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(54) **PRESSURE GAS CYLINDER VALVE**

(57) A valve (1) is described for a cylinder with pressurized gas; the cylinder comprises a tank (20) with pressurized gas and the valve is configured to seal the pressurized gas of the tank. The tank comprises a threaded opening (22) and the valve comprises an at least partially threaded connection (133) adapted to couple with the

threaded opening of the tank. The valve comprises a metal ring (3) arranged so as to wind a portion (15) of the connection of the valve; the metal ring is configured to damage a portion (26) of the threaded opening of the tank during the coupling of the valve with the tank.

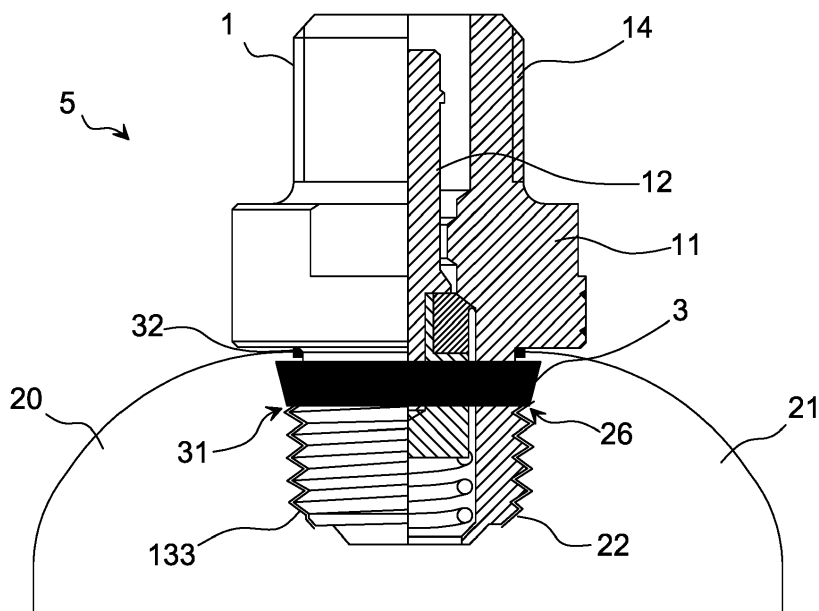


Fig.5

Description

[0001] The present invention relates to a pressure gas cylinder valve.

[0002] Cylinders containing pressurized gases, for example refrigerant gases and technical gases such as nitrogen, carbon dioxide, oxygen, compressed air and argon, consisting of a gas containment tank closed at the top by a valve consisting of a hollow body, in which a sealing plug flows, are known. The valve is screwed with a male thread to a female thread of the upper opening of the tank.

[0003] Great care must be taken when making the valve threads and the upper opening of the tank intended to be coupled. The manufacturing tolerances are very tight, having to ensure the sealing of very dangerous gases at high pressures.

[0004] The quality of the threads imposes quality checks on the extremely rigid components, involving a non-negligible component waste.

[0005] The new regulations which will come into force in 2019 will impose the prohibition of re-using the tanks of the cylinders with pressurized gases, i.e., the cylinders may no longer be refillable.

[0006] It is the object of the present invention to provide a valve for a cylinder with pressurized gas which is different from those known and which allows to comply with the new regulations coming into force in 2019.

[0007] In accordance with the invention, such object is achieved by means of a valve for a cylinder with pressurized gas, said cylinder comprising a tank with pressurized gas and said valve being configured to seal the pressurized gas of the tank, said tank comprising a threaded opening and said valve comprising an at least partially threaded connection adapted to couple with the threaded opening of the tank, characterized in that it comprises a metal ring arranged so as to wind a portion of the valve connection, said metal ring being configured to damage a portion of the threaded opening of the tank during the coupling of the valve with the tank.

[0008] These and other features of the present invention will become more apparent from the following detailed description of a practical embodiment thereof, shown for non-limiting purposes, in the accompanying drawings, in which:

Figure 1 is a partial vertical sectional view of a known valve for a cylinder with pressurized gas;

Figure 2 is a partial vertical sectional view of a known tank for a cylinder with pressurized gas;

Figure 3 is a vertical sectional view of the upper part of the tank of Figure 2;

Figure 4 is a partial vertical sectional view of a valve for a cylinder with pressurized gas in accordance with an embodiment of the present invention;

Figure 5 is a partial vertical sectional view of the valve of Figure 4 applied to the tank of Figures 2 and 3;

Figure 6 is a partially sectional front view of a valve

for a cylinder with pressurized gas in accordance with a variant of the embodiment of the present invention;

Figure 7 is a partial vertical sectional view of the valve of Figure 6 applied to the tank of Figures 2 and 3.

