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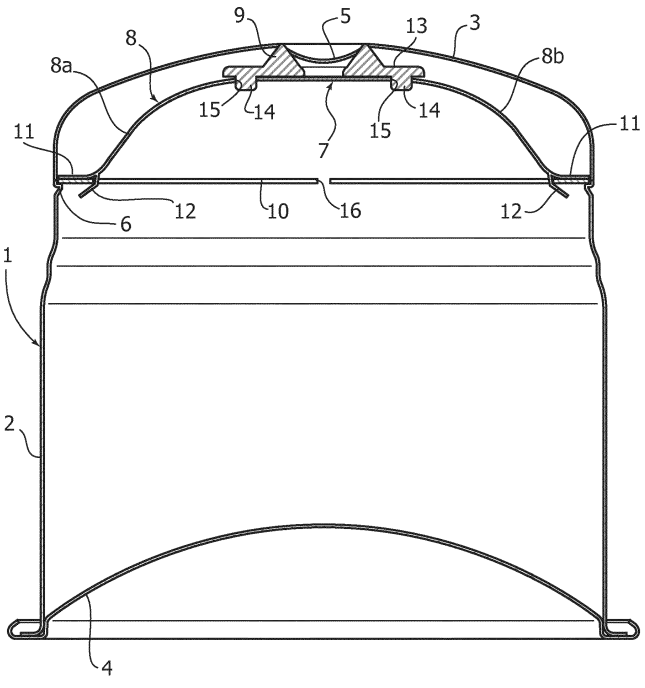
(54) **A perforable cartridge for liquefied gas with a safety device**

(57) A cartridge for liquefied gas comprising a casing (1) with a side wall (2) and an upper wall (3) having a perforable central part (5). The cartridge contains a safety device (7) including a seal (9) facing the perforable part (5) and carried by an elastic element (8) anchored on a support (10) consisting of an elastic ring (10) engaged on an inner annular projection (6) of the side wall (2) of the casing (1), formed in the vicinity of its upper wall (3).

FIG. 1



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Description

Field of the invention

[0001] The present invention relates to cartridges for pressurized liquefied gas such as the type used for camping stoves and lanterns and similar applications.

[0002] Typically, such cartridges consist of a generally cylindrical casing having a bottom wall, a side wall and an upper wall equipped with a perforable central part. In addition, based on recent regulations, these cartridges must be internally equipped with a safety device having the function of preventing gas leakage following perforation of the upper wall by the equipment user.

State of the prior art

[0003] The safety device of the perforable cartridges in question may consist of a valve with a spring-loaded obturator, for example as in the case of document FR-A-2901863, or more simply of a seal facing the perforable part and carried by an elastic element tending to push the seal around this perforable part, as described for example in document EP-B-1406041.

[0004] In this latter known solution the seal is annular, so as to be passed through by the piercing member of the apparatus connected to the cartridge, and the elastic element has at least two bearing points so as to bear against at least one inner wall of the cartridge. The direct bearing involves instability to the seal, as well as some complications in mounting of the safety device inside the cartridge. To avoid this instability, document EP-B-1406041 proposes several solutions, all having a relatively complex construction owing to the fact that the elastic element bearing the annular seal and the related support are made in one piece together. In spite of the circumstance that the description of this document states that the support might consist of a combination of different parts joined together before or after mounting the device within the cartridge, no teaching and even no suggestion are provided in connection with a solution in which the support and the elastic element are not formed in one single piece.

[0005] A different solution, related to gas cartridges already provided at the origin with a top opening, is described and illustrated in document GB-A-967.988, according to which the elastic element carries a seal consisting of a plug for the tight closure of the top opening. This elastic element has radially-extending arms resting on a support fixed inside the cartridge, consisting of an inverted basin-shaped disc welded to the inner surface of the upper wall of the cartridge and whose peripheral edge is inturned to support and center the elastic element.

[0006] This solution, whilst more effective with regard to stability of the cartridge safety closur, as compared to that of document EP-B-1406041, is also complex in its application, particularly due to the difficulties of welding the support of the elastic element to the upper wall of the cartridge.

Summary of the invention

[0007] The present invention aims to overcome the aforesaid drawbacks, and to provide a perforable cartridge for liquefied gas in which the safety device is capable of ensuring the necessary reliability, along with a simple and economical construction, both from a manufacturing point of view and in relation to its assembling and and mounting inside the cartridge.

[0008] According to the invention, this object is achieved by means of a cartridge for liquefied gas of the type defined in the preamble of Claim 1, whose peculiar characteristic resides in that it comprises a support distinct from said elastic element and consisting of an elastic ring forcedly engaged above an inner annular projection of the side wall of the casing formed in the vicinity of its upper wall, and in that said elastic element is formed by an arcuate strip having two opposite arms mechanically engaged with two diametrically opposed areas of the elastic ring.

[0009] Preferably each of said two arms of the arcuate strip has respective hoooking appendages engaged above and below said elastic ring.

[0010] The invention also relates to a method for manufacturing the cartridge, with particular reference to the steps of assembly and mounting of the safety device.

