(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 January 2016 (14.01.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/005777 A1

(51) International Patent Classification:
B65D 83/68 (2006.01)

(21) International Application Number:
PCT/HU2014/000056

(22) International Filing Date:
11 July 2014 (11.07.2014)

(25) Filing Language: Hungarian

(26) Publication Language: English

(72) Inventor; and
(71) Applicant : **FAZEKAS, Gábor** [HU/HU]; Fehérsas u. 27, H-1163 Budapest (HU).

(72) Inventor: **RIDEG, Mihály**; Apolló u. 2/a, H-1158 Budapest (HU).

(74) Agent: **GÖDÖLLE, KÉKES, MÉSZÁROS & SZABÓ**; Patent and Trademark Attorneys, Keleti Károly u. 13/b, H-1024 Budapest (HU).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

(54) **Title**: STORAGE DEVICE, CONTAINER PROVIDED THEREWITH AND METHOD FOR MANUFACTURING THE STORAGE DEVICE

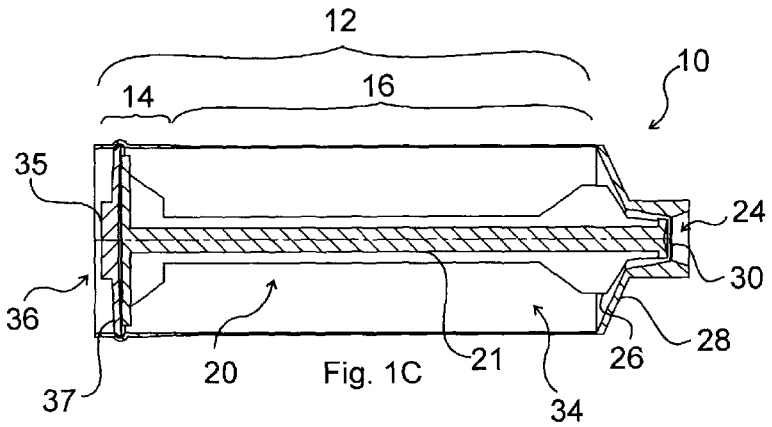

Fig. 1C

(57) **Abstract**: The invention is a storage device for storing a liquid, and particularly for arrangement in a container comprising a liquid and/or a gas, said storage device comprising a storage tube having a cylindrical wall element (12) and a covering element (28) sealing one end of the wall element (12), a sealing element (36) sealing the other end of the wall element (12), and a transmitting element (20) arranged in the storage tube. In the storage device according to the invention the storage tube and the sealing element (36) is made of metal. The storage device according to the invention comprises a transmitting element (20) supported inside the storage tube, said transmitting element (20), at the end of the transmitting element (20) being at the sealing element (36), has a support surface (22) supporting the sealing element (36), and said support surface (22) is arranged transversely to an axis of symmetry of the wall element (12), and the sealing element (36) is disc-shaped, and is pressed along its whole circumference in a liquid- and gas-tight manner into the inside surface of the wall element (12). The invention is furthermore a container provided with the storage device and a method for manufacturing the storage device.

WO 2016/005777 A1

STORAGE DEVICE, CONTAINER PROVIDED THEREWITH AND METHOD FOR MANUFACTURING THE STORAGE DEVICE

TECHNICAL FIELD

The invention relates to a storage device sealed in a liquid- and gas-tight manner, a container provided with the storage device, and a method for manufacturing the storage device.

BACKGROUND ART

The storage of two-component products, for example polyurethane foams, aerosols, automotive paints and varnishes, hair dyes, chemical – particularly household chemical – products, pharmaceutics, cosmetics, etc. often poses problems related to the storing of the second component. A number of known solutions are targeted at overcoming these problems.

In WO 2007/122001 A1 an arrangement adapted for storing and mixing two-component materials, and comprising an inner and an outer container is disclosed, where the contents of the inner container are able to get mixed with the medium held in the outer container after the closure cap of the inner container is removed. WO 2007/122001 A1 discloses a solution comprising a pressure equalisation zone arranged in the wall of the inner container. The pressure equalisation zone is formed by means of a resilient film placed on a window formed in the wall of the inner container. In the document a number of different sealing solutions are described for separating the contents of the inner container from the contents of the outer container. Separation is provided by a film that is attached to the end section of the inner container applying various rings. The film can be removed from the end section of the inner container by means of a pushing mechanism arranged in the container, either by removing the film together with the rings, or by cutting it through applying a circular piercing tool disposed at the end of the pushing mechanism.

In US 8,157,130 B2 an arrangement consisting of an inner container and an outer container is disclosed. According to this solution the inner container is capable of storing a liquefied gas fuel. The wall of the inner container is made of easily deformable metal. The outer container surrounding the inner container is filled with

high pressure gas, such that the wall of the inner container becomes deformed by the high-pressure gas as the inner container is gradually emptied. A supporting element is arranged in the inner container to prevent the cylindrical container from getting deformed at its end section, but only on the side walls. The solution of US 8,157,130 B2 is not capable of mixing the materials stored in the inner and outer containers, since according to the solution disclosed in the document the mixing of the contents of the outer and inner containers is undesirable.

WO 01/30668 A1 describes an arrangement capable of mixing two components wherein the cover separating the inner container from the outer container can be removed by means of a pushing mechanism extending through the inner container. The cover element separating the inner and outer containers can be removed by means of a pushing mechanism also in the solutions disclosed in US 4,651,899, US 6,675,993 B2 and US 8,403,177 B2.

In US 8,403,177 B2 a solution applying an outer and inner container is presented wherein the wall of the inner container is pressure-proof with a wall thickness of 0.3-0.8 mm, while the suggested wall thickness is 0.05-0.1 mm at the membrane Said membrane ensures pressure equalisation, covers the upper end of the cylindrical container, and is arranged at the connection to the outer container.

WO 2006/069458 A1 discloses a container suitable for storing multiple components wherein the closure cap of the inner container is snapped into the neck of the inner container. Similar arrangements are disclosed in US 2,793,776 and WO 84/01355 A1.

Arrangements allowing the removability of the separator wall of a two-compartment container are disclosed in US 3,603,483 and US 3,799,398.

In EP 2 062 616 A1 an arrangement comprising an inner and an outer container is disclosed wherein the closure cap sealing the inner container is pushed in between protrusions formed on the inside wall of the inner container. A closure cap separating an inner container from an outer container and being detachable applying a screw spindle is described in EP 0 042 128 B1. According to US 5,638,992 an outer container is separated from an inner container by a snap-in

plug. Further storages capable of storing and mixing two components are disclosed in EP 1 943 164 B1 and US 8,595,502 B2.

A common disadvantage of known solutions is that either the sealing and the draining of the inner container is cumbersome or the seal is not liquid- or gas-tight, furthermore, in a number of solutions, pressure equalisation between the inner and outer containers is not provided for or is cumbersome.

In view of the known solutions, there is a demand for a storage device, a container provided with the storage device, and a method for manufacturing the storage device, wherein the sealing of the storage device is implemented in a simple and liquid- and gas-tight manner.

DESCRIPTION OF THE INVENTION

The primary object of the invention is to provide a storage device, a container provided with the storage device, and a method for manufacturing the storage device which are free of disadvantages of prior art solutions to the greatest possible extent.

A further object of the invention is to provide a storage device, a container provided with the storage device, and a method for manufacturing the storage device, wherein the sealing of the storage device is provided in a simple and liquid- and gas-tight manner, while, at the same time, it may be removed easily.

The objects of the invention can be achieved by the storage device according to claim 1, the container according to claim 11, and the method according to claim 14. Preferred embodiments of the invention are defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described below by way of example with reference to the following drawings, where

Figs. 1A-1D are sectional drawings illustrating the storage device according to the invention and the method for sealing the storage tube of the storage device,

Fig. 2 is a magnified detail of Fig. 1A,

Fig. 3 is a magnified detail of Fig. 1C,

Fig. 4 is a spatial drawing of an embodiment of the device according to the invention,

Figs. 5A-5D illustrate the storage device according to the invention, as well as a further embodiment of the method for sealing the storage tube, wherein the storage device is attached to the cover or bottom plate of the container,

Fig. 6 is a sectional drawing illustrating the attachment of an embodiment of the storage device to the bottom plate of the container,

Figs. 7 and 8, respectively, are sectional and spatial drawings illustrating a further embodiment of the storage device according to the invention,

Figs. 9 and 10, respectively, are sectional and spatial drawings illustrating how the embodiment presented in Figs. 7 and 8 is operated,

Figs. 11, 12 and 13, respectively, are sectional, exploded, and spatial drawings illustrating a yet further embodiment of the storage device according to the invention, and

Figs. 14 and 15, respectively, are sectional and spatial drawings illustrating the operation of the embodiment shown in Figs. 11, 12 and 13.

MODES FOR CARRYING OUT THE INVENTION

The storage device according to the invention is adapted for storing a liquid, and may be particularly advantageously applied for arrangement in a container holding a liquid and/or a gas. The invention also relates to a method for producing the storage device.

In the following, the method for manufacturing the storage device is presented first, since by going through the steps of the method the features of the storage device may also be understood. In an embodiment, the steps of the method according to the invention are illustrated in Figs. 1A-1C.

For manufacturing a storage device 10 shown in Fig. 1C, a storage tube and a sealing element made of metal is applied. The storage tube has a cylindrical wall element 12 and a covering element 28 sealing one end of the wall element 12. Carrying out the steps to the method according to the invention, the sealing element 36 shown in Fig. 1C is obtained from a sealing element preform 18.

In the course of the method according to the invention a transmitting element 20 is placed into the storage tube, and a sealing element 36 is provided to the other end of the wall element 12 as described below. In the step of Fig. 1A the transmitting element 20 is supported inside the storage tube, said transmitting element 20, at the end of the transmitting element 20 being at the sealing element 36, has a support surface 22 supporting the sealing element 36 (shown in Fig. 1C), and the support surface 22 is arranged transversely to an axis of symmetry of the wall element 12; and, applying a force parallel with the axis of symmetry of the wall element 12, a conical sealing element preform 18 is pushed against the support surface 22, thereby deforming the sealing element preform 18 into a disc-shaped sealing element 36, which is pressed along its whole circumference in a liquid- and gas-tight manner into the inside surface of the wall element 12. The term conical is used here to refer to any of conical, frustroconical, or hemispheric.

In Fig. 1A the sealing element preform 18 is separated from the wall element 12. In the step illustrated in Fig. 1B, the sealing element preform 18 is placed on the support surface 22 of the transmitting element 20, when the transmitting element 20 is supported in the storage tube. In Fig. 1C the completed storage device is illustrated; the drawing shows a protrusion 32 extending around the outside surface of the wall element 12, and produced when the sealing element 36 is pressed into the inside surface of the wall element 12.

