; a shut-off device of the passage, said device comprising a seat in the passage and a shutter extending through and cooperating with said seat; a lever adapted for moving the shutter against a delivery flow direction in the passage from the inlet towards the outlet, in order to open the shut-off device; wherein the lever is rotatable around a transversal axis that is perpendicular to the longitudinal axis or

that forms an angle with said perpendicular that is less than 30°, preferably less than 20°, more preferably less than 10°.

- [0008] According to a preferred embodiment, the shutter of the shut-off valve is slidably movable along a transversal direction that is parallel to the rotation axis of the lever or that forms an angle with said axis that is less than 30°, preferably less than 20°, more preferably less than 10°.
- [0009] According to a preferred embodiment, the shutter of the shut-off valve is urged towards the seat of said device by a spring in the delivery flow direction.
- [0010] According to a preferred embodiment, said the lever comprises a contact surface that is sloped relative to plane perpendicular to the rotation axis, said sloped surface contacting an actuating rod slidably mounted in the body and contacting the shutter.
- [0011] According to a preferred embodiment, the actuating rod extends through the passage downstream of the seat in the delivery flow direction.
- [0012] According to a preferred embodiment, said tap comprises a residual pressure device arranged in the passage downstream of the seat in the delivery flow direction, and preferably wherein said device comprises a shutter urged by a spring towards a seat in a direction opposite to the delivery flow direction, the actuating rod extending through said shutter.
- [0013] According to a preferred embodiment, said tap comprises an anti-refill device arranged in a refill passage interconnecting a refill port and the inlet, said passage intersecting the passage upstream, in the delivery flow direction, of the shut-off device.
- [0014] According to a preferred embodiment, the anti-refill device comprises a shutter urged by a spring towards a seat in the refill passage in refill flow direction from the refill port to the inlet, the shutter of the shut-off device being adapted, in a refill position, for contacting and moving said shutter of the anti-refill device off said seat of the anti-refill device in order to open the refill passage.
- [0015] According to a preferred embodiment, the shutter of the anti-refill device is slidable along a direction that is aligned with the sliding direction of the shutter of the shut-off device, said shutter preferably comprising a

protruding portion extending through the seat of the anti-refill device for contacting said shutter of the anti-refill device.

- [0016] According to a preferred embodiment, wherein the lever comprises a first position where the shut-off device is closed, a second position where the shut-off device is opened, and third position where the shut-off device is further opened and the anti-refill device is opened.
- [0017] Advantageously, the actuating rod can comprise a shoulder that abuts against the shutter of the residual pressure device when passing from the second position to the third position so as to keep the residual pressure device in a closed position.
- [0018] According to a preferred embodiment, said tap comprises blocking means that prevent rotation of the lever to the third position, said means being releasable.
- [0019] According to a preferred embodiment, the body comprises a longitudinal portion comprising the gas inlet, and a transversal portion extending transversally on each side of the longitudinal portion and housing the shut-off device, the residual pressure device and the anti-refill device.
- [0020] According to a preferred embodiment, the lever comprises two side arms rotatably mounted on both sides of the body, and a handle interconnecting said arms.
- [0021] According to a preferred embodiment, one of the two arms is adapted for converting the pivoting movement of the lever into a movement the shutter of the shut-off device and the other of said two arms is freely rotatably mounted on the body.
- [0022] According to a preferred embodiment, the two side arms are mounted on the transversal portion of the body.
- [0023] The invention is also directed to a tap assembly comprising: a tap for gas cylinder; and a cover housing the tap; wherein the tap is according to the invention, and the tap assembly further comprises a lid fixed with the lever of said tap, said lid covering or uncovering a front area of the cover when actuating said lever.
- [0024] According to a preferred embodiment, the lid uncovers the front area comprising an indicator and/or a hand-wheel for adjusting the delivery

outlet pressure and/or flow rate when the lever is actuated for opening the shut-off device.

- [0025] According to a preferred embodiment, the tap comprises a flow selector, and the front area of the cover comprises a hand-wheel for actuating said selector, said hand-wheel comprising at its periphery a flattened portion that allows movement of the lever in a closing direction of the shut-off valve only when the hand-wheel is in an angular position that corresponds to a null flow rate.

Advantages of the invention

- [0026] The invention is particularly interesting in that it provides a reliable and convenient operation of the shut-off device, in particular in relation with a tap assembly that comprises a cover housing the tap.

Brief description of the drawings

- [0027] Figure 1 is front perspective view of a tap assembly in accordance with the invention, the tap being in an open position.
- [0028] Figure 2 is a view of the tap assembly of figure 1 in a close position.
- [0029] Figure 3 is a front view of the tap of the tap assembly of figures 1 and 2.
- [0030] Figure 4 is a side view of the tap of figure 3.
- [0031] Figure 5 is a sectional view of the central portion of the tap of figures 3 and 4, the tap being in a close position.
- [0032] Figure 6 corresponds to figure 5 where the tap is in an open position.
- [0033] Figure 7 correspond to figures 4 and 5 where the tap is in a refill position.

Description of an embodiment

- [0034] In the following description of the invention, the concepts of “upstream” and “downstream” are expressed with reference to the flow direction when gas is delivered from the cylinder to a user. A reverse gas flow can indeed take place for refilling the cylinder but this flow direction is not referred to with these concepts, unless expressly mentioned.
- [0035] Figures 1 and 2 illustrate a tap assembly in accordance with the invention. The tap assembly 2 comprises a cover 4 housing a tap (not visible in figures 1 and 2). The cover 4 comprises, essentially, a shell 4¹ that can be generally ball-shaped, a handle 4² extending generally horizontally above

the shell 4¹, and two side arms connecting the handle 4² to the shell 4¹. The tap (not visible) and the shell can be attached to each other so as to form an assembly that can be mounted as a unit on a gas cylinder.

