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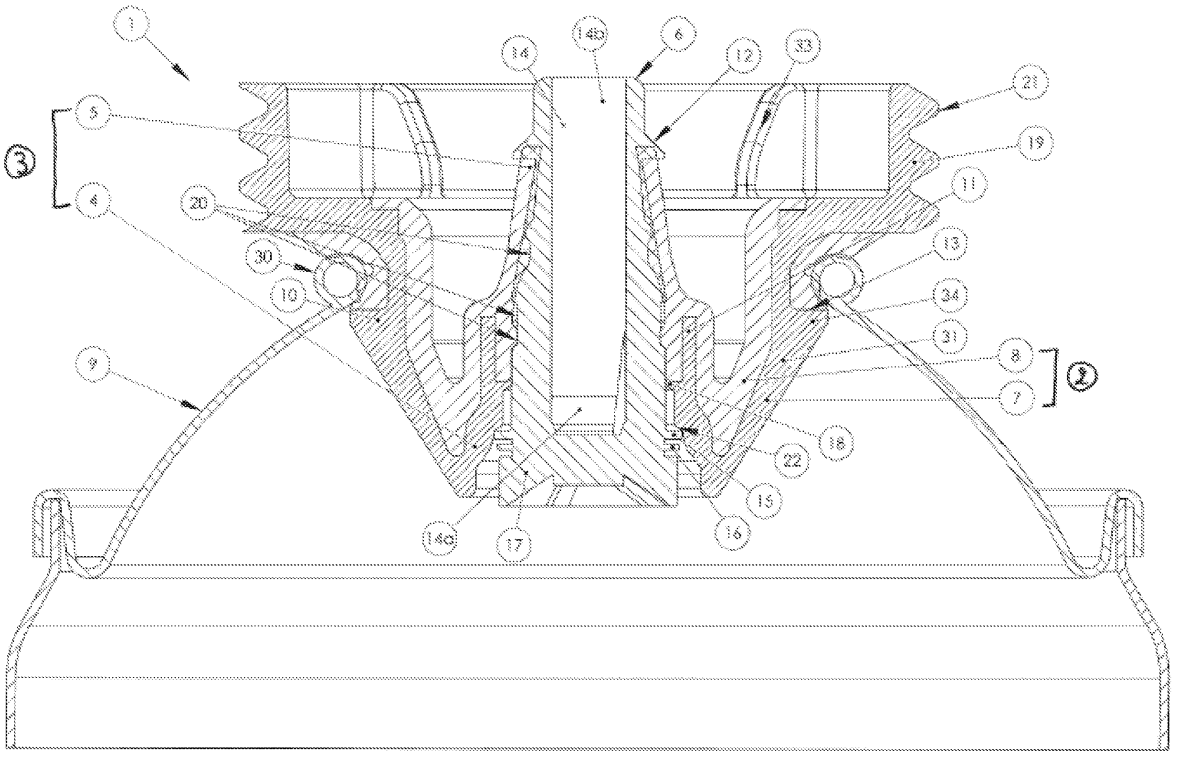
(54) **Valve with safety protrusion**

(57) The present invention is directed to a valve (1) for a container comprising a grommet (2) having a plug system (10) and defining a channel (3) with an inlet end (4) and an outlet end (5) and a stem (6) slideably arranged in the channel (3), whereby the grommet (2) comprises at least two parts (7) and (8) sealingly engaged, said first part (7) having protrusion within said second part (8).

FIG. 1

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## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a new aerosol valve for a pressurized fluid container, more particularly for one component polyurethane foam applications.

### BACKGROUND OF THE INVENTION

**[0002]** It is known generally known to store fluids under pressure in containers (cans or vessels) in a wide field of applications. The fluids are usually dispensed from the container by means of a valve arranged in a cup of the container.

**[0003]** A well-known application is sprayable foams used in both industrial applications and by hobbyists. As such, containers with sprayable foam can be exposed to rather extreme conditions in terms of temperature and pressure.

**[0004]** Under these extreme conditions, the pressure in the container may rise and the valve may detach from the container creating potential safety issues.

