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(71) Applicant: **L'OREAL** [FR/FR]; 14, rue Royale, 75008 Paris (FR).

(72) Inventor; and

(71) Applicant *(for AL only)*: **KIM, Jin Seok** [KR/CN]; c/o L'Oréal, No. 550 JinYu Rd., Pudong New Area, Shanghai 210206 (CN).

(72) Inventors: **JACQUART, Vincent**; c/o L'Oréal, Export Processing Zone, Pudong, Shanghai 210206 (CN). **LEROUX, Stéphane**; c/o L'Oréal, Export Processing Zone, Pudong, Shanghai 210206 (CN).

(74) Agent: **KANGXIN PARTNERS, P.C.**; Floor 16, Tower A, InDo Building, A48 Zhichun Road, Haidian, Beijing 100098 (CN).

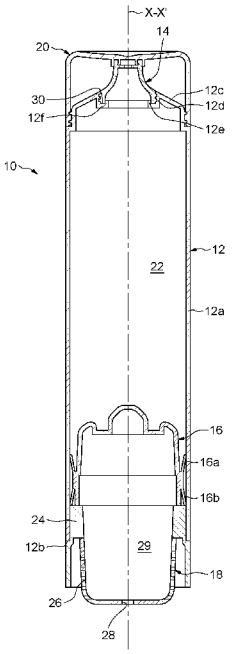
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(54) **Title:** DEVICE FOR PACKAGING AND DISPENSING A PRODUCT COMPRISING A MOVEABLE PISTON

FIG.1



(57) **Abstract:** The device for packaging and dispensing a product comprises a container (12), a moveable piston (16) mounted inside the container and delimiting at least one compartment (22) containing the product, and a dispensing member (14) mounted on the container and comprising at least one outlet orifice in communication with the compartment. The container comprises an adapter portion for the dispensing member provided with an outer skirt (12d) extending from an end wall (12c) of the container, with an inner skirt (12e) radially surrounded at least in part by the outer skirt and with a wall (12f) connecting the outer and inner skirts, the wall and the skirts delimiting a groove (30) oriented axially on the side opposite to the compartment (22) and inside which the dispensing member (14) is fitted.

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Device for packaging and dispensing a product comprising a moveable piston

The present invention relates to the general field of devices for packaging and dispensing a liquid, a semi-liquid or a pasty product.

More particularly, the present invention relates to a device comprising a container and a moveable piston disposed inside said container and delimiting at least one compartment inside which is housed the product to be dispensed.

According to a first known design, the container is divided into first and second compartments by the movable piston. The product to be dispensed is contained within one of the compartments, while the other compartment is filled with a gas under pressure.

With such a design, when the dispensing member such as a valve is open, the gas under pressure moves the piston against the product to be dispensed and causes said product to be discharged through an outlet orifice of the dispensing member. For example, such device is disclosed in patent US 4, 078, 359.

According to a second known design, the device comprises an air pump which is mounted on the container at the side opposite to the dispensing member and provided with an air inlet. When the user recovers the air inlet and presses the air pump, this produces a displacement of the piston against the product to be dispensed. For more details, it is possible for example to refer to the patent US 8, 403, 182.

The filling operation of the container of such devices can be either a back filling operation or a top filling operation.

In a back filling operation, the device is disposed in an inverted orientation with the dispensing member located below the container. A predetermined quantity of product to be dispensed is discharged into the container through an open end of said container. Then, the piston is pushed into the container through said open end

until it engages the product. Such a mounting of the piston generally leads to pressurisation problems of the product.

This drawback is overcome by a top filling operation wherein the piston is firstly placed within the container and then the product is discharged into the container. Once the predetermined quantity of product has been discharged, the top end of the container is closed by a wall and the dispensing member is mounted on such closing wall, for example by crimping.

However, with respect to a back filling operation, a top filling operation requires an additional assembly step and also an additional part for closing off the container. This leads to a reduction in production rates.

It is a particular object of the present invention to provide a device having a moveable piston whose manufacture and mounting are easily carried out at a lesser cost.

Another object of the present invention is to provide a device having good sealing properties between the dispensing member and the container.

The invention relates to a device for packaging and dispensing a product comprising a container, a moveable piston mounted inside the container and delimiting at least one compartment containing the product, and a dispensing member mounted on the container and comprising at least one outlet orifice in communication with the compartment.

According to a first general feature, the container comprises an adapter portion for the dispensing member. Such adapter portion is provided with an outer skirt extending from an end wall of said container, with an inner skirt radially surrounded at least in part by said outer skirt, and with a wall connecting the outer and inner skirts.

According to a second general feature, the inner and outer skirts delimit together with the connecting wall a groove oriented axially on the side opposite to said compartment. The dispensing member is fitted inside said groove.

With the specific design of the container, the mounting of the dispensing member can be easily achieved in one single step. The provision of the groove on the container reduces manufacturing time and costs. Otherwise, with the groove delimited by the inner and outer axial skirts and the connecting wall, the dispensing member is mounted on the container in a leaktight manner. A possible leakage of product between the dispensing member and the container is prevented.