Fig. 1C illustrates the sealed storage device 10. As mentioned above, the storage device 10 comprises a storage tube having a cylindrical wall element 12 and a covering element 28 sealing one end of the wall element 12. The storage device further comprises a sealing element 36 sealing the other end of the wall element 12, and a transmitting element 20 arranged in the storage tube. As described above, the storage tube and the sealing element of the storage device according to the invention are made of metal. It is shown in Fig. 1C that the storage device has such a transmitting element 20 which is supported in the storage tube, the transmitting element 20, at the end of the transmitting element 20 being at the sealing element 36, has a support surface 22 supporting the sealing element 36, and the support surface 22 is arranged transversely to an axis of symmetry of the wall element 12; furthermore, the sealing element 36 is disc-shaped, and is

pressed along its whole circumference in a liquid- and gas-tight manner into the inside surface of the wall element 12.

In the embodiment of Fig. 1C of the storage device according to the invention the transmitting element 20 comprises a supporting element 26 supported by the covering element 28, and a transmitting rod 21 connecting the supporting element 26 with the support surface 22. It is shown that in this embodiment, in relation to the operation of the transmitting element, the covering element 28 is formed like a tube-end, i.e. it has a protruding portion into which the end section of the supporting element 26 of the transmitting element 20 is extending, and a shoulder portion, on which the portion of the supporting element 26 extending laterally with respect to the axis of symmetry of the wall element 12 is supported.

It is also shown in Fig. 1C that the sealing element 36 comprises a push member 35 arranged about the centre thereof, and a sealing mantle 37 arranged concentrically about the push member and being of a thickness smaller than the thickness of the push member 35 and is arranged in a concentric fashion about the push member 35. It is shown in Figs. 1A and 1B, that the sealing element preform 18 obviously also has a push member 17 and a sealing mantle 19, and the sealing element preform 18 receives its conical shape from the configuration of the push member 17 and the sealing mantle 19 shown in Figs. 1A and 1B. The sealing mantle 19 is attached to the push member 17 in a manner shown in Fig. 1A, such that the sealing element preform 18 has a smaller diameter than the sealing element 36; thereby, the sealing element preform 18 can be inserted into the internal space of the wall element 12 as shown in Fig. 1B (the inside diameter of which is only larger with a small extent than the diameter of the sealing element preform 18). The sealing element preform 18 is dimensioned such that after it has been pressed against the support surface 22 its diameter is larger than the inside diameter of the wall element 12, thus becomes pressed into the interior surface of the wall element 12, and a protrusion 32 is thereby produced on the outside wall of the wall element 12 due to the wall thickness of the wall element 12. Pressing-in along the entire circumference is ensured by appropriate centring of the members.

Under the pressing force, therefore, the conical sealing element preform 18 becomes flat, while its diameter increases. Under the pressing force, thereby, the

edge of the sealing element preform 18 abuts against the interior surface of the wall element 12 and locally deforms it.

It is shown also in Figs. 1A-1C that in this embodiment the wall element 12 comprises a first wall element portion 16 of a first thickness and a second wall element portion 14 of a second thickness, which is arranged at the end of the wall element 12 being at the sealing element 36, wherein the second thickness is larger than the first thickness, and the sealing element 36 is pressed into the second wall element portion 14.

It is also shown in Figs. 1A-1C that in this embodiment a pass-through opening 24 sealed by a sealing foil 30 is formed on the covering element 28. The wall element 12, the covering element 28, and the sealing foil 30 are preferably made from one piece. The sealing foil may be such a metallic film or plastic foil as conventionally applied for sealing storage tubes, which film or foil may be ruptured by an actuating element described below. It is shown in Figs. 1A-1C that in this embodiment the pass-through opening 24 is formed in an end section that is tapering with respect to the storage tube. As shown in Fig. 1D, this end section preferably comprises a screw thread on its outside surface, and thus the end section may be closed for instance by a threaded closure cap applied in addition to or, optionally, instead of the sealing foil 30. In addition to that, the threaded end section may be applied for attaching the storage device to a container as described below.

It is shown in Figs. 1A-1C that the first wall element portion 16 extends to a much larger part of the wall element 12 than the second wall element portion 14, thus the wall element 12 is primarily characterized by the thickness of the first wall element portion 16. The second wall element portion 14 preferably extends only to the end section of the wall element 12 that receives the sealing element 36 in order that the sealing element 36 may be pressed into a much thicker portion.

In some embodiments the second thickness is equal to 1.5-10 times, preferably 2-5 times the first thickness. The first thickness is e.g. between 0.05 mm and 0.2 mm, preferably between 0.08 mm and 0.12 mm, and particularly preferably it is 0.1 mm. The above dimensions imply that the wall element 12 has a thickness of 0.1

mm along almost its whole length, and it is made thicker only at its end section proximate the sealing element 36 to allow for the most preferable connection between the sealing element 36 and the wall element 12. In case of the above thicknesses, the characteristic thickness of the covering element is approx. 0.5-1 mm.

The second wall portion extends along the wall element 12 at a length of approx. 5 mm in case a storage device having commonly applied dimensions is applied. There is preferably a variable-thickness wall portion between the first wall portion and the second wall portion, along which the wall thickness decreases from the thickness of the second wall portion to the thickness of the first wall portion. This variable-thickness wall portion extends along an approx. 10-mm-long section. For example approx. 80% of the wall element belongs to the first wall portion, i.e. particularly preferably it has a thickness of approx. 0.1 mm.

In case the thickness of the wall element 12 is in the above specified ranges, the wall element 12 may be formed applying cold flow, i.e. applying a mass-production method. The variable-thickness wall element may be produced by cold flow applying an appropriately configured flow-ring. In some embodiments of the invention the wall element and/or the sealing element is made of aluminium, copper, or zinc.

According to the invention, both the wall element – the whole storage tube – and the sealing element are made of metal. A metal-to-metal seal is therefore made as the sealing element preform 18 is pressed into the internal wall of the wall element 12. To press the sealing element preform 18 into the interior surface of the wall element 12 such a force has to be applied that presses the sealing element 36 into the surface roughness of the wall element 12; by applying a force of such a magnitude a liquid- and gas-tight seal is made. The thickness of the sealing mantle 19 of the sealing element preform 18 is preferably in the range of 0.5-1 mm. The thickness of the push member 17 is greater than that, being preferably 2-3 times greater than the thickness of the sealing mantle 19. A sealing element preform 18 having these thicknesses is pressed into the wall element 12 applying a force of preferably 100-500 N, particularly preferably approx. 300 N; the force is preferably applied to the push member 17. The application of such a force is

required particularly for flattening the conical sealing element preform 18, but is also sufficient for pressing the sealing element 36 obtained from the sealing element preform 18 into the interior surface of the wall element 12 providing liquid- and gas-tight sealing. The application of a metal-to-metal seal makes it unnecessary to use sealing materials. Since the sealing element 36 is disc-shaped, it can be pressed into the interior surface of the wall element 12 in a circular fashion, i.e. along its entire circumference.

In Fig. 1D it is illustrated that the sealing element 36 may be removed from the end section of the wall element 12 by operating the transmitting element 20. Thereby, the liquid contained in the internal space 34 of the storage device, shown in Fig. 1C, may be removed therefrom, and, in case the storage device is arranged in a container, the contents of the storage device may be mixed with the contents of the container. The storage device according to the invention may thus be applied for the storage of a second component inside a container. It is illustrated that by configuring the sealing element according to the invention the second component may be easily drained off from the storage device. A preferred application of the storage device for two-component fluid systems is illustrated in Fig. 6. The transmitting element 20 may be put in operation (i.e. pushed towards that end of the wall element that is fitted with the sealing element) preferably by applying an actuating element, as illustrated in Fig. 5D. It is shown in Fig. 1D that as the sealing element 36 is removed, the wall element 12 is expanded along a portion 38 as the larger-diameter sealing element 36 is being pushed outwards.

In some embodiments, the required displacement of the transmitting element 20 may be brought about also by applying a rotatable member attached to the treaded end section of the pass-through opening.

As it is clearly shown in Fig. 1D, the width of the support surface 22 is preferably a bit smaller than the diameter of the sealing element 36. In case such dimensions are applied, the transmitting element may preferably be freely slid into the interior space of the wall element, but this small size difference do not affect the role of the support surface 22 during the pressing-in of the sealing element preform 18. To allow the pressing-in of the sealing element preform 18 the support surface 22

preferably has a circular face, but polygonal (hexagonal, octogonal, etc.) configuration is also conceivable.

Fig. 2 shows a magnified detail of Fig. 1A, illustrating the portion of the wall element 12 proximate the sealing element, toward which the sealing element preform 18 is displaced. The second wall element portion 14 having a larger thickness than the first wall element portion 16, as well as the push member 17 and the sealing mantle 19 of the sealing element preform 18 are particularly well illustrated in Fig. 2.

Fig. 3 shows the sealing element 36 pressed into the interior surface of the wall element 12 in greater detail compared to Fig. 1C. In Fig. 3, a gap extending between the sealing element 36 and the support surface 22 is shown. Depending on the magnitude and dynamics of the force applied for pressing, as well as on the elasticity of the sealing element preform 18 and the support surface 22, such a gap may also be formed during the pressing-in of the sealing element 36. It is shown in Fig. 3 that stiffener members 42, for providing a sufficiently strong connection between the transmitting rod 21 and the support surface 22, are arranged at the connection of the transmitting rod 21 and the support surface 22. In the embodiment illustrated in Fig. 1C, the supporting element 26 is constituted by similar stiffener members.

Fig. 4 is a spatial drawing of the embodiment of Fig. 1C. The figure shows a circular protrusion 32 extending along the circumference of the end of the wall element 12 next to the sealing element 36 that is formed as a result of the pressing-in of the sealing element 36, as well as the flat sealing element 36, obtained from the sealing element preform 18, with a push member 35 protruding from the central portion thereof. The screw thread 44 belonging to the pass-through opening is shown in the figure at the end of the wall element opposite the sealing element 36.

