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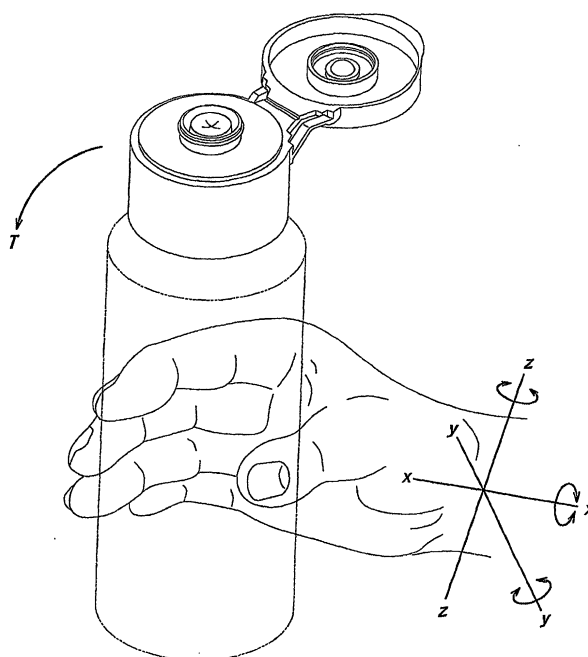
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(54) **LIQUID CONTAINER HAVING CAP WITH SLIT VALVE**

(57) A liquid container according to the present invention includes a container body (1) that can be resiliently deformed when grasped and pressed by user, and a cap (2) secured to a mouth portion of the container body (1). The cap (2) includes a cap body (2a) having an opening (O) in communication with interior of the con-

tainer, and a slit valve (2b) having slits that can be opened to discharge a desired amount of a liquid within the container, with the container tilted and the container body (1) pressed. Further, the slits include a first slit (S_1) that extends in a direction (T) in which the container is to be tilted, and a second slit (S_2) intersecting with the first slit (S_1).

FIG. 6



EP 1 445 208 A1

Description

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present invention relates to a liquid container comprising a cap with a slit valve, and contemplates to improve shut-off performance upon discharge of various kinds of contents and effectively avoid malfunctioning of the valve or contamination of the cap due to attachment or solidification of the contents around the discharge opening.

Prior Art

[0002] A liquid container for cosmetics or detergent is known, which is provided with a slit valve for allowing discharge of a desired amount of contents and good shut-off performance upon discharge of the contents. Such a liquid container is disclosed, e.g., in U.S. Patent No. 5,897,033, the disclosure of which is herein incorporated by reference. Typically, a slit valve has slits that are arranged in the form of a cross, so as to discharge a desired amount of contents by grasping and pressurizing the container body to increase the inner pressure, and thereby instantaneously open the slit portion that is situated at the center region of the valve.

[0003] Conventional slit valve operates satisfactorily, when the contents is a highly viscose liquid, such as creamy substance. However, when the contents is a liquid with low viscosity, such as oil-based cosmetics or vegetable oil, due to insufficient shut-off performance upon discharge of the contents, it is inevitable that the contents remains attached to the tip end portion of the valve. When the attached contents is left as it is, the contents undergoes solidification and often adversely affects the opening motion of the valve or causes contamination at the periphery of the discharge opening.

DISCLOSURE OF THE INVENTION

[0004] It is therefore a primary object of the present invention to provide a novel liquid container comprising a cap with a slit valve that exhibits a satisfactory shut-off performance of the contents upon discharge.

[0005] To this end, the present invention provides liquid container comprising a container body that can be resiliently deformed when grasped and pressed by user, and a cap secured to a mouth portion of the container body. The cap comprises a cap body having an opening in communication with interior of the container, and a slit valve having slits that can be opened to discharge a desired amount of a liquid within the container, with the container tilted and the container body pressed. Further, the slits comprise a first slit that extends in a direction in which the container is to be tilted, and a second slit intersecting with the first slit.