Brief description of the drawings

[0011] The invention will now be described in greater detail with reference to the accompanying drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic view in axial section of a perforable cartridge for liquefied gas according to a first embodiment of the invention,

Figure 2 shows the safety device of the cartridge of Figure 1 on a greater scale,

Figure 3 is a top plan view of Figure 2,

Figures 4 and 5 are two perspective views from above and below, respectively, of a detail of the safety device,

Figure 6 is an analogous view to Figure 1, which schematically shows the successive steps of the method for manufacturing the cartridge of Figure 1, and

Figures 7, 8, 9 and 10 are analogous views of Figures 1, 2, 3 and 6, respectively, which show a second embodiment of the cartridge according to the invention.

Detailed description of the invention

[0012] Referring initially to Figure 1, the cartridge for liquefied gas according to a first embodiment of the in-

vention comprises a casing having an essentially cylindrical-shaped canister 1, having a side wall 2 and an upper wall 3 formed of a single piece, and a bottom wall 4 fixed to the edge of the side wall 2 typically by means of roller seaming.

[0013] The upper wall 3 has, in a conventional manner, a lowered central portion 5, which is perforable by thrusting the supply duct of an apparatus such as a stove, a lantern, a heater or similar gas-powered appliances.

[0014] According to a first particular aspect of the invention, the side wall 2 includes, in the vicinity of the upper wall 3, an inner annular projection 6 that forms the peripheral support for a safety device, indicated as a whole by 7, and represented in greater detail in Figures 2 and 3.

[0015] As is visible in Figure 1, the annular projection 6 has an inclined slide surface at its bottom part 6, and a radially-orientated flat surface at the upper wall 3 part.

[0016] The safety device 7 is formed by three components: an elastic element 8, an annular seal 9 carried by the elastic element 8, and a support 10 of the elastic element 8.

[0017] The elastic element 8 consists of a metal strip, typically made of harmonic steel, to the central part of which the seal 9 is fixed, and whose arms extending radially from opposite parts of the seal 9 are each formed with respective sets of terminal hook appendages of mechanical coupling of which the side ones, indicated as 12, are bent below the central one, indicated as 11.

[0018] The length of the strip 8 is greater than the inner diameter of the elastic ring 10 so that, when the arms 8a, 8b are coupled to the elastic ring 10 in the manner outlined below, the strip 8 assumes the arcuate configuration shown in Figures 1 and 2.

[0019] The seal 9, typically produced by means of molding a soft thermoplastic material, has a generally triangular cross-sectional profile, as represented in Figures 1 and 2, and is formed of a single piece with a base 13 which, as is also represented in Figures 4 and 5, has a pair of integral feet 14, forcibly engaged against corresponding holes 15 of the strip 8.

[0020] The elastic ring 10, which is a distinct and separate piece relative to the strip 8, has a flat configuration and an open gap 16. In its undeformed condition, its outer diameter is greater than the inner diameter of the annular projection 6 of the cartridge 1.

[0021] Figure 6 schematically shows the successive assembly steps of the safety device 7, and its mounting within the cartridge 1, after the formation of a single piece composed of the upper wall 3 and the side wall 2, plastically deformed in order to form the inner annular projection 6, and before applying the bottom wall 4.

[0022] In the first step, after attaching the base 13 with the seal 9 to the central part of the elastic strip 8, the arms 8a, 8b of the strip are elastically deformed in order to mechanically connect by hooking the terminal appendages 11, 12 respectively below and above two diametrically opposed areas of the elastic ring 10, preferably offset by 90° with respect to the gap 16.

[0023] The safety device 7 is then introduced axially within the side wall 2 until the elastic ring 10, becoming radially deformed, goes beyond the inner annular projection 6, and is forcedly snap-fit engaged thereabove. This step is facilitated by the slide conformation of the lower part of the projection 6.

[0024] After inserting, the annular seal 9 faces the perforable part 5 of the upper wall 3, and axially bears against its edge under the thrust exerted by the elastic strip 8.

[0025] The final step consists of attaching the bottom wall 4 to the edge of the side wall 2 of the cartridge 1.

[0026] The variant represented in Figures 7 to 10, where parts that are identical or similar to those previously described are indicated with the same reference numerals, differs from the previous embodiment only in the fact that the elastic ring 10, also split in this case, has ends 10a, 10b level with the gap, which overlap with one another instead of being spaced apart as in the previous case.

[0027] The assembly steps of the device 7 according to this variant, represented in Figure 10, are entirely analogous to those described above with reference to Figure 6.

[0028] Naturally, the details of construction and the embodiments may vary with respect to what is described and illustrated here, without departing from the scope of the present invention as defined by the following claims.

[0029] For instance, while in the shown examples the seal 9 has an annular design, as a matter of fact it is more preferable that it so designed to be not passed through by a piercing member associated with an apparatus employing the cartridge. To such effect, and according to different embodiments, not shown in the drawings but within the skill of the practitioner, the seal 9 can be formed by a solid body shaped as a non-pierceable plug or, in case the seal be still annular, the strip 8 would be formed centrally with an embossment or projection protruding axially within the seal towards the perforable part 5, so as to be intercepted by the piercing member thus preventing the latter from passing through the seal.