- [0036] The tap assembly 2 comprises also a hand-wheel 6 that actuates a flow selector provided in the tap. The hand-wheel is located on a front area of the shell 4¹. The tap assembly 2 comprises a lid 8 that is pivotally mounted on the tap around a transversal axis, i.e. an axis that is at least generally perpendicular to the longitudinal axis of the assembly. The longitudinal axis is vertical when the assembly is oriented as in figures 1 and 2, i.e. oriented as when mounted on an upright cylinder gas.
- [0037] Still with reference to figures 1 and 2, the tap assembly can comprise two outlets 10, one being a barbed connector for a hose and the other one being a quick connector. These outlets are advantageously positioned on the front area of the shell 4¹, below the hand-wheel 6.
- [0038] With reference to figure 2 illustrating the tap assembly in a closed position, the lid 8 is pivoted downwardly so as to cover the hand-wheel. The pivoting movement of the lid 8 interacts with the tap so as to open or close a shut-off device in said tap, as this will be explained further in relation with figures 5 to 7.
- [0039] Figures 3 and 4 illustrate the tap of the tap assembly of figures 1 and 2. The tap 12 comprises a body 14 with a first longitudinal portion 14¹ extending along the longitudinal axis 16, and a second transversal portion 14² extending along the transversal axis 18 that is generally perpendicular to the longitudinal axis 16. The transversal portion 14² of the body 14 supports the two lateral arms 8² and 8³ of the pivoting lid 8. These two arms are interconnected by a gripping and covering portion 8¹. As is best visible in figure 4, this portion 8¹ is indeed generally curved so as to travel around the tap, more particularly the hand-wheel 6. It comprises also a gripping portion for facilitating its manoeuvring by a user.
- [0040] The hand-wheel 6 can comprise at its periphery a flattened portion 6¹ that cooperates with one of the arms 8² and 8³, for instance with the arm 8² such that this flattened portion 6¹ needs to be positioned towards said arm to allow its pivoting movement down to a position as illustrated in figure 2.

This position of the flattened portion 6¹ can correspond to an angular position of the hand-wheel that sets a null flow rate. Such measures provide the effect that the lid can only be moved back to the position as illustrated in figure 2 when the flow selector is set to a flow rate of zero. This provides an enhanced security and also ergonomics of the tap assembly since it requires from the user who wants to stop the delivery of gas and use of the assembly to first sets the flow rate to zero and second to move the lid over the hand-wheel to close the shut-off device.

- [0041] Still with reference to figures 3 and 4, the body 14 comprises a gas inlet at the lower end of the longitudinal portion 14¹ and a gas passage (not visible) that interconnects the inlet with the outlet(s) 10. A shut-off device is provided in the body 14 for shutting-off the passage. A pressure reducer 20 and a flow selector operated by the hand-wheel 6 are also provided downstream of said shut-off device. The pressure reducer and the flow selector are as such well known to the skilled person and do not need to be further detailed.
- [0042] Figures 5 to 7 are sectional views of the tap 12, more particularly of the transversal portion of the body 14 of the tap, illustrating the interaction between the arms of the lid 8 and the shut-off device. Figure 5 corresponds to a closed state, figure 6 to an open state and figure 7 to a refill state of the tap.
- [0043] With reference to figure 5, the transversal portion 14² of the body comprises a gas passage 22 interconnecting the inlet (not represented) with the outlet(s) (also not represented). A shut-off device 24 is provided in the passage 22. More specifically, the passage 22 comprises a portion 22¹ that is in direct connection with the inlet (not represented) and upstream of the shut-off device. The passage 22 comprises also a portion 22² that is downstream of the shut-off device 24 and in direction connection with the above mentioned pressure reducer (20 in figure 4) towards the outlet(s) (10 in figures 1 and 3).
- [0044] The shut-off device 24 comprises a seat 26 in the passage 22, a shutter 28, also in the passage and upstream of the seat 26, and a spring 29 urging the shutter 28 against the set 26. In the absence of additional

external forces, the shutter 28 is in a gas tight contact with the seat 26 so as to shut-off the passage 22 between the portions 22¹ and 22² of said passage. The high pressure present in the cylinder and in the portion 22¹ of the passage 22 further urges the shutter 28 against the seat 26.

[0045] An actuating rod 30 is provided between the lever 8² and the shutter 28. More specifically, one end of the rod 30 is in contact with a trunnion 32 that is rotatably attached to the lever 8² by means of its end portion 32¹. This latter can comprise a flattened portion for providing a secure torque transmission between the lever 8² and the trunnion 32. The trunnion 32 comprises a contact surface 32² that is sloped relative to a plane perpendicular to the transversal axis 18. The axis of rotation 19 of the trunnion is parallel and offset to the transversal axis 18. The rotation of the trunnion 32 can therefore move the actuating rod 30 towards the shutter 28 so as to move it to an open position and vice versa.

[0046] Still with reference to figure 5, the tap can comprise residual pressure device 34 adapted for maintaining a residual pressure in the gas cylinder, e.g. comprises between 10 and 1 bars. The purpose of such a device is to avoid a direct contact between the interior of the cylinder and the ambient environment of the cylinder in the absence of gas flow because such a direct contact could contaminate the interior of the cylinder. The residual pressure opens when gas is delivered to a user as long as the pressure inside the cylinder is high enough to open the device. When the pressure in the cylinder is below the critical pressure of the device, this latter remains closed, thereby preventing contamination of the cylinder when the shut-off device remains open.

