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(54) **High performance valve**

(57) A valve comprising a grommet (3) and a stem (4), the grommet comprising a tubular member (6) having an outwardly extending radial skirt (7) at one end, said

grommet being manufactured in a single material, characterized in that said material has a hardness ranging between 80 Shore A - 90 Shore A and in that the valve has a gas loss of less than 5 grams per year.

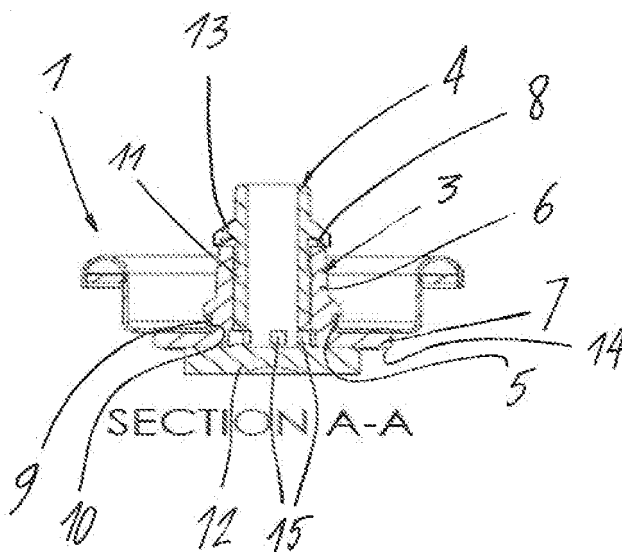


Figure 2

Description

Field of the Invention

[0001] The present invention concerns a valve for dispensing fluid from a pressurized container, more particularly for moisture sensitive fluids such as one or two component polyurethane foam compositions.

Background of the Invention

[0002] With increasing attention for waste and severe waste restrictions adopted in a growing number of countries, shelf life and ease of handling of chemicals becomes ever more important. For moisture sensitive products, such as polyurethane foam compositions, prevention of moisture penetration into the container is one of the most drivers for increasing shelf life.

[0003] The containers are usually made of metal, topped with a metal cup wherein a valve is provided. Typically, the valve is the most sensitive element of the container in terms of moisture ingress and is by far the most important part regarding ease of handling of the container and ease of dispensing of the fluid without wasting the valuable fluid contained in the container.

[0004] In order to reduce the cost of the valve and its assembling in the container, valves have been developed lacking a spring for closing or opening the valve, wherein the spring function is fulfilled by the grommet. Therefore, the grommet essentially comprises a tubular member having an outwardly extending skirt at one end thereof, the surface of the skirt facing away from the tubular member defining the valve seat. The tubular member hereby fulfills a spring function, whereas the skirt has a primary sealing function.

[0005] A remaining challenge for the existing valves is that moisture can penetrate through the valve to the valve seat such that for example polyurethane compositions start curing against the valve seat, preventing good closing of the valve and rendering the content of the container unusable.

[0006] WO 2009/004097 discloses a valve resolving the problem of moisture ingress, wherein the grommet is a dual plastic grommet that is manufactured in two materials. In particular, the skirt is manufactured in a material having a hardness that is greater hardness of the tubular member. By selecting a material with high hardness such as for example polypropylene or polyethylene that are optionally strengthened by additives such as glass fibre, water penetration through the grommet can be prevented and the sealing functionality of the valve can be safeguarded.

[0007] An inconvenience of this dual plastic grommet is the elevated manufacturing and material cost, which makes the dual plastic grommet only applicable for containers with high value content.

[0008] WO 2005/102867 discloses another valve resolving the problem of moisture ingress, by altering the

design of the grommet. WO 2005/102867 describes a so called flat grommet, wherein the skirt of the grommet is designed as a flat flange with a reduced thickness of less than 4 mm. This altered grommet design limits the surface through which moisture can penetrate into the container and hence improves shelf life of the container.

[0009] However, said flat grommet has the inconvenience that the skirt is compressed by the stem at elevated pressure levels in the container at which for example polyurethane foam compositions are stored. Due to that compression of the skirt, the stem protrudes further through the cup and increases the risk of accidental opening of the valve by contact therewith, for example at the time of mounting a dispensing gun on the container.