[0006] Since, according to the present invention, the slits of the slit valve provided for the cap comprise a first slit that extends in a direction in which the container is to be tilted, and a second slit intersecting with the first slit, it is possible to achieve improved shut-off performance upon discharge of the contents irrespectively of its viscosity, and thereby effectively avoid malfunctioning of the valve or contamination at the periphery of the discharge opening due to attachment or solidification of the contents.

[0007] It is preferred that container body has a cross-sectional shape that determines the direction in which said container is to be tilted as it is grasped by user. In this instance, it is preferred that the container body has a flat cross-sectional shape, and it is particularly preferred that one of said first slit and said second slit of the slit valve extends in a direction of major axis of the container as seen in its cross-section, and the other of said first slit and said second slit extends in a direction of minor axis of the container.

[0008] It is preferred that the cap further comprises a cover that is hinge-connected to the cap main body so as to be movable between a closed position where it is engaged by the cap main body and an open position exposing said slit valve.

[0009] Moreover, it is preferred that the liquid container according to the present invention further comprises a valve retainer that cooperates with the cap main body to hold the slit valve, and positioning means for determining an angular position of the valve retainer relative to the cap main body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be described below in further detail, with reference to preferred embodiments shown in the accompanying drawings.

[0011] FIG. 1 is a perspective view showing the appearance of the liquid container according to one embodiment of the present invention.

[0012] FIGS. 2A and 2B are plan view and sectional view, respectively, of the cap shown in FIG. 1.

[0013] FIG. 3 is a view explaining the manner of incorporating a valve into the cap main body.

[0014] FIG. 4 is a view explaining a state in which the content is attached to the tip end portion of the valve.

[0015] FIGS. 5A and 5B are bottom view and sectional view, respectively, of the valve positioning means.

[0016] FIG. 6 is a view useful for analyzing the tilting behavior of user's hand grasping an object.

[0017] FIG. 7 is a perspective view showing the appearance of the liquid container according to another embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0018] There is shown, in FIG. 1, a liquid container according to one embodiment of the present invention,

which comprises a cap with a slit valve. Reference numeral 1 designates a generally cylindrical container body, and 2 a cap that is secured to a mouth portion of the container body 1.

[0019] As shown in the plan view and sectional view of FIGS. 2A and 2B, the cap 2 has an opening O that is in communication with the interior of the container body 1, and is comprised of a cap body 2a threadedly connected to the mouth portion of the container body 1, a slit valve 2b arranged at the opening O of the cap body 2a, and clamped between the cap body 2a and a valve retainer 3 and thereby fixedly held in place, as well as a cover 2c for covering the slit valve 2b and detachably hold by the can body 2a, wherein the cover 2c may be of a hinge-connection type.

[0020] The slit valve 2b has a tip end portion that is formed with cross-like slits comprised of a first slit S_1 extending along a direction T in which the container is to be tilted, and a second slit S_2 intersecting at right angles with the first slit S_1 .

[0021] With reference to FIG. 6, analysis is made of tilting movement of user's hand when grasping an object such as a liquid container. In many instance, the tilting movement of the hand is classified into a twisting movement about a longitudinal axis $x-x$ of the forearm, a twisting movement about an axis $y-y$ that passes the wrist and is substantially perpendicular to the general surface of the palm, and a twisting movement about an axis $z-z$ of the wrist, which is substantially parallel to the general surface of the palm, wherein the three axes $x-x$, $y-y$, $z-z$ are perpendicular to each other.

[0022] In conventional cap provided with a slit valve, an exact control is not performed for positioning the valve relative to the cap body and, hence, to the container body. Thus, as shown in FIG. 3, the valve is mounted without taking into consideration the direction in which the liquid container is tilted. In this instance, when the liquid container is tilted to discharge the contents, the shut-off performance may not be satisfactory depending upon properties of the contents, giving rise to a situation wherein the contents remain attached to the tip end portion of the valve, and resulting in obstacle to opening operation of the valve, or contamination at the periphery of the discharge opening.