[0047] The residual pressure device 34 is arranged downstream of the shut-off device 24. It comprises essentially a shutter 36, a seat 38 and a spring 40. The spring 40 urges the shutter 36 in the reverse direction of the delivery flow of the gas towards the seat 38. As soon as the pressure difference on the shutter 36 is high enough, this latter is moved against the resilient force of the spring off the seat 38 so as to open the passage. The actuating rod 30 extends in a gas tight fashion through the spring 40 and the shutter 36 of the residual pressure device 34. This construction

prevents the rod 30 from disturbing the functioning of the residual pressure device and vice versa.

- [0048] In the present embodiment, the seat 38 of the residual pressure device 34 is formed on a bushing that is inserted into a bore of the body portion 14². This bushing forms a cavity that houses the shutter 36. Its front portion comprises a deepening that houses the seat 26 of the shut-off device 24. Its rear portion is in contact with plug 42 that closes the bore cavity and through which the actuating rod 30 extends in a gas tight fashion.
- [0049] Still with reference to figure 5, the tap can comprise an anti-refill device 44 adapted to prevent a refill of the cylinder by an unauthorized person. Such an uncontrolled refilling could indeed change the composition of the gas contained in the cylinder and could also contaminate it. The anti-refill device 44 is arranged in a portion 22³ of the passage that branches off the upstream portion 22¹ of the passage to a refill port (not represented). As is visible in the figure, the anti-refill device is arranged along the transversal axis 18 at the opposite of the residual pressure device 34 and the actuating rod 30.
- [0050] The anti-refill device 44 comprises essentially a shutter 46, a seat 48 and a spring 50 urging the shutter 46 towards the seat 48. More specifically, the closing sliding movement of the shutter 46 is in the refill flow direction, i.e. from the (not represented) refill port connected with the refill portion 22³ of the passage towards the upstream portion 22¹ of said passage 22. During normal use of the tap assembly, the refill portion is closed and the anti-refill device remains closed by virtue of the spring 50. If the refill port would be opened, the anti-refill device 44 remains closed. Indeed, the shutter 46 forms with the plug 52 a gas tight cavity housing the spring 50. It comprises also a gas channel interconnecting the cavity with the downstream side of shutter (relative to the refill flow direction). The cavity housing the spring 50 has a cross-sectional surface that is larger than the cross-sectional surface of the front face of shutter downstream (relative to the refill flow direction) the seat 48. This means that even if the pressure at in the refill portion 22³ of the passage drops down, the pressure at the inlet and in the upstream section 22¹ of the passage generates a resulting force

on the shutter 46 that is towards the seat 48. When a refill pressure is applied to the refill port, i.e. a pressure that is higher than the pressure inside the cylinder and at the inlet, the anti-refill device 44 remains also closed, thereby preventing unauthorized refilling of the cylinder.

- [0051] In the present particular embodiment, a bushing 54 is inserted into a bore formed in the corresponding end of the transversal portion 14² of the body 14. The seat 48 of the anti-refilling device 44 is housed in a circular recess formed in the bottom wall of the bore. The seat 48 is held in said recess by the front wall of the bushing 54. This latter houses the shutter 46. The plug 52 is in contact with rear of the bushing 54, so as to keep the bushing 54 and the seat 48 in place in the bore. A trunnion 56 is attached to the body portion 14² and supports in free rotation around the axis 19 the arm 8³ of the lid.
- [0052] In the state of the tap as illustrated in figure 5, the shutter 28 of the shut-off device 24 is in contact with the seat 26 so that the gas passage from the section 22¹ toward the section 22² is shut-off. The shutter 28 comprises a front portion 28¹ that protrudes downstream through the seat 26. The corresponding end of the actuating rod 30 is distant from the front portion 28¹ of the shutter 28, so as not to interfere with the shut-off device. The closed state of figure 5 can correspond to the position of the lid 8 as illustrated in figure 2.
- [0053] Figure 6 illustrates the tap of figure 5 in an open state. The arms or levers 8² and 8³ have pivoted having for effect to rotate the trunnion 32 and to move the actuating rod 30 by virtue of movement of the sloped contact surface 32². The actuating rod 30 contacts the front portion 28¹ of the shutter 28 and moves it off the seat 26. The shut-off device 24 is then open and allows a delivery flow of gas from the inlet towards the outlet(s). The pressure at the inlet is applied to the shutter 36 of the residual pressure device 34 and moves it off its seat 38 so as to open the passage. The rear portion 28² of the shutter 28 of the shut-off device remains distant from the anti-refill device 44. This latter remains closed as in the closed state of the tap described in relation with figure 5.