Claims

1. A cartridge for liquefied gas comprising a generally cylindrical casing (1) with a side wall (2) and an upper wall (3) having a perforable central part (5), said cartridge containing a safety device (7) including a seal (9) facing the perforable part (5) and carried by an elastic element (8) tending to urge it around said perforable part (5), **characterized in that** it comprises a support distinct from said elastic element (8) and consisting of an elastic ring (10) forcedly engaged above an inner annular projection (6) of the side wall (2) of the casing (1) formed in the vicinity of its upper wall (3), and **in that** said elastic element (8) is formed by an arcuate strip (8) having two opposite arms (8a,

8b) mechanically engaged with two diametrically opposed areas of said elastic ring (10).

2. A cartridge according to claim 1, **characterized in that** each of said two arms (8a, 8b) of the arcuate strip (8) has respective hoooking appendages (11, 12) engaged above and below said elastic ring (10).

3. A cartridge according to claim 1 or 2, **characterized in that** said elastic ring (10) is a flat, split and open ring.

4. A cartridge according to claim 1 or 2, **characterized in that** said elastic ring (10) is a flat, split and closed ring.

5. A cartridge according to one or more of the preceding claims, **characterized in that** said seal (9) is formed in one piece with a base (13) mechanically attached to said strip (8).

6. A cartridge according to one or more of the preceding claims, **characterized in that** said seal (9) is annular.

7. A cartridge according to one or more of claims 1 to 5, **characterized in that** said seal (9) consists of a plug.

8. A cartridge according to one or more of claims 1 to 5, **characterized in that** said seal is designed not to be passed through by a member for piercing said perforable part (5).

9. A cartridge according to one or more of the preceding claims, **characterized in that** said inner annular projection (6) of the side wall (2) of the casing (1) has, on the side opposite to said upper wall (3), an inclined slide surface.

10. A method for manufacturing a cartridge according to the preceding claims, **characterized in that** it comprises the following steps:

- forming said side wall (2) and said upper wall (3) of the casing (1) as a single piece,
- plastically deforming said side wall (2) in the vicinity of said upper wall (3) in order to form said inner annular projection (6),
- mechanically assembling said seal (9) and said strip (8),
- elastically deforming said strip (8) into an arcuate configuration, and engaging said coupling appendages (11, 12) with two diametrically opposed areas of said elastic ring (10) in order to complete said safety device (7),
- axially introducing said safety device (7) within said side wall (2) of the casing (1) until engagement of said elastic ring (10) above said inner annular projection (6), so that said seal (9) is pushed around said perforable part (5),
- closing said casing (1) by applying a bottom wall (4).

