(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 436 893 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.05.2025 Bulletin 2025/21

(21) Application number: **22818256.4**

(22) Date of filing: **15.11.2022**

(51) International Patent Classification (IPC):
B65D 47/20 *(2006.01)* ***B65D 77/06*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65D 47/2025; B65D 47/2031; B65D 77/06

(86) International application number:
PCT/EP2022/081870

(87) International publication number:
WO 2023/094203 (01.06.2023 Gazette 2023/22)

(54) CAP WITH VALVE FOR CARTRIDGE

KAPPE MIT VENTIL FÜR KARTUSCHE

CAPUCHON AVEC SOUPAPE POUR CARTOUCHE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **23.11.2021 PCT/CN2021/132349**
16.12.2021 EP 21215242

(43) Date of publication of application:
02.10.2024 Bulletin 2024/40

(73) Proprietors:
- **Unilever IP Holdings B.V.**
3013 AL Rotterdam (NL)
Designated Contracting States:
AL AT BE BG CH CZ DK EE ES FI FR GR HR HU IS LI LT LU LV MC ME MK NL NO PL PT RO SE SI SK SM
- **Unilever Global IP Limited**
Wirral, Merseyside CH62 4ZD (GB)
Designated Contracting States:
CY DE GB IE IT MT RS TR

(72) Inventors:
- **CHEN, Hao**
6708 WH Wageningen (NL)
- **ZHANG, Lixiao**
6708 WH Wageningen (NL)

(74) Representative: **Newbould, Frazer Anthony**
Unilever Patent Group
Bronland 14
6708 WH Wageningen (NL)

(56) References cited:
US-A- 5 301 838 **US-A1- 2015 336 719**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 4 436 893 B1

Description

Field of the Invention

[0001] The invention relates to a cap for a cartridge and a cartridge for use in appliances with automatic dosing function.

Background of the Invention

[0002] Cartridges for automatic dosing machines typically have a rigid outer side and a connection portion with an outlet valve for connecting to the machine to automatically dose a portion of the contents into the machine. US5301838 discloses an example of such a cartridge.

[0003] These types of cartridges typically have a check valve somewhere on the cartridge body that allows air exchange between the inside of the cartridge and the enviroment. Check valves are necessary for a correct discharge of the contents of the cartridge as they prevent building of a vacuum inside the cartridge during the discharge process. On the other hand, outlet valves have to allow easy and controlable discharge of the contents of the cartridge with desirably no unwanted leakage of the contents through the outlet valves when the cartridge is not in use.

[0004] However, simple check valves although efficient for air exchange result in leakage of the contents of the cartridge which is inconvenient for the user and wasteful. CN111270480A disclosesa one-way air-permeable structure which includes an air-permeable element, a switch element and a power part. This results in a complex structure of the check valve with a number of elements made of different materials.

[0005] In order to provide an external liquid storage box with better sealing performance and easy replacement, CN108998931A discloses an external liquid storage box comprising a box body and a flow guiding structure arranged on a liquid outlet of the box body. On the other hand, CN112900012A discloses a detergent box comprising a liquid storage box, a breathable one-way valve and a liquid extraction connector assembly, wherein the top of the liquid storage box is provided with the breathable one-way valve or a breathable film assembly. US2015/0336719 A1 discloses a container and closure combination, for the containment of fluids and extraction therefrom by way of an extraction tube. The container comprises a closed volume with an opening configured to close the opening of the container; the closure is provided with an aperture such that the closure, upon fitment to the container opening, cannot be removed therefrom. The aperture of the closure comprises a unitary elastic unidirectional valve member that can operate in a first, closed condition, to prevent a flow of fluid from the container; and a second, operational condition, with an extraction tube sealingly engaged with respect to the valve, to permit an extraction of fluid from the container through the tube.

[0006] Further, US2015/0336719 discloses a cap according to the preamble of appended claim 1.

[0007] To prevent leakage of the liquid, the cartridge solutions proposed offer complex structure of the outlet valves and/or check valves which are costly due to presence of metallic parts and/ springs, difficult to produce and problematic to recycle due to the presence of different materials. Furthermore, the liquid at the bottom of the cartridge cannot be fully extracted resulting in an undesirable waste of the product.

Summary of the Invention

[0008] According to a first aspect of the invention, there is provided a cap for a cartridge comprises fastening means for fastening the cap to a cartridge opening and a valve configured to control liquid flow from inside the cartridge through the cartridge opening and the cap under negative pressure. The valve is a deformable ball which covers one or more flow openings in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings in the deformed state (DS).

[0009] Such a cap provides a simple yet effective way of controlling liquid flow from a cartridge. The use of a deformable ball which covers one or more flow openings in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings in the deformed state (DS) minimizes or prevents leakage out of the cartridge and then allows for an easy flow or dose out of the cartridge under negative pressure.

[0010] Preferably, the cap comprises a cap opening that is bound by an edge of the opening. The valve is placed over, within or adjacent to the cap opening such that it functionally controls flow through the cap opening. The cap opening may be circular or another shape, and the edge of the opening may extend from the cap towards the inside of the container.

[0011] Throughout this application the following directions are used: the axis passing through the center of the cap is a central axis (C), the direction perpendicular to the central axis is a radial direction (R), and the longitudinal direction (X) is the direction along the cartridge and parallel to the central axis (C) of the cap.

[0012] The cap may further comprise a pressure ring for securing one or more valve parts. Outer edges of the valve may be placed over the edge of the opening and the pressure ring is then placed over the portion of the valve sitting on the edge of the opening to ensure that the valve remains securely in place despite being subject to pressure and flow. The pressure ring may be, for example, a gasket, a rubber band, a silicon band or the similar.

[0013] The fastening means may comprise one or more of a thread, groove, shoulder or other connecting part. The fastening means may be an integral part of the cartridge (e.g., by moulding, printing and/or machining), or may be made separate and connected later, for example, by adhesive, tight fit, etc. The fastening means can provide a simple and easy way of connecting the cap

with valve.

[0014] The valve is in a form of a deformable ball which covers one or more flow openings in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings in the deformed state. The one or more flow openings extend in the radial direction (R) from the central axis of the cap (C).

[0015] The ball may be placed in a ball space which comprises flow openings. The ball space may be an integral part of the cap, or formed separately and connected. The valve may comprise a closing ring and/or other features configured to confine the ball within a ball space.

[0016] Preferably, the ball can comprise silicone or rubber. Such materials are resilient, allowing numerous cycles of ball deformation and long life span of the valve.

[0017] The ball may deform through compressive forces. Optionally, the compressive forces may be induced by the injection pin or other part of the cleaning appliance. This can provide a simple yet effective method for preventing or allowing flow through the valve and cap.

[0018] According to a second aspect of the invention, there is provided a cartridge comprising a rigid outer body, a flexible inner body at least partially inside the outer body, a cartridge opening, and a cap for the cartridge comprising fastening means for fastening the cap to the cartridge opening; and a valve configured to control liquid flow from inside the cartridge through the cartridge opening and the cap under negative pressure, wherein the valve consists of one of the following: i) a silicon cross piece, ii) a duckbill valve, iii) a deformable ball which covers one or more flow openings in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings in the deformed state (DS).