Figs. 5A-5D illustrate the preparation of the sealing, i.e. the pressing-in of the sealing element 36, in such an embodiment wherein the storage tube is attached to the cover plate or bottom plate of a container. It is shown in the drawing that the storage tube is secured to the cover plate 46 of the container by a transmitting

piece 50. According to the present embodiment of the storage device, in a manner similar to the embodiment shown in Fig. 1C, a pass-through opening 24 sealed by a sealing foil 30 is formed in the covering element 28. In this embodiment, furthermore, an actuating element 48 adapted for piercing through the sealing foil 30 and for removing the sealing element 36 cooperating with the transmitting element 20 is connected to the pass-through opening 24. It is shown in Fig 5C that the threaded outside surface of the pass-through opening of the storage device 10 is screwed in the corresponding portion of the transmitting piece 50 to secure together the storage device 10 and the transmitting piece 50. The transmitting piece 50 may be connected to the cover plate 46 of the container in several known ways.

In Figs. 5A-5C the pressing-in procedure of the sealing element preform 18 into the storage tube is illustrated, while Fig. 5D illustrates the removal of the sealing element 36 from the storage tube. Fig. 5A shows how the transmitting element 20 is introduced into the storage tube and also shows the sealing element preform 18 beside the storage tube.

In Fig. 5B the sealing element preform 18 is pressed against the support surface 22 but the pressing-in of the sealing element preform 18 into the interior surface of the wall element 12 has not yet started. It is shown in Fig. 5B that in the present embodiment the sealing element preform 18 has a greater width than the support surface 22. Accordingly, the sealing mantle 19 laterally overhangs the support surface 22, with the component forming the support surface 22 extending into the "dome" defined by the sealing element preform 18.

In Fig. 5C a pressed-in sealing element 36 is illustrated, i.e. in Fig. 5C it is the storage device 10 that is secured via the transmitting piece 50 to the corresponding part of the container. As it is shown in Fig. 5C, the end of the actuating element 48 extends into the pass-through opening 24 (i.e. it is connected into the pass-through opening 24). In the state illustrated in Fig. 5C the end of the actuating element 48 does not reach the sealing foil. The actuating element 48 may be supported in a known manner in its position shown in Fig. 5C. From the position illustrated in Fig. 5C the actuating element may be displaced, and brought in the position shown in Fig. 5D by exerting thereon an – expediently low – force.

As the actuating element 48 is displaced downwards, it pierces through the sealing foil 30 as shown in Fig 5D, abuts against the end section of the supporting element 26, and pushes the transmitting element 20 downwards. The support surface of the downward moving transmitting element pushes the sealing element 36 pressed into the wall element 12 out from the storage tube, whereby the end of the wall element 12 proximate the sealing element 36 becomes free. Since the end of the actuating element 48 shown in the top of the drawing is accessible from outside of the container, the contents of the storage device 10 may be drained into the container surrounding the storage device 10 applying the actuating element 48 as illustrated in Fig. 5D.

According to the description above, certain embodiments of the invention are related to a container adapted for storing a gas and/or liquid, in the interior space of which a storage device according to the invention is arranged. Such an embodiment of the invention is illustrated in Fig. 6.

In the embodiment illustrated in Fig. 6 the storage device 10 is preferably attached to a bottom portion 54 of the wall of a container 52 applying a transmitting piece in a manner also shown in Fig. 5C. In the embodiment of Fig. 6 the container comprises a dispenser unit 51. In the embodiment of Fig. 6 the two-component material to be dispensed is obtained by – preferably before using the dispenser unit 51 for the first time – removing the sealing element 36 of the storage device 10 utilising the transmitting piece 48, thereby allowing that the material held in the interior space of the storage device 10 becomes mixed with the material held in the interior of the external container 52. To facilitate mixing, it may then be expedient to shake the container 52, after which the mixed material may be dispensed from the container 52 applying a dispenser unit 51. In the embodiment of the container shown in Fig. 6 the actuating element 48 can be operated from outside of the container 52.

In other embodiments the storage device 10 is attached to the wall of the container.

As the container is being filled with gas or liquid, the wall element of the storage device disposed in the container becomes deformed in a manner depending on

the quantity of air locked in the storage device during fill-up and on the pressure of the container in case the first portion of the wall element has the thickness value specified above. Thereby, due to the permanent deformation pressure equalisation takes place between the container and the storage device in case the above specified wall thickness values are applied. In case such wall thickness values, the wall element deforms under as low a pressure difference as approx. 100 mbar (pressure equalisation happens), and thus by applying a wall element having an appropriate thickness the metal-to-metal seal at the sealing element is relieved of load. In order that the pressure equalisation that takes place is focused on the wall element, the wall element may preferably be flattened or indented to some extent after insertion of the transmitting element. The support surface of the transmitting element provides that such a flattening extends only to the wall element and does not affect the sealing element. In case the above described storage device is applied, no other means are necessary to provide for pressure equalisation.

In an embodiment the transmitting element 20 is preferably formed such that a transmitting rod 21 connects the support surface 22 and the supporting element 26 thereof. This arrangement has the advantage that – despite the above described deformations occurring during pressure equalisation – the material held in the interior of the storage device may be drained off since the transmitting rod 21 is separated from the wall element 12 by a gap. Thereby, in case of deformations characteristic of usually occurring pressure differences, the deforming wall element 12 does not reach the transmitting rod 21, i.e. it does not hinder the displacement thereof. In case a transmitting element 20 of this configuration is applied, the sealing element 36 may be removed even in case the wall element 12 becomes deformed.

Figs. 7 to 15 illustrate further embodiments – storage devices 60 and 100 – of the storage device according to the invention. By arranging the storage devices 60 and 100 in the same container, a container capable of holding three or four components, or, continuing the arrangement according to Figs. 7 to 15, a container for holding even more components may be provided. In these embodiments of the invention the storage device comprises more than one transmitting elements, a spacer element is arranged between additional sealing

elements pressed into the wall element, said spacer element being supported against a support surface of one of the neighbouring transmitting elements and against the supporting element of the other of the neighbouring transmitting elements, and at least one opening is formed in the wall element between the additional sealing elements.

Figs. 7 and 8 illustrate the storage device 60 according to an embodiment of the invention. The storage device 60 comprises a wall element 61 two transmitting elements 64 arranged in a storage tube comprising a covering element 72; said transmitting elements 64 are configured similar to the transmitting element 20 of the storage device 10 according to Fig. 1C. Accordingly, both transmitting elements 64 comprise a support surface 66, a supporting element 70, and a transmitting rod 63 connecting the support surface 66 with the supporting element 70.

It is shown in Fig. 7 that a spacer element 80 is arranged between additional sealing elements 62, 82 pressed into the wall element 61, said spacer element 80 is supported against a support surface 66 of the transmitting element 64 shown at the right side of the figure and against the supporting element 70 of the transmitting element 64 shown at the left side of the figure. Inside the storage device 60 the sealing element 62, the spacer element 80, and the sealing element 82 constitute one block. The spacer element 80 has a support surface for supporting the sealing element 82, and spacer legs for providing the required spacing, supported on the sealing element 62 next to the push member thereof. Due to such an arrangement of the spacer element the block comprising the sealing elements 62, 82 and the spacer element 80 defines a separate, additional interior space compartment within the storage device 60. In the storage device 60, in addition to that, internal space compartments 65, 85, adapted for storing the liquid components and formed in a manner similar to internal space compartment 34 shown in Fig. 1C.

In this embodiment, multiple openings 78 connecting the additional internal space to the space outside the storage device 60 are formed on the wall element 61 between the additional sealing elements 62, 82.

At the end of the wall element 61 distal to the cover plate 72 a sealing element 92 is pressed into the storage tube. The wall element 61 comprises an increased-thickness wall section 88 at the location of where the sealing element 92 is pressed-in, and has a protrusion 94 extending along the entire circumference of the outside surface of the section 88 being formed on said outside surface due to the pressing-in of the sealing element 92. Similarly to the sealing element 36, the sealing elements 62, 82, 92 also have push members and sealing mantles.

It is shown in Fig. 7 that the covering element 72 has a pass-through opening 74 wherein a sealing foil 68 is disposed. The outside surface of the end section comprising the pass-through opening 74 is fitted with a screw thread.

It is shown in Fig. 8, as a result of the pressing-in of the additional sealing elements 62, 82, respective protrusions 76, 90 are formed on the outside surface of the wall element 61. The sealing element 92, pressed into the end section of the wall element 61, is shown also in Fig. 8.

The manufacturing of the storage device 60, i.e. the pressing-in of the sealing elements 62, 82, 92, is very similar to the way of pressing-in the sealing element 36 of the embodiment shown in Fig. 1C; forming of the storage device 60 only differs in that the individual components have to be inserted into the storage tube in the right order, and that multiple pressing-in operations are required. Accordingly, the storage device 60 is produced carrying out the following steps. First, the transmitting element 64, shown at the left of the figure, is inserted into the storage tube, and then a sealing element preform is placed on the support surface of the inserted transmitting element 64, and by pressing the preform into the wall element, the sealing element 62 is obtained. Next, the spacer 80 is placed on the sealing element 62. The sealing element 82 is then formed by pushing another sealing element preform against the support surface of the spacer element 80, and pressing the sealing element preform into the inside surface of the wall element 61. Subsequently, the next transmitting element 64 is inserted in the storage tube, and, by the help of the support surface of the transmitting element 64, a sealing element 92, produced from a sealing element preform, can be pressed into the wall element portion 88.

The storage device 60 can be manufactured carrying out the above steps due to the fact that the sealing element preform has a smaller diameter than the sealing element, and thus it can be slid into the wall element 61 in a manner similar to the embodiment shown in Fig. 1C. The embodiment illustrated in Figs. 11 to 13 is made in a manner analogous to the process described above.

Figs. 9 and 10 illustrate the operation of the embodiment shown in Figs 7 and 8, that is, the manner in which the liquid is drained from the internal space compartments 65, 85 shown in Fig. 7. Before the operation is started, the space surrounding the spacer element 80 may be flushed through the openings 78. The arrangement of the storage device 60 allows that the internal space compartments 65, 85 may be emptied simultaneously. In Fig. 9, an arrow in the pass-through opening 74 indicates that the transmitting element 64 is pushed away from the covering element 72, preferably applying an actuating element. For assembling the storage device 60 it is required that the two transmitting elements 64, the additional sealing elements 62, 82, and the spacer element 80 are supported against one another, i.e. they are touching one another and are constricted together in the storage device 60. Accordingly, as the transmitting element 64 shown in the left in the drawing is displaced to the left, the block consisting of the additional sealing elements 62, 82 and the spacer element 80 is also displaced together with the left side transmitting element 64. The sealing element 92 is thereby pushed out from the storage tube by the support surface 66 of the left side transmitting element 64. Then, the internal space compartments 65, 85 can be flushed entirely through the openings 78 by e.g. shaking the container holding the storage device 60.