FIG. 1

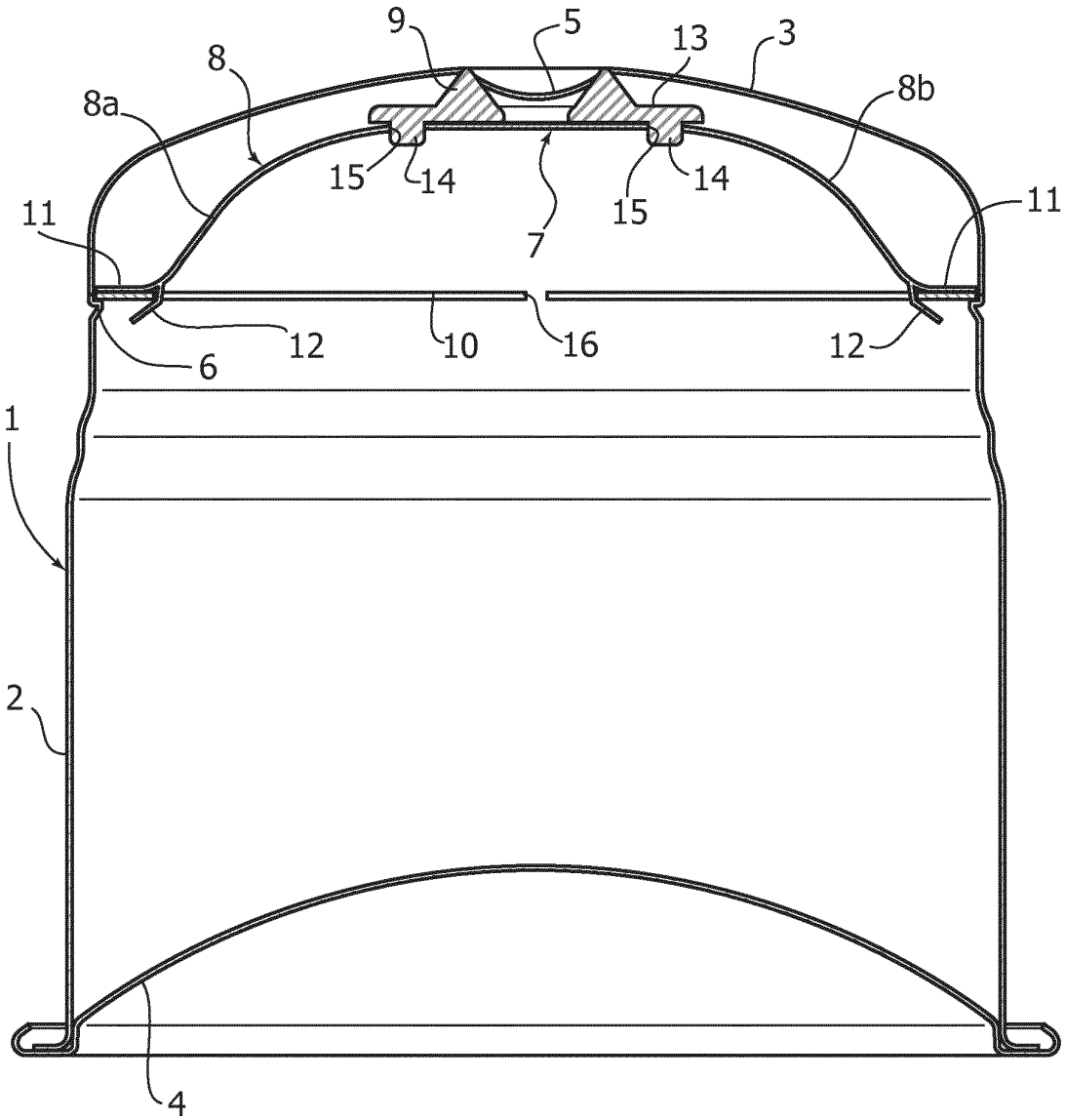

FIG. 2

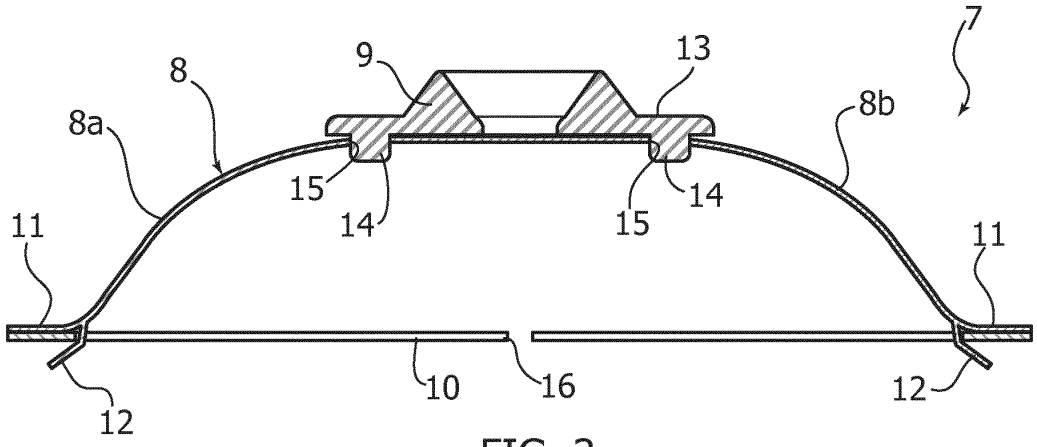
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