[0019] Such a container or cartridge with a rigid outer body and flexible inner body provides a simple and effective way to store liquid contents inside a cartridge without leaking and ensure that most or all of the contents are able to be dispensed from the cartridge through use. Using a rigid outer body allows for easy handling, storage and connection to cleaning appliances, while the flexible inner body provides for no leakage while allowing controlled flow out of the container.

[0020] The valve of the cap may extend at least partially over the cartridge opening to control liquid flow from the flexible inner body through the cartridge opening and the cap.

[0021] The valve may consist of a silicon cross piece extending over a cap opening which aligns with the cartridge opening when the cap is connected to a cartridge. Optionally, the silicon cross piece comprises a valve body and two slits, crossing each other perpendicularly such that at least four flaps are formed. The flaps abut each other and form a seal when the cartridge is not used. Under the negative pressure, the flaps can open to allow liquid flow through the valve. This simple valve structure offers good flow control from the cartridge to the cleaning appliance using minimal parts. Furthermore, due to its simple design the valve can be easily (dis) connected to the cap and/or replaced together with the cap. It is also easy and inexpensive to manufacture such a valve, and can easily be replaced when needed.

[0022] Preferably, the valve consists of a duckbill valve. The duckbill valve comprises first and second flaps which extend from an outer edge of the cap opening towards the central axis (C) of the cap opening.

[0023] The first and second flaps can meet at the central axis of the cap opening to form a seal. The duckbill valve offers good sealing properties using a minimal number of parts. No metallic parts and/or springs are used resulting in an economical valve solution which is easy to recycle.

[0024] Alternatively or additionally, the first and second flaps are configured to open upon receiving compressive forces to form a liquid conduit from the cartridge through the cap. Optionally, the compressive forces may be induced by the injection pin or other part of the cleaning appliance. The injection pin may be part of the negative pressure device. Optionally, the injection pin may have hollow body to allow flow of the liquid from the cartridge to the cleaning appliance.

[0025] Preferably, the duckbill valve comprises silicone or rubber. Such materials offer good flexibility needed for opening of the valve while providing sufficient strength needed to seal the valve and prevent leakage.

[0026] Lastly, the valve may be in a form of a deformable ball which covers one or more flow openings in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings in the deformed state. The one or more flow openings extend in the radial direction (R) from the central axis of the cap (C).

[0027] The ball may be placed in a ball space which comprises flow openings. The ball space may be an integral part of the cap, or formed separately and connected. The valve may comprise a closing ring and/or other features configured to confine the ball within a ball space.

[0028] Preferably, the ball can comprise silicone or rubber. Such materials are resilient, allowing numerous cycles of ball deformation and long life span of the valve.

[0029] The ball may deform through compressive forces. Optionally, the compressive forces may be induced by the injection pin or other part of the cleaning appliance. This can provide a simple yet effective method for preventing or allowing flow through the valve and cap.

[0030] The skilled person will appreciate that except where mutually exclusive, a feature or parameter described in relation to any one of the above aspects may be applied to any other aspect. Furthermore, except where mutually exclusive, any feature or parameter described herein may be applied to any aspect and/or combined with any other feature or parameter described herein.

Detailed Description of the Invention

[0031] Except in the examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use may optionally be understood as modified by the word "about".

[0032] It should be noted that in specifying any ranges of values, any particular upper value can be associated with any particular lower value.

[0033] For the avoidance of doubt, the word "comprising" is intended to mean "including" but not necessarily "consisting of" or "composed of". In other words, the listed steps or options need not be exhaustive.

[0034] Where a feature is disclosed with respect to a particular aspect of the invention (for example a composition of the invention), such disclosure is also to be considered to apply to any other aspect of the invention (for example a method of the invention) *mutatis mutandis.*

[0035] We note that in this application terms "container" and "cartridge" are not meant to be mutually exclusive or limiting but instead can be used interchangeably.

[0036] The container typically takes a form of a cartridge that is suitable to be the inserted into a cleaning appliance, preferably, a cleaning appliance with an automatic dosing function of the cleaning product. Suitable cleaning appliances could be, for example, a washing machine, a dishwasher, a mop or other cleaning device.

[0037] The cartridge comprises a rigid outer body, and a flexible inner body inside the outer body. The outer body may have a shape of a prism, a cylinder, or any other shape suitable for inserting into the cleaning appliance. The outer body comprises a base, plurality of side faces, and an outer body opening. The inner body comprises an inner body opening and a cleaning product space configured to accommodate an amount of the cleaning product.

[0038] The outer body opening may be aligned with the inner body opening to allow discharge of the cleaning product from the cleaning product space. The inner body and the outer body may be connected around their respective openings by connection means such as one or more of the following: an adhesive, welding, stitching, mechanical means, or similar. The cartridge can have a cap placed on the base of the outer body. The cap can include means for control of the cleaning product flow. The cap may be mounted onto the outer body by fastening means, such as threads, a tight fit, latch, or similar. Additionally, cap or cover could be used for storage and/or transport.

[0039] The inner body can be additionally fixed to the outer body by one or more linear connections connecting an outside surface of the inner body to an inside surface of the outer body. These can be in the longitudinal direction and/or around the sides (e.g., radially). In some examples, the linear connections can be in a form of one long connection extending along the length of the outer body or series of short/point connections along the body, for example, on each side face. This can be achieved by an adhesive, welding, stitching, mechanical means, or the similar.

[0040] The connection between the cartridge and a cleaning appliance can be formed by coupling a connecting insert on the cap to a negative pressure device, which could be part of the cleaning appliance or separate. The connection can be air-tight to allow correct discharge of the cleaning product. This connection can be through threads, a tight fit or any other means which could secure the two parts together.

[0041] The cap can further comprise a cap opening which allows liquid to flow through the cap. In this manner a liquid conduit is formed between the cartridge and the cleaning appliance. Under the negative pressure, for example generated by the negative pressure device of the cleaning appliance, the cleaning product can be discharged from the cleaning product space within the inner body, through the cap opening and the negative pressure device into the cleaning appliance.

[0042] Before use, the cartridge inner body is stretched to maximize volume of the cleaning product space, and the inner body almost completely coincides with the outer body of the cartridge. When the cartridge is in use, the cleaning product is periodically discharged from the cartridge. As the cleaning product is discharged, the volume of the cleaning product space decreases and the inner body separates from the outer body except around the one or more linear connections. At the same time, a volume of an unused space inside the (rigid) outer body and outside the flexible inner body increases. The unused space fills with air as the cleaning product is discharged and the inner body, and as such the inner body decreases in volume. The volume of the cleaning product space and the volume of the unused space together always add to a volume of the outer body. Consequently, as the volume of cleaning product space is decreased when the cleaning product is discharged, the volume of the unused space increases. The outer body can have one or more air openings, for example, away from the linear connections or other means that allow pressure leveling between the unused space and the environment. When the cleaning product has been mostly or completely used, the cleaning product space is minimized, while the volume of the unused space is maximized.