**[0005]** In order to prevent the above, several safety measures are used, such as providing an overpressure relief valve or providing "burst parts" in the container. However, the use of overpressure relief valves is expensive, while providing weakened "burst parts" in the container is no option for containers that are used on building sites as unintended burst of the container may be triggered by the nature of use of these containers.

**[0006]** Still, in order to prevent the valve from detaching from the container due to overpressure, it is possible to mould part of the grommet over the container cup. However, the overmoulding is a cost inefficient process.

**[0007]** It has now been found that the new valve of the present invention overcomes the above mentioned drawbacks. In order to prevent the valve from detaching from the container due to overpressure, it is possible to increase the adhesion between the different grommet parts.

**[0008]** The valve according to the present invention is a valve for a container, the valve comprising a cup, a grommet defining a channel with an inlet end and an outlet end and a stem slideably arranged in the channel, whereby the grommet comprises at least two parts sealingly engaged, said first part having protrusion within said second part.

**[0009]** In addition, it has been found that the valve is safe and sufficiently resilient while equally being moisture resistant thereby avoiding stickiness and blockage of the valve.

**[0010]** Use of a valve for a container has already been disclosed in EP 1,074,484. The invention describes a valve comprising a plastic cup attached to the opening edge of a pressurized can, comprising a coupling device for a can adaptor of a dispensing unit. The plastic cup further comprises a plastically deformable, particularly a clinchable, cylindrical pot wall. The coupling device for the can adaptor is formed as an integral connection part. It made of plastics material and is attached via thin connecting webs to the outer edge of the pot wall of the valve head. A safety lip is provided to assist in withstanding pressure.

**[0011]** Although the coupling device of the invention comprises a safety lip to assist in withstanding pressure, the inside of the valve is not protected against rising pressure. If the pressure inside the can rises due to extreme conditions in terms of temperature and pressure, the grommet comprising different elements can loosen and the valve can detach from the container. Further, although a thermoplastic material has been used to provide hydrophobic properties and avoid diffusion/absorption of ambient moisture in the container through the valve, thermoplastic materials exhibit other inconveniences such as "creep", which is a well known property of thermoplastic (TP) rubbers. This creep allows for the materials to deform and causes the grommet to detach from the cup when the container is put under extreme pressure.

**[0012]** Given the above, the present invention provides a valve for a container dispensing a pressurized fluid and an assembly applied for dispensing of pressurized fluids with safety properties, high adhesion properties and sufficient resilience while avoiding the use of an embedding or molding step and avoiding the necessity of using of a spring.

**[0013]** In addition, a valve is provided for a container dispensing pressurized fluids which valve is moisture repellent and therefore will inhibit the water diffusion and/or absorption that is causing stickiness and blockage of the valve.

**[0014]** None of the prior art discloses the valve according to the present invention nor do these documents suggest the presently obtained benefits associated therefrom.

### SUMMARY OF THE INVENTION

**[0015]** The present invention is directed to a valve for a container, said valve comprising a grommet having a plug system and defining a channel with an inlet end and an outlet end and a stem slideably arranged in the channel, whereby the grommet comprises at least two parts sealingly engaged, said first part having protrusion within said second part.

### DESCRIPTION OF THE INVENTION

**[0016]** The present invention is directed to a valve (1) for a container, said valve (1) comprising a grommet (2) having a plug system (10) and defining a channel (3) with an inlet end (4) and an outlet end (5) and a stem (6) slideably arranged in the channel (3), whereby the grommet (2) comprises at least two parts (7) and (8) sealingly engaged, said first part (7) having protrusion (11) within said second part (8).

**[0017]** An advantage of a valve according to the present invention is that additional safety is provided by the design of the grommet. Due to the first part of the grommet having a plug system and protrusion within said second part of the grommet, the valve is prevented from detaching from the container dome (9) when overpressure occurs inside the container due to extreme conditions in terms of temperature and pressure

**[0018]** Another advantage of a valve according to the present invention is that by providing a first part of the grommet having protrusion within a second part of the grommet, additional resilience is provided. Also, by increasing the contact surface of the first and second part of the grommet, additional adhesion and sealing is provided. Furthermore, the different parts of the hydrophobic grommet are dual injected. Due to the technique of injecting the different grommet parts, the adhesion between the first and second part of the grommet is guaranteed.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0019]** FIG 1 schematically represents a valve according to the present invention for a container dispensing a pressurized fluid.