In one embodiment, the groove may be in cross-section a U-shape.

Preferably, at least one retaining element is provided on the outer skirt, or on the inner skirt, of the adapter portion of the container and cooperates with at least one retaining element of complementary shape of the dispensing member for axially retaining said dispensing member on said container. The device may be transported and handled with complete safety without any risk of loss of the dispensing member.

Alternatively, it could however be possible, instead of retaining elements, to provide a radial press-fitting the between dispensing member and at least one of the outer and inner skirts of the container.

In one embodiment, the outer or inner skirt of the adapter portion comprises at least one annular recess and the dispensing member comprises at least one annular clipping rib engaging into said recess. Alternatively, it could be possible to provide an inverted arrangement with said at least one annular recess provided on the dispensing member and said at least one annular clipping rib provided on the inner or outer skirt of the adapter portion.

Accordingly, the mounting of the dispensing member into the groove can be achieved with a simple axial pushing movement.

In another embodiment, the inner or outer skirt of the adapter portion may comprise at least one annular screw groove and the dispensing member may comprise a screw thread engaging into said

screw groove. In another variant, it is also possible to provide an inverted arrangement.

Here, the mounting of the dispensing member is obtained by screwing instead of snap-fitting.

Preferably, the outer skirt of the adapter portion extends from the end wall of the container axially inside the compartment. Such a design promotes the axial compactness of the container. Besides, the container is easier to manufacture.

In order to facilitate the production of the device, at least the end wall and the adapter portion of the container may be made in one part. This further reduces manufacturing time and costs since the number of parts as well as the assembly steps are limited.

The dispensing member may comprise a sealing lip engaging into the inner skirt of the container in a leaktight manner.

In one embodiment, the device further comprises a cap mounted on the container for closing off the outlet orifice of the dispensing member.

Advantageously, the cap comprises an inner sealing skirt engaging into the outlet orifice. This prevents leakage of product between the dispensing member and the cap. To this end, the cap may also comprise an outer sealing skirt radially coming into contact with an outer surface of the dispensing member.

In order to secure the cap on the dispensing member, the inner sealing skirt may comprise at least one hook extending radially and engaging into a groove formed on the dispensing member. Alternatively or in combination, the outer sealing skirt may also comprise such hook(s).

Otherwise, the device may comprise an actuating member for delivering the product through the outlet orifice of the dispensing member in response to an actuating command.

Preferably, the actuating member comprises an air pump mounted on the container axially on the side opposite to the dispensing member. Said air pump and the piston axially delimit a

chamber which is separate from the compartment and which is in communication with the outside.

Alternatively, it is also possible to mount the actuating member on the dispensing member. In another variant, the actuating member may be formed by said dispensing member. In such cases, the piston delimits inside the container an additional compartment separate from the compartment containing the product to be dispensed, said additional compartment containing a propellant gas capable of pressurizing said product via said piston.

The present invention and its advantages will be better understood by studying the detailed description of specific embodiments given by way of a non-limiting examples and illustrated by the appended drawings on which:

- Figure 1 is a cross-section of a device according to a first example of the invention,
- Figure 2 is a detail view of Figure 1,
- Figure 3 is a detail view of a container of the device of Figure 1,
- Figure 4 is an exploded view of the device of Figure 1,
- Figure 5 is a detail view of a device according to a second example of the invention, and
- Figure 6 is a detail view of a device according to a third example of the invention.

Figure 1 shows an example of a device, denoted by the general reference number 10, for packaging and dispensing a product (not shown) for example a liquid, a semi-liquid or a pasty cosmetic product. The device 10 may also be used for packaging other types of products.

Figure 1 represents the device 10 in a state that is assumed to be vertical. The device 10 has a longitudinal axis X-X'. The device 10 comprises a container 12, a dispensing plug 14 mounted on the container, a movable piston 16 mounted inside the container, and an air pump 18 axially mounted on said container on the side opposite to the dispensing plug 14 with respect to the piston 18. The device 10

further comprises a closure cap 20 mounted on the container 12 for closing off the dispensing plug 14.

As will be described later, the structure of the container 12 is adapted for receiving the dispensing plug 14 in a leaktight manner.

The piston 16 is mounted axially slidably into the container 12 along the axis X-X'. The piston 16 delimits inside the container a compartment 22 containing the product to be dispensed under pressure. The compartment 22 which contains the product is in communication with the dispensing plug 14.

The piston 16 bears against the inner surface of a peripheral wall 12a of the container. To this end, in the illustrated example, the piston 16 comprises two friction sealing lips 16a, 16b coming into friction contact the peripheral wall 12a of the container. The lips 16a, 16b extend in opposite direction. The lip 16a, which extends axially on the side of the dispensing plug 14, acts as a scraper lip during an upward movement of the piston 16. The lip 16b, which extends axially on the side of the air pump 18, is adapted to prevent any inlet of air into the compartment 22 through said air pump. The piston 16 fits inside the container 12 in a leaktight manner while maintaining its freedom to slide.