[0043] By using a flexible inner body inside the outer body, the cartridge is able to hold and empty the contents almost completely without the need for complicated air valves (and leakage there through). As described in the background, past cartridges typically only had a rigid outside, which required an air valve for emptying. Liquid would sometimes leak out that valve. By instead using a flexible inner body, only a simple air hole is needed in the outer body, and no contents leak as they are completely contained in the inner body. The flexibility of inner body allows for more complete emptying of the contents of cartridge, resulting in less waste. The use of one or more

linear connections provides a simple way of ensuring that inner body empties in a way that contents will not remain stuck or trapped inside. Thus, forming cartridge of an outer body and a flexible inner body with aligned outlets provides a simpler cartridge which is easier to manufacture (due to no complicated air valves), does not leak and is able to more completely use all the contents within.

[0044] In order to control the liquid flow from the cartridge and prevent the spilling of the cleaning product when the cartridge is not connected to the cleaning appliance, a valve is placed on or in the cap. The valve has the form of a deformable ball. Preferably, the valve is placed over the cap opening.

[0045] The seal may be opened by an injection pin of the negative pressure device to form the liquid conduit between the cleaning product space and the cleaning appliance. The contents then may flow from inside the cartridge out the valve and cap for use.

[0046] The cap has a deformable ball placed in the center of the cap and one or more flow openings that extend radially around a ball space. The ball may sit within the ball space and a closing ring may be placed around the cap opening such that the ball stays within the ball space and cannot escape. The flow openings allow passage of the cleaning product from the cleaning product space into the ball space and out of cartridge. When the cartridge is not in use, the ball (in its natural state) covers openings, forming a seal that prevents spillage or flow of the cleaning product out of the cartridge.

[0047] When in use, the cartridge may be connected to the negative pressure device via the cap. The injection pin may be arranged to apply a force and deform the ball. The ball is configured to be deformed such that it moves away from the closing ring, and allows for flow through the flow openings. Consequently, the liquid conduit is formed from the cleaning product space, through the flow openings and the ball space, to the cleaning appliance.

[0048] The ball may be formed of a compressible material which reverts back into its original shape after the compressive force is removed (to seal off openings again). Such suitable materials can be, for example silicone or rubber.

[0049] The ball valve provides a simple but effective way to prevent flow and leakage in a cartridge until it is ready for use. The use of a compressible ball allows for sealing in a non-use state and a simple compression of that ball (e.g., by a pin) allows for flow out of cartridge. This simple but effective valve is formed with minimal parts and is therefore robust and easy to manufacture and use.

[0050] As discussed in the background, past cartridges required complicated outlet valves to ensure that liquid could exit the outlet when needed, but not leak out when not in use. Such valves typically included a number of metal parts, springs, etc. Instead, the valves described in this application provide very simple, yet effective designs for ensuring that the contents of a cartridge does not leak, but is able to exit the container when connected to the proper device. None require metallic parts or springs, which typically means less degradation and therefore a longer useable life for the valve and cartridge. Additionally, this can result in an easier and less costly manufacturing process for the valves.

Figures

[0051]

Figure 1A shows a longitudinal view of a container for a cleaning product;

Figure 1B shows a transversal cross-sectional view of a container for a cleaning product;

Figure 1C shows an enlarged area of Figure 1A around a cap portion of the container for the cleaning product;

Figure 2 illustrates a cartridge containing an amount of cleaning product connected to a cleaning appliance;

Figure 3A illustrates a cross-sectional view of a cartridge filled and prior to use,

Figure 3B shows the cartridge of Fig. 3A in a partially used state, and

Figure 3C shows the cartridge of Fig. 3A in an empty or almost fully used state;

Figure 4A shows a front view of a cartridge with the cap;

Figure 4B shows a cross-sectional view of the cap portion of the cartridge of Fig. 4A and with a cross-valve;

Figure 4C illustrates a cross-sectional view of the cap portion of the cartridge of Fig. 4A connected to a negative pressure device; and

Figure 5A illustrates a cross-sectional view of the cap portion of a cartridge with a duckbill valve;

Figure 5B shows the cap of Fig. 5A connected to a negative pressure device;

Figure 6A illustrates a cross-sectional view of the cap portion of a cartridge with a deformable ball valve, according to the invention; and

Figure 6B shows the cap of Fig. 6A connected to a negative pressure device.

[0052] Figures 1A to 5B do not show embodiments of

the invention, but can help to understand its use and function.

Examples

[0053] The invention will now be further described with reference to the following non-limiting embodiments and with reference to the drawings. The drawings are only schematic and are not limiting. In the drawings, the size, shape and placement of some of the elements may be exaggerated and not drawn to scale for illustration purposes. The dimensions and the relative dimensions do not correspond to actual reductions to practice of the invention.

[0054] Figures 1A and 1B show a longitudinal and a transversal cross-sectional view of a container for a cleaning product, respectively. The container has a form of a cartridge that is suitable to be the inserted into a cleaning appliance 200 with an automatic dosing function of the cleaning product.

[0055] The cartridge 10 comprises a rigid outer body 12, and a flexible inner body 14 inside the outer body 12. The outer body 12 shown has a shape of a prism with a rectangular base 11, four side faces 15 and an outer body opening 36. The inner body 14 has an inner body opening 34 and is configured to accommodate an amount of the cleaning product in a cleaning product space 16.

[0056] As shown in Figures 1A and 1C, the inner body opening 34 and outer body opening 36 are aligned such that the cleaning product can be easily discharged from the cleaning product space 16. The inner body 14 and the outer body 12 are connected around their respective openings by connection means 22. The cartridge 10 has a cap 50 placed on the base 11 of the outer body 12, around the outer body opening 36. The cap 50 can include means for control of the cleaning product flow, which will be discussed in more detail in relation to Figures 4-6. The cap 50 is mounted onto the outer body opening 36 by fastening means 52. The inner body 14 is additionally fixed to the outer body 12 by series of linear connections 26 along a longitudinal direction X. Figure 1B shows an example in which the inner body 14 is connected to each side face 15 of the outer body 12. The linear connections 26 are formed by connecting an outside surface of the inner body 28 to an inside surface of the outer body 32.

[0057] Figure 2 illustrates the cartridge 10 containing an amount of cleaning product 42 connected to the cleaning appliance 200. The connection is formed by coupling a coupling insert 18 placed on the cap 50 to a negative pressure device 44 of the cleaning appliance 200.

[0058] The cap 50 further comprises a cap opening 54 which allows liquid to flow through the cap 50. In this manner a liquid conduit 24 is formed between the cartridge 10 and the cleaning appliance 200. Under negative pressure, the cleaning product 42 is discharged from the cleaning product space 16, through the cap opening 54 and the negative pressure device 44 into the cleaning appliance 200, as shown by the flow arrows in Figure 2.

[0059] Three different working stages of the cartridge 10 are shown in Figures 3A-3C, which show cross-sectional views of cartridge 10 with outer body 12 and inner body 14 at different stages of fill of the inner body 14. Figure 3A illustrates the cartridge filled and prior to use, Figure 3B shows the cartridge 10 in a partially used state, and Figure 3C shows an empty or almost fully used state.