FIG. 3

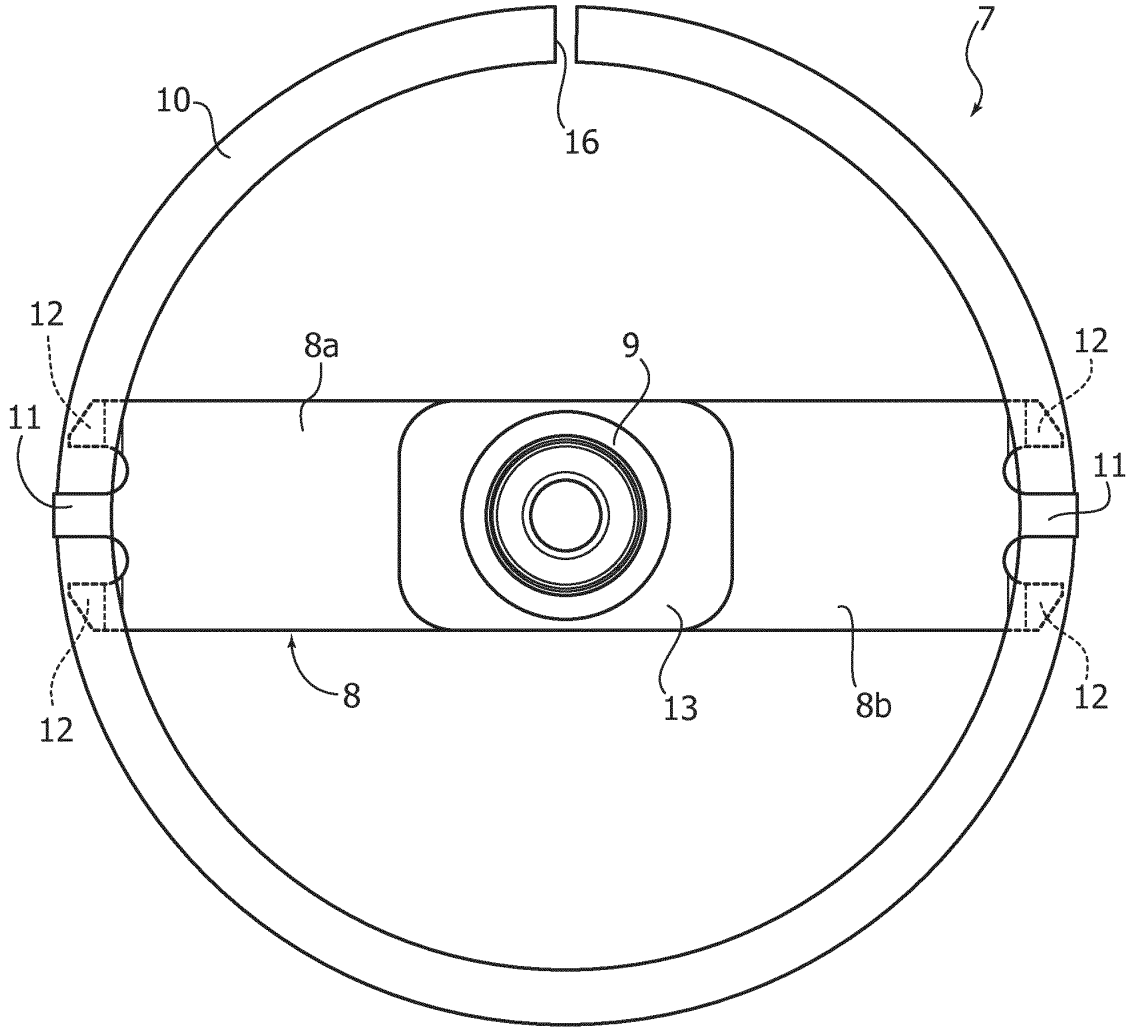
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FIG. 4

