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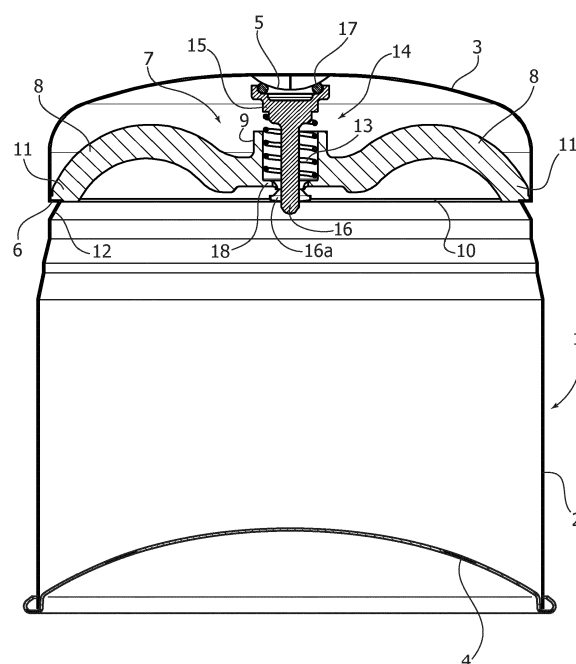
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(54) **PERFORABLE CARTRIDGE FOR LIQUEFIED GAS PROVIDED WITH A SAFETY DEVICE**

(57) A perforable cartridge for liquefied gas comprising a generally cylindrical casing (1) with a lateral wall (2) and an upper wall (3) having a central perforable portion (5), and a safety device (7) including a check valve (14) biased against the perforable portion (5) by the action of a helical spring (13) carried by a support (9) formed in one piece with an array of rigid radial arms (8) whose radially outer ends (11) are engaged upon said inner annular projection (6) of the lateral wall (2) of the cartridge formed in proximity of the upper wall (3) thereof.

FIG. 1



Description

Field of the invention

[0001] The present invention regards cartridges for liquefied gas under pressure of the type for example utilisable for camping stoves and lanterns and the like.

[0002] These cartridges consist in a generally cylindrical casing with a lateral wall and an upper wall having a central perforable portion. In addition, according to the European Community Directives, such cartridges must be internally provided with a safety device having the function of limiting gas leakage, following the perforation of the gas cylinder, should the user apparatus be removed.

State of the prior art

[0003] According to a first known solution, the safety device for the perforable cartridges in question, described and illustrated in document FR-2901863A1, consists in a valve with a spring check valve carried by a support fixed to the upper wall of the cartridge around the perforable portion thereof. Such support is in this case constituted by a drinking-glass-shaped element whose upper edge is welded to the wall of the cartridge. The welding implies additional difficulties and costs in the cartridge manufacturing process.

[0004] A different solution, described and illustrated in document EP-1406041A1, provides for a sealing facing the perforable part and biased against the latter by an elastic element formed by a metal strip that has at least two support points directly against at least one inner wall of the cartridge. This solution allows avoiding welding but causes some instability to the sealing, which is directly over-moulded on the metal strip. When using the cartridge, this instability could lead to the malfunctioning of the safety device.

[0005] A third solution, known from document EP-2803897A1 and devised to overcome the drawbacks of the previous solutions, provides for an elastic ring engaged on an inner annular projection of the lateral wall of the cartridge and to which an elastic strip carrying the sealing is engaged, pressed around the perforable portion of the upper wall. Though fully efficient from the functional point of view, this solution however implies a certain degree of complication in terms of construction and assembly of the safety device in the cartridge.

Summary of the invention

[0006] The object of the invention is to overcome the aforementioned technical drawbacks of the known solutions, avoiding the need for welding and problems related to the instability of the safety device on the one hand and considerably facilitating the manufacture and assembly of the safety device in the cartridge on the other, thus reducing production costs.

[0007] According to the invention, this object is attained thanks to a cartridge for liquefied gas of the type defined in the pre-characterising part of claim 1, and generally corresponding to the prior art known from document EP-2803897A1, whose distinctive characteristic lies in the fact that the spring is a helical compression spring and the support is formed in one piece with an array of rigid radial arms whose radially outer ends are engaged upon said inner annular projection of the lateral wall of the cartridge.

[0008] The aforementioned radially outer ends of the rigid radial arms are conveniently connected to each other by an integral peripheral ring, and such rigid radial arms are preferably arched with the convexity thereof facing towards the upper wall of the cartridge.