[0060] Figure 3A illustrates the cartridge prior to use when the cleaning product space 16 is completely filled with the cleaning product 42. The inner body 14 is stretched to maximize volume of the cleaning product space 16, and the inner body 14 almost completely coincides with the outer body 12. When the cartridge 10 is in use, the cleaning product 42 is periodically discharged from the cartridge 10. This situation is shown in Figure 3B. As the cleaning product 42 is discharged, the volume of the cleaning product space 16 decreases and the inner body 14 separates from the outer body 12 except around linear connections 26. At the same time, a volume of an unused space 17 increases. The unused space 17 is the space inside the (rigid) outer body 12 and outside the flexible inner body 14, which fills with air as the cleaning product is discharged and the inner body 14 decreases in volume. The volume of the cleaning product space 16 and the volume of the unused space 17 together always add to a volume of the outer body 12. Consequently, as the volume of the cleaning product space is decreased when the cleaning product 42 is discharged, the volume of the unused space 17 increases. The outer body 12 has air openings 19 away from the linear connections 26 or other means that allow pressure leveling between the unused space and the environment. Figure 3C illustrates the cartridge 10 when the cleaning product 42 has been mostly or completely used. The cleaning product space 16 is minimized in this case, while the volume of the unused space 17 is maximal.

[0061] In order to control the liquid flow from the cartridge 10 and prevent the spilling of the cleaning product 42 when the cartridge 10 is not connected to the cleaning appliance 200, a valve 60 is placed on or in the cap 50, and over the cap opening 54. The valve 60 can have the form of a silicon cross piece 70 (Figs. 4A-4C), a duckbill valve 80 (Figs. 5A-5B) or, according to the invention, a deformable ball 90 (Figs. 6A-6C).

[0062] Figure 4A shows the front view of the cartridge 10 with the cap 50 and cross valve 60. The valve 60 is placed over the cap opening 54. In this case, the valve 60 is the silicon cross piece 70. This valve has four flaps 72 formed by two perpendicular slits extending through the center of the silicon cross piece 70. Figure 4B shows the cross-sectional view of the cap 50 with the silicon cross piece 70. The cap opening 54 is bound in the radial direction by an edge of the opening 56. The flaps 72 extend in a radial direction R from a central axis C of the cap opening 54 towards an edge of the opening 56. The

silicon cross piece 70 is placed around the edge of the opening 56 and fastened by a pressure ring 62 that extends radially around the edge of the opening 56 and the outer edge of the cross piece. Figure 4C illustrates the situation when the cap 50 is connected to the negative pressure device 44 of the cleaning appliance. Under the negative pressure, the flaps 72 open and the liquid conduit 24 is formed between the cleaning product space 16 and the cleaning appliance, shown by the flow arrows.

[0063] Figure 5A illustrates a preferred type of the valve, the duckbill valve 80. Similarly as in Figs. 4A-4C with the silicon cross-valve, the duckbill valve 80 is placed over the cap opening 54 and fastened to the edge of the opening 56 by the pressure ring 62. The duckbill valve has two flaps 82 which form a seal 59 around the central axis C of the cap when the cartridge 10 is not in use to prevent spillage of the cleaning product 42.

[0064] Figure 5B shows the cap 50 when connected to the negative pressure device 44 of the cleaning appliance 200. The negative pressure device 44 has an injection pin 46 which opens the seal 59 to form the liquid conduit 24 between the cleaning product space 16 and the cleaning appliance 200. The contents then flow from inside the cartridge 10 out the valve 80 and cap 50 for use.

[0065] Figure 6A shows the cap 50 with the deformable ball 90. The cap 50 has a ball space 58 placed in the center of the cap 50 and one or more flow openings 92 that extend radially around the ball space 58. The ball 90 sits within the ball space 58 and a closing ring 94 is placed around the cap opening 54 such that the ball stays within the ball space 58 and cannot escape. The flow openings 92 allow passage of the cleaning product from the cleaning product space 16 into the ball space 58 and out of cartridge 10. However, when the cartridge 10 is not in use, the ball 90 covers the openings 92, forming a seal that prevents spillage or flow of the cleaning product out of the cartridge 10.

[0066] When in use, the cartridge 10 is connected to the negative pressure device 44 via the cap 50, as illustrated in Figure 6B. The injection pin 46 of the negative pressure device 44 applies a force and deforms the ball 90. The ball 90 is deformed such that it moves away from the closing ring 94, and allows for flow through the flow openings 92. In this manner, the liquid conduit 24 is formed from the cleaning product space 16, through the flow openings 92 and the ball space 58, to the negative pressure device 44.

[0067] While the invention has been described with reference to exemplary embodiments and examples, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed, but that the invention will include all embodiments falling within the scope of the appended claims.

Claims

1. A cap (50) for a cartridge (10), the cap comprising:

fastening means (52) for fastening the cap (50) to a cartridge opening (36); and
a valve (60) configured to control liquid flow from inside the cartridge (10) through the cartridge opening (36) and the cap (50) under negative pressure,
characterised in that
the valve (60) is a deformable ball (90) which covers one or more flow openings (92) in a non-deformed state (NS) and deforms to allow flow through the one or more flow openings (92) in the deformed state (DS).

2. The cap (50) according to claim 1, wherein the cap (50) further comprises a pressure ring (62) for securing one or more valve parts.

3. The cap (50) according to claim 1 or claim 2, wherein the fastening means (52) comprises one or more of a thread, groove, shoulder or other connecting part.

4. The cap (50) according to any one of claims 1 to 3, wherein the one or more flow openings (92) extend in a radial direction (R) from a central axis (C) of the cap (50).

5. The cap (50) according to any of the preceding claims, wherein the ball (90) comprises silicone or rubber.

6. The cap (50) according to any of the preceding claims, wherein the ball (90) deforms through compressive forces.

7. The cap (50) according to claim 6, wherein the compressive forces are from an injection pin (46).

8. A cartridge (10) comprising:

a rigid outer body (12);
a flexible inner body (14) at least partially inside the outer body (12);
a cartridge opening (36); and
a cap (50) according to claim 1 for the cartridge.

9. The cartridge (10) according to claim 8, wherein the valve (60) of the cap (50) extends at least partially over the cartridge opening (36) to control liquid flow from the flexible inner body (14) through the cartridge opening (36) and the cap (50).

10. The cartridge (10) according to claim 8 or claim 9, wherein the one or more flow openings (92) extend in a radial direction (R) from a central axis (C) of the cap (50).

11. The cartridge (10) according to claim 10, wherein the ball (90) deforms through compressive forces, preferably the compressive forces are from an injection pin (46).

12. The cartridge (10) according to any one of claims 8 to 11, wherein the cartridge (10) is configured to be inserted into a cleaning appliance (200).