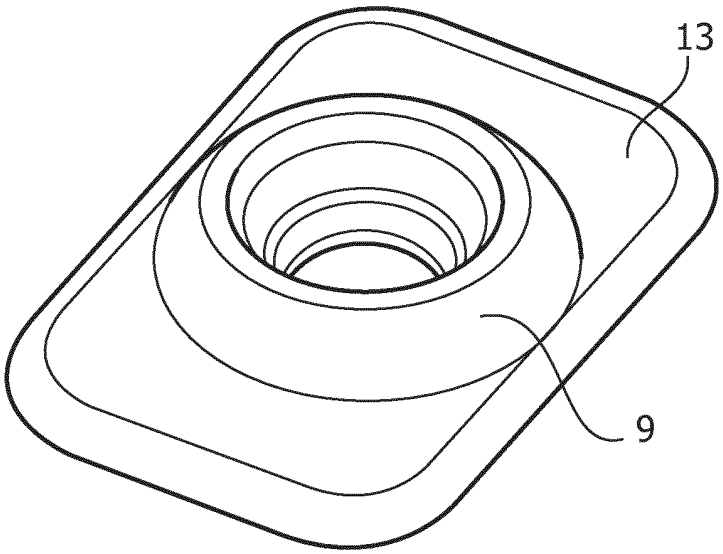

FIG. 5

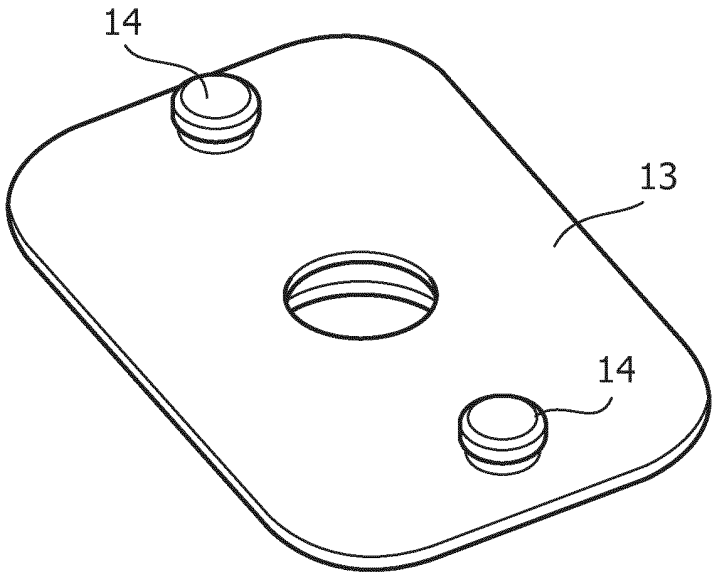

FIG. 6

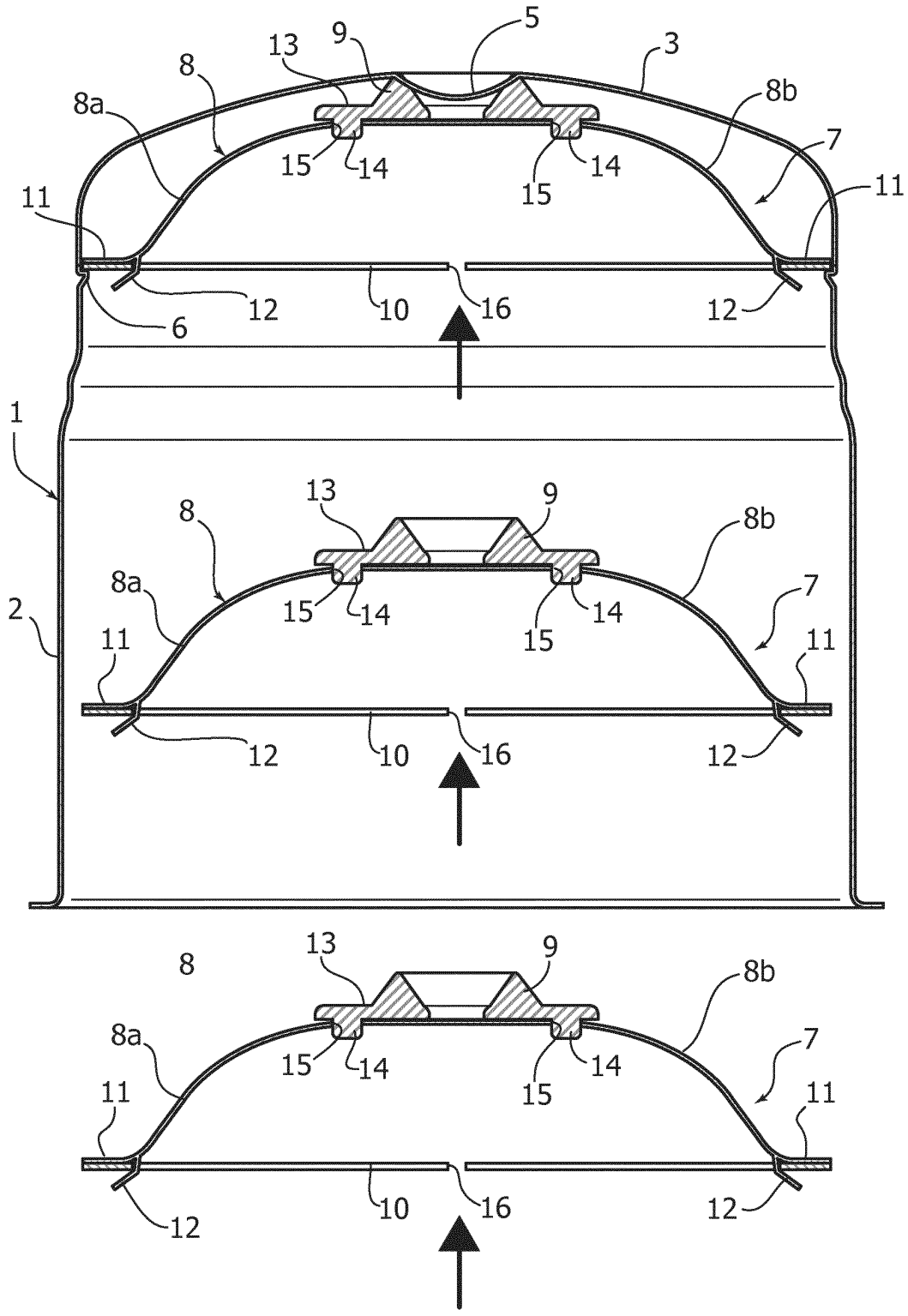
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FIG. 7