## DESCRIPTION OF A PREFERRED EMBODIMENT

**[0020]** Referring to figure 1 and 2, and in accordance with the present invention, a valve (1) for a container dispensing a pressurized fluid is presented, the valve (1) comprising a grommet (2) having a plug system (10) and defining a channel (3) with an inlet end (4) and an outlet end (5), a stem (6) slideably arranged in the channel (3), the grommet (2) comprising a first part (7) provided at said outlet end (5), and a second part (8) provided at said inlet end (4) **characterized in that** said first part (7) having protrusion (11) within said second part (8).

**[0021]** The valve (1) is designed to be provided in an opening of a container dome (9) for controlling dispensing a fluid from said container. According to a preferred embodiment, the valve (1) is designed to be clinched in an opening of a container dome (9). A radially outwardly extending plug system (10) is provided and will clinch the valve against the rim (30) of the container dome (9). The radially outwardly extending plug system (10) is made of a thermoplastic material, preferably strengthened with reinforcing additives such as glass fiber. The plug system (10) is resilient. The plug system (10) of the grommet (2) is snapped in the opening of the container dome (9) and clinched to the rim (30) of the container dome (9). By means of the plug system (10), additional safety is provided. Due to the first part of the grommet having a plug system and protrusion within said second part of the grommet, the valve is prevented from detaching from the container dome when overpressure occurs inside the container due to extreme conditions in terms of temperature and pressure

**[0022]** Said first part (7) of the grommet (2) is preferably made from a thermoplastic material, such as polyethylene, polypropylene, polyamide, ABS, POM or PET, preferably reinforced with fillers, such as glass fibre. Use of thermoplastic materials, in particular with the valve (1) comprising at least two parts (7) and (8) sealingly engaged, wherein the first part (7) has protrusion (11) within the second part (8), is advantageously to avoid corrosion, which is experienced when metal cups are used.

**[0023]** The first part (7) is formed in the shape of a ring, centrally defining the inlet end (4) of said channel (3). The first part (7) is designed so that it comprises a plug system (10) for clinching the valve (1) onto the container rim (30), preferably by means of a radially outwardly extending part (31), more preferably four extending parts, as illustrated in figure 2. The shoulder portion (34) of the radially outwardly extending part (31) is provided to be snapped against the container rim (30) and provides additional safety so that the valve (1) is hindered to be detached from the container dome (9) when the pressure inside the container rises.

**[0024]** Preferably, the first part (7) further comprises an extended portion (19) which is extendedly injection molded with the plug system (10) of the grommet (2). The extended portion (19) is mounted over the rim (30) of the container dome (9) and is preferably designed as a multipurpose connection ring for a can adaptor of a dispensing unit. At least two extended legs (33), preferably four, are connected with the extended portion (19) to reinforce the extended portion (19). In a preferred embodiment, the four extending parts (31) of the plug system (10), the extended portion (19), the four legs (33) are injection molded simultaneously and in one piece.

**[0025]** The sealing of the first part (7) onto the container dome (9) may in this way be optimalized. The first part (7) with the plug system (10) has a diameter larger than the inner diameter of the opening of the container dome (9), so the shoulder portion (34) of the plug system (10) can be plugged against the rim (30) of the container dome (9). As illustrated in figure 1 and more in detail in figure 3, the inner wall of the first part (7) is provided with a shoulder portion (22) conically shaping the inlet end (4) of the first part (7) of the grommet (2).

**[0026]** Another preferred embodiment of the present invention comprises a roundabout extending part (not shown in the figures) as an alternative for the four legs (33).

**[0027]** The second part (8) of the grommet (2) preferably has a ring form defining part of said channel (3) and extending from the ring form is a conically shaped wall portion defining the outlet end (5) of said channel (3). Said wall portion is preferably defined by the stem (6) having an annular extension (12) provided at a distance of the ring form. In the present embodiment, the ring form of the second part (8) of the grommet (2) is adhered to the first part (7) of the grommet (2). The second part (8) of the grommet (2) preferably comprises at least one, and in this case three inwardly extending sealing lips (20).