Patentansprüche

1. Kappe (50) für eine Kartusche (10), wobei die Kappe Folgendes umfasst:

Befestigungsmittel (52) zum Befestigen der Kappe (50) an einer Kartuschenöffnung (36); und
ein Ventil (60), das konfiguriert ist, eine Flüssigkeitsströmung vom Inneren der Kartusche (10) durch die Kartuschenöffnung (36) und die Kappe (50) bei Unterdruck zu steuern,
dadurch gekennzeichnet, dass
das Ventil (60) eine verformbare Kugel (90) ist, die eine oder mehrere Strömungsöffnungen (92) in einem nicht verformten Zustand (NS) bedeckt und sich verformt, um eine Strömung durch die eine oder mehrere Strömungsöffnungen (92) im verformten Zustand (DS) zu ermöglichen.

2. Kappe (50) nach Anspruch 1, wobei die Kappe (50) ferner einen Druckring (62) zum Befestigen eines oder mehrerer Ventilteile umfasst.

3. Kappe (50) nach Anspruch 1 oder Anspruch 2, wobei die Befestigungsmittel (52) ein Gewinde, eine Rille, einen Ansatz und/oder ein anderes Verbindungsteil umfasst.

4. Kappe (50) nach einem der Ansprüche 1 bis 3, wobei die eine oder die mehreren Strömungsöffnungen (92) von einer Mittelachse (C) der Kappe (50) in einer radialen Richtung (R) verlaufen.

5. Kappe (50) nach einem der vorhergehenden Ansprüche, wobei die Kugel (90) Silikon oder Gummi umfasst.

6. Kappe (50) nach einem der vorhergehenden Ansprüche, wobei sich die Kugel (90) durch Druckkräfte verformt.

7. Kappe (50) nach Anspruch 6, wobei die Druckkräfte von einem Einspritzstift (46) herrühren.

8. Kartusche (10), die Folgendes umfasst:

einen starren Außenkörper (12);
einen elastischen Innenkörper (14), der wenigstens teilweise im Außenkörper (12) angeordnet ist;
eine Kartuschenöffnung (36); und
eine Kappe (50) nach Anspruch 1 für die Kartusche.

9. Kartusche (10) nach Anspruch 8, wobei sich das Ventil (60) der Kappe (50) zum Steuern einer Flüssigkeitsströmung vom elastischen Innenkörper (14) durch die Kartuschenöffnung (36) und die Kappe (50) wenigstens teilweise über die Kartuschenöffnung (36) hinaus erstreckt.

10. Kartusche (10) nach Anspruch 8 oder Anspruch 9, wobei die eine oder die mehreren Strömungsöffnungen (92) von einer Mittelachse (C) der Kappe (50) in einer radialen Richtung (R) verlaufen.

11. Kartusche (10) nach Anspruch 10, wobei sich die Kugel (90) durch Druckkräfte verformt, wobei die Druckkräfte vorzugsweise von einem Einspritzstift (46) herrühren.

12. Kartusche (10) nach einem der Ansprüche 8 bis 11, wobei die Kartusche (10) so konfiguriert ist, dass sie in ein Reinigungsgerät (200) eingesetzt wird.

Revendications

1. Capuchon (50) pour une cartouche (10), le capuchon comprenant :

des moyens de fixation (52) pour fixer le capuchon (50) à une ouverture de cartouche (36) ; et une soupape (60) configurée pour contrôler l'écoulement de liquide depuis l'intérieur de la cartouche (10) en passant par l'ouverture de cartouche (36) et le capuchon (50) sous pression négative,
caractérisé en ce que :
la soupape (60) est une bille déformable (90) qui recouvre une ou plusieurs ouvertures d'écoulement (92) dans un état non déformé (NS) et se déforme pour permettre l'écoulement à travers les une ou plusieurs ouvertures d'écoulement (92) à l'état déformé (DS).

2. Capuchon (50) selon la revendication 1, dans lequel le capuchon (50) comprend en outre une bague de pression (62) pour fixer une ou plusieurs parties de

soupape.

3. Capuchon (50) selon la revendication 1 ou la revendication 2, dans lequel le moyen de fixation (52) comprend un ou plusieurs parmi un filetage, une rainure, un épaulement ou une autre partie de raccordement.

4. Capuchon (50) selon l'une quelconque des revendications 1 à 3, dans lequel les une ou plusieurs ouvertures d'écoulement (92) s'étendent dans une direction radiale (R) à partir d'un axe central (C) du capuchon (50).

5. Capuchon (50) selon l'une quelconque des revendications précédentes, dans lequel la bille (90) comprend de la silicone ou du caoutchouc.

6. Capuchon (50) selon l'une quelconque des revendications précédentes, dans lequel la bille (90) se déforme par le biais des forces de compression.

7. Capuchon (50) selon la revendication 6, dans lequel les forces de compression proviennent d'une tige d'injection (46).

8. Cartouche (10) comprenant :

un corps externe rigide (12) ;
un corps interne flexible (14) au moins partiellement à l'intérieur du corps externe (12) ;
une ouverture de cartouche (36) ; et
un capuchon (50) selon la revendication 1 pour la cartouche.

9. Cartouche (10) selon la revendication 8, dans laquelle la soupape (60) du capuchon (50) s'étend au moins partiellement sur l'ouverture de cartouche (36) pour contrôler l'écoulement de liquide à partir du corps interne flexible (14) en passant par l'ouverture de cartouche (36) et le capuchon (50).

10. Cartouche (10) selon la revendication 8 ou la revendication 9, dans laquelle les une ou plusieurs ouvertures d'écoulement (92) s'étendent dans une direction radiale (R) à partir d'un axe central (C) du capuchon (50).

11. Cartouche (10) selon la revendication 10, dans laquelle la bille (90) se déforme par le biais des forces de compression, de préférence les forces de compression proviennent d'une tige d'injection (46).

12. Cartouche (10) selon l'une quelconque des revendications 8 à 11, dans laquelle la cartouche (10) est configurée pour être insérée dans un appareil de nettoyage (200).