In the illustrated example, the profile of the piston 16 is chosen appropriately so as to optimize the degree to which the container 12 is emptied. For example, the upper end of piston 16 is contoured to complement the upper end of the container 12 so as to minimize the volume of the compartment 22 when the piston 16 is located at its uppermost position, adjacent to the dispensing plug 14. Alternatively, the piston 16 may have a different shape, for example cylindrical.

The container 12 extends along the axis X-X'. The container 12 comprises a bottom end 12b delimiting an opening which is closed by the air pump 18, an upper end wall 12c axially opposite to the bottom end 12b, and the peripheral wall 12a extending axially between said bottom end and upper end wall. The compartment 22 is

axially delimited by the piston 16 and the end wall 12c of the container.

The air pump 18 comprising a mounting part 24 secured to the bottom end 12b of the container, and a push-button 26 connected to said mounting part for delivering a dose of product in response to an actuating command. The push-button 26 is provided with a through-opening providing an air inlet orifice 28. The push-button 26 delimits together with the piston 16 a chamber 29 in communication with the outside. The chamber 29 is separate from the compartment 22 by the piston 16. The chamber 29 may be delimited by the push-button 26, the piston 16 and also the container 12 depending on the position of said piston. When no pressure is exerted on the push-button 26, the chamber 29 is substantially at atmospheric pressure.

Once the cap 20 has been removed, to distribute the product contained into the chamber 22 the user recovers the inlet orifice 28 with one finger and exerts an axial pressure inwards on the push-button 26. This produces an increase of the pressure within the chamber 29, thereby moving the piston 16 against the product to be dispensed. Accordingly, the product is discharged through the dispensing plug 14. In the disclosed example, the push-button 26 is made in a resilient material, such as rubber, to be elastically deformable. Alternatively, the push-button 26 may be provided with an elastic element, such as a spring, in order to be able to return to its initial position when the pressure exerted by the user ceases.

As shown more clearly on Figures 2 and 3, the container 12 also comprises an annular outer skirt 12d extending from the end wall 12c axially inside the compartment 22, an annular inner skirt 12e and a wall 12f connecting said outer and inner skirts. The skirts 12d, 12e and the wall 12f delimit a groove 30 oriented axially on the side opposite to the compartment 22. The groove 30 is oriented axially outwards. Here, the groove 30 has in cross-section a U-shape. The dispensing plug 14 is fitted into the groove 30. The skirts 12d, 12e and the wall 12f form an adapter portion for the mounting of the dispensing plug 14 on the container. The container 12 is made in one

part. For example the container 12 may be made from moulding of plastic material. Alternatively, the container 12 may be made in metallic material.

The outer skirt 12d of the container extends axially inside the compartment 22 and radially surrounds the inner skirt 12e. The wall 12f extends from a lower end of the outer skirt 12d. The wall 12f extends radially. The wall 12f is extended at a small-diameter edge by the inner skirt 12e. The inner skirt 12e extends axially on the side opposite to the compartment 22. The inner skirt 12e delimits on opening 31 in communication with the compartment 22. The outer and inner skirts 12d, 12e are coaxial with the axis 12a.

The dispensing plug 14 projects into and sealingly engages the groove 30 of the container. This prevents leakage of product contained inside the compartment 22. The plug 14 is in radial contact against the inner skirt 12e on one side and in radial contact with the outer skirt 12f on the other side. In the disclosed example, the groove 30 has an annular form. Alternatively, it could be possible to foresee a groove with a different shape, for example a square or a rectangular one, according to the shape of the dispensing plug 14.

In the illustrated example, annular recesses 32 are formed on the inner surface of the outer skirt 12d of the container into which engage complementary annular clipping ribs 34 of the dispensing plug in order to secure said plug on the container by snap-fitting. The recesses 32 form retaining elements cooperating with complementary axial retaining elements formed by ribs 34 to fix the plug 14 to the container. In the illustrated example, the outer skirt 12d of the container is provided with two recesses 32. Alternatively, the outer skirt 12d may comprise a single recess or more than two recesses. In another variant, it could also be possible to foresee on the outer skirt 12d an annular screw groove into which a screw thread of the dispensing plug.

The dispensing plug 14, coaxial with the axis X-X', comprises an assembly base 14a engaged inside the groove 30 of the container and provided with the ribs 34, and a nozzle 14b extending axially

said base. In the illustrated example, the nozzle 14b presents a conical shape that converges upwards. The nozzle 14b delimits a dispensing or outlet orifice 36 in fluidly communication with the compartment 22 of the container. The outlet orifice 36 is delimited by the upper end of the nozzle 14b. The dispensing plug 14 has a hollow shape. The plug 14 is made in one part, for example from plastic material, for example polyethylene (PE), polypropylene (PP), polyethylene terephthalate glycol-modified (PETG), etc.