- [0054] The open state of figure 6 can correspond to the position of the lid 8 as illustrated in figure 1.
- [0055] Figure 7 illustrates the tap in a refill state. Compared with the state of figure 6, the arms 8² and 8³ have pivoted further to that the trunnion 32 is rotated further and its sloped contact surface 32² moves further the actuating rod 30. The shutter 28 of the shut-off device is moved further in the open position to such an extent that its rear portion 28² contacts the shutter 46 of the anti-refill device 44 so as to open it. In that state, a refill flow of gas can be applied from the refill section 22³ of the passage towards the upstream portion 22¹ through the anti-refill device forced in an open position. In that state, the shut-off device 24 is open. This is therefore necessary to shut-off the passage 22 downstream of the shut-off device. This can be achieved with the residual pressure device which can be held in a closed position. The actuating rod 30 can comprise a shoulder portion 30¹ is adjusted to rest on the shutter 36 of the residual pressure device 34 in the refill state as illustrated in figure 7. This corresponds to a position of the shoulder portion that is to the right of the shoulder portion 30¹ as illustrated in figure 7. Alternatively, the tap can comprise a further shut-off means downstream in section 22² of the passage.
- [0056] The refill state as illustrated in figure 7 can be normally blocked for normal users by limiting the pivoting movement of the arms 8² and 8³ between the positions corresponding to the closed and opened states as illustrated in figures 5 and 6. A mechanical element can be provided for normally blocking a further pivoting movement of the arms 8² and 8³ from the open state as illustrated in figure 6 towards a refill state as illustrated in figure 7. This mechanical element can be designed to be deactivated by a special tool that would be provided to authorised persons for refilling the gas cylinder.

Claims

1. Tap (12) for gas cylinder, comprising:
 - a body (14) with a threaded gas inlet extending along a longitudinal axis (16) and adapted to be connected to a collar of the gas cylinder, a gas outlet (10) and a passage (22) interconnecting said inlet and outlet;
 - a shut-off device (24) of the passage (22), said device comprising a seat (26) in the passage (22) and a shutter (28) extending through and cooperating with said seat (26);
 - a lever (8¹, 8², 8³, 32) adapted for moving the shutter (28) against a delivery flow direction in the passage (22) from the inlet towards the outlet, in order to open the shut-off device (24);characterized in that
the lever (8¹, 8², 8³, 32) is rotatable around a transversal axis (19) that is perpendicular to the longitudinal axis (16) or that forms an angle with said perpendicular that is less than 30°, preferably less than 20°, more preferably less than 10°.
2. Tap (12) according to claim 1, wherein the shutter (28) of the shut-off device (24) is slidably movable along a transversal direction (18) that is parallel to the rotation axis (19) of the lever (8²) or that forms an angle with said axis that is less than 30°, preferably less than 20°, more preferably less than 10°.
3. Tap (12) according to claim 2, wherein the shutter (28) of the shut-off device (24) is urged towards the seat (26) of said device (24) by a spring (29) in the delivery flow direction.
4. Tap (12) according to any one of claims 1 to 3, wherein said the lever (8¹, 8², 8³, 32) comprises a contact surface (32²) that is sloped relative to plane perpendicular to the rotation axis (19), said sloped surface (32²) contacting an actuating rod (30) slidably mounted in the body (14) and adapted for contacting the shutter (28).
5. Tap (12) according to claim 4, wherein the actuating rod (30) extends through the passage (22) downstream of the seat (26) in the delivery flow direction.

6. Tap (12) according to one of claims 4 and 5, wherein said tap (12) comprises a residual pressure device (34) arranged in the passage (22²) downstream of the seat (26) in the delivery flow direction, and preferably wherein said device (34) comprises a shutter (36) urged by a spring (40) towards a seat (38) in a direction opposite to the delivery flow direction, the actuating rod (30) extending through said shutter (36).
7. Tap (12) according to any one of claims 1 to 6, wherein said tap (12) comprises an anti-refill device (44) arranged in a refill passage (22³) interconnecting a refill port and the inlet, said passage (22³) intersecting the passage (22¹) upstream, in the delivery flow direction, of the shut-off device (24).
8. Tap (12) according to claim 7, wherein the anti-refill device (44) comprises a shutter (46) urged by a spring (50) towards a seat (48) in the refill passage (22³) in refill flow direction from the refill port to the inlet, the shutter (28) of the shut-off device (24) being adapted, in a refill position, for contacting and moving said shutter (46) of the anti-refill device (44) off said seat (48) of the anti-refill device (44) in order to open said refill passage (22³).
9. Tap (12) according to claim 8, wherein the shutter (46) of the anti-refill device (44) is slidable along a direction that is aligned with the sliding direction of the shutter (28) of the shut-off device (24), said shutter (28) preferably comprising a protruding portion (28²) extending through the seat (48) of the anti-refill device (44) for contacting the shutter (46) of said anti-refill device (44).
10. Tap (12) according to any one of claims 7 to 9, wherein the lever (8¹, 8², 8³, 32) comprises a first position where the shut-off device (24) is closed, a second position where the shut-off device (24) is opened, and a third position where the shut-off device (24) is further opened and the anti-refill device (44) is opened.
11. Tap (12) according to claim 10, wherein said tap (12) comprises blocking means that prevent rotation of the lever (8¹, 8², 8³, 32) to the third position, said means being releasable.