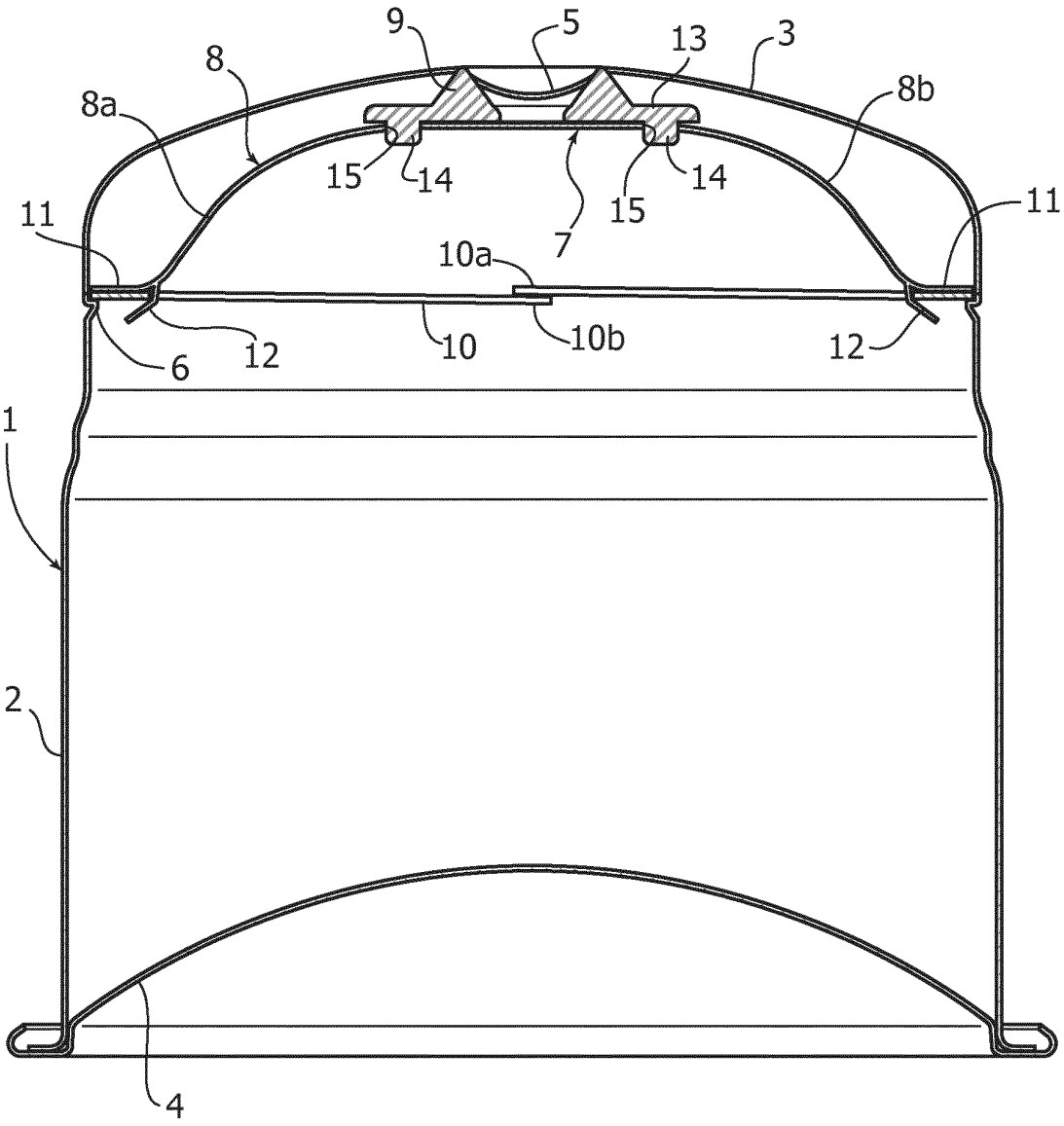

FIG. 8

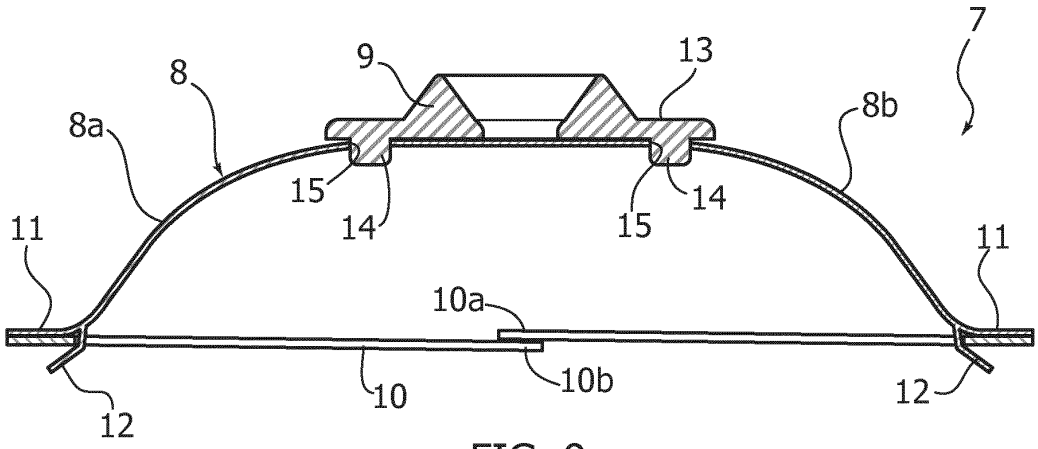
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FIG. 9