**[0028]** The first part (7) of the grommet (2) has protrusion (11) within the second part (8) of the grommet (2). Said protrusion (11) may increase adhesion between said first (7) and said second (8) part of the grommet (2). The protrusion (11) of the first part (7) within the second part (8) of the grommet (2) increases the contact surface of both parts and thus the sealing of both grommet parts (7) and (8). More adhesion between the two parts (7) and (8) of the grommet (2) prevents the valve (1) of being detached from the container dome (9). Safety in hence increased. The protrusion (11) of the first part (7) within the second part (8) of the grommet (2) prevents the fluid in the container from contacting the second grommet part (8), thereby avoiding sticking of the material against the inner side of the grommet (2) and hence avoiding blocking of the valve function. Additionally, the radially outwardly extending plug (10) and the protrusion (11) increase the resiliency of the grommet (2) of the valve (1).

**[0029]** According to the present invention, the first (7) and second (8) part of the grommet (2) preferably are dual injection molded. Due to the technique of injecting the different grommet parts (7) and (8), additional resilience is provided. Furthermore, by providing a dual injected grommet (2), the adhesion between the first and second part of the grommet is guaranteed. The grommet (2) is designed so that the adhesion surface of the different parts (7) and (8) of the grommet (2) is increased. This additional sealing provides a safer alternative for the valve assembly than the existing valves for pressurized cans. Further, the first part (7) is dual injection molded so that the sealing onto the rim (30) of the container dome (9) is optimized.

**[0030]** The first part (7) of the grommet (2) is preferably manufactured in a hydrophobic thermoplastic material. An advantage thereof is that polyurea formed by a reaction of polyurethane and ambient water ingress in the container, will not stick on the first part (7). Hence proper sealing of the valve (1) by the stem (6) can be achieved during entire lifetime of the container.

**[0031]** In a preferred embodiment, the first part (7) is made of a thermoplastic material, such as polypropylene or polyethylene, polyamide, ABS, POM or PET. The materials can be strengthened with reinforcing additives such as glass fibre.

**[0032]** Although these compounds are hydrophobic, they exhibit other inconveniences such as creep, which is a well known property of thermoplastic rubber. Therefore, there is a need for an improved grommet which is still moisture repulsive but keeps the required snappy properties of rubber and does not necessarily requires a spring.

**[0033]** According to the present invention, the hardness of the first part (7) is higher than the hardness of the second part (8) of the grommet (2). Preferably, the second part (8) is made of material having a hardness in the range between Shore A35 and Shore A90, more preferably, between Shore A70 and Shore A85 and even more preferably a hardness of Shore A80 .

**[0034]** The second part (8) can for example be made of a thermoplastic elastomer, such as styrene-butadiene, butylene-styrene, silicone rubbers, isopropyl ether (Kraton, Shell), chlorinated polyethylene (Tyrin, Dupont de Nemours), epichlorhydrin homopolymers or copolymer, ethylene propylene (Nordel, Dupont de Nemours), fluoroelastomers (Viton, Dupont de Nemours), alcryn MPR (chlorinated olefin interpolymer alloy), Santoprene, Vegaprene, Geolast, Thermolast and Trefsin (Advanced Elastomer Services (EXXON, Elastollan (Elastrogran) In a preferred embodiment according to the present invention, the second part (8) of the grommet (2) may act as a spring.

**[0035]** As illustrated in figure 1, the stem (6) comprises a disk-shaped base (17) and a conical protrusion extending therefrom, said conical protrusion defining a dispensing channel (14) with an inlet (14a) adjacent to said disk and an outlet end (14b) at the distal end of the protrusion. The inlet (14a) is defined by holes in the conical protrusion adjacent the disk-shaped base. The stem (6) preferably comprises a first (15) and a second (16) disk-shaped resilient lip section, both provided at the outer circumference of the disk-shape base (17). The diameter of the first disk-shaped resilient lip section (15) is preferably larger than the diameter of the second disk-shaped resilient lip section (16).