[0010] It is clear from the above that there remains a demand for a technical solution to provide a low cost grommet having a sealing and spring functionality that improves shelf life of the content in a container by preventing moisture uptake and that allows easy handling without the risk for accidental activation of the valve.

[0011] The present invention meets this demand by providing a new grommet that ensures extended shelf life of the fluid in the concerned container and that is easy in manufacture and valve assembly and allows easy handling of the concerned container.

Summary of the Invention

[0012] The present invention concerns a valve comprising a grommet and a stem, the grommet comprising a tubular member having an outwardly extending radial skirt at one end, said grommet being manufactured in a single material, characterized in that said material has a hardness ranging between 80 Shore A - 90 Shore A and in that the valve has a gas loss of less than 5 grams per year, preferably less than 3 grams per year, more preferably less than 2,5 grams per year, most preferably less than 1,5 grams per year.

[0013] The hardness of the grommet material preferably ranges between 85 Shore A and 90 Shore A and even more preferably between 87 Shore A and 90 Shore A.

[0014] Furthermore, the material preferably has a pressure deformation at room temperature of 25% or less, preferably 20% or less, and more preferably 15% or less according to DIN ISO 815.

[0015] The grommet is preferably manufactured in a thermoplastic polyurethane (TPU) and more preferably in an aromatic TPU.

[0016] According to the present invention it is preferred that the grommet has a sealing function in view of a stem and a spring function acting on said stem in a closing direction of the valve, such that the valve can lack a spring.

[0017] The present invention further relates to the use of the above described valve in pressurized containers for storing moisture sensitive liquids such as one or two component polyurethane compositions.

Brief Description of the Drawings

[0018]

Figure 1 represents a side view of a valve according to the present invention;
 Figure 2 represents a cross section according to line A-A in figure 1;
 Figure 3 represents another embodiment of a valve according to the present invention;
 Figure 4 represents a cross section according to line B-B in figure 3;
 Figure 5 represents yet another embodiment of a valve according to the present invention;
 Figure 6 represents a cross section according to line C-C in figure 5;
 Figure 7 represents yet another embodiment of a valve according to the present invention;
 Figure 8 represents a cross section according to line D-D in figure 7.

Description of a preferred Embodiment

[0019] Figure 1 represents a cup 1 bearing a gun valve 2 the cup being designed for fixing on a container for closing it. Figure 2 represents a cross section visualizing the gun valve 2 that comprises a grommet 3 and a stem 4.

[0020] The grommet 3 is fixed in a sealing relation in an orifice 5 in the cup 1 of the container and grommet essentially comprises a tubular member 6 having an outwardly extending skirt 7 at one end thereof. The other end 8 of the tubular element 6 is preferably free.

[0021] In the outer surface of the tubular member 6, adjacent to the skirt 7, an annular groove 9 is provided that is designed to snap fit with edges 10 of an orifice in the cup 1 to fix the grommet 3 in a sealing relation in the cup 1, such that the skirt 7 is located inside the container when assembled, whereas the tubular member 6 extends through the orifice out of the container.

[0022] According to the present invention, the grommet is manufactured in a single material having a hardness ranging between 80 Shore A - 90 Shore A and preferably between 85 Shore A and 90 Shore A, most preferably between 87 Shore A and 90 Shore A. The grommet material further preferably has a pressure deformation at room temperature of 20% or more preferably 15% or less according to DIN ISO 815.

[0023] The grommet is preferably manufactured in a thermoplastic polyurethane (TPU), more preferably an aromatic TPU. A suitable TPU with a hardness 85 Shore A is described in for example US 2008/207846 A1.

[0024] The stem 4 is preferably manufactured in a dimensionally stable material such as polypropylene or polyethylene either or not comprising glass fibers and comprises a hollow shaft 11 extending perpendicularly from a base plate 12 and a radially extending shoulder 13 provided on the shaft 11 at a defined distance from the base plate 12. The distance between the facing surfaces of

the base plate 12 and the shoulder 13 being slightly smaller than the distance between a surface 14 of the grommet's skirt 7 facing away from the tubular element 6 and the free end 8 of the tubular member of the grommet 3.