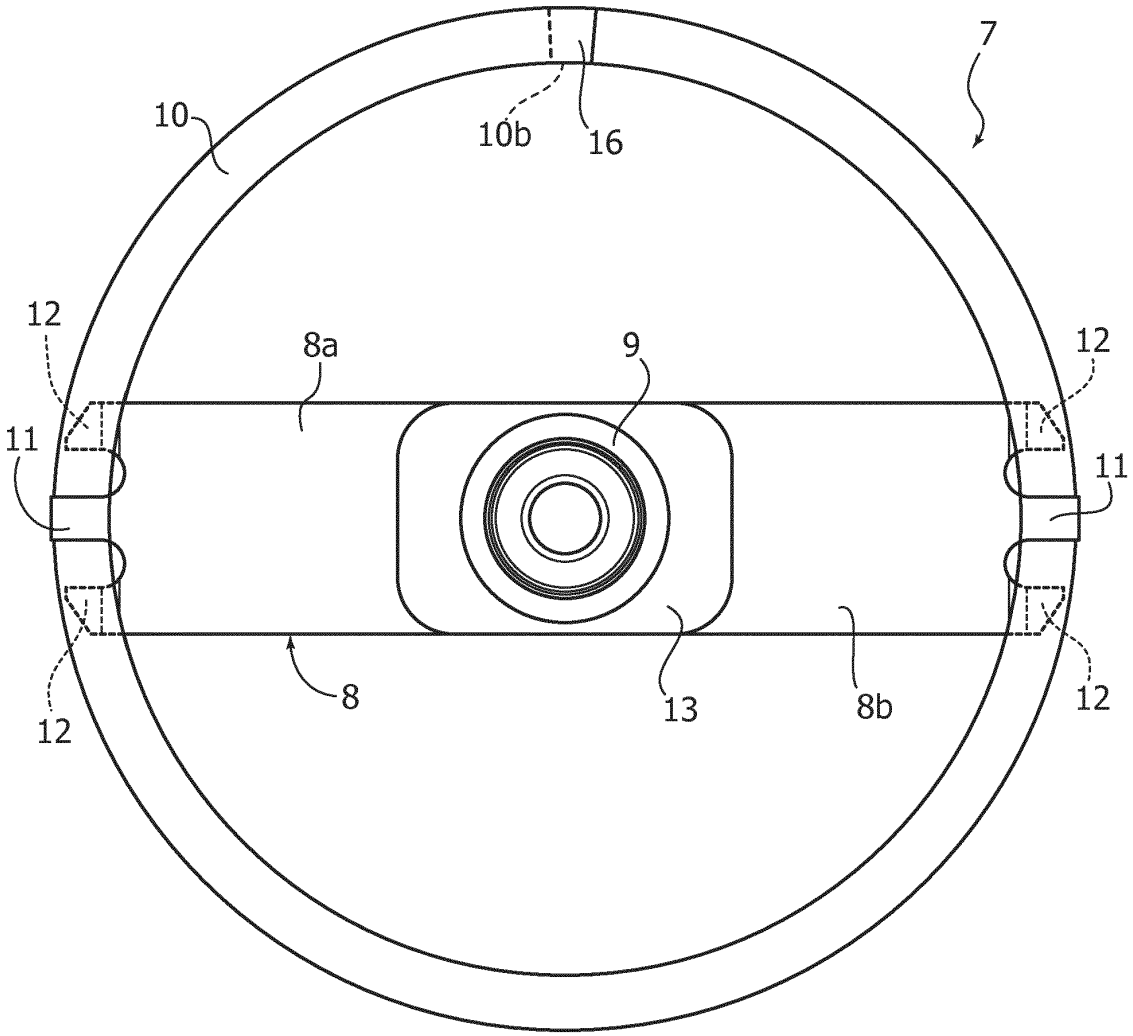
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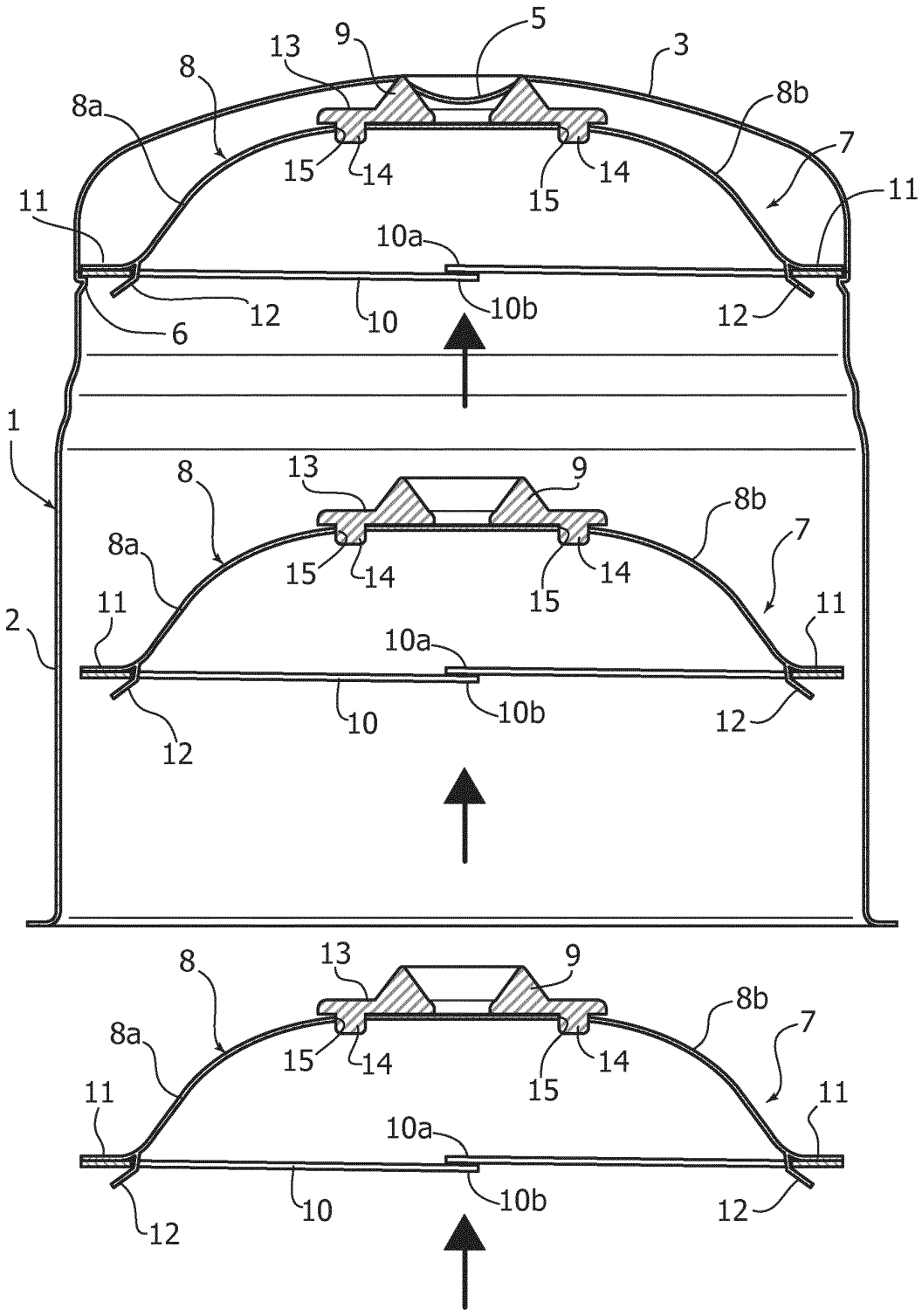
FIG. 10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REFERENCES CITED IN THE DESCRIPTION

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- EP 1406041 B **[0003] [0004] [0006]**
- GB 967988 A **[0005]**