**[0036]** In an assembled composition, the stem (6) is inserted into the channel (3) of the grommet (2) whereby the grommet (2) is clamped between circular sealing lip (12) at the outlet end (5) and the disk-shaped base (17) at the inlet end (4) of the channel (3). The stem (6) is hereby in sealing contact with the inner walls of the channel (3), which sealing is ascertained by, on the one hand the first (15) and a second (16) disk-shaped resilient lip section abutting the conical shoulder portion (22) of the first part (7) of the grommet (2), and on the other hand the annular extension (12) abutting the conical protrusion of the stem (6).

**[0037]** As represented in figure 1, the valve is meant to be incorporated in the opening of the rim (30) of the container's dome (9) whereby the inner wall portion of said rim (30) opening is fixedly clamped between the ring form (19) and the shoulder portion (34) of the first part (7) of the grommet (2), thereby providing a first sealing function. Clearly, the the shoulder portion (34) of the first part (7) of the grommet (2) is positioned in the container. It is further noticed that the first grommet part (7) preferably has an outer diameter larger than the inner diameter of the cup's opening, in order to help preventing the valve (1) from accidentally detaching from the dome (9).

**[0038]** In a preferred embodiment, the second part (8) of the grommet (2) is injection molded over and along the first grommet part (7). In this way, adhesion between the different grommet parts (7) and (8) is increased and optimized. The protrusion (11) of the first part (7) in the second part (8) of the grommet provides additional sealing and safety. Preferably, the second part (8) of the grommet (2) is injection molded along and under the first

part (7) and at the sealing surface (13) pressed against the rim (30) of the container dome (9), providing a second sealing function. As the second part (8) of the grommet (2) is made of a resilient material, a good sealing can be obtained between the container dome(9) and the grommet (2).

**[0039]** In operation, the stem (6) can be slided between an open and closed position of the valve (1). In rest, the valve (1) is closed due to the disk-shaped part (17) of the stem (6) pressing against the shoulder portion (22) of the inner wall of the first grommet part (7). To open the valve (1), the stem (6) is pushed in a direction towards the container whereby the inlet (14a) of the dispensing channel (3) is in fluid communication with the container's inner space. Once the pressure on the stem (6) is released, it will be forced in a closed position again by the resilience of the second part (8) of the grommet (2) and by the pressure inside the container. By means of the protrusion (11) of the first part (7) of the grommet (2), the holes at the inlet (14a) of the dispensing channel (3) are located at a distance of the second grommet part (8), both in a closed and open position of the valve (1), the fluid in the container will not contact the second grommet part (8), thereby avoiding sticking of the material against the inner side of the grommet (2) and hence avoiding blocking of the valve function.

**[0040]** According to a preferred embodiment of the present invention and as illustrated in figure 1, the second part (8) of the grommet (2) preferably is dual injection molded onto the first part (7) of the grommet (2) of the container dome (9) via a number of injection axes starting from the grommet (2). In this way, the second (8) part of the grommet (2) is fastened over the rim (30) of the container cup (9). By injection molding the second part (8) of the grommet (2) onto the rim of the container dome (9), the safety is increased. When the pressure inside the container rises, detachment of the valve (1) from the container dome (9) is hence prevented. Furthermore, the adhesion surface between the first (7) and the second (8) part of the grommet (2) is substantially increased. Another advantage of molding the second part (8) of the grommet (2) onto the first part (7) of the grommet (2) at the position of the sealing surface (13) pressed against the rim (30) of container dome (9) is that the radially outwardly extending plug (10) and the thermoplastic sealing surface (13) seals the cup (9) on the pressurized cans without the use of a crimping machine.

**[0041]** Another embodiment according to the present invention provides a thermoplastic multipurpose connection ring (19) as intermediate connection part for easy mounting on the foam applicator, illustrated in figure 1. The presence of an external thread (21) assures easy outside mounting of the foam applicator on the thermoplastic multipurpose connection ring (19).

**[0042]** According to a preferred embodiment of the present invention, a thermoplastic multipurpose connection ring (19) is injection molded as the extension of the first part (7) of the grommet. Thereby, the valve (1) and the multipurpose connection ring (19) are formed as an integral part to be mounted on the rim (30) container dome (9), as illustrated in figure 1.