[0023] In the cap according to the present invention, the slit S_1 of the slit valve extends in the direction T in which the container is to be tilted. Thus, when pressure is released from the container body and a vacuum pressure is thereby produced in the container so that the valve is operated from the open position to the closing position, the contents at the tip end portion of the valve is sucked back into the container body to realize a satisfactory shut-off performance even in the case of contents having a low viscosity.

[0024] In order to perform positioning of the slits S_1 , S_2 when the slit valve 2b is mounted into the cap body 2a, as shown in FIGS. 5A and 5B, the valve retainer 3 is provided with projections 3a, while the cap body 2a

for supporting the valve retainer 3 is provided with recesses "h" corresponding to the projections 3a. The slit valve 2a and the valve retainer 3 are previously positioned relative to each other so that, when the projections 3a of the valve retainer 3 are engaged with the recesses "h", the slit S_1 is aligned in the direction in which the container is tilted. The positioning structure is illustrated in FIGS. 5A and 5B with reference to an example wherein the valve retainer 3 and the valve body 2a are fittingly engaged with each other. However, the present invention is not limited to such a structure, and other fitting form may be applied, besides that fusion bonding means or adhesion means may be adopted, as may be appropriately selected.

[0025] As shown in FIG. 1, in the case of a cap having a cover 2c of hinge-type, when the container is tilted so that the cap is oriented upwards, the slit S_1 of the slit valve extends in the tilting direction T. It is thus possible to avoid discharge of the contents in a state as shown in FIG. 4.

[0026] FIG. 7 shows another embodiment wherein the present invention is applied to a container of tube-type, wherein the container body has a flat sectional shape. The cap 2 secured to such container has a cover 2c that can be detached from the cap body 2a. The cap is secured so that the slit S_1 of the slit valve extends in the tilting direction T of the container, assuming that the contents are discharged by tilting the container with its wide sides directed upwards and downwards. In this embodiment, also, to the extent that the slit S_1 of the slit valve extends in the tilting direction T of the container, it is possible to achieve an improved shut-off performance of the liquid.

[0027] Incidentally, also when the container shown in FIG. 7 is tilted with its narrow sides directed upwards and downwards, the slits S_2 extends in the tilting direction T so as to improve the shut-off-performance of the liquid.

[0028] The direction T in which the container is tilted may be determined by appropriately designing the securing position of the hinge-type cover or the shape of the container body. Besides, it is also possible to indicate the direction in which the container is to be tilted for discharging the contents, by applying an arrow or the like marking (not shown) to the cap or the container body.

[0029] According to the present invention, it is possible to achieve improved shut-off performance upon discharge of the contents irrespectively of its viscosity, and thereby effectively avoid malfunctioning of the valve or contamination at the periphery of the discharge opening due to attachment or solidification of the contents.

[0030] It will be appreciated that the present invention is not limited to the above-mentioned embodiments and it may be carried out with various modified forms.

Claims

1. A liquid container comprising a container body (1) that can be resiliently deformed when grasped and pressed by user, and a cap (2) secured to a mouth portion of the container body (1), said cap (2) comprising a cap body (2a) having an opening (O) in communication with interior of the container, and a slit valve (2b) having slits that can be opened to discharge a desired amount of a liquid within the container, with the container tilted and the container body (1) pressed, wherein said slits comprise a first slit (S₁) that extends in a direction (T) in which said container is to be tilted, and a second slit (S₂) intersecting with said first slit (S₁).
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2. The liquid container according to Claim 1, wherein said container body (1) has a cross-sectional shape that determines the direction (T) in which said container is to be tilted as it is grasped by user.
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3. The liquid container according to Claim 2, wherein said container body (1) has a flat cross-sectional shape.
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4. The liquid container according to Claim 3, wherein one of said first slit (S₁) and said second slit (2b) of the slit valve (2b) extends in a direction of major axis of the container as seen in its cross-section, and the other of said first slit (S₁) and said second slit (2b) extends in a direction of minor axis of the container.
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5. The liquid container according to Claim 1, wherein said cap (2) further comprises a cover (2c) that is hinge-connected to the cap main body (2a) so as to be movable between a closed position where it is engaged by the cap main body (2a) and an open position exposing said slit valve (2b).
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6. The liquid container according to Claim 1, further comprising a valve retainer (3) that cooperates with the cap main body (2a) to hold the slit valve (2b), and positioning means for determining an angular position of the valve retainer (3) relative to the cap main body (2a).
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FIG. 1