[0025] In the side walls of the shaft 11, adjacent to the base plate 12, a series of openings 15 is provided through which, in an open position of the valve, a fluid to be dispensed can flow from the container through the shaft of the stem 4.

[0026] In an assembled state, the grommet 3 is snap fitted in the cup 1 of the container such that the skirt 7 abuts the inner surface of the cup 1. The stem 4 is mounted in the grommet 3 such that the base plate is located in the container and abuts the surface of the skirt facing away from the grommet's tubular member 6, this surface of the skirt 7 defining the valve seat. The shaft 11 of the stem extends through the tubular member 6 out of the container, whereby the shoulder 13 faces the free end of the tubular member 6, thereby preventing that the stem 4 can be pressed through the grommet into the container and at least slightly compressing the tubular member in the longitudinal direction, such that the tubular member exerts a force on the stem in a closing direction of the valve.

[0027] In use, the gun valve is forced into a closed position by, on the one hand a spring functionality of the grommet and in particular of the tubular member 6 acting on the shoulder 13 of the shaft 11, and on the other hand, by the pressure inside the container, acting on the base of the stem and forcing it in close abutment with the grommet's skirt 7.

[0028] In order to open the gun valve, one has to exert a force on the shaft in the direction of the container, thereby compressing and flexing the tubular member and releasing the base plate 12 from the skirt 7, such that fluid from the container can flow through the openings 15 in the shaft 11 and out of the container.

[0029] At release of the pressure applied on the stem, the valve is forced closed by the spring function of the tubular member regaining its uncompressed state and by the pressure inside the container that is higher than ambient pressure. The valve according to the present invention preferably lacks a separate spring acting on the stem in a valve closing direction.

[0030] According to the invention, the design of the valve and material used therein is such that valve has a gas loss of less than 5 grams per year, preferably less than 3 grams per year, even more preferably of less than 2,5 grams per year and most preferably less than 1,5 grams per year.

[0031] The gas loss in grams/year is measured by providing the valve on a container in a sealing relation and filling the container with a gas mixture of 4 volume parts of LPG (LPG being defined by a mixture of 46,5% propane; 33,5% butane and 20% isobutane) and 1 volume part of dimethylether upto a pressure of 6 bar at 23°C.

[0032] The container is then stored at 23°C in a position wherein the valve is situated at the top of the container.

The amount of gas escaping from the closed container with the valve kept closed is measured weekly for upto 8 weeks, by measuring the loss of weight of the closed container and the results are extrapolated to a period of a year, resulting in a value of X grams per year of gas lost.

[0033] Figures 3 and 4 represent a gun valve 20 wherein the design of the skirt 27 of the grommet 23 is slightly different in that the thickness thereof is larger. The design corresponds to the design of the valve as described in WO 2004/002986. The functionality of this gun valve is essentially similar to what is described above.

[0034] Figures 5 and 6 represent a tilting valve 30 with a design similar to the valve represented in claims 1 and 2, with the only difference that the shaft 311 of the stem 34 is provided with a screw thread at it's free end.

[0035] Figures 7 and 8 represents a tilting valve 40 with the grommet design corresponding to that in figures 3 and 4.

[0036] The valve according to the present invention is particularly suitable for use in pressurized containers storing moisture sensitive liquids, such as for example one or two component polyurethane (foam) compositions.

[0037] The present invention is by no means limited to the embodiments described above and represented in the accompanying figures; on the contrary, such a device for handling food can be made in various executions while remaining within the scope of the invention.

has a pressure deformation at room temperature of 25% or less, preferably 20% or less and more preferably 15% or less according to DIN ISO 815.