12. Tap (12) according to any one of claims 1 to 11 and according to claims 6 and 7, wherein the body (14) comprises a longitudinal portion (14¹) comprising the gas inlet, and a transversal portion (14²) extending transversally on each side of the longitudinal portion (14¹) and housing the shut-off device (24), the residual pressure device (34) and the anti-refill device (44).
13. Tap (12) according to any one of claims 1 to 12, wherein the lever (8¹, 8², 8³, 32) comprises two side arms (8², 8³) rotatably mounted on both sides of the body (14), and a handle (8¹) interconnecting said arms (8², 8³).
14. Tap (12) according to claim 13, wherein one (8²) of the two arms (8², 8³) is adapted for converting the pivoting movement of the lever into a movement the shutter (28) of the shut-off device (24) and the other (8³) of said two arms (8², 8³) is freely rotatably mounted on the body (14).
15. Tap (12) according to claim 12 and one of claims 13 and 14, wherein the two side arms (8², 8³) are mounted on the transversal portion (14²) of the body (14).
16. Tap assembly (2) comprising:
 - a tap (12) for gas cylinder; and
 - a cover (4) housing the tap (12);characterized in that
the tap (12) is according to any one of claims 1 to 15, and the tap assembly (2) further comprises a lid (8¹) fixed with the lever (8¹, 8², 8³, 32) of said tap, said lid (8¹) covering or uncovering a front area of the cover (4) when actuating said lever.
17. Tap assembly (2) according to claim 16, wherein the lid (8¹) uncovers the front area comprising an indicator and/or a hand-wheel (6) for adjusting the delivery outlet pressure and/or flow rate when the lever is actuated for opening the shut-off device.
18. Tap assembly (2) according to one of claims 16 and 17, wherein the tap comprises a flow selector, and the front area of the cover (4) comprises a hand-wheel (6) for actuating said selector, said hand-wheel (6) comprising at

its periphery a flattened portion (6¹) that allows movement of the lever (8¹, 8², 8³, 32) in a closing direction of the shut-off valve (24) only when the hand-wheel (6) is in an angular position that corresponds to a null flow rate.