Brief description of the drawings

[0009] The invention will now be described in detail, purely by way of non-limiting example, with reference to the attached drawings, wherein:

- figure 1 is a schematic view, in axial section, of a cartridge for liquefied gas with the safety device according to the invention,
- figure 2 is a perspective view, and in larger scale, of the safety device of the cartridge,
- figure 3 is a perspective view, in top plan view, of a component of the safety device of the figure 2, and
- figure 4 shows an enlarged scale of the detail of figure 1.

Detailed description of the invention:

[0010] Initially with reference to figure 1, the cartridge for liquefied gas according to the invention comprises a casing shaped to form a substantially cylindrical gas cylinder 1 and an upper wall 3 formed of one piece made of deep-drawn strip, and a bottom wall 4 fixed to the edge of the lateral wall 2 by crimping.

[0011] The upper wall 3 has, in an entirely usual fashion, a recessed central part 5 which is perforable due to the thrust-introduction of a perforator that gas-fuelled devices such as stoves, lanterns, heaters and other similar devices are conventionally provided with.

[0012] The lateral wall 2 is formed, in proximity of the upper wall 3, with an inner annular projection 6 which constitutes a perimeter peripheral support for a safety device indicated in its entirety with 7 and illustrated in larger detail in figures 2-4.

[0013] The safety device 7 comprises a body made of moulded plastic material forming - in a single piece - an array of radial arms 8 (four of which are illustrated angularly equally spaced from each other in the example) centrally joined to a drinking-glass-shaped support 9 and whose radially outer ends are connected to each other by means of a peripheral ring 10.

[0014] The arms 8 are rigid, i.e. they are substantially

undeformable under bending according to the axis of the safety device 7: for this purpose, they have a considerable axial thickness, clearly visible in figure 1, and they are conveniently arched with the convexity thereof facing towards the upper wall 3 of the cartridge 1.

[0015] At the radially outer ends of the radial arms 8, connected to each other by means of the integral peripheral ring 10 as mentioned, there are formed slight radial projections 11 for engaging the safety device 7 upon the inner annular projection 6 of the cartridge 1. The engagement is executed, during the assembly of the cartridge, by axially introducing the safety device 7 up to snap-engaging the reliefs 11 beyond the annular projection 6. Such engagement is enabled, albeit the rigidity of the of the radial arms 8, thanks to the presence of chute-like annular surface 12 formed in the lateral wall 2 immediately beneath the annular projection 6.

[0016] The support 9, which is drinking-glass-shaped and integrally formed with the radial arms 8 as mentioned, contains a helical compression spring 13 on which an obturator 14, also made of moulded plastic material rests, forming - in a single piece - a head 15 and a stem 16. The head 15 is hollow and internally bears an o-ring seal 17 usually pressed, by the action of the helical spring 13, against the central perforable portion 5 of the cartridge 1. The stem 16 extends in an axially slidable fashion through the support 9 and traverses, with a projecting end part 16a, the bottom wall 18 thereof. As better observable in figure 3, such bottom wall 18 has a hole 19 delimited by elastically deformable portions 20 through which the projection 16a is adapted to be engaged irreversibly.

[0017] When using the cartridge 1, when the perforator of the gas device is introduced through the perforable portion 5, the rigidity of the radial arms 8 allows the obturator 14 to be pushed downwards, against the action of the helical spring 13, so as to allow the outflow of the gas. Should the device be removed, the helical spring 13 returns the obturator 14 against the upper wall 3, thus pressing the o-ring seal 17 around the edge of the perforation.

[0018] The above will show that besides being manufactured in a relatively simple and economic manner, the safety device 7 can be inserted into the cartridge 1 in a manner that is equally simple and capable of ensuring, in use, maximum stability and precision to close the perforable portion 5 once again following the perforation thereof.

[0019] Obviously, the construction details and the embodiments may widely vary with respect to what has been described and illustrated, without departing from the scope of protection of the invention as described in the claims that follow.

Claims

1. A perforable cartridge for liquefied gas comprising a

generally cylindrical casing (1) with a lateral wall (2) and an upper wall (3) having a central perforable portion (5), said cartridge containing a safety device (7) including an obturator (14) biased against said perforable portion (5) by the action of a spring (13) carried by a support (9) borne by an inner annular projection (6) of the lateral wall (2) of the cartridge, **characterized in that** the spring is a helical compression spring (13) and the support (9) is formed in one piece with an array of rigid radial arms (8) whose radially outer ends (11) are engaged upon said inner annular projection (6) of the lateral wall (2) of the cartridge.