As it is shown in Fig. 9, the additional sealing elements 62, 82 are displaced but preferably do not leave the storage tube. In Figs. 9 and 10, the arrows pointing away from the openings 78 indicate that, as a result of the displacement of the sealing element 62, the liquid held inside the internal space compartment 65 shown in Fig. 7 is able to leave the storage tube through the openings 78, and thus it is drained into the space surrounding the storage device 60. The liquid held in the internal space 85 of Fig. 7 leave the storage tube at the end of the storage tube that has been freed up by removing the sealing element 92 (as illustrated by

arrows in Fig. 7). It is shown in Figs. 9 and 10 that due to the displacement of the sealing elements 62, 82, 92 the wall element 61 is expanded along portions 96, 98.

Figs. 11, 12 and 13, respectively, show sectional, exploded, and spatial views of a yet further embodiment of the invention i.e. a storage device 100. The configuration of the storage device 100 is very similar to the storage device 60, but there are three separate internal space parts 105 inside the storage device 100. The storage tube of the storage device 100 comprises a wall element 101 and a covering element 123. Three transmitting elements 108 are arranged in the storage device 100. The transmitting elements 108 have respective support surfaces 110 and supporting elements 107. Additional sealing elements 102, 106, as well as a sealing element 112 are disposed in the storage tube of the storage device 100. The spacer elements 104, operating in a manner analogous to spacer elements 80, are disposed between the additional sealing elements 102, 106. The spacer elements 104 have support surfaces, but their spacer legs are supported on the push member of the additional sealing elements 102. Fig. 11 shows a transmitting piece connected to the screw thread of the end section of the pass-through opening, by which the storage device 100 is connected to the container portion 112. An actuating element 118, adapted for rupturing the sealing foil of the pass-through opening, and for displacing the transmitting element 108 shown in the left of the drawing – and, thus, also for displacing the other transmitting elements 108 together with the additional sealing elements 102, 106 and the spacer elements –, is arranged in the transmitting piece. In a fashion similar to how the storage device 60 is configured, openings 109 are disposed along the block constituted by the additional sealing elements 102, 106 and the spacer elements, such that the internal space compartments 105 can be emptied by putting in operation the actuating element 118. The internal space compartment 105 adjacent the sealing element 112 can be emptied through an opening formed by removing the sealing element 112.

Specific details of the arrangement of the storage device 100 are illustrated in Figs. 12, 13. As a result of the pressing-in of the sealing elements 102, 106, 112,

protrusions 114, 116 are formed on the outside surface of the wall element 101. Fig. 12 also shows the structure of the transmitting elements 108.

Figs. 14, 15 illustrate the drainage process of the internal space compartments 105 shown in Fig. 11. The internal space parts 105 can be emptied by putting in operation the actuating element 118. As the actuating element 118 is pressed in, the transmitting elements 108 are displaced, and the end of the storage tube proximate the sealing element 112, as well as the openings 109, are freed up. As a result of the displacement of the sealing elements 102, 106, 112 the wall element 101 is expanded along portions 124, 126.

In the embodiments presented in Figs. 7 to 15 the internal space compartments of the storage devices 60, 100 are preferably filled with so-called dilute-flowing materials, i.e. materials which are diluted enough to allow them to be drained off from the internal space compartments applying the actuating element. However, the internal space compartment 105 sealed by sealing elements 85, 112 may contain a material of higher viscosity.

To make the wall element durable enough, the maximum diameter of the openings 78, 109 may expediently be half the applied displacement value.

The invention is, of course, not limited to the preferred embodiments described in details above, but further variants, modifications and developments are possible within the scope of protection determined by the claims.

CLAIMS

1. A storage device for storing a liquid, and particularly for arrangement in a container comprising a liquid and/or a gas, said storage device comprising
   - a storage tube having a cylindrical wall element (12, 61, 101) and a covering element (28, 72, 123) sealing one end of the wall element (12, 61, 101),
   - a sealing element (36, 92, 112) sealing the other end of the wall element (12, 61, 101), and
   - a transmitting element (20, 64, 108) arranged in the storage tube,

   characterised in that
   - the storage tube and the sealing element (36, 92, 112) are made of metal,
   - the transmitting element (20, 64, 108) is supported inside the storage tube, and, at the end of the transmitting element (20, 64, 108) being at the sealing element (36, 92, 112), has a support surface (22, 66, 110) supporting the sealing element (36, 92, 112), and said support surface (22, 66, 110) is arranged transversely to an axis of symmetry of the wall element (12, 61, 101), and
   - the sealing element (36, 92, 112) is disc-shaped, and is pressed along its whole circumference in a liquid- and gas-tight manner into the inside surface of the wall element (12, 61, 101).

2. The storage device according to claim 1, characterised in that the transmitting element (20, 64, 108) comprises a supporting element (26, 70, 107) supported by the covering element (28, 72, 123), and a transmitting rod (21, 63, 103) connecting the supporting element (26, 70, 107) with the support surface (22, 66, 110).

3. The storage device according to claim 1 or claim 2, characterised in that the wall element (12, 61, 101) comprises a first wall element portion (16) being of a first thickness and a second wall element portion (14, 88) being of a second thickness and arranged at the end of the wall element (12, 61, 101) being at the sealing element (36, 92, 112), wherein the second thickness is

larger than the first thickness, and the sealing element (36, 92, 112) is pressed into the second wall element portion (14, 88).

4. The storage device according to claim 3, characterised in that the second thickness is equal to 1.5-10 times, preferably 2-5 times the first thickness.

5. The storage device according to claim 3, characterised in that the first thickness is between 0.05 mm and 0.2 mm, preferably between 0.08 mm and 0.12 mm, and is particularly preferably 0.1 mm.

6. The storage device according to any of claims 1 to 5, characterised in that the wall element (12, 61, 101) is manufactured by cold flow.

7. The storage device according to any of claims 1 to 6, characterised in that the wall element (12, 61, 101) and/or the sealing element (36, 92, 112) are made of aluminium, copper, or zinc.

8. The storage device according to any of claims 1 to 7, characterised by comprising a push member (35) arranged about the centre of the sealing element (36, 92, 112), and a sealing mantle (37) arranged concentrically about the push member (35) and being of a thickness smaller than the thickness of the push member (35).

9. The storage device according to any of claims 1 to 8, characterised in that a pass-through opening (24, 68) sealed by a sealing foil (30, 74) is formed in the covering element (28, 72, 123), and an actuating element (48, 118) adapted for piercing through the sealing foil (30, 74) and removing the sealing element (36, 92, 112) through actuation of the transmitting element (20, 64, 108) is positioned in the pass-through opening (24, 68).

10. The storage device according to any of claims 1 to 9, characterised in that
    - it comprises more than one transmitting element (64, 108),
    - a spacer element (80, 104) is arranged between additional sealing elements (62, 82, 106) being pressed into the wall element (61, 101), said spacer element (80, 104) being supported against a support surface (66, 110) of one of the neighbouring transmitting elements (64,

108) and against the supporting element (70, 105) of the other of the neighbouring transmitting elements (64, 108), and

- at least one opening (78, 109) is formed in the wall element (61, 101) between the additional sealing elements (62, 82, 106).

11. A container for storing liquid and/or gas, characterised in that a storage device (10) according to any of claims 1 to 10 is arranged in an inner space of the container (52, 56).

12. The container according to claim 11, characterised by comprising a dispenser unit (58) adapted for dispensing the liquid and/or gas, and the storage device is connected to the dispenser unit (58) or to a wall of the container, preferably to a bottom portion (54) of the wall of the container (52).

13. The container according to claim 11 or 12, characterised in that a storage device according to claim 9 is arranged in the container, and that the actuating element (48, 118) is operable from outside of the container (52, 56).

14. A method for manufacturing a storage device sealed in a liquid- and gas-tight manner, comprising the steps of

- placing a transmitting element (20, 64, 108) into a storage tube having a cylindrical wall element (12, 61, 101) and a covering element (28, 72, 123) sealing one end of the wall element (12, 61, 101),
- providing an other end of the wall element (12, 61, 101) with a sealing element (36, 92, 112),

c h a r a c t e r i s e d by

- applying a storage tube and a sealing element (36, 92, 112) made of metal,
- supporting the transmitting element (20, 64, 108) inside the storage tube, said transmitting element (20, 64, 108), at the end of the transmitting element (20, 64, 108) being at the sealing element (36, 92, 112), has a support surface (22, 66, 110) supporting the sealing element (36, 92, 112), and said support surface (22, 66, 110) is arranged

transversely to an axis of symmetry of the wall element (12, 61, 101), and

- pushing, applying a force parallel with the axis of symmetry of the wall element (12, 61, 101), a conical sealing element preform (18) against the support surface (22, 66, 110), thereby deforming the sealing element preform (18) into a disc-shaped sealing element (36, 92, 112), which is pressed along its whole circumference in a liquid- and gas-tight manner into the inside surface of the wall element (12, 61, 101).