FIG 1

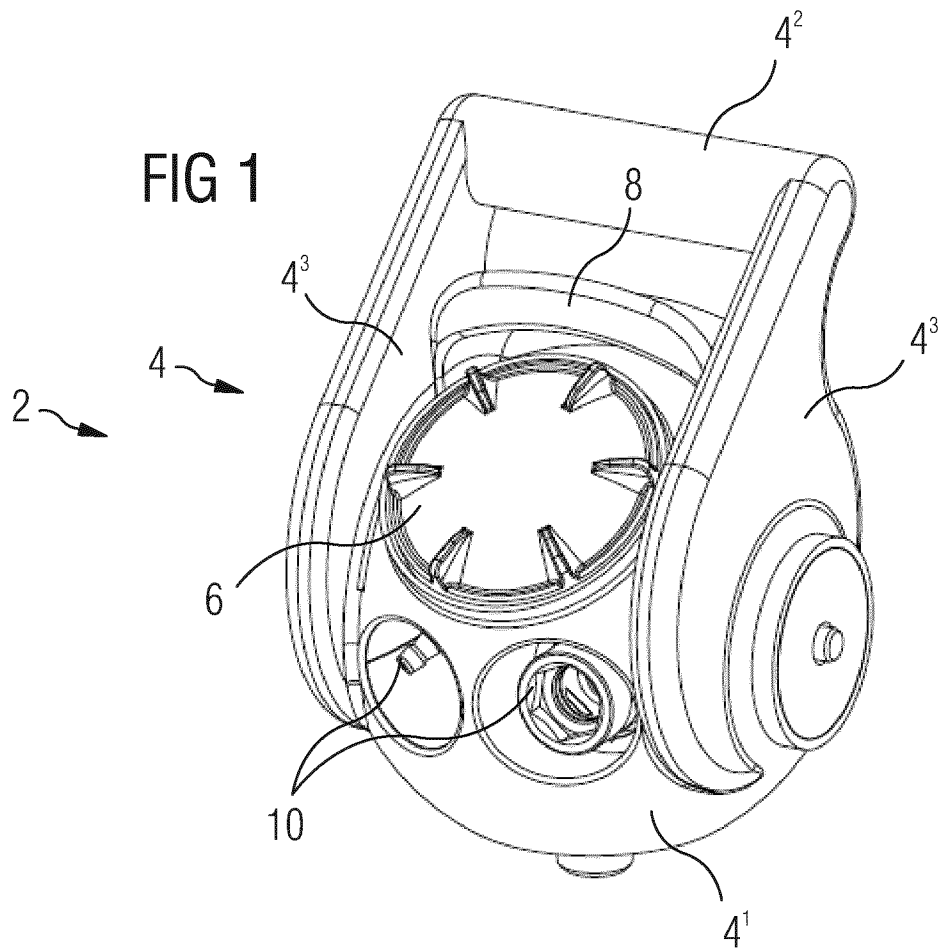


FIG 2

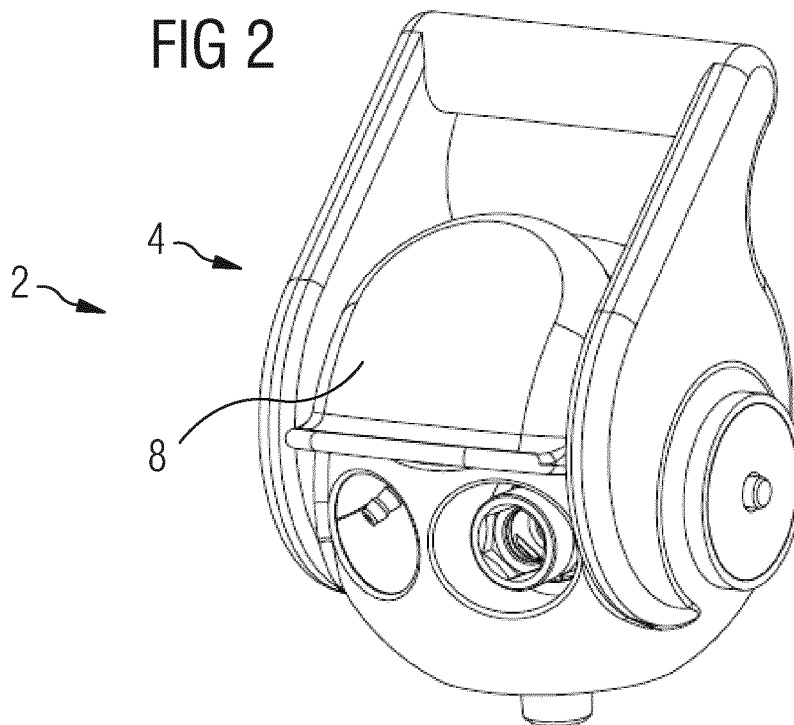


FIG 3

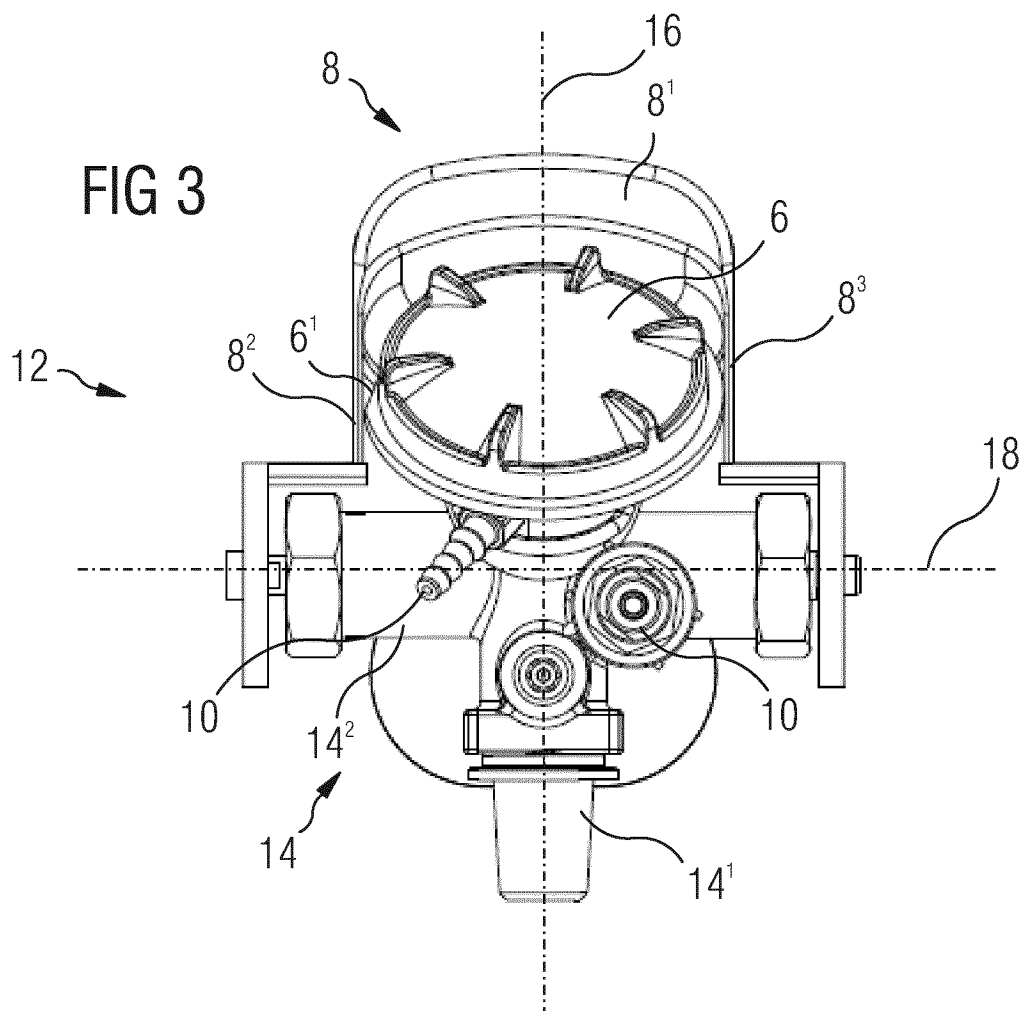