Figure 1 shows a known valve 10 for a cylinder with pressurized gas;

the valve has a hollow body 11 comprising a plug 12 and a threaded part or threaded connection 13, of the cylindrical type, for the coupling with a tank 20 shown in Figures 2 and 3.

[0009] The tank 20 is filled with pressurized gases, for example refrigerant gases and technical gases such as nitrogen, carbon dioxide, oxygen, compressed air and argon (class 2), in particular gases with classification code ADR 1A - 2A - IF - 2F. The tank 20 has a lower cap shell 23, a cylindrical part 24 and an upper cap shell 21 (better shown in Figure 3) provided with a threaded opening 22, preferably with a conical thread, adapted to receive the threaded part 13 of the valve 10.

[0010] When the valve 10 is coupled with the tank 20, the plug 12 regulates the possible passage of gas requested by the external user. The valve 10 is usually sealed; if the plug 12 is pressed downwards, gas comes out. Usually, the actuation occurs by means of an external operating body (not shown) of the plug 12 coupled with the valve 10 by means of coupling portions 14 placed on the valve head.

[0011] The tank 20 is preferably filled with gas with a pressure of 163 bar and with an operating temperature preferably of between -20°C and 60°C, preferably with a burst pressure of at least 260 bar. Preferably, the cylindrical wall of the part 24 has a thickness of at least 2.5 mm. Preferably the shells 21 and 23 have a diameter of 102 mm and a thickness of 2 mm.

[0012] The valve 10 is preferably made of standardized steel as well as of brass, as is the common practice. The tank 20 is preferably made of carbon steel or of aluminum.

[0013] Figure 4 shows a valve 1 for a cylinder 5 with pressurized gas in accordance with an embodiment of the present invention. The valve 1 comprises some elements of the valve 10, i.e., it has a hollow body 11 comprising a plug 12; the valve 1 comprises an at least partially threaded part or connection 133, of the cylindrical type, for the coupling with the tank 20 shown in Figures 2 and 3. The valve 1 is preferably made of standardized steel as well as of brass, as is the common practice.

[0014] The valve 1 also comprises a metal ring 3, preferably made of hard metal and still preferably made of stainless steel or carbon steel, arranged so as to wind a portion 15 of the at least partially threaded connection 133. Preferably, the portion 15 is a predefined seat for the ring 3 in which the ring is maintained and in this case the portion 15 is non-threaded; alternatively, the portion 15 may also be threaded, the ring 3 is wound on the portion 15 and the connection 133 is completely threaded. The inner surface of the ring 3 is in contact with the

portion 15 of the connection 133. Preferably, the ring 3 has a frustoconical shape and has a lower annular end 31 with a smaller diameter with respect to the diameter of the upper annular end 32; alternatively, the ring 3 may only have a bevel in the lower annular end 31 thereof. Preferably, the ring 3 has a height of about 1-2 mm.

[0015] Preferably, the portion 15 is an upper portion of the connection 133, i.e., the portion of the connection 133 which is adjacent to the body 11 of the valve 1.

[0016] The valve 1 is adapted to couple with the tank 20 of Figures 2 and 3 to seal the pressurized gas inside the tank 20; the combination of the valve 1 and the tank 20 form the cylinder 5 of pressurized gas.

[0017] The valve 1 is coupled with the tank 20 by screwing the connection 133 onto the threaded opening 22 of the tank 20. The screwing of the threaded part of the connection 133 onto the threaded opening 22 usually continues until the remaining part to be screwed is the portion 15 provided with the ring 3 on the outside.

[0018] The frustoconical shape of the ring 3 allows the entrance of the ring 3 into the opening 22. By forcing the further screwing of the connection 133 into the opening 22 a portion 26 of the threaded opening 22 of the tank is damaged, in particular the upper portion of the threaded opening 22 of the tank, as shown in Figure 5.