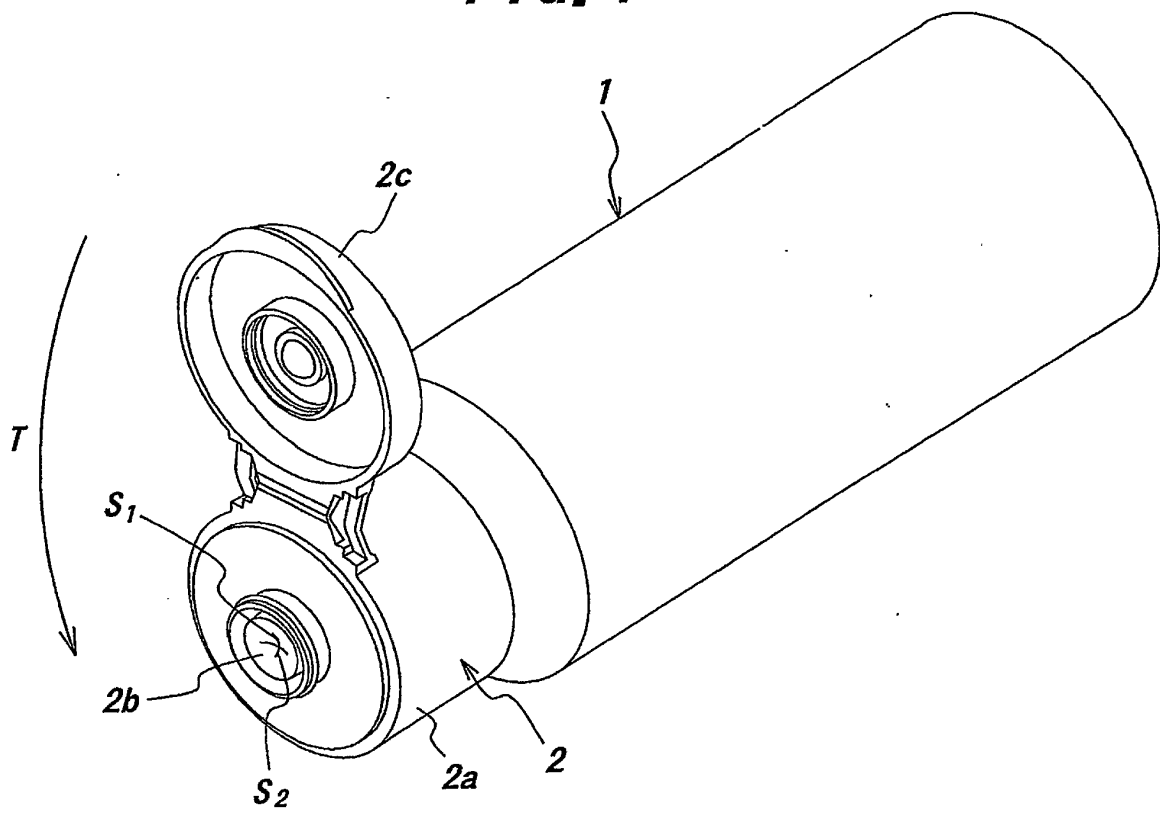


FIG. 2A