Fig. 1A

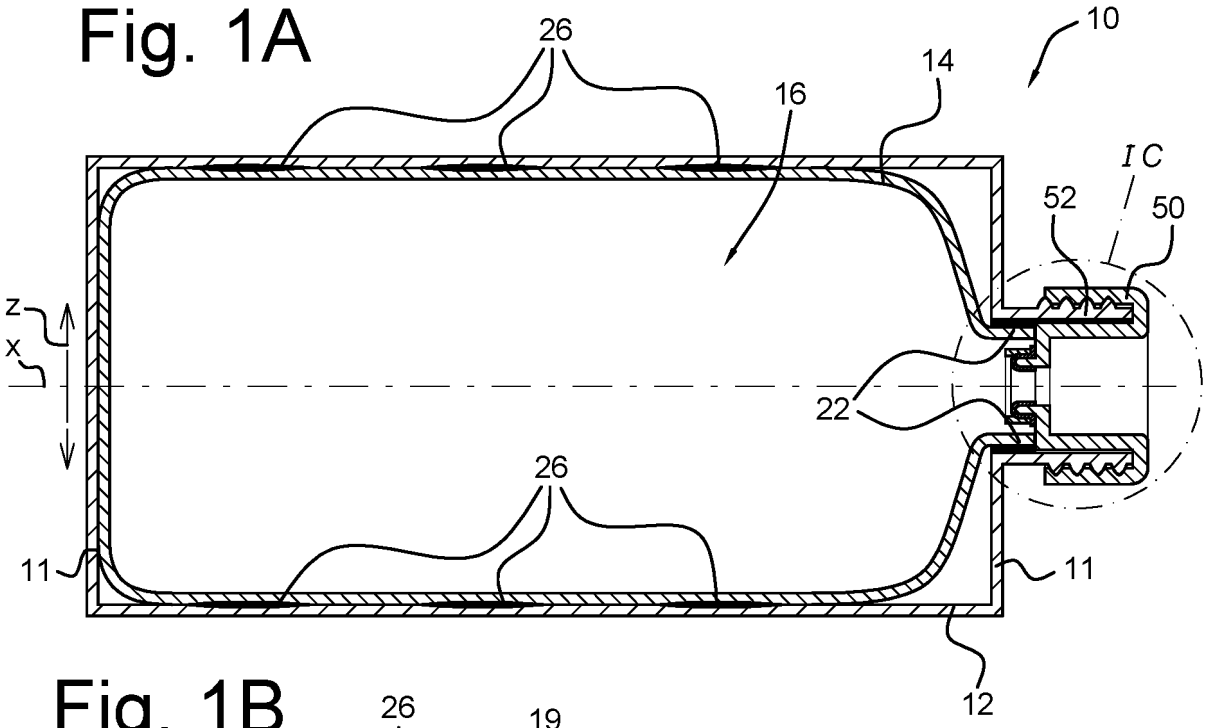


Fig. 1B

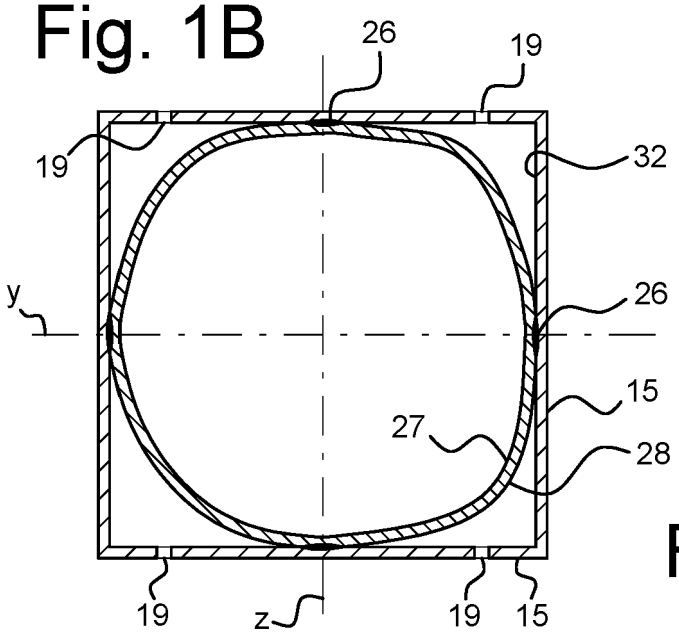
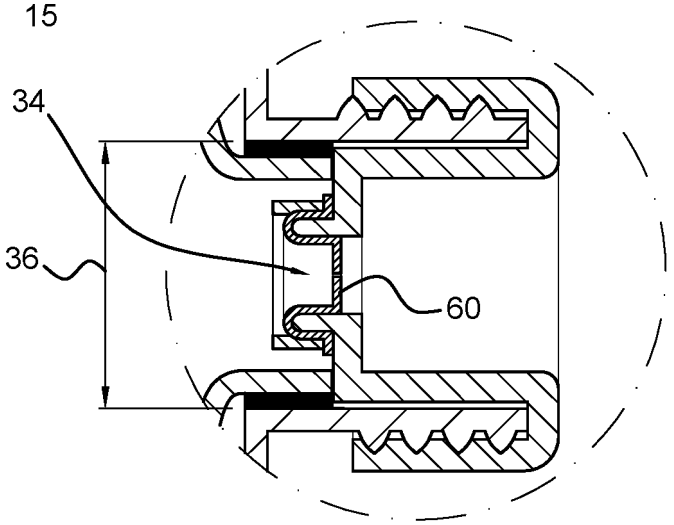