[0019] The damage to the portion 26 of the threaded opening 22 of the tank is irreparable and makes the tank 20 no longer reusable since it will no longer be possible to screw another sealing valve onto the threaded opening 22 of the tank; the portion 26 comprises at least 2 or 3 threads of the opening 22.

[0020] When the valve 1 is coupled with the tank 20, the plug 12 regulates the possible passage of gas requested by the external user. The valve 1 is usually sealed; if the plug 12 is pressed downwards, gas comes out. Usually, the actuation occurs by means of an external operating body (not shown) of the plug 12 coupled with the valve 1 by means of the coupling portions 14 placed on the valve head.

[0021] Figure 6 shows a valve 1 for a cylinder 5 with pressurized gas in accordance with a variant of the embodiment of the present invention. The valve 1 of Figure 6 differs from the valve 1 of Figure 4 only by the different shape of the ring 3, which, in such case, has a tubular shape with a full circular section, and by the semicircular conformation of the seat or portion 15 of the annular type suitable for housing the ring 3 with a tubular shape and a circular section; preferably, the ring 3 is made of stainless steel.

[0022] The seat 15 is an annular portion of the upper part of the connection 133. In particular, the annular portion 15 is arranged above the threaded part of the connection 133 in the path from the body 11 of the valve to the end of the connection 133 which represents the lower end 134 of the valve 1.

[0023] The ring 3 is arranged in the seat 15 so that it may not be pulled out from the seat 15 itself.

[0024] The valve 1 is adapted to couple with the tank

20 of Figures 2 and 3 to seal the pressurized gas inside the tank 20; the combination of the valve 1 and the tank 20 forms the cylinder 5 of pressurized gas.

[0025] The valve 1 is coupled with the tank 20 by means of screwing the connection 133 onto the threaded opening 22 of the upper shell 21 of the tank 20 which is adapted to receive the connection 133. The screwing of the threaded part of the connection 133 onto the threaded opening 22 usually continues until the remaining part to be screwed is the portion 15 provided with the ring 3 on the outside.

[0026] By forcing the further screwing of the connection 133 into the opening 22 the portion 26 of the threaded opening 22 of the tank is damaged, in particular the upper portion of the threaded opening 22 of the tank, as shown in Figure 7.

[0027] The damage to the portion 26 of the threaded opening 22 of the tank is irreparable and makes the tank 20 no longer reusable since it will no longer be possible to screw another sealing valve onto the threaded opening 22 of the tank; the portion 26 comprises at least 2 or 3 threads of the opening 22.

[0028] Preferably, the tank 20 has an upper ring bevel 28 before the threaded opening 22 to facilitate the entrance of the connection 133 into the opening 22.

Claims

1. A valve (1) for a cylinder with pressurized gas, said cylinder comprising a tank (20) with pressurized gas and said valve being configured to seal the pressurized gas of the tank, said tank comprising a threaded opening (22) and said valve comprising an at least partially threaded connection (133) adapted to couple with the threaded opening of the tank, **characterized in that** it comprises a metal ring (3) arranged so as to wind a portion (15) of the connection of the valve, said metal ring being configured to damage a portion (26) of the threaded opening of the tank during the coupling of the valve with the tank.
2. A valve according to claim 1, **characterized in that** said metal ring is arranged so as to wind the upper portion of the at least partially threaded connection of the valve to damage the upper portion of the threaded opening of the tank during the coupling of the valve with the tank.
3. A valve according to claim 1, **characterized in that** said metal ring is made of stainless steel.
4. A valve according to claim 1, **characterized in that** said metal ring is made of carbon steel.
5. A valve according to claim 1, **characterized in that** said metal ring has a frustoconical shape and has a lower annular end (31) with a diameter smaller with

respect to the upper annular end (32).