In the illustrated example, the dispensing plug 14 further comprises, near to the outlet orifice 36, an inner wall 38 extending radially inwards from the nozzle 14b and provided with a through-hole 40. Alternatively, it could be possible to foresee a dispensing plug 14 deprived of such inner wall 38.

The cap 20 comprises a top wall 20a and an annular peripheral skirt 20b extending axially said top wall towards the container 12. The skirt 20b, coaxial with the axis X-X', extends a large-diameter of the top wall 20a. The skirt 20b axially abuts against a radial shoulder (not referenced) formed between the peripheral wall 12a and the end wall 12c of the container.

The cap 20 also comprises an inner annular sealing skirt 20c projecting axially from the top wall 20a and which engages into the outlet orifice 36 of the dispensing member. The inner sealing skirt 20c fits into the outlet orifice 36 to close it in a sealed manner. The inner sealing skirt 20c is in radial contact with the inner surface of the dispensing plug 14.

The cap 20 further comprises an outer annular sealing skirt 20d projecting axially from the top wall 20a and which radially surrounds the inner sealing skirt 20c. The outer sealing skirt 20d is in radial contact with the outer surface of the dispensing plug 14. The outer sealing skirt 20d is sealingly engaged around the dispensing plug 14. The inner and outer sealing skirts 20c, 20d are disposed in a concentric manner about the axis X-X'

In order to secure the cap 20 on the dispensing plug 14, the inner sealing skirt 20c is provided with an annular hook 42 extending

radially outwards and engaged into an annular groove (not referenced) formed on the inner surface of the dispensing plug 14. The hook 42 is formed on the outer surface of the inner sealing skirt 20c. Here, the hook 42 is provided at the free end of the skirt 20c.

Alternatively, the inner sealing skirt 20c may comprise a plurality of hooks spaced apart one relative to another in the circumferential direction instead of the annular hook. In another variant, it could be possible to provide hook(s) on the bore of the outer sealing skirt 20d engaging into a groove formed on the outer surface of the plug 14. However, with such a design, once the cap 20 is removed, said groove is visible from the outside.

To increase the holding of the cap 20 on the dispensing plug 14, the inner diameter of the outer sealing skirt 20d is adapted to obtain a radial interference fit between said skirt and the outer surface of the dispensing plug 14. In the illustrated example, for the axial retention of the cap 20 on the container 12, the peripheral skirt 20b of the cap is also provided internally with grooves 44 into which engage annular clipping ribs 46 provided on the container near to the radial shoulder. The cap 20 is made in one part, for example made from moulding of plastic material.

Concerning the filling of the container 12, the product to be dispensed may be introduced into the compartment 22 with a top filling operation. Once the product is introduced via the opening 31 delimited by the inner skirt 12e of the container, the mounting of the dispensing plug 14 can be easily achieved with a simple axial pushing movement into the groove 30 as illustrated schematically on Figure 4 by the arrow referenced 50. The mounting of the dispensing plug 14 is achieved without angular indexation. Then, the cap 20 is mounted on the plug 14 in a similar way, by an axial pushing movement illustrated by the arrow 52. Alternatively, it could be possible to assemble together the plug 14 and the cap 20 in a first operation, and then to mount such unitary assembly on the container 12 by one axial pushing.

In the second example illustrated on Figure 5, in which identical parts are given identical references, the cap 20 of the device differs in that it further comprises a sealing stud 54 projecting axially from the top wall 20a and which engages into the through-hole 40 of the dispensing member. The stud 54 is coaxial with the axis X-X'. In this example, the inner sealing skirt 20c of the cap is deprived of hook. Alternatively, it is possible to provide hook(s) on the cap as described in the first example.

The third example illustrated on Figure 6, in which identical parts are given identical references, differs from the first example in that the inner skirt 12e of the container comprises on its outer surface a screw thread 60 cooperating with a complementary screw thread 62 formed on the bore of the assembly base 14a of the dispensing plug in order to secure said plug on the container. Alternatively, to axially secure the dispensing plug 14, it could be possible to foresee on the outer surface of the inner skirt 12e annular recesses into which engage complementary annular clipping ribs formed on the bore of the plug 14 as previously described in the first example. In this example, the outer and inner skirts 12d, 12e have an elongated length.

The dispensing plug 14 further comprises an annular sealing lip 64 engaging into the opening 31 of the inner skirt 12e. The lip 64 comes into radial contact with said opening 31 and thus engages the inner skirt 12e in a leaktight manner. The lip 64 extends from the nozzle 14b of the plug.

Although the invention has been illustrated on the basis of an assembly comprising an air pump mounted on the container on the side opposite to the dispensing member, it should be understood that the invention also applies to a container comprising a propellant gas introduced into a second compartment delimited by the piston and a bottom end of said container. In this case, the dispensing member may comprise a valve equipped with a push-button in order to permit the product to be expelled outside.