Fig. 1C



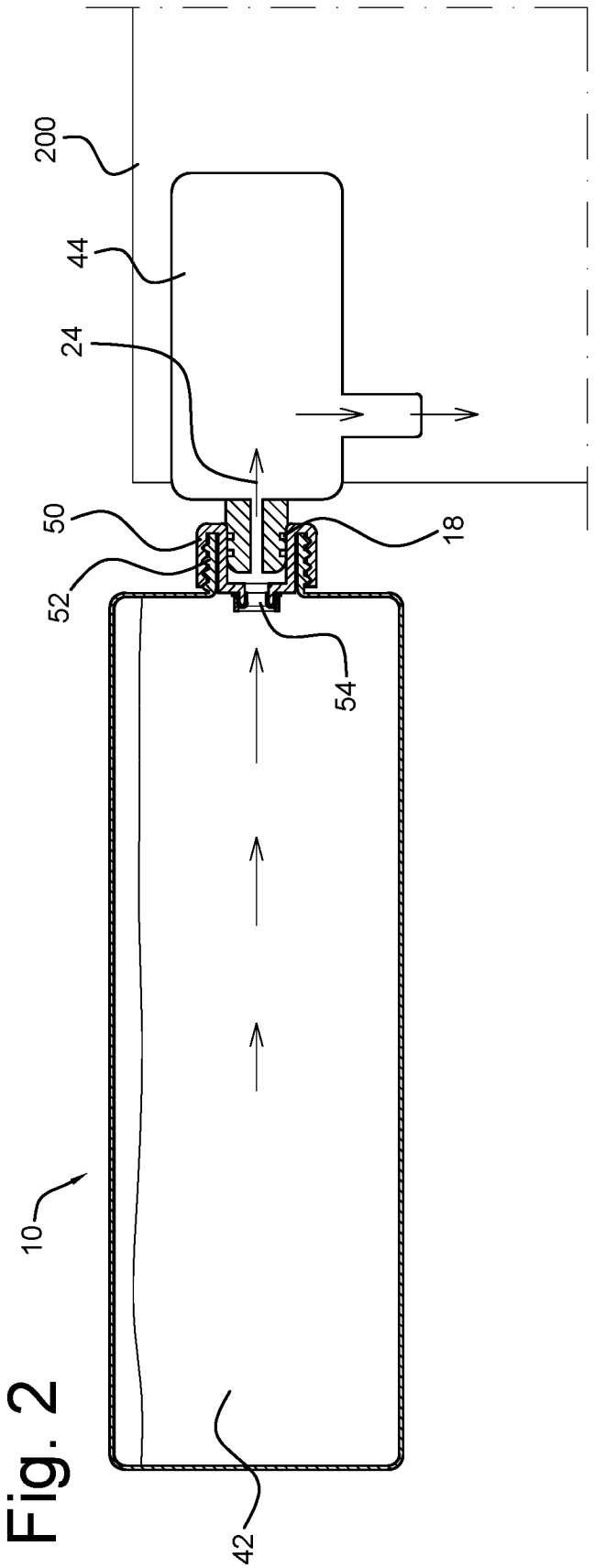


Fig. 2

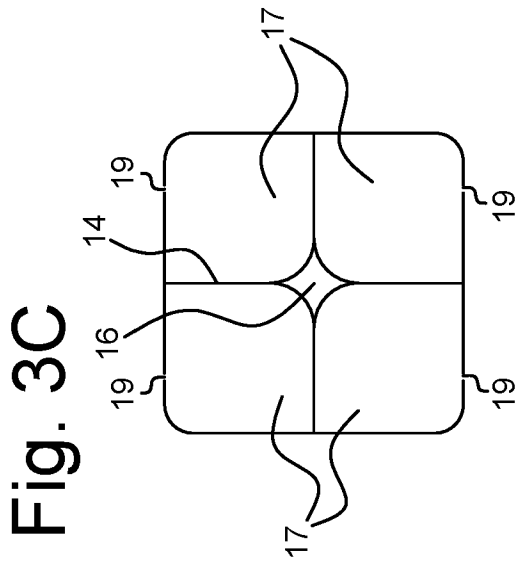


Fig. 3C

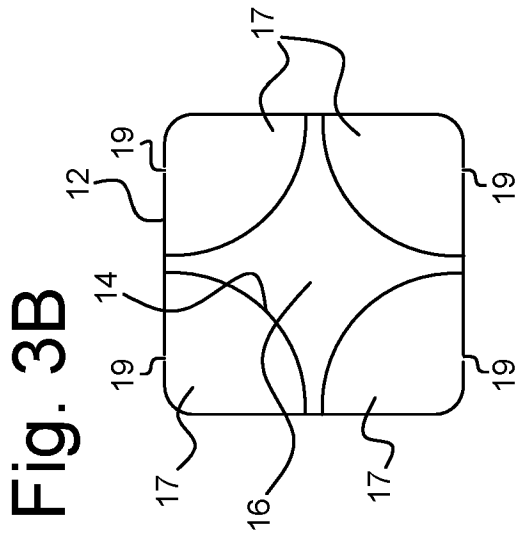


Fig. 3B

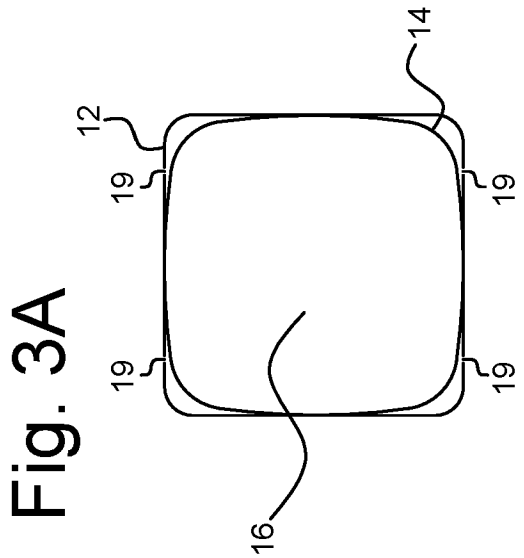


Fig. 3A

Fig. 4A

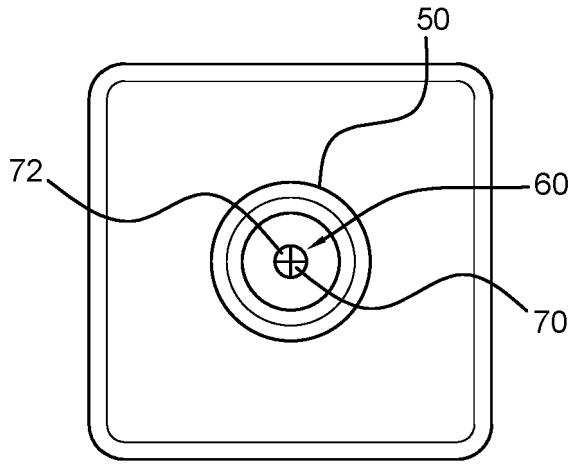


Fig. 4B

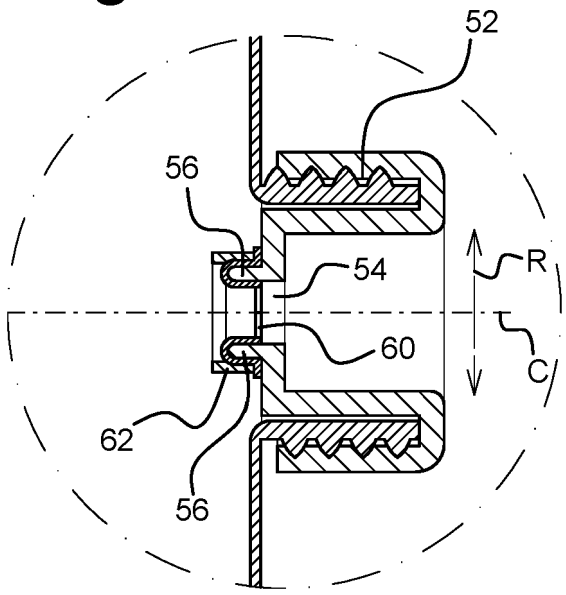


Fig. 4C

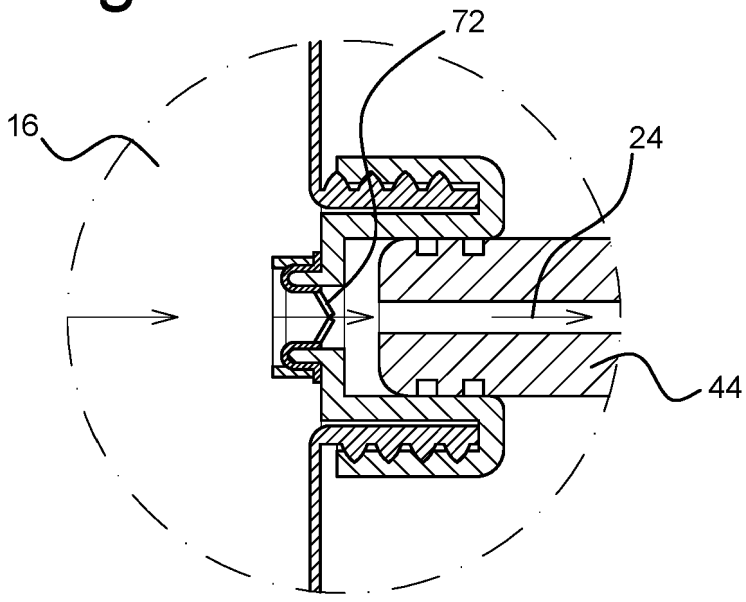


Fig. 5A