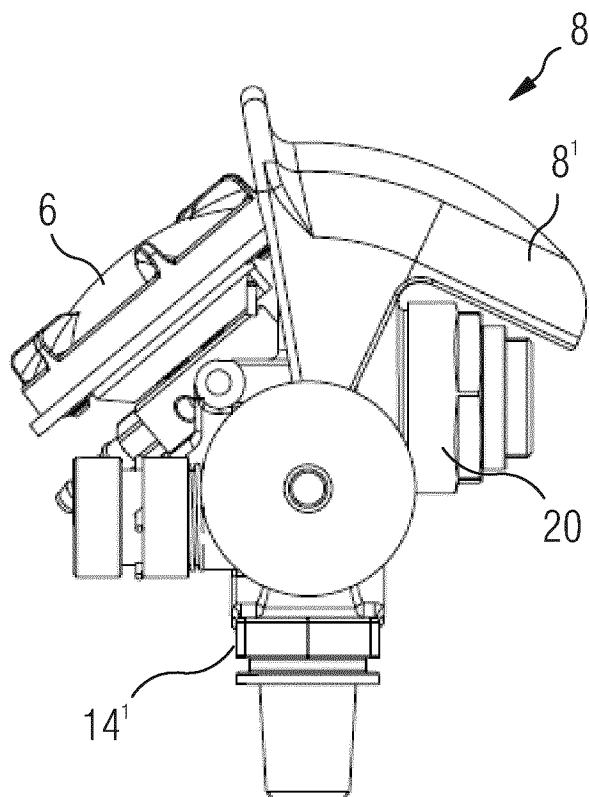
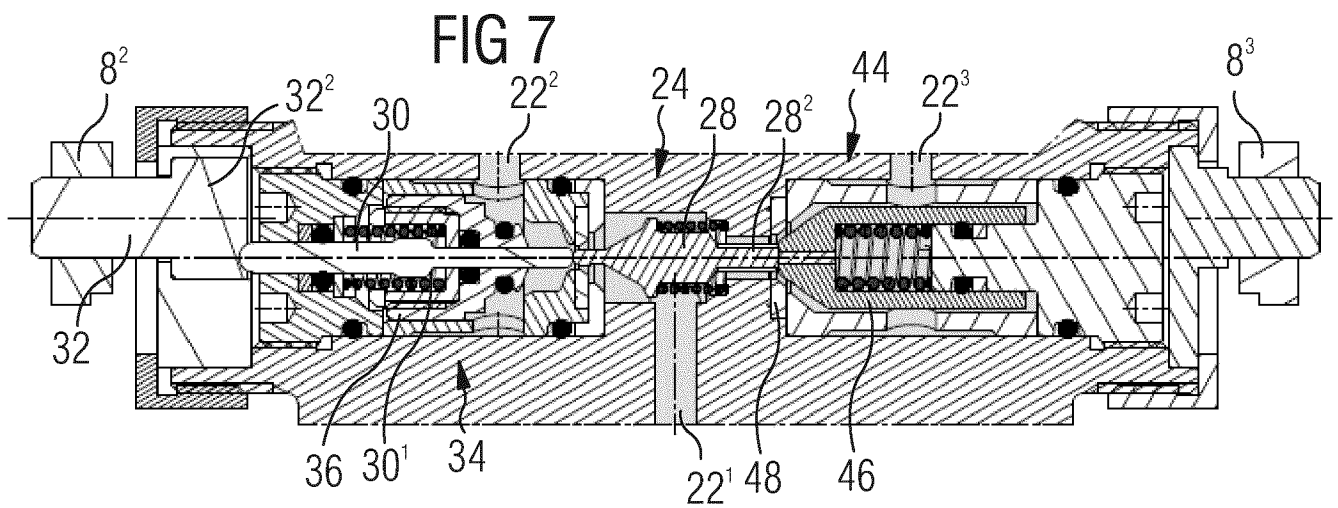
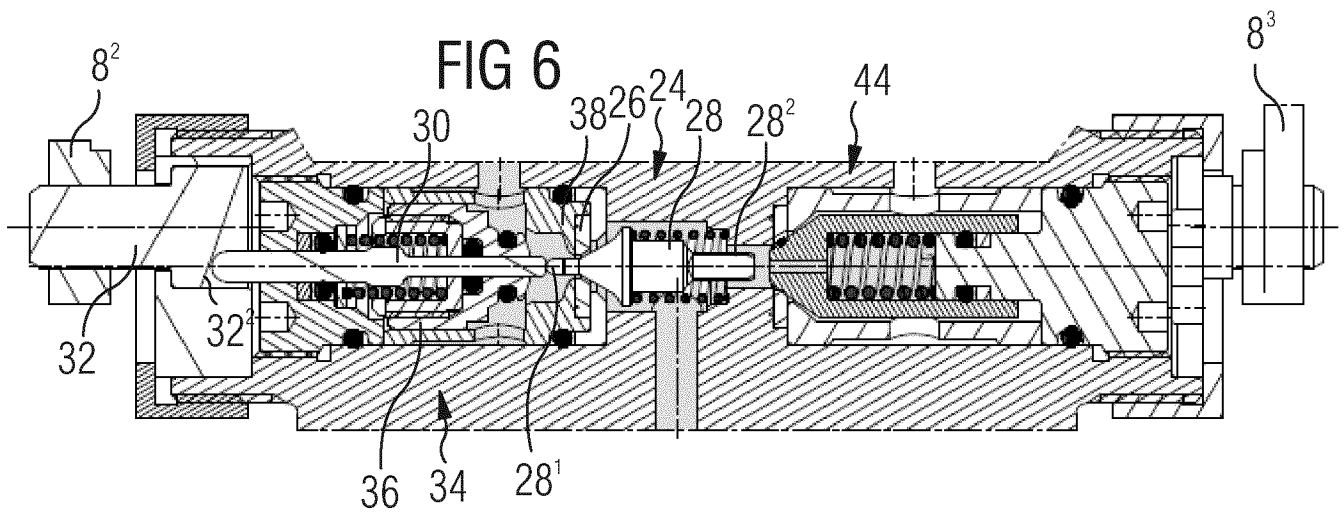
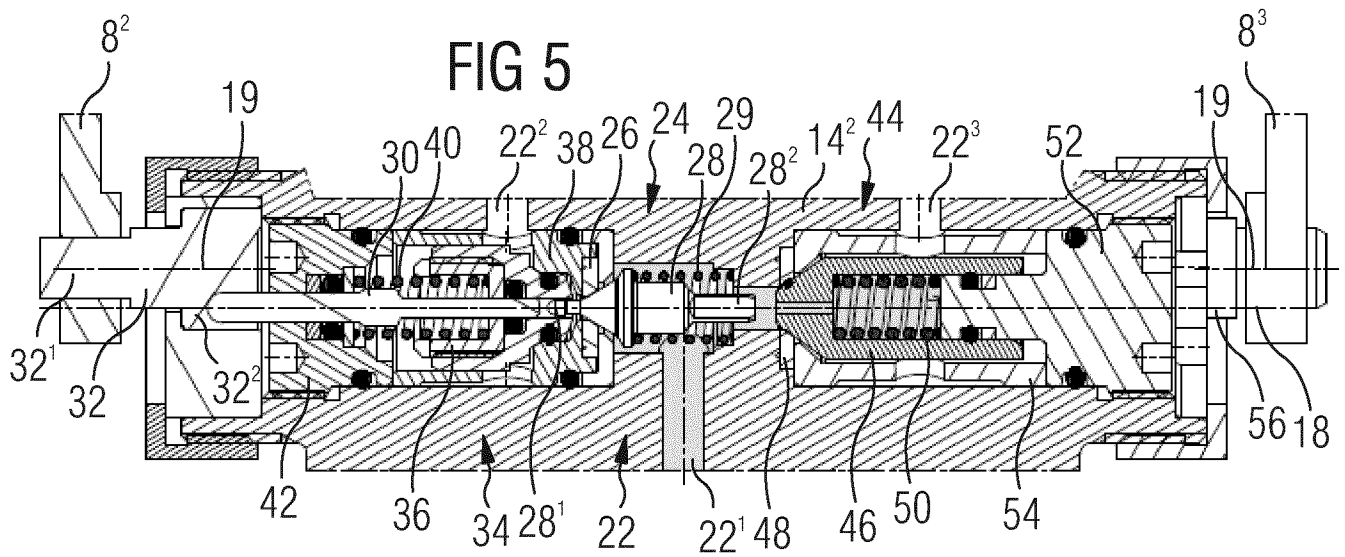