**[0043]** In another embodiment of the present invention, the valve (1) comprises a radially outwardly extended plug system (10) which offers additional safety. The plug system (10) is designed as two legs (40) which may be clamped against the inside of the container's cup (9), as illustrated in figure 5. Further, the design of this preferred embodiment requires no mechanical clinching process to fasten the valve (1) to rim (30) of the container's dome (9), the valve (1) can thus be assembled without the use of a clinching equipment thereby simplifying production and reducing production cost. Additional sealing is obtained by the radially outwardly extending legs (10) of the first grommet part (7) abutting the container dome (9).

**[0044]** According to another embodiment of the invention, the aerosol valve (1) according to the invention can comprise a spring mechanism mounted on the first part (7) of the grommet (2) to assist the closing of the valve at filling (not shown in the figures).

**[0045]** The prior art grommets have been replaced by a grommet (2) comprising a combination of a first part (7) having a protrusion (11) within a second part (8). The protrusion (11) prevents the second grommet part (8) from contacting the content of the container. Further, the protrusion (11) increases the adhesion of the first (7) and second part (8) on the interface. Thereby, the need for an additional process step, such as laser welding to join both parts together is avoided.

**[0046]** The valve (1) further needs to be moisture resistant. Therefore, the first part (7) of the grommet (2) is preferably made of hydrophobic thermoplastic material. Since the chemical components present in the container are moisture sensitive and react with moisture and/or gas to form the final polymer, it should be acknowledged that any contact with ambient moisture is to be avoided in order to prevent the forming of the final polymer inside the can or vessel. Moisture diffuses via the valve system, more particular the rubber grommet in case of gun and tilting valves. Additionally, by means of the protrusion (11) of the first part (7) within the second part (8), any contact between the chemical components in the container and the second part (8) of the grommet is avoided. Water penetration that is causing stickiness and blockage of the valve is hence inhibited.

**[0047]** The valve (1) according to the present invention is a new aerosol valve for pressurized fluid containers, more particularly for One Component Foam (OCF) applications, such as polyurethane foam containers, for adhesives and sealants, for food products and for spray paint.

**[0048]** Having described the valve, it is believed that other apparatus and/or containers comprising a valve according to the invention will be suggested to those skilled in the art in view of the description set forth above. It is therefore to be understood that all such apparatus and/or

containers are believed to fall within the scope of the invention as defined in the appended claims.

## Claims

**1.** A valve (1) for a container, said valve (1) comprising:

- a grommet (2) having a plug system (10) and defining a channel (3) with an inlet end (4) and an outlet end (5);
- a stem (6) slideably arranged in the channel (3);
**characterized in that** the grommet (2) comprising at least two parts (7) and (8) sealingly engaged, said first part (7) having protrusion within said second part (8).

**2.** A valve (1) according to claim 1, whereby the grommet (2) is dual injected.

**3.** A valve according to claim 2, whereby a multipurpose connection ring (19) is injected to the grommet (2) during the same process.

**4.** A valve (1) according to claim 2, whereby the second part (8) of the grommet (2) is dual injected onto the the first part (7) of the grommet (2).

**5.** A valve (1) according to claim 1, whereby said part (7) has a hardness higher than the hardness of said part (8).

**6.** A valve (1) according to claim 1, wherein at least the first part (7) of the grommet is made of a thermoplastic material, selected from polypropylene or polyethylene, polyamide, ABS, POM or PET.

**7.** A valve (1) according to claim 6, wherein at least the first part (7) of the grommet is reinforced with fillers and/or glass fibers.

**8.** A valve (1) according to claim 7, wherein the second part (8) of the grommet (2) is made of a thermoplastic elastomer.

**9.** A valve (1) according to claim 1, whereby the stem (6) is made of a polyolefine, selected from polyethylene or polypropylene.