- 5 7. The valve according to claim 1, wherein the grommet (3) has a sealing function in view of a stem (4) and a spring function acting on said stem (4) in a closing direction of the valve.
- 10 8. The valve according to claim 7, said valve lacking a spring.
- 15 9. Use of a valve as identified in claim 1 in a container for a moisture sensitive fluid.
- 20 10. Use of the valve according to claim 9, wherein the container contains a one or two component polyurethane composition.

Claims

1. A valve comprising a grommet (3) and a stem (4), the grommet comprising a tubular member (6) having an outwardly extending radial skirt (7) at one end, said grommet being manufactured in a single material, **characterized in that** said material has a hardness ranging between 80 Shore A - 90 Shore A and **in that** the valve has a gas loss of less than 5 grams per year.
2. The valve according to claim 1, wherein said hardness ranges between 85 Shore A and 90 Shore A and preferably between 87 Shore A and 90 Shore A.
3. The valve according to claim 1, wherein the gas loss is less than 3 grams per year and preferably less than 2,5 grams per year, even more preferably less than 1,5 grams per year.
4. The valve according to claim 1, said grommet (3) being manufactured in a thermoplastic polyurethane (TPU).
5. The valve according to claim 4, wherein said TPU is an aromatic TPU.
6. The valve according to claim 1, wherein said material