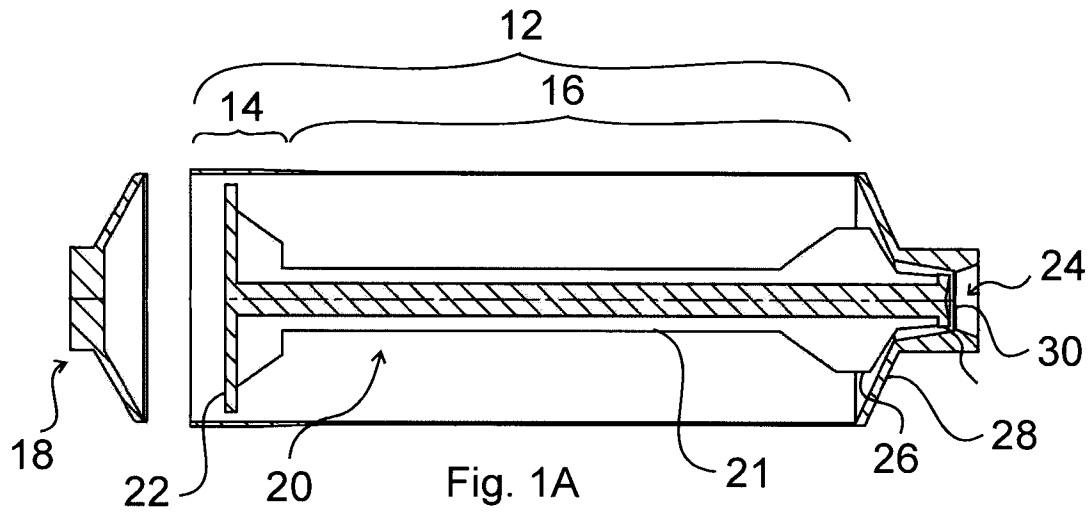

Fig. 1A

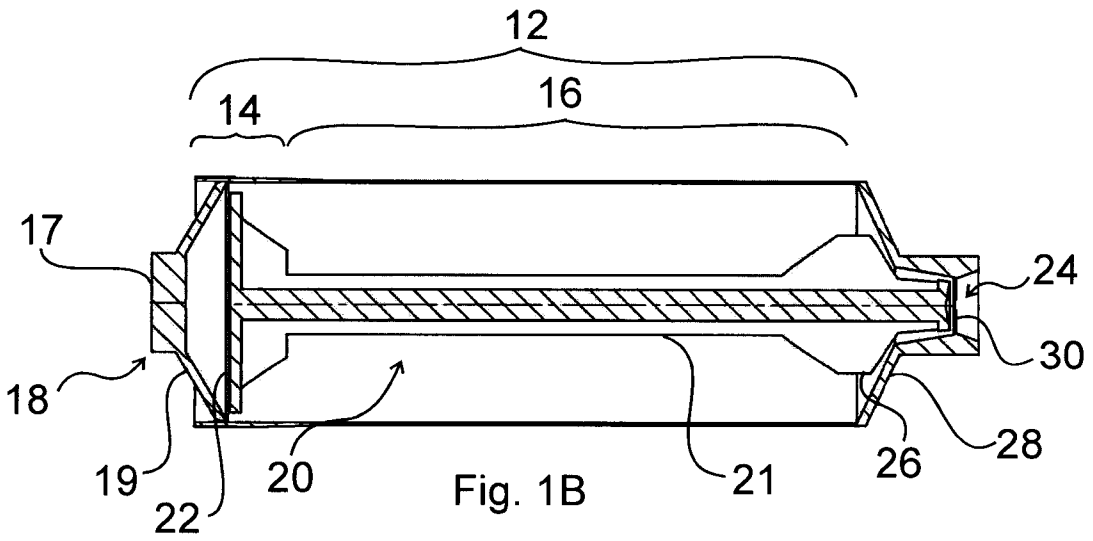

Fig. 1B

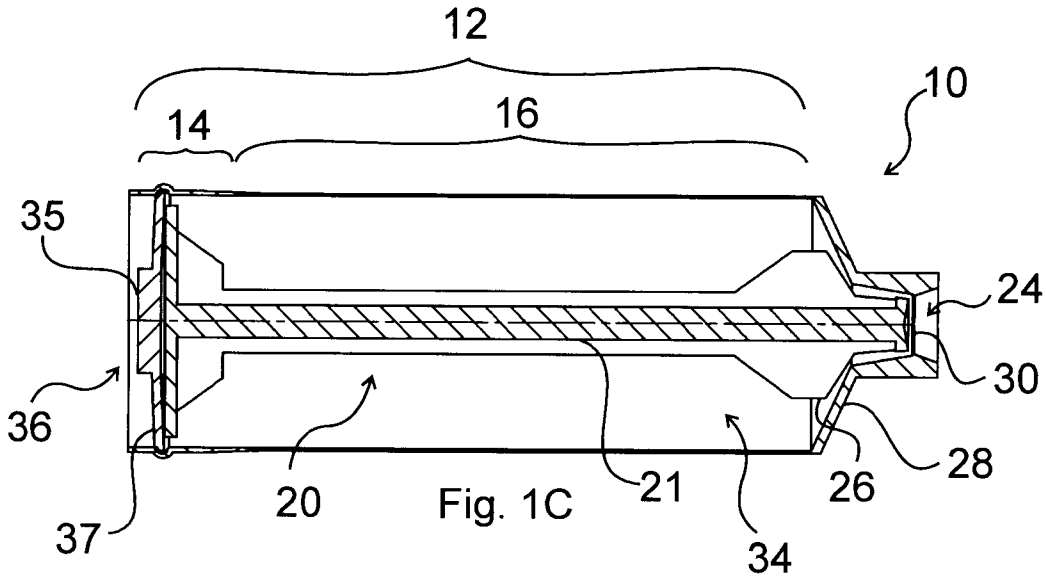

Fig. 1C

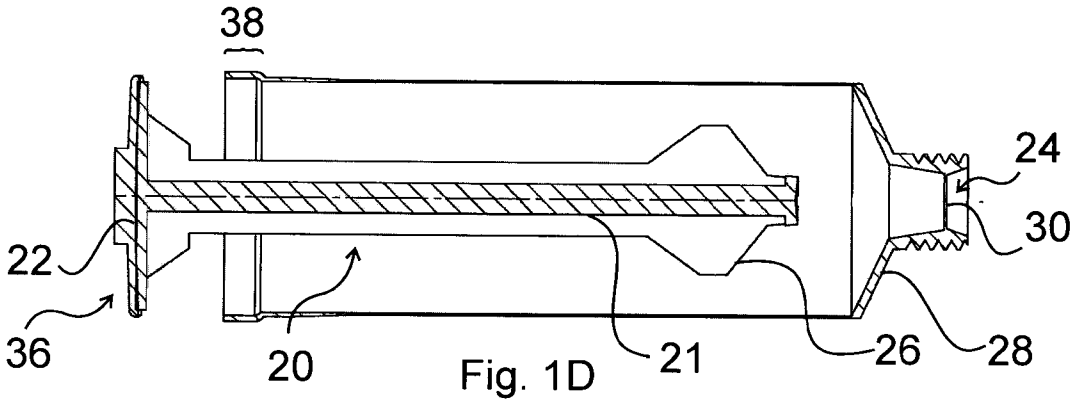

Fig. 1D

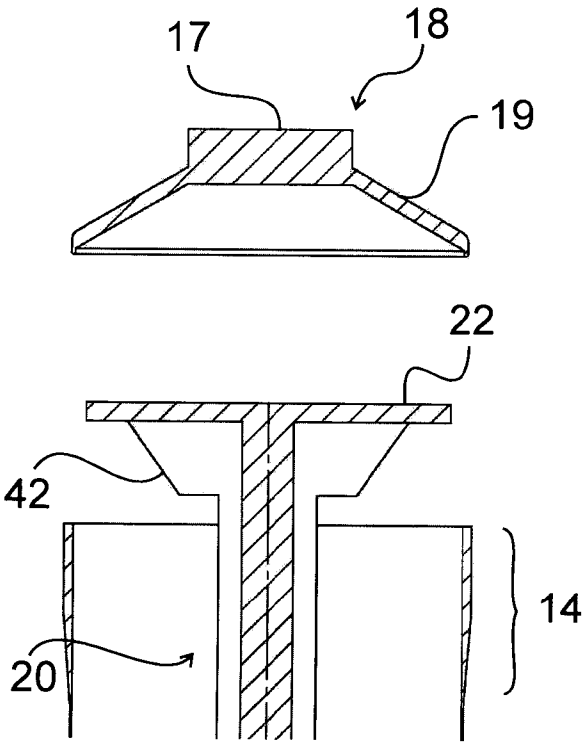

Fig. 2

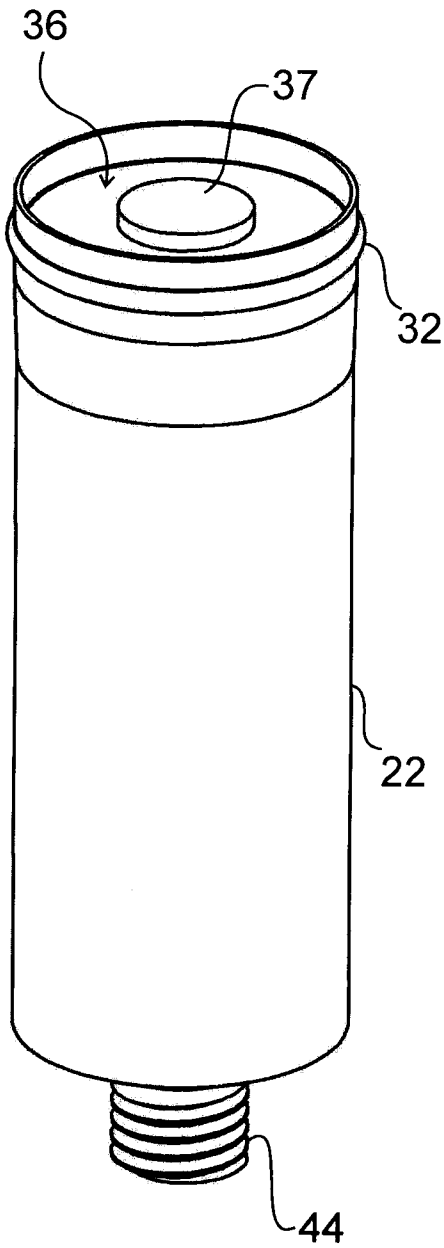

Fig. 4

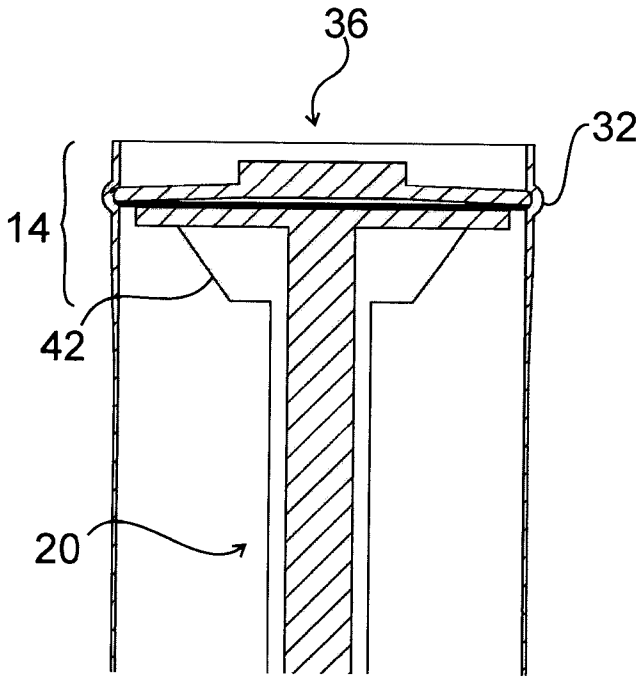

Fig. 3

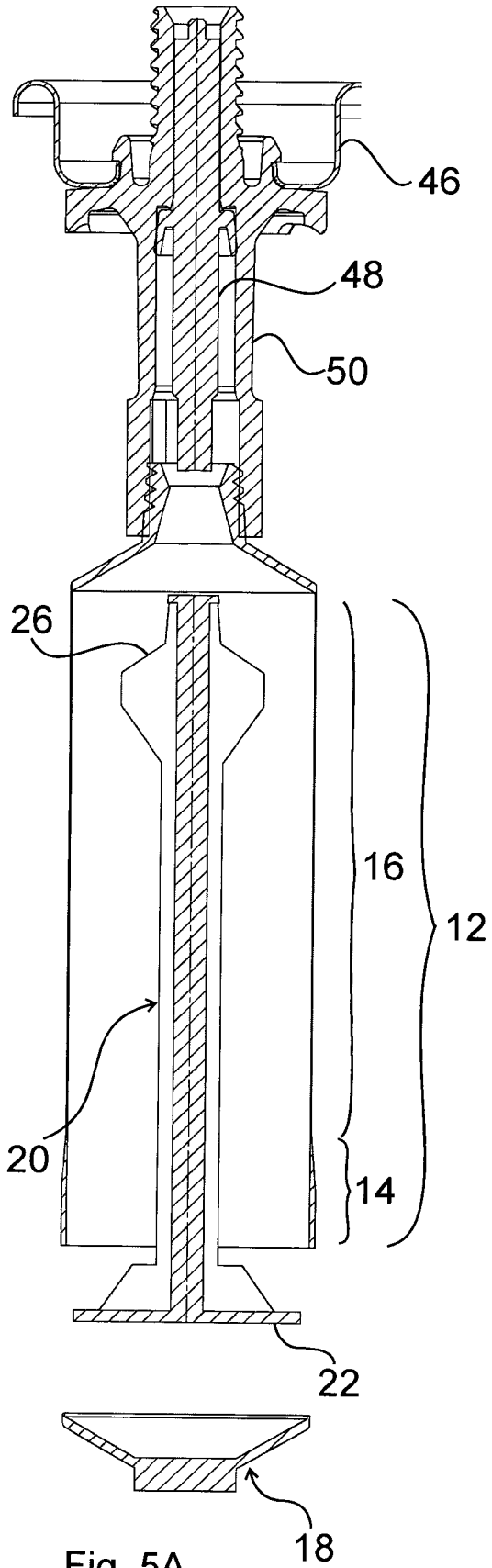

Fig. 5A

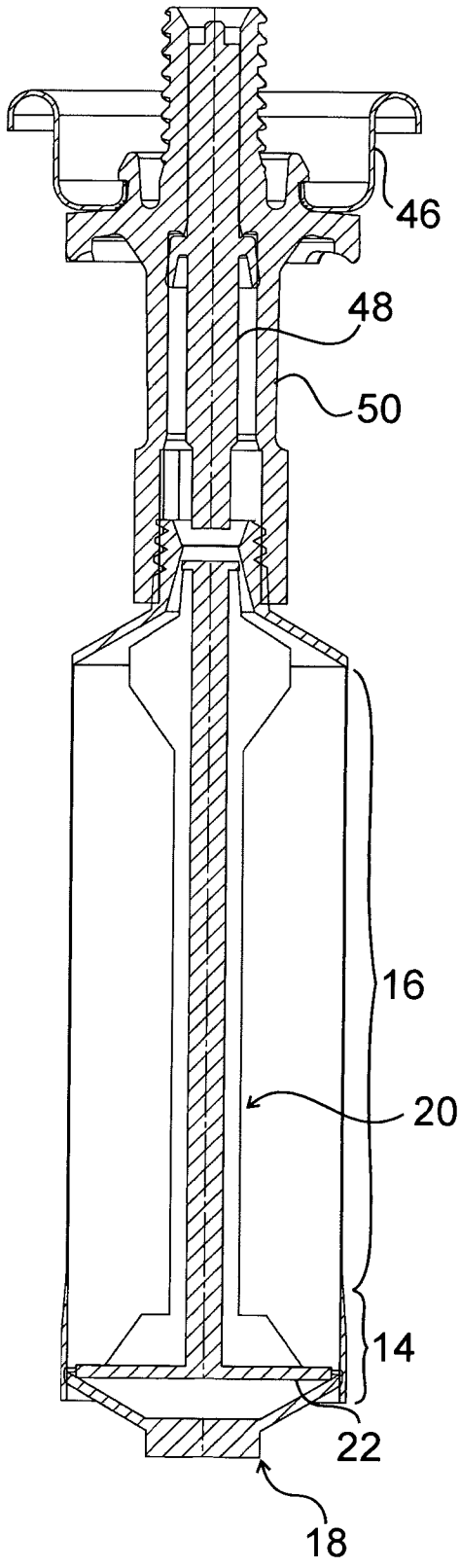

Fig. 5B

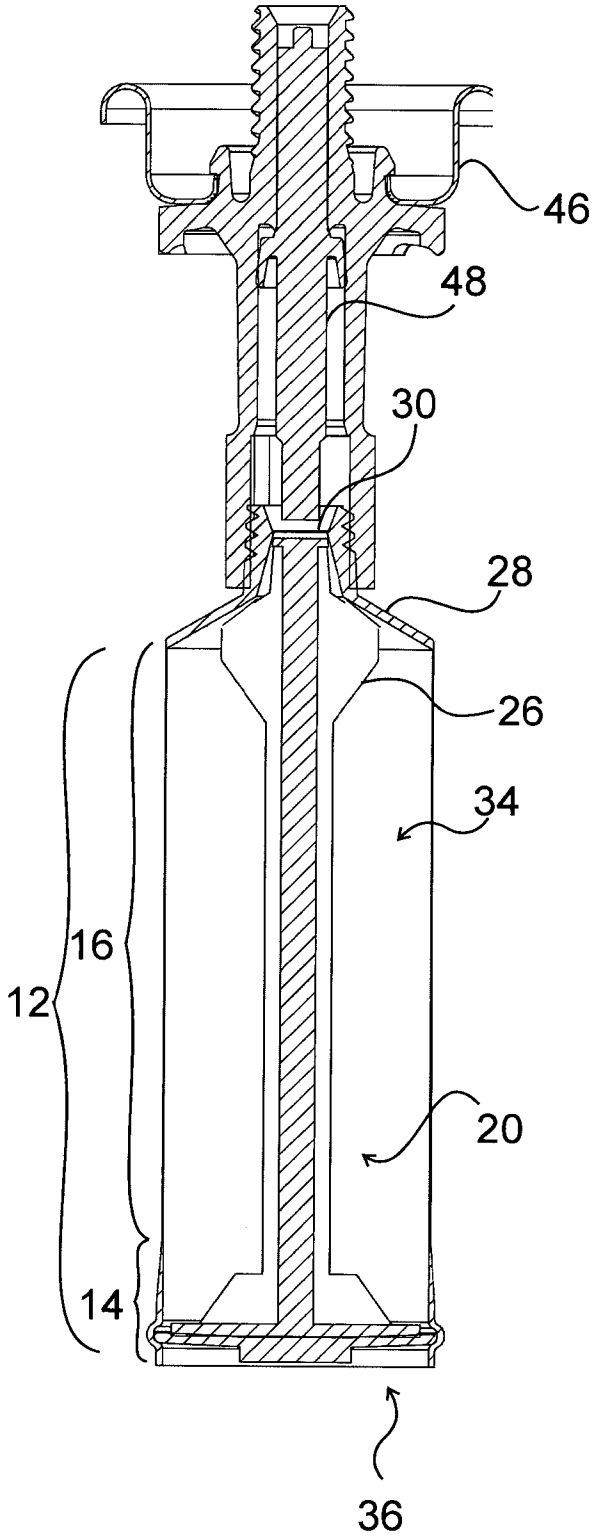

Fig. 5C

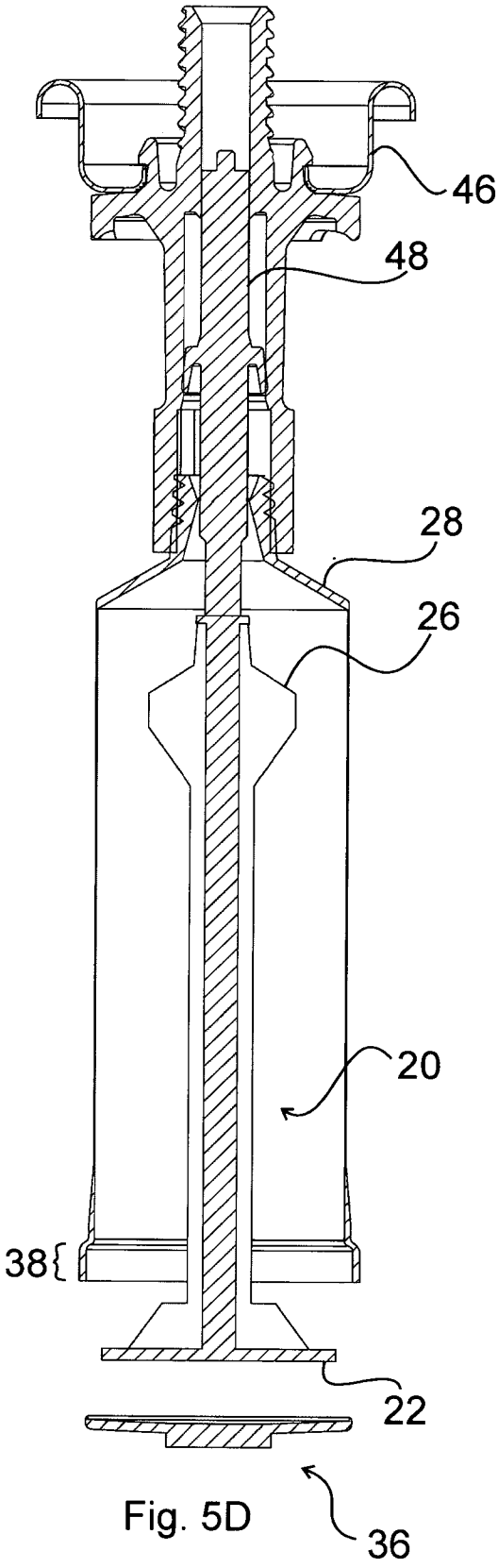

Fig. 5D