2. Cartridge according to claim 1, **characterized in that** the radially outer ends (11) of said rigid radial arms (8) are connected to one another by an integral peripheral ring (10).

3. Cartridge according to claim 1 or claim 2, **characterized in that** said rigid radial arms (8) are arched with their convexity facing towards the upper wall (3) of the cartridge.

4. Cartridge according to any one of the preceding claims, **characterized in that** said shutter (14) comprises a head (15) carrying an o-ring seal (17) and a stem (16) having an enlarged end (20) irreversibly engaged in an axially slidable fashion with said support (9).

FIG. 1

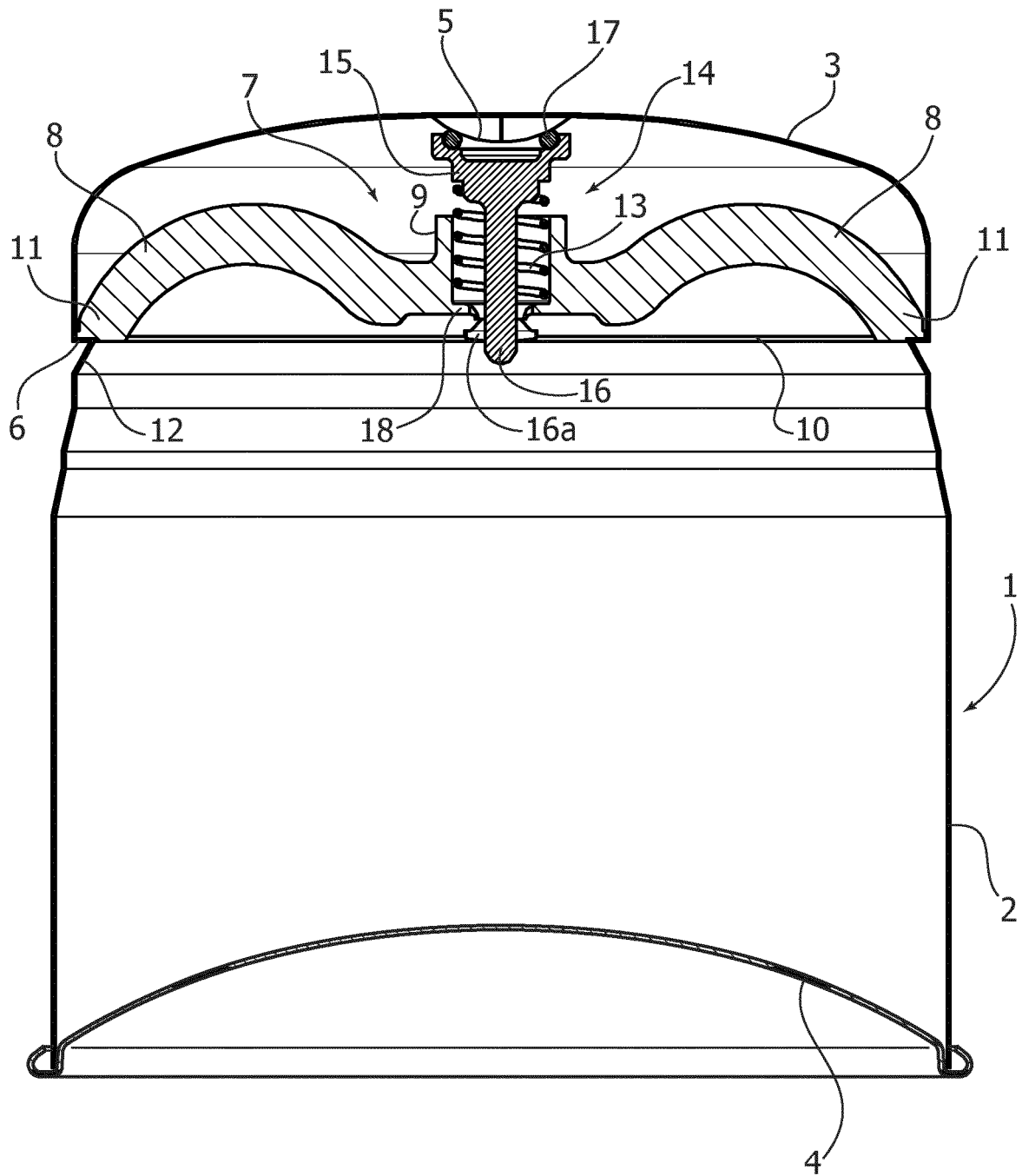


FIG. 2

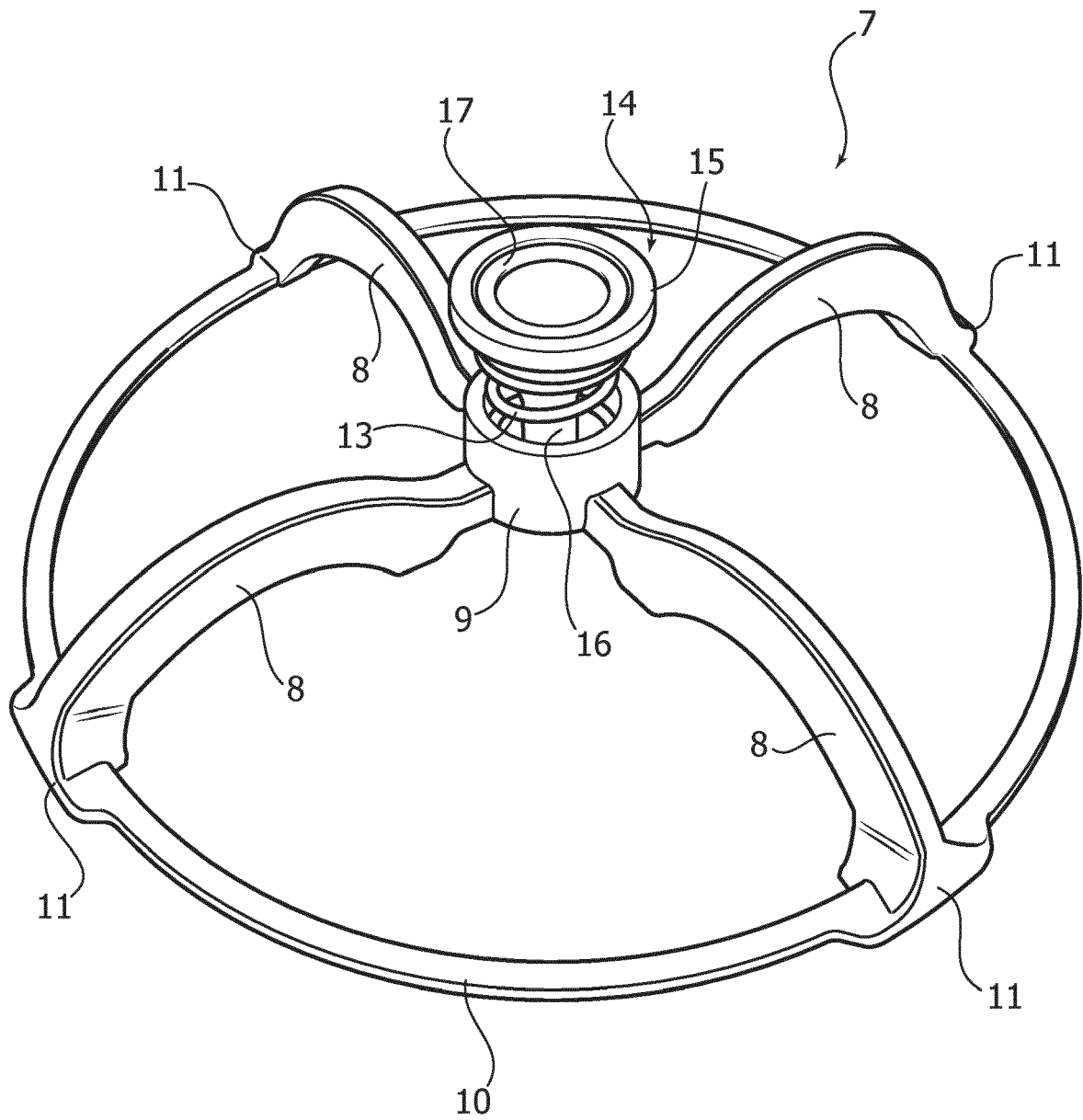


FIG. 3

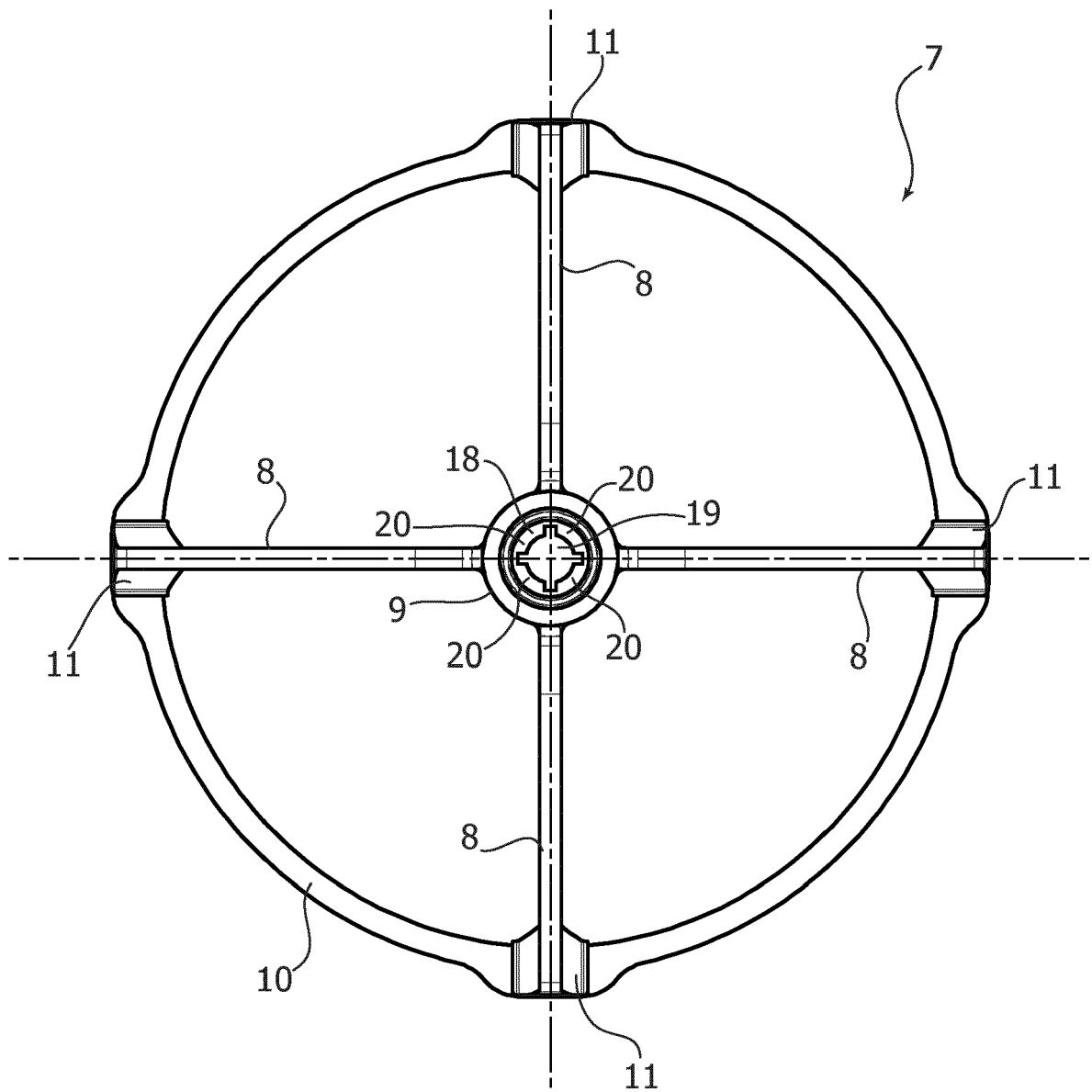
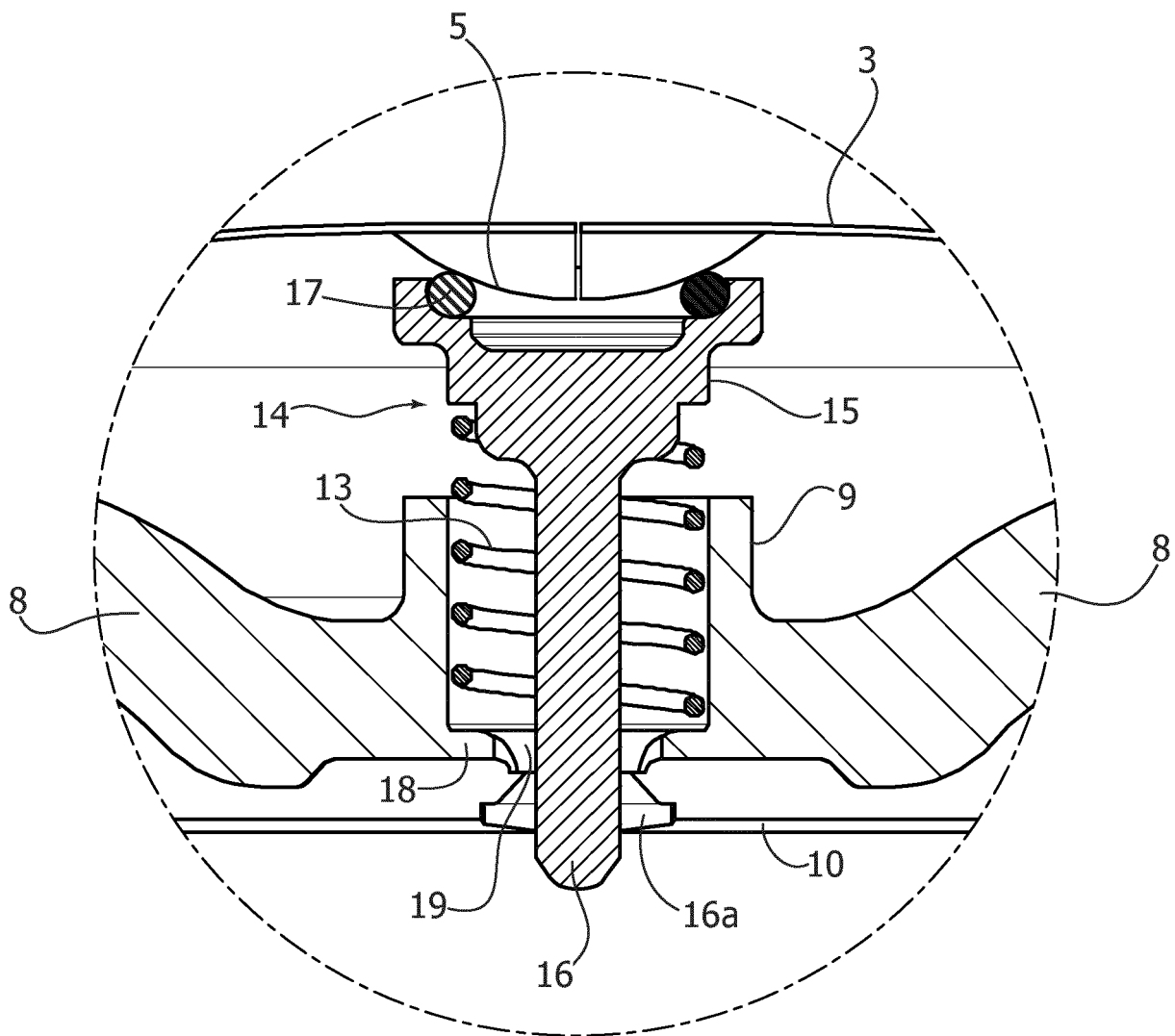