FIG 4





INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/081201

A. CLASSIFICATION OF SUBJECT MATTER
INV. F17C13/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F17C

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 970 313 A1 (AIR LIQUIDE [FR]) 13 July 2012 (2012-07-13)	1-5, 13-16,18
Y	figures 6,7 page 5, lines 11-25 page 6, lines 4-20 page 7, line 1 - page 8, line 2 page 9, lines 11-36 -----	6-12,17
X	WO 2014/174236 A1 (LINDE AG [DE]; CHRISTIE GEMMA LOUISE) 30 October 2014 (2014-10-30)	1
Y	page 4; figure 2 -----	17
X	US 2012/175375 A1 (LIGONESCHE RENAUD [FR] ET AL) 12 July 2012 (2012-07-12)	1
Y	paragraphs [0029] - [0038] -----	17
	-/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

27 February 2017

Date of mailing of the international search report

22/03/2017

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Ott, Thomas

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/081201

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LU 91 690 A1 (LUXEMBOURG PATENT CO [LU]) 21 November 2011 (2011-11-21) figures 3,4 paragraphs [0035] - [0047] -----	6-12
A	FR 2 974 402 A1 (AIR LIQUIDE [FR]) 26 October 2012 (2012-10-26) page 5, line 35 - page 9, line 3; figures 3-4 -----	1-18
A	FR 2 955 170 A1 (AIR LIQUIDE [FR]) 15 July 2011 (2011-07-15) page 1, line 1 - page 2, line 7; figures 5-6 page 3, line 15 page 4, line 23 page 5, lines 26-30 page 7, lines 7-15 -----	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/081201

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2970313	A1	13-07-2012	EP 2663793 A1 20-11-2013 ES 2542778 T3 11-08-2015 FR 2970313 A1 13-07-2012 WO 2012098318 A1 26-07-2012
WO 2014174236	A1	30-10-2014	CA 2910057 A1 30-10-2014 CN 105378371 A 02-03-2016 EP 2989371 A1 02-03-2016 JP 2016520177 A 11-07-2016 KR 20160003717 A 11-01-2016 US 2016047487 A1 18-02-2016 WO 2014174236 A1 30-10-2014
US 2012175375	A1	12-07-2012	AU 2011355182 A1 11-07-2013 BR 112013017790 A2 11-10-2016 CA 2820017 A1 19-07-2012 CL 2013001998 A1 13-12-2013 CN 103299115 A 11-09-2013 CN 104806812 A 29-07-2015 DK 2663797 T3 23-11-2015 DK 2863093 T3 12-09-2016 EP 2663797 A1 20-11-2013 EP 2863093 A1 22-04-2015 EP 2902684 A1 05-08-2015 ES 2552658 T3 01-12-2015 ES 2588540 T3 03-11-2016 ES 2588541 T3 03-11-2016 FR 2970314 A1 13-07-2012 JP 5960166 B2 02-08-2016 JP 2014503775 A 13-02-2014 KR 20140029366 A 10-03-2014 MA 34891 B1 01-02-2014 NZ 611666 A 27-06-2014 PL 2863093 T3 30-12-2016 PT 2663797 E 23-11-2015 RU 2013137434 A 20-02-2015 TN 2013000235 A1 10-11-2014 UA 109686 C2 25-09-2015 US 2012175375 A1 12-07-2012 US 2015144210 A1 28-05-2015 US 2015144824 A1 28-05-2015 WO 2012095570 A1 19-07-2012
LU 91690	A1	21-11-2011	EP 2572126 A1 27-03-2013 LU 91690 A1 21-11-2011 WO 2011144573 A1 24-11-2011
FR 2974402	A1	26-10-2012	CN 103492786 A 01-01-2014 DK 2699837 T3 23-03-2015 EP 2699837 A1 26-02-2014 ES 2533214 T3 08-04-2015 FR 2974402 A1 26-10-2012 US 2014048169 A1 20-02-2014 WO 2012143635 A1 26-10-2012
FR 2955170	A1	15-07-2011	NONE