CLAIMS

1. Device for packaging and dispensing a product comprising a container (12), a moveable piston (16) mounted inside the container and delimiting at least one compartment (22) containing the product, and a dispensing member (14) mounted on the container and comprising at least one outlet orifice (36) in communication with the compartment, characterized in that the container comprises an adapter portion for the dispensing member (14) provided with an outer skirt (12d) extending from an end wall (12c) of said container, with an inner skirt (12e) radially surrounded at least in part by said outer skirt and with a wall (12f) connecting the outer and inner skirts, said wall and said skirts delimiting a groove (30) oriented axially on the side opposite to said compartment (22) and inside which the dispensing member (14) is fitted.

2. Device according to claim 1, wherein the groove (30) has in cross-section a U-shape.

3. Device according to claim 1 or 2, wherein at least one retaining element is provided on the outer skirt (12d), or on the inner skirt (12e), of the adapter portion of the container and cooperates with at least one retaining element of complementary shape of the dispensing member (14) for axially retaining said dispensing member on said container.

4. Device according to claim 3, wherein one of said retaining elements comprises an annular recess (32), the other of said retaining elements comprising an annular clipping rib (34) engaging into said recess.

5. Device according to claim 3, wherein one of said retaining elements comprises an annular screw groove, the other of said retaining elements comprising a screw thread engaging into said screw groove.

6. Device according to any of the preceding claims, wherein the outer skirt (12d) of the adapter portion extends from the end wall (12c) of the container axially inside the compartment (22).

7. Device according to any of the preceding claims, wherein at least the end wall (12c) and the adapter portion of the container are made in one part.

8. Device according to any of the preceding claims, wherein the dispensing member (14) comprises a sealing lip (64) engaging into the inner skirt (12e) of the container in a leaktight manner.

9. Device according to any of the preceding claims, further comprising a cap (20) mounted on the container for closing off the outlet orifice (36) of the dispensing member.

10. Device according to claim 9, wherein the cap (20) comprises an inner sealing skirt (20c) which engages into the outlet orifice (36).

11. Device according to claim 10, wherein the inner sealing skirt (20c) comprises at least one hook (42) extending radially and engaging into a groove formed on the dispensing member (14).

12. Device according to any of the preceding claims, comprising an actuating member for delivering the product through the outlet orifice (36) of the dispensing member (14) in response to an actuating command.

13. Device according to claim 12, wherein the actuating member comprises an air pump (18) mounted on the container (12) axially on the side opposite to the dispensing member (14), said air pump and the piston (16) axially delimiting a chamber (29) separate from the compartment (22) and in communication with the outside.

14. Device according to claim 12, wherein the actuating member is mounted on the dispensing member (14) or formed by said dispensing member.

15. Device according to claim 14, wherein the piston (16) delimits inside the container an additional compartment containing a propellant gas capable of pressurizing the product to be dispensed via said piston.