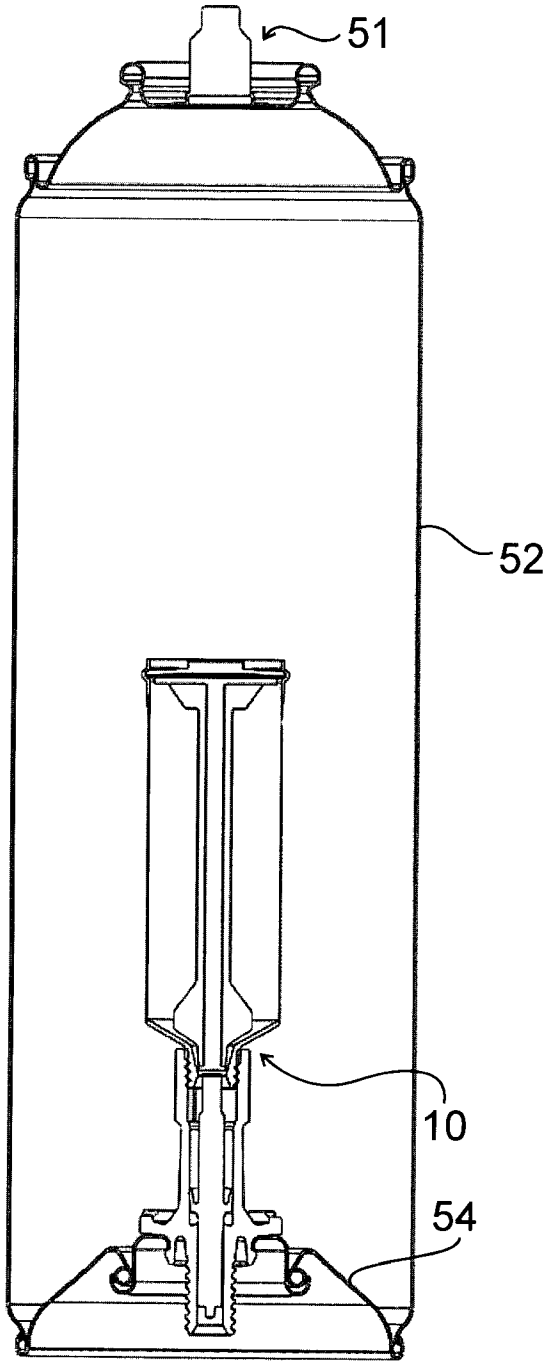

Fig. 6

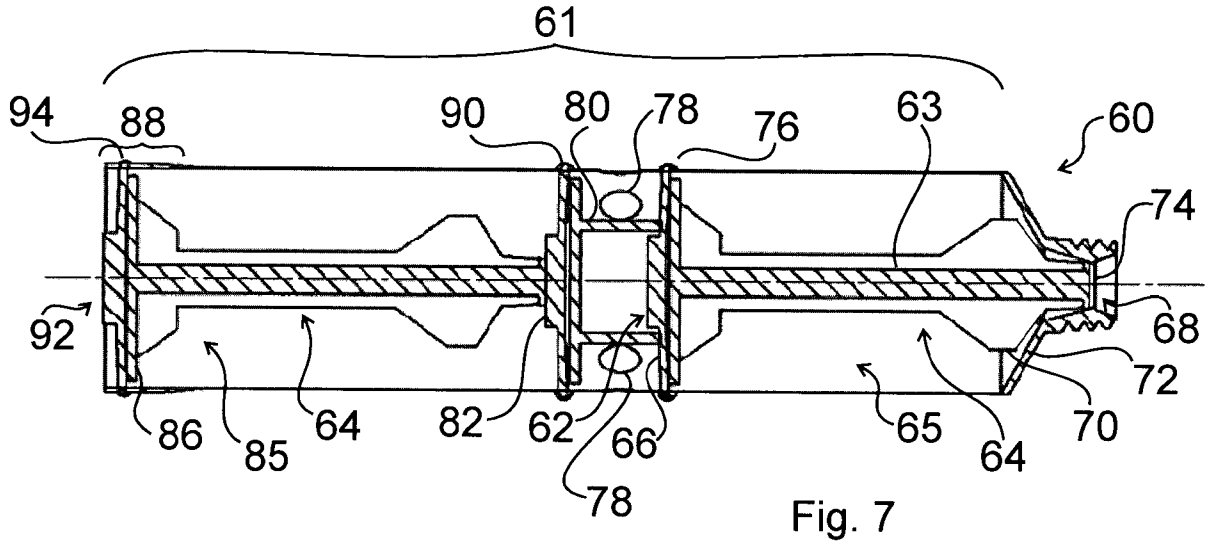

Fig. 7

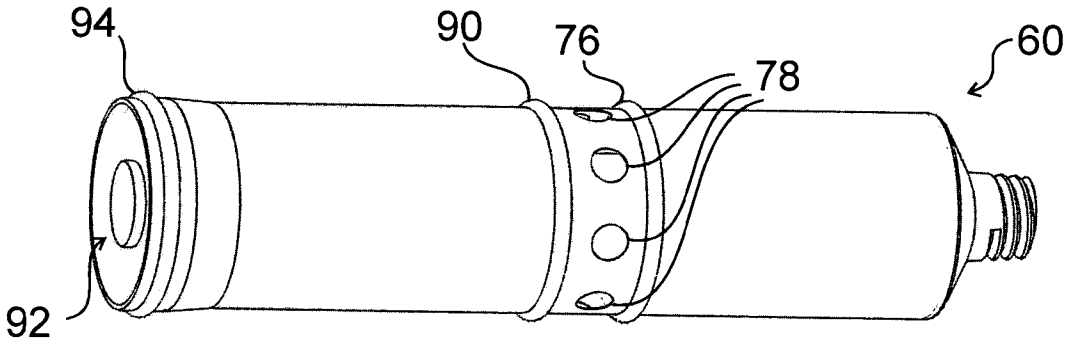

Fig. 8

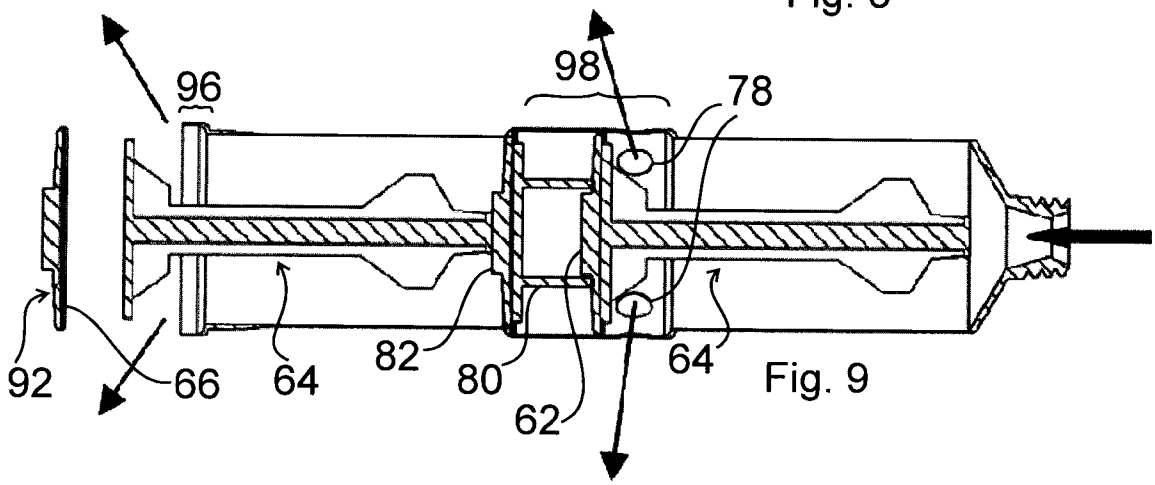

Fig. 9

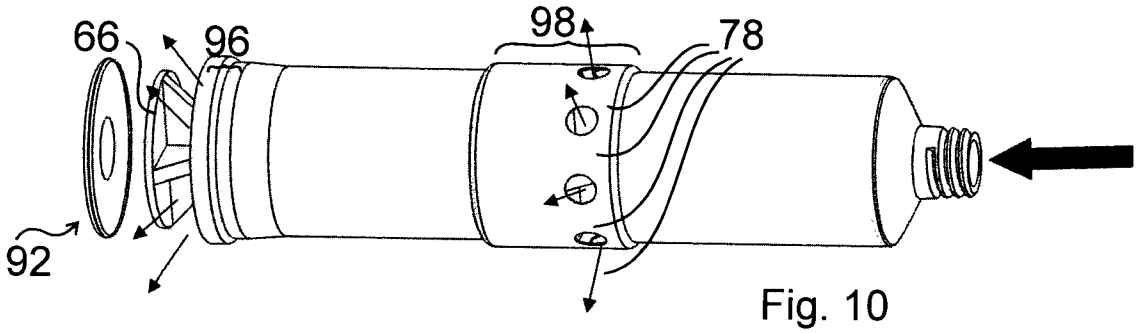

Fig. 10

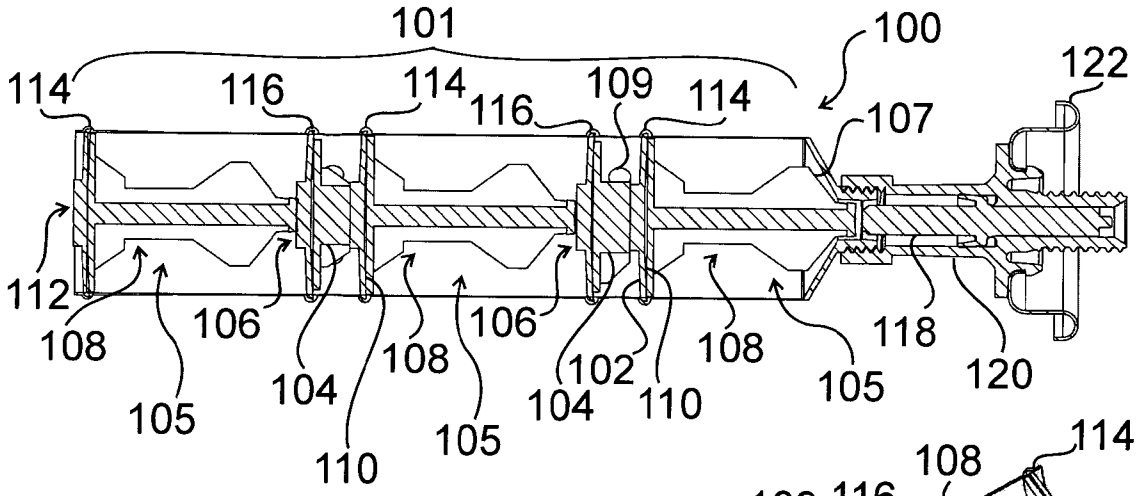

Fig. 11

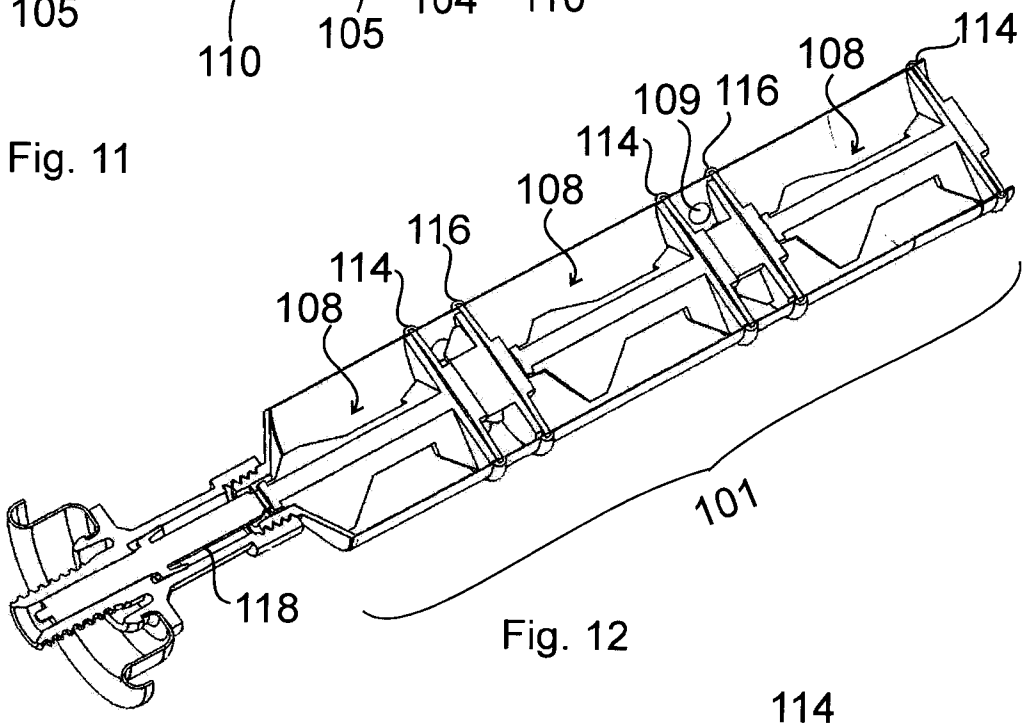

Fig. 12

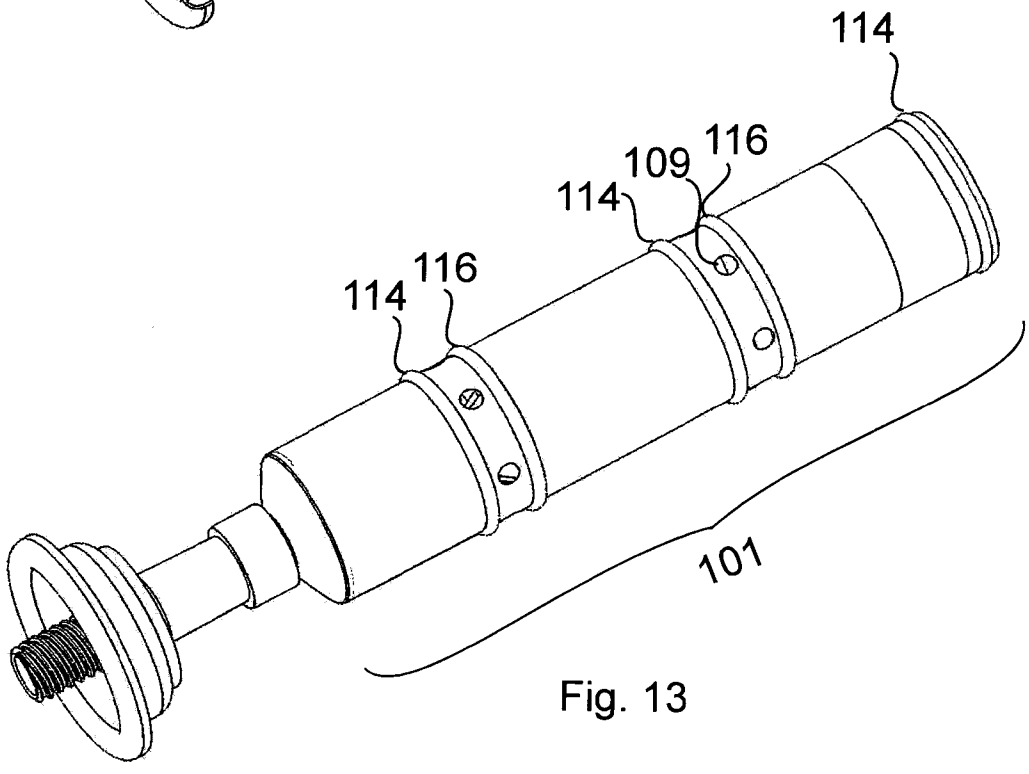

Fig. 13

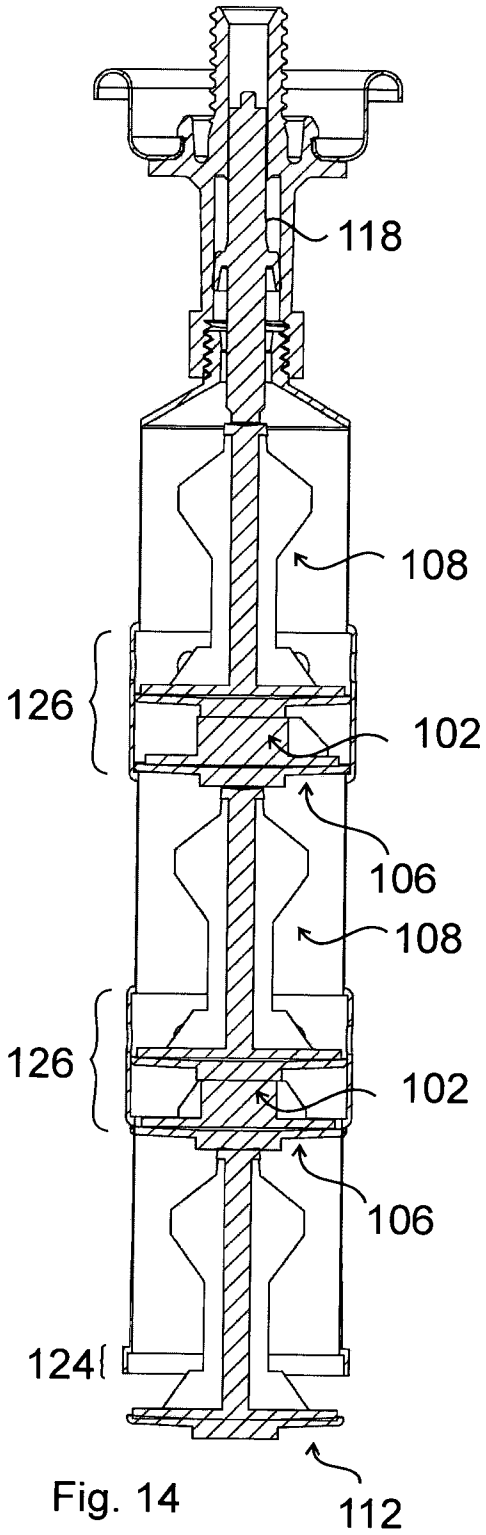

Fig. 14

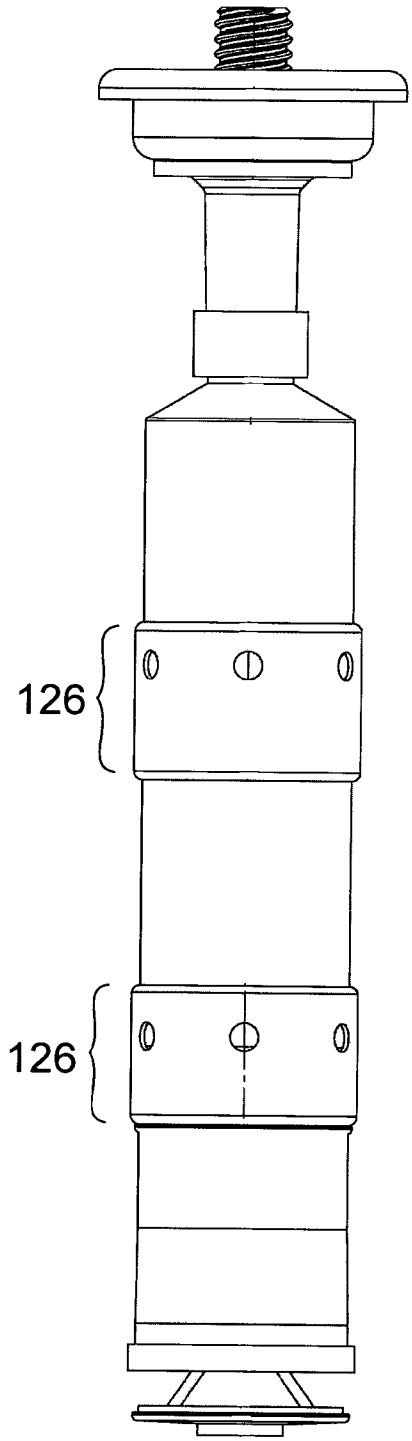

Fig. 15

INTERNATIONAL SEARCH REPORT

International application No
PCT/HU2014/000056

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D83/68
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2007/122001 A1 (FAZEKAS GABOR [HU]; WERNER HANS JUERGEN [DE]; RIDEG MIHALY [HU]) 1 November 2007 (2007-11-01) page 12, line 14 - page 18, line 6; figures	1-14
A	EP 1 188 690 A1 (MORCK ROUVEN [DE]) 20 March 2002 (2002-03-20) paragraph [0031] - paragraph [0048]; figures	1-14
A	DE 297 04 521 U1 (COCON ARKEL B V [NL]) 9 July 1998 (1998-07-09) page 5, line 11 - page 7, line 4; figures	1-14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 March 2015	20/03/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Krysta, Dieter

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/HU2014/000056

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007122001 A1	01-11-2007	AT 533704 T	15-12-2011
		DE 102006056280 A1	31-10-2007
		EP 2013115 A1	14-01-2009
		WO 2007122001 A1	01-11-2007
EP 1188690 A1	20-03-2002	AT 264796 T	15-05-2004
		CA 2357262 A1	15-03-2002
		DE 50006163 D1	27-05-2004
		EP 1188690 A1	20-03-2002
		US 2002088724 A1	11-07-2002
DE 29704521 U1	09-07-1998	NONE	