6. A valve according to any one of the preceding claims, **characterized in that** said portion of said at least partially threaded connection is a non-threaded portion and represents a seat for said metal ring. 5
7. A valve according to any one of the preceding claims, **characterized in that** said portion of said connection is a threaded portion and said connection is completely threaded. 10
8. A cylinder (5) for pressurized gas comprising a tank (20) with pressurized gas and a sealing valve (1), **characterized in that** said valve is defined as in any of the preceding claims. 15
9. A valve according to claim 1, **characterized in that** said metal ring has a tubular shape with a circular cross-section. 20
10. A valve according to claims 6 and 9, **characterized in that** said seat (15) for said metal ring is an annular portion with a semicircular conformation of said connection (133) said seat adapted to receive said metal ring (3) with a tubular shape and circular cross-section. 25
11. A cylinder (5) for pressurized gas comprising a tank (20) with pressurized gas and a sealing valve (1), **characterized in that** said valve is defined as in any one of claims 9 to 10. 30

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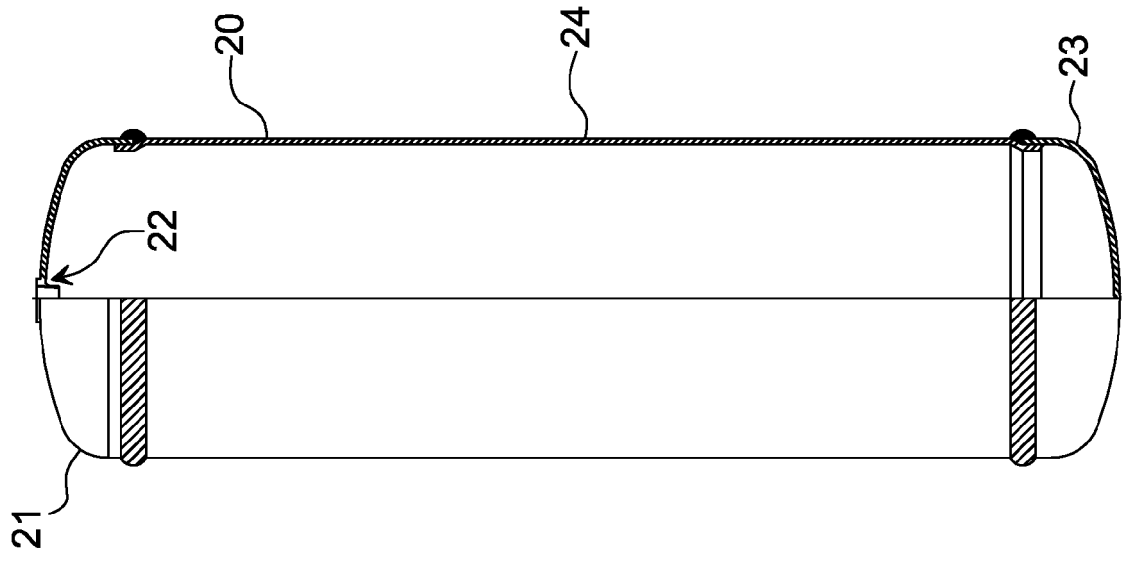