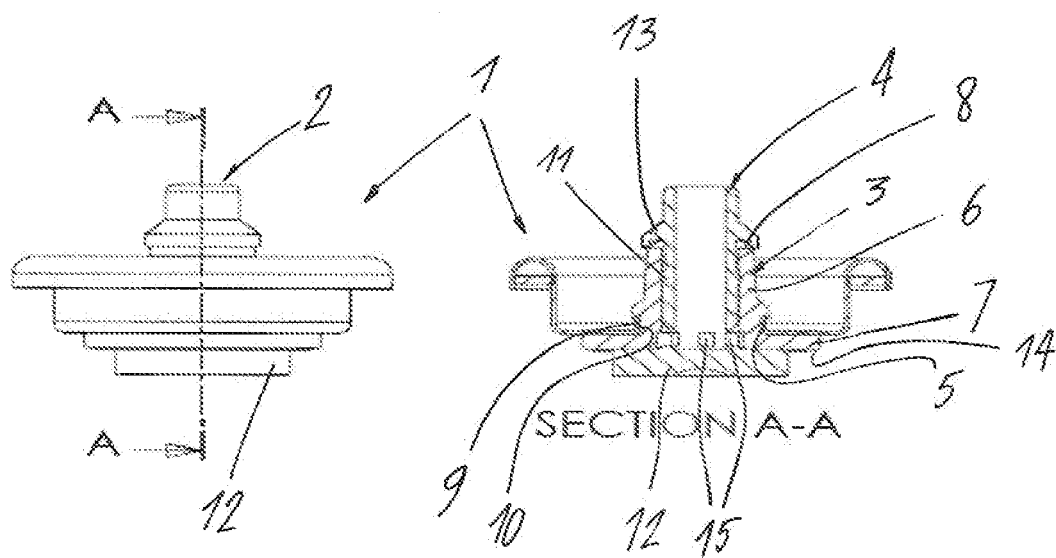


Figure 1

Figure 2

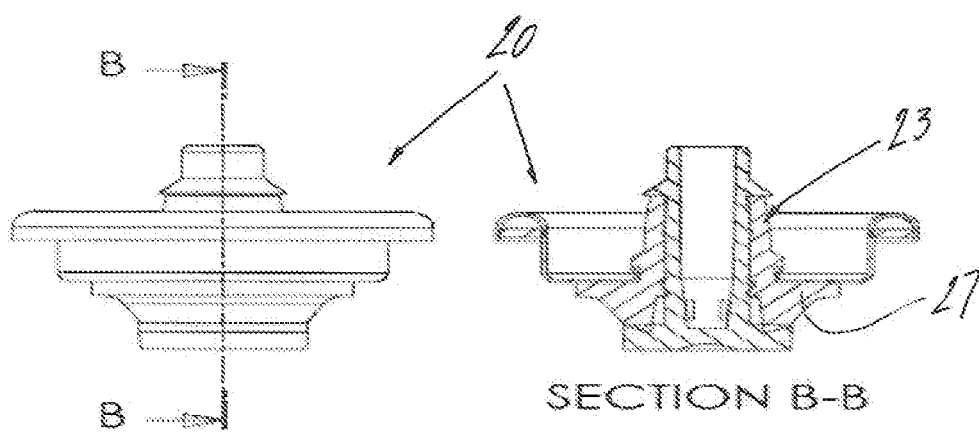


Figure 3

Figure 4

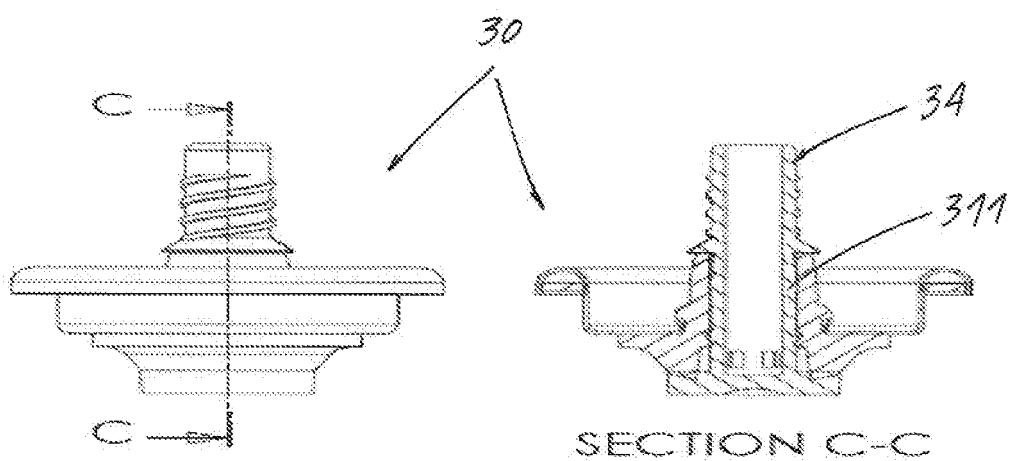


Figure 5

Figure 6

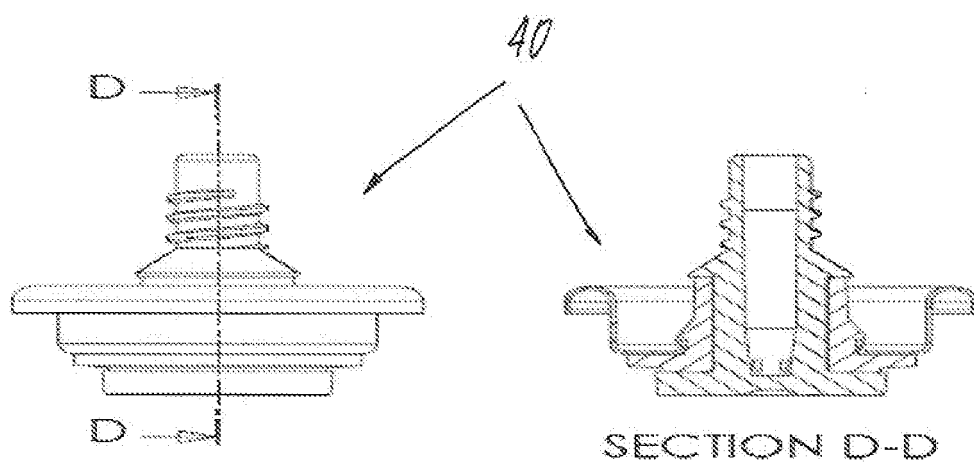


Figure 7

Figure 8



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9274

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,D	WO 2009/004097 A1 (DE SCHRIJVER ASTER [GB]) 8 January 2009 (2009-01-08) * page 6, line 14 - line 24 * * figure 1 *	1-10	INV. B65D83/14
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			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 September 2010	Examiner Roldán Abalos, Jaime
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			

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

EP 10 15 9274

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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- US 2008207846 A1 **[0023]**
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