FIG.1

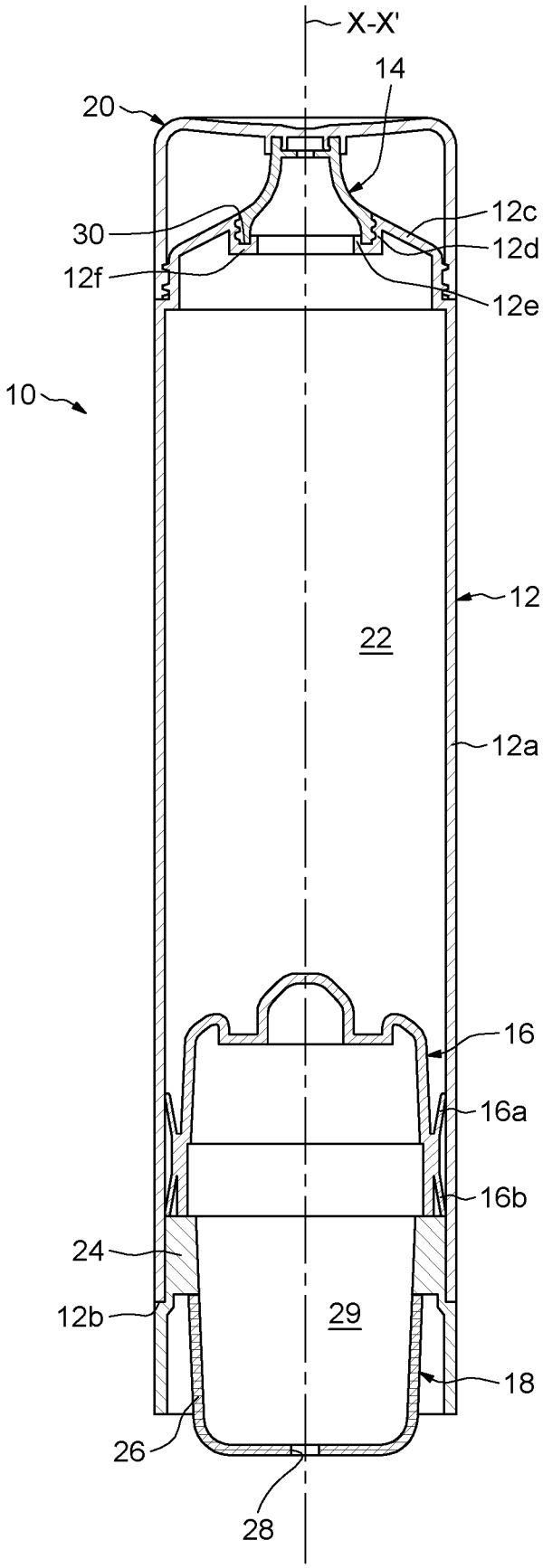

X-X'
14
20
12c
30
12d
12f
12e
10
12
22
12a
16
16a
16b
24
12b
29
18
26
28

FIG.2

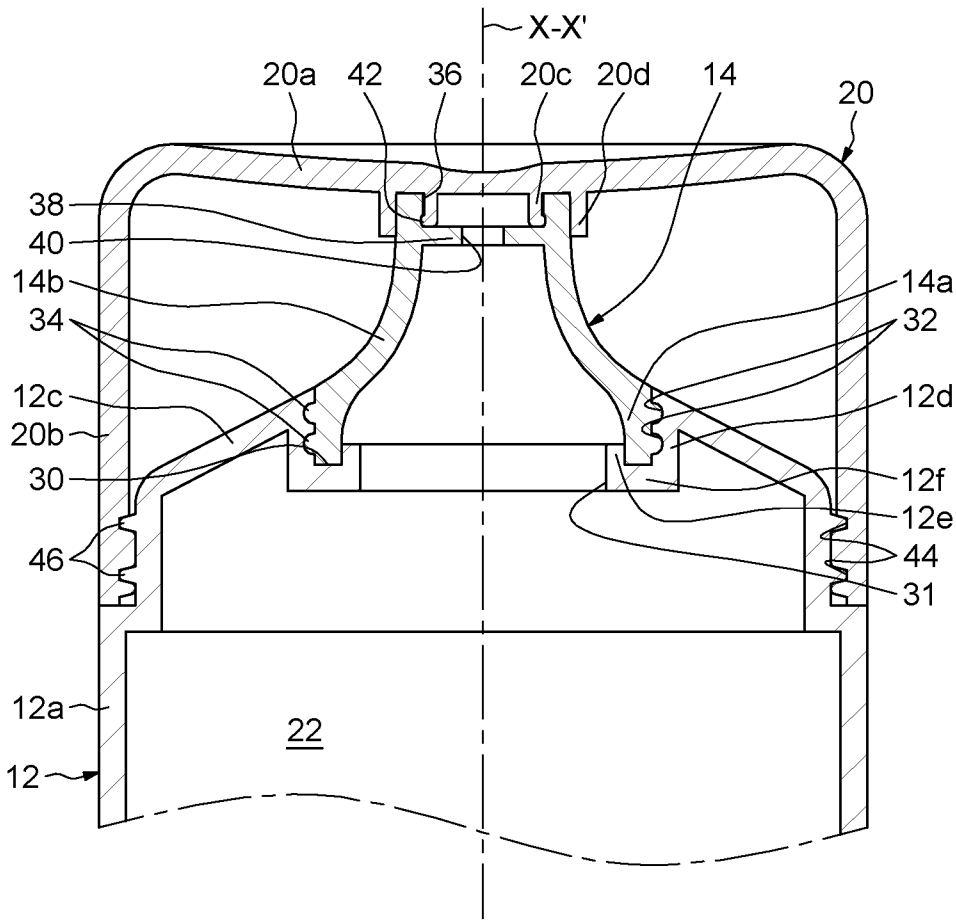

X-X'
20a
42
36
20c
20d
14
20
38
40
14b
34
12c
20b
30
46
12a
12
22
14a
32
12d
12f
12e
44
31