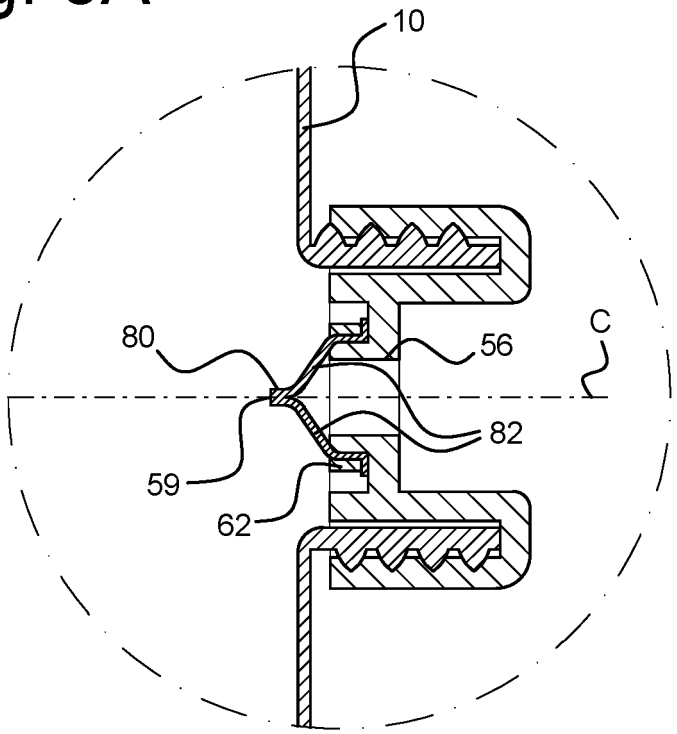


Fig. 5B

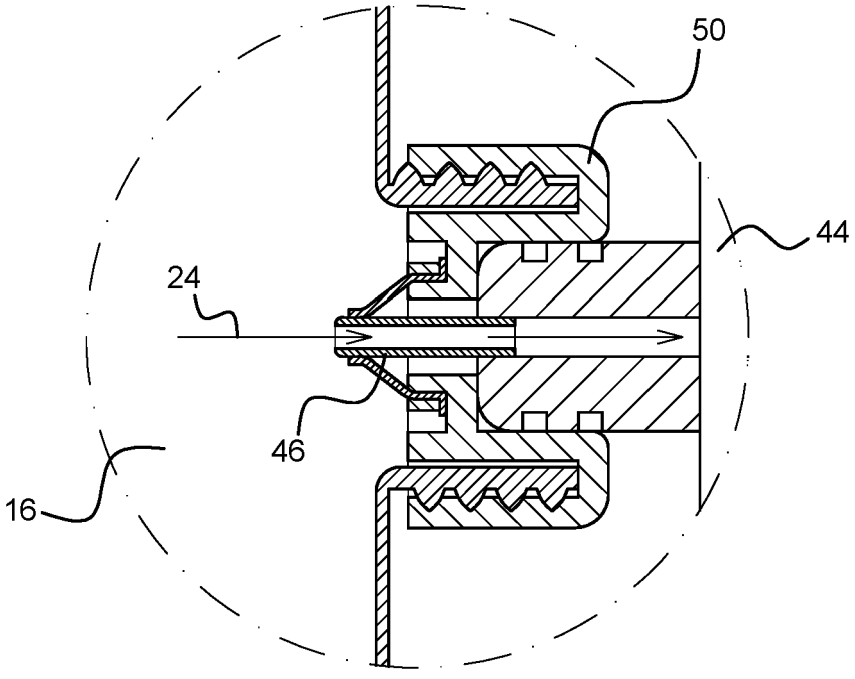


Fig. 6A

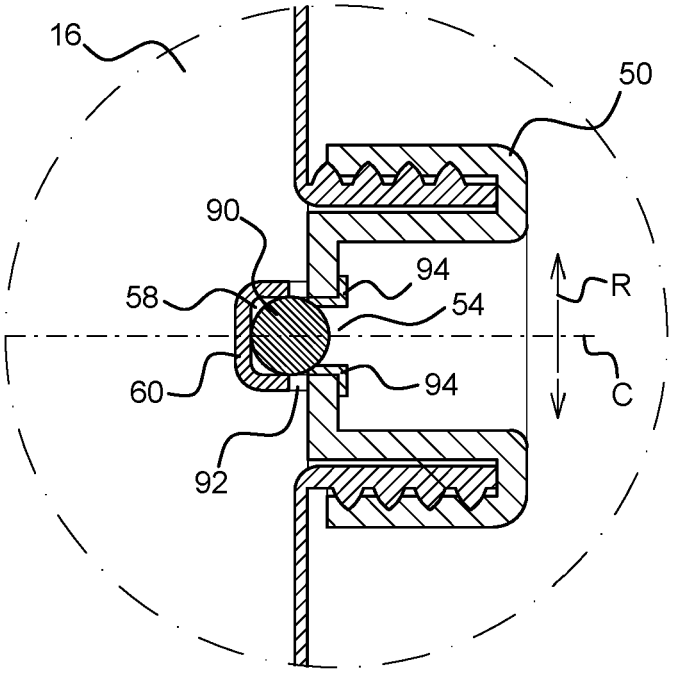
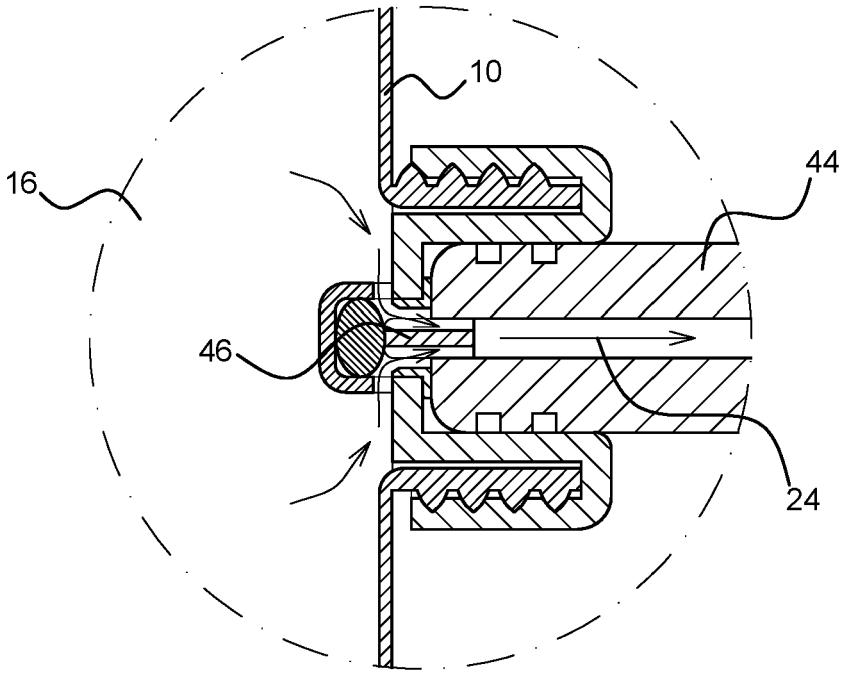


Fig. 6B



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5301838 A **[0002]**
- CN 111270480 A **[0004]**
- CN 108998931 A **[0005]**
- CN 112900012 A **[0005]**
- US 20150336719 A1 **[0005]**
- US 20150336719 A **[0006]**