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 16 16 2368

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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)
A,D	EP 2 803 897 A2 (PROVIDUS S R L [IT]) 19 November 2014 (2014-11-19) * page 3; figures 1-3 *	1-4	INV. F17C1/00 F17C13/00
A,D	EP 1 406 041 A2 (GUILBERT EXPRESS SA [FR]) 7 April 2004 (2004-04-07) * paragraphs [0041] - [0051], [0075] - [0077]; figures 2-8,11 *	1-4	
A,D	FR 2 901 863 A1 (APPLIC DES GAZ SOC PAR ACTIONS [FR]) 7 December 2007 (2007-12-07) * figures 1,2 *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			F17C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 September 2016	Examiner Nicol, Boris
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EPO FORM 1503 03.82 (P04C01)

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

EP 16 16 2368

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
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01-09-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2803897	A2	19-11-2014	NONE
EP 1406041	A2	07-04-2004	AT 461397 T 15-04-2010 DK 1406041 T3 28-06-2010 EP 1406041 A2 07-04-2004 ES 2342882 T3 16-07-2010 FR 2845456 A1 09-04-2004 PT 1406041 E 25-05-2010
FR 2901863	A1	07-12-2007	AT 523729 T 15-09-2011 EP 2024676 A1 18-02-2009 ES 2371884 T3 11-01-2012 FR 2901863 A1 07-12-2007 HK 1127115 A1 02-12-2011 JP 5101608 B2 19-12-2012 JP 2009540255 A 19-11-2009 PT 2024676 E 21-12-2011 US 2011017752 A1 27-01-2011 WO 2007141400 A1 13-12-2007

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- FR 2901863 A1 [0003]
- EP 1406041 A1 [0004]
- EP 2803897 A1 [0005] [0007]