FIG.3

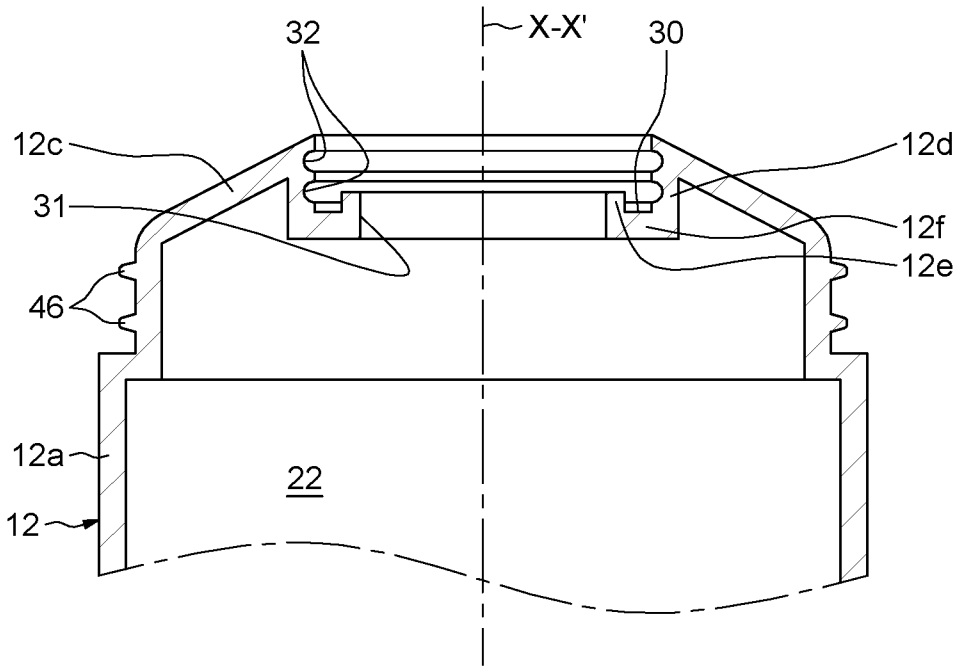

32
X-X'
30
12c
31
46
12a
12
22
12d
12f
12e

FIG.4

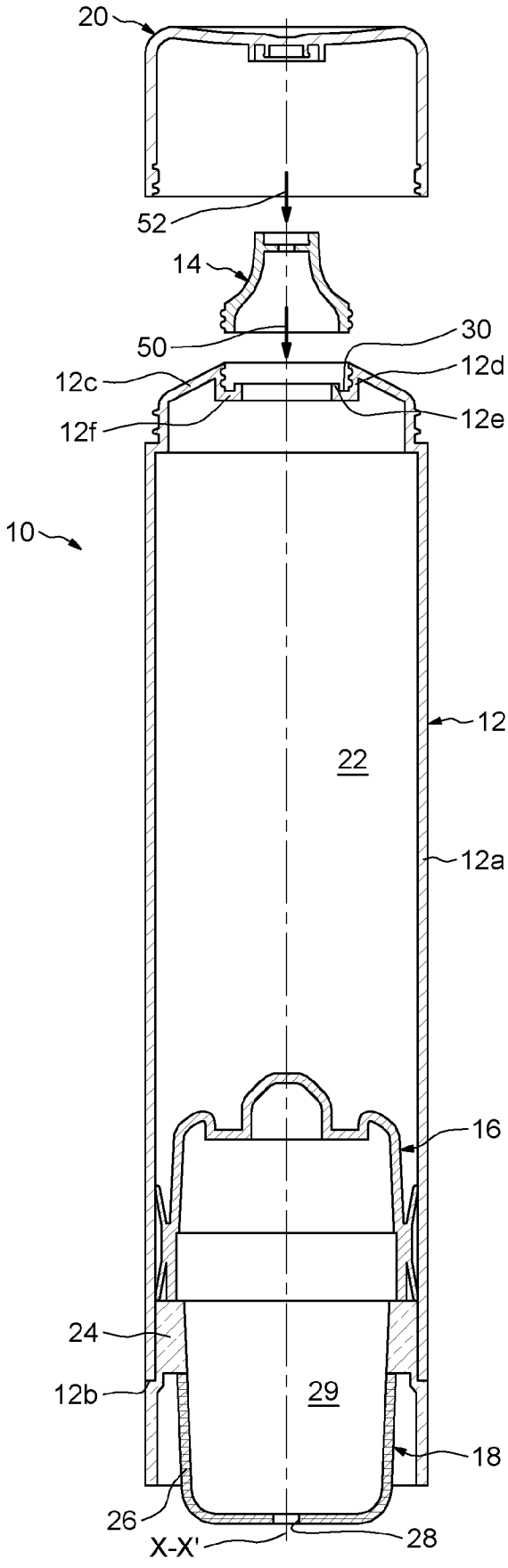


FIG.5

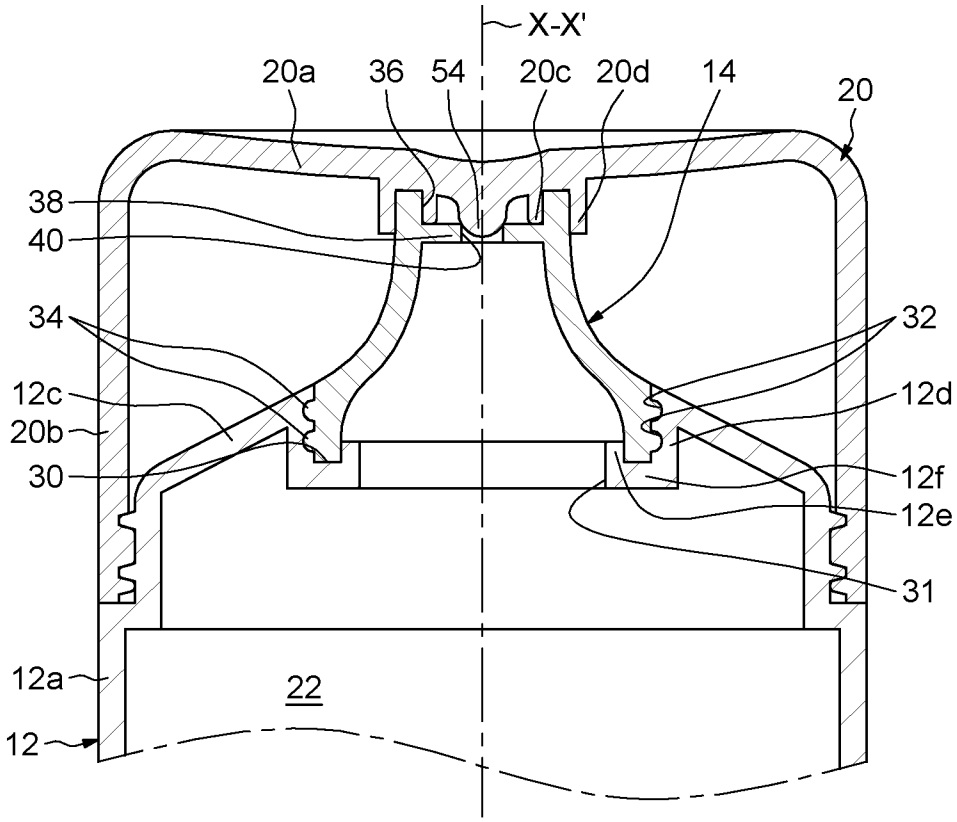
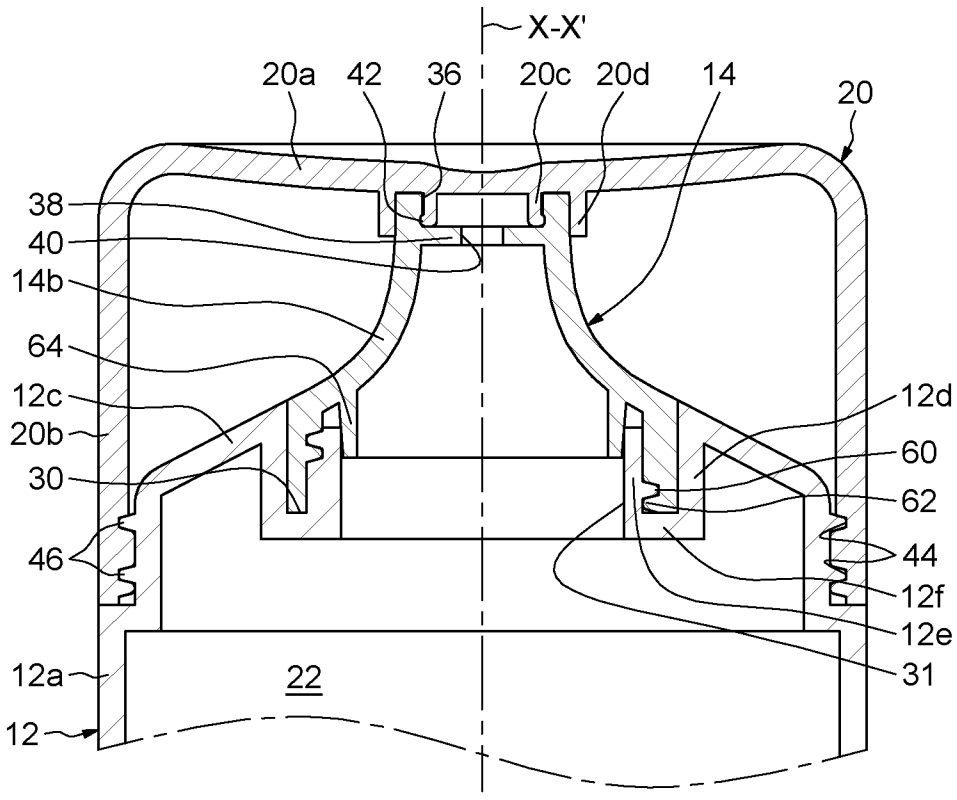

X-X'
20a
36
54
20c
20d
14
20
38
40
34
32
12c
12d
20b
30
12f
12e
31
12a
22
12

FIG.6


X-X'
20a
42
36
20c
20d
14
20
38
40
14b
64
12c
12d
20b
60
30
62
46
44
12f
12e
31
12a
22
12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/107510

A. CLASSIFICATION OF SUBJECT MATTER

B65D 83/14(2006.01)i

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)

SIPOABS,DWPI,CNKI,CPRSABS:slot?, groove?, pasty, opening?, adapter, product, orifice?, wall?, piston, dispensing, liquid, hole

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 August 2017	**11 September 2017**
Name and mailing address of the ISA/CN **STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **WU,Fei** Telephone No. **(86-10)62085294**

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INTERNATIONAL SEARCH REPORT
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International application No.
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