Fig. 2

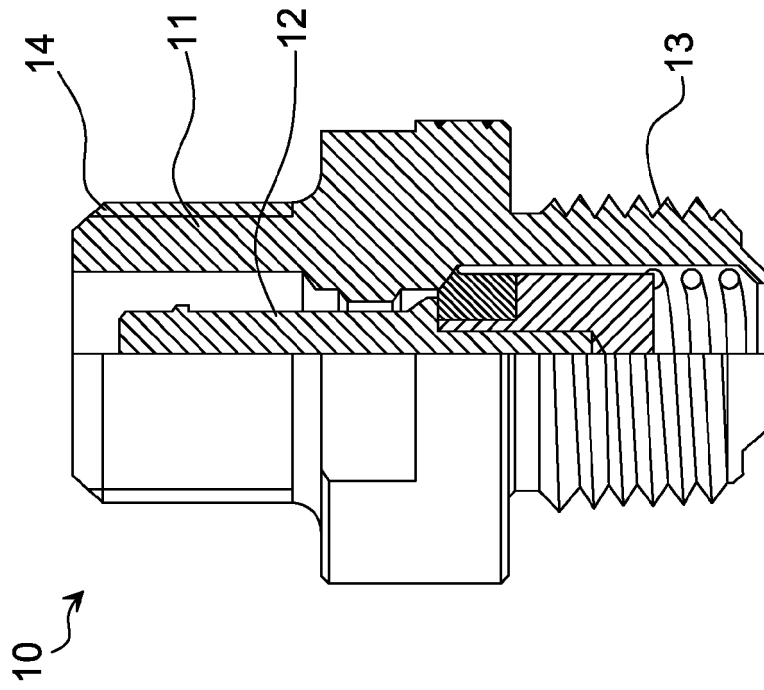


Fig. 1

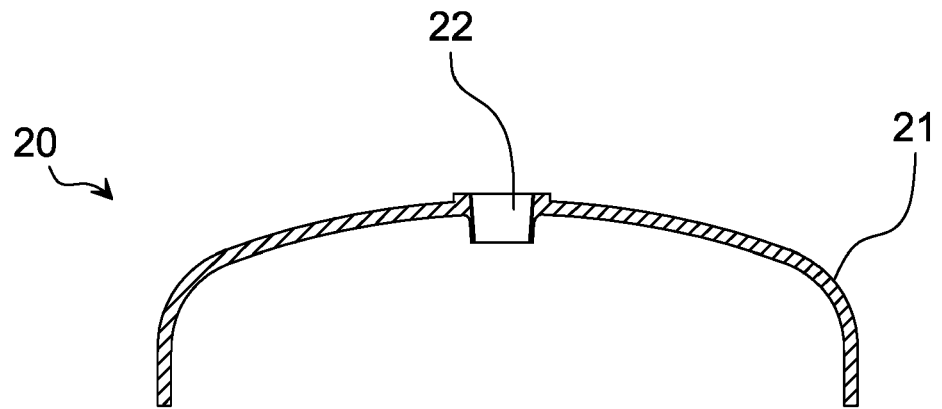


Fig.3

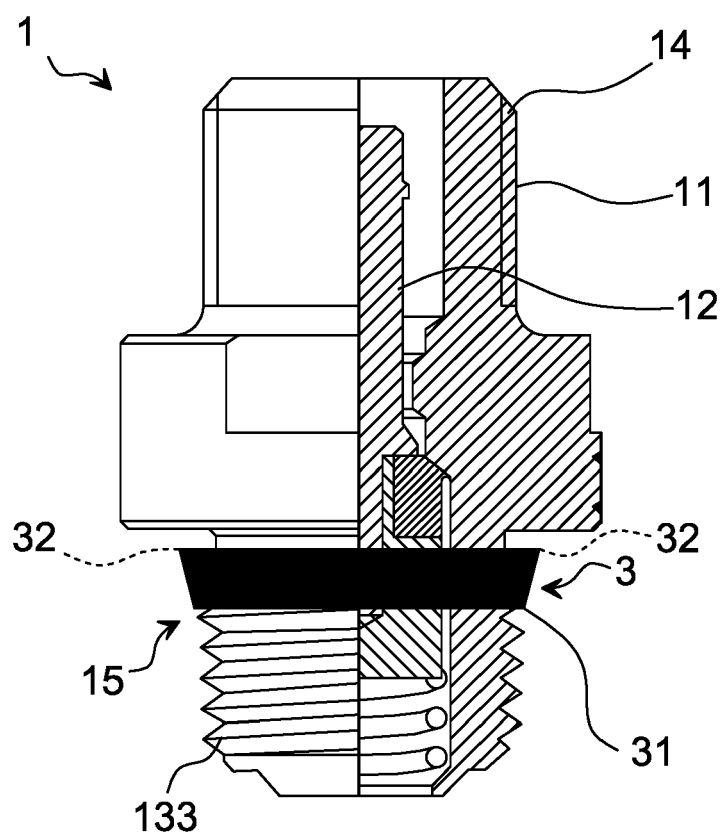


Fig.4

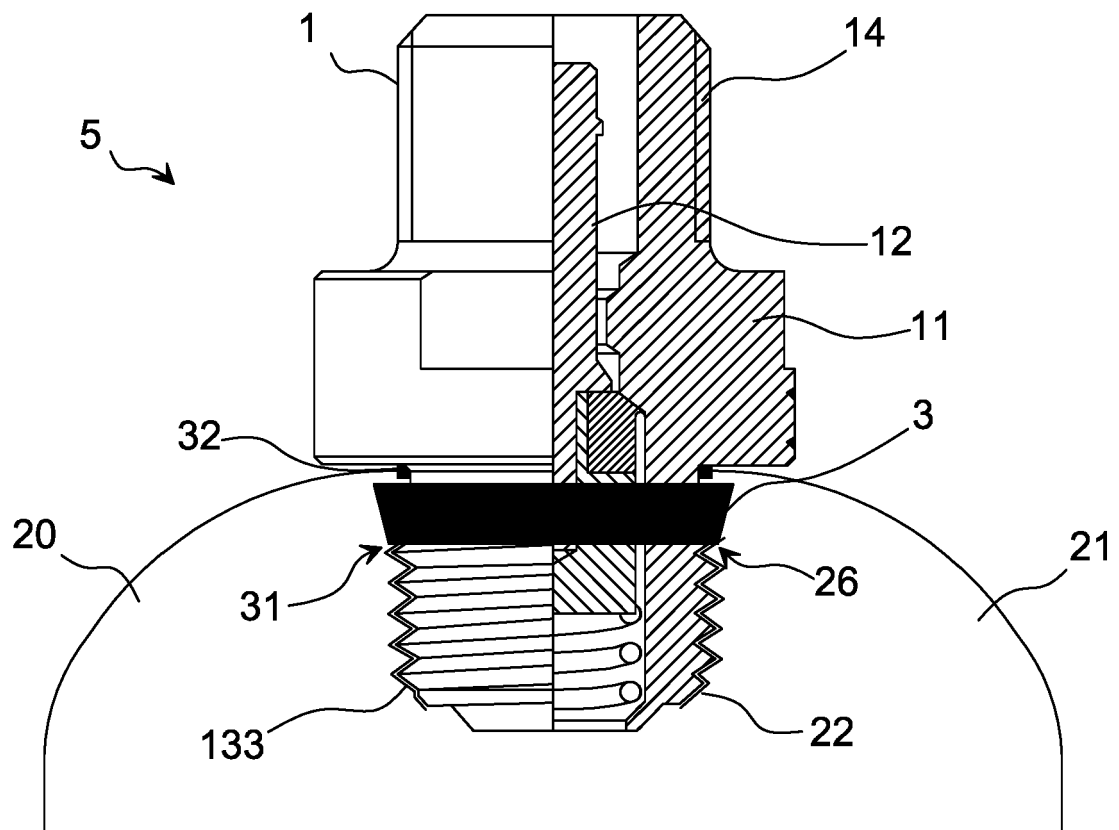


Fig.5

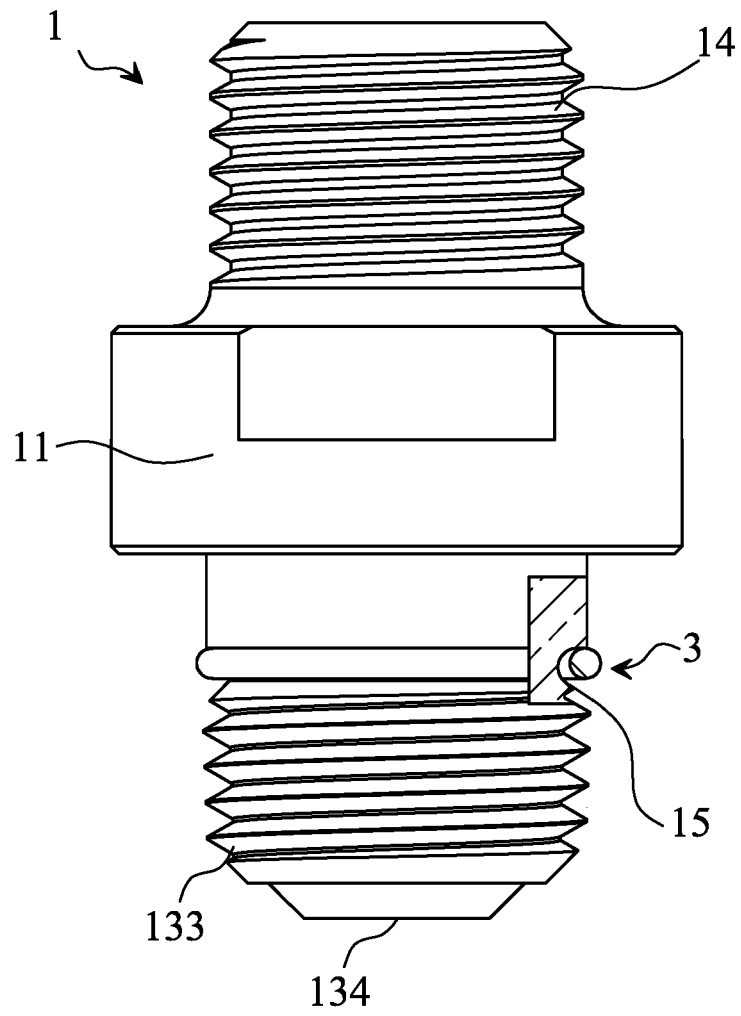


Fig.6

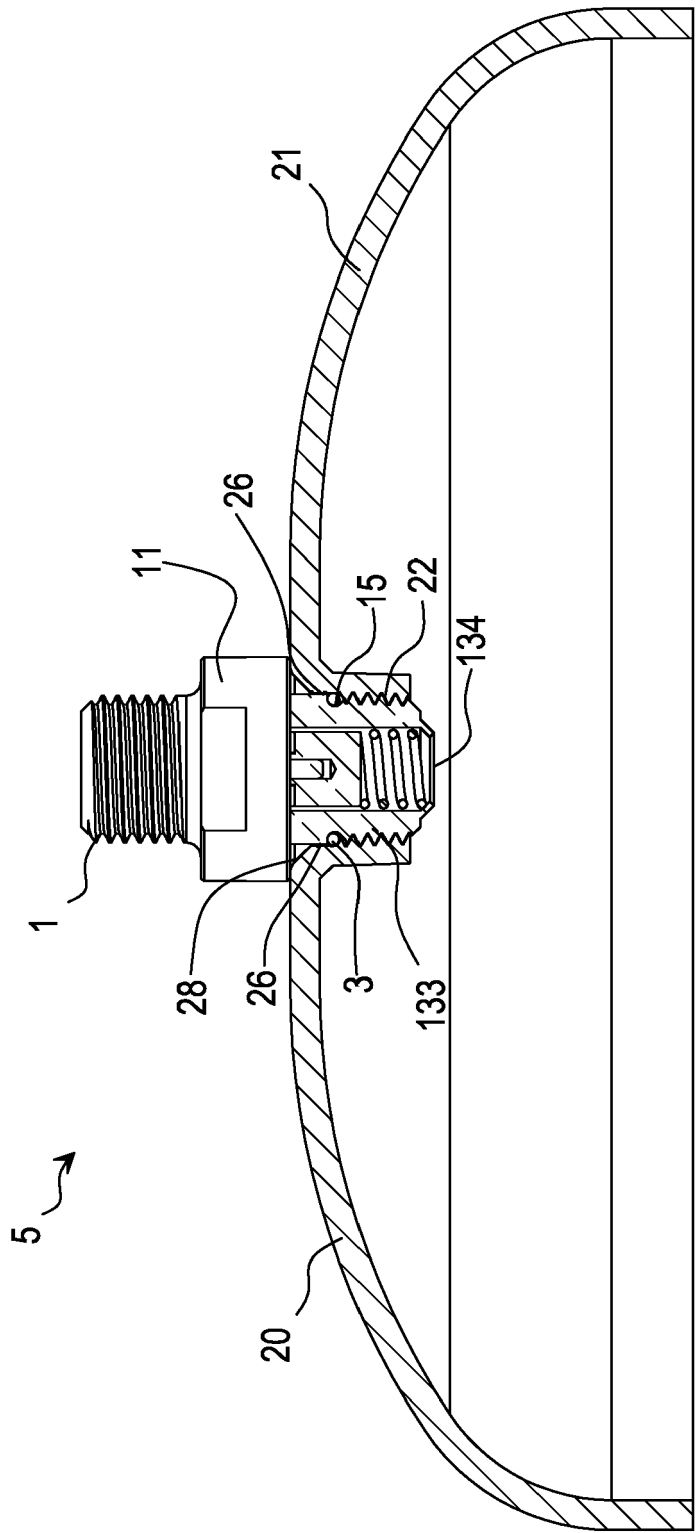


Fig.7



EUROPEAN SEARCH REPORT

Application Number
EP 18 18 5666

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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)
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			TECHNICAL FIELDS SEARCHED (IPC)
			F17C F16K F16L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 June 2019	Examiner Ott, Thomas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

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

EP 18 18 5666

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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12-06-2019

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