**10.** A valve (1) according to claim 9, wherein the stem (6) is reinforced with fillers and/or glass fibers.

**11.** A valve (1) according to claim 1, whereby the stem (6) comprises at least one circular sealing lip (15).

**12.** A valve (1) according to claim 1, whereby the stem (6) comprises at least two annular resilient lip sections (15) and (16)

**13.** An assembly for a container comprising:

- a valve (1) as in any of claims 1 to 12;
- a thermoplastic extended portion (19);
**characterized in that** said thermoplastic extended portion (19), is formed as an integral part of the grommet (2).

FIG. 1

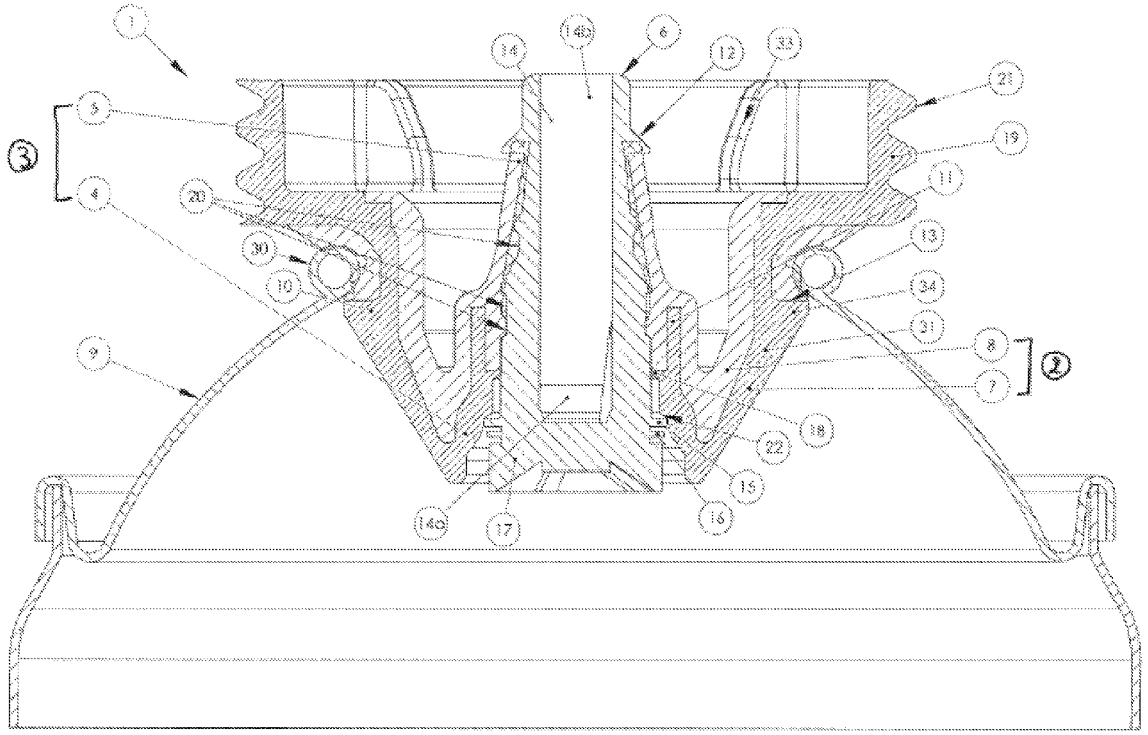


FIG. 2

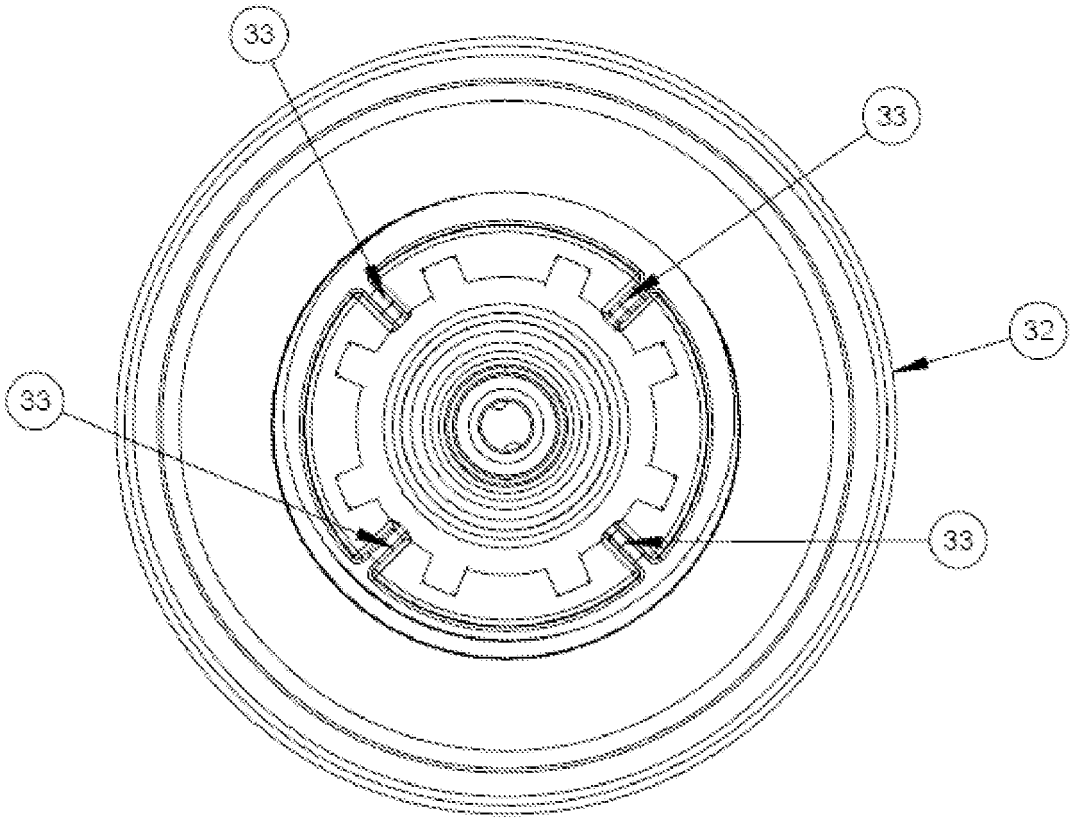


FIG. 3

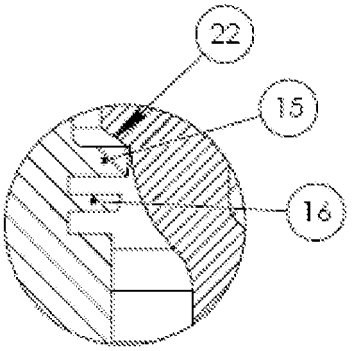
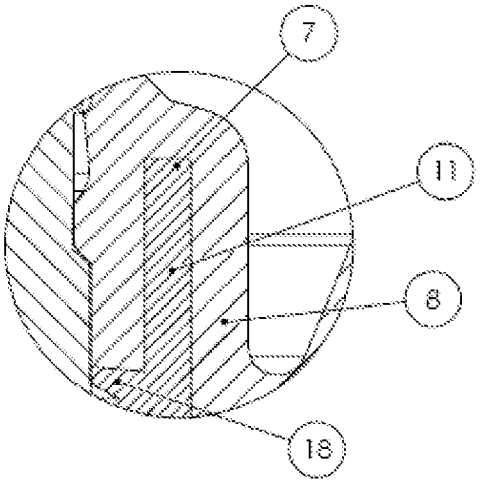



FIG. 4



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# EUROPEAN SEARCH REPORT

Application Number
EP 09 16 8169

## 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 | WO 2009/004097 A1 (DE SCHRIJVER ASTER [GB]) 8 January 2009 (2009-01-08) | 1-2,5-13 | INV. B65D83/14 |
| A | * page 5, line 3 - page 6, line 2 * * page 7, line 1 - line 4 * * figure 1 * | 3 | |
| X | WO 2004/083074 A1 (DE SCHRIJVER ASTER [GB]) 30 September 2004 (2004-09-30) | 1-2,4 | |
| A | * page 3 * * figures 2-3 * | 3 | |
| A,D | EP 1 074 484 A1 (HILTI AG [LI]) 7 February 2001 (2001-02-07) * paragraphs [0005], [0006] * * figure 1 * | 3 | |

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 20 October 2009 | Roldán Abalos, Jaime |

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 16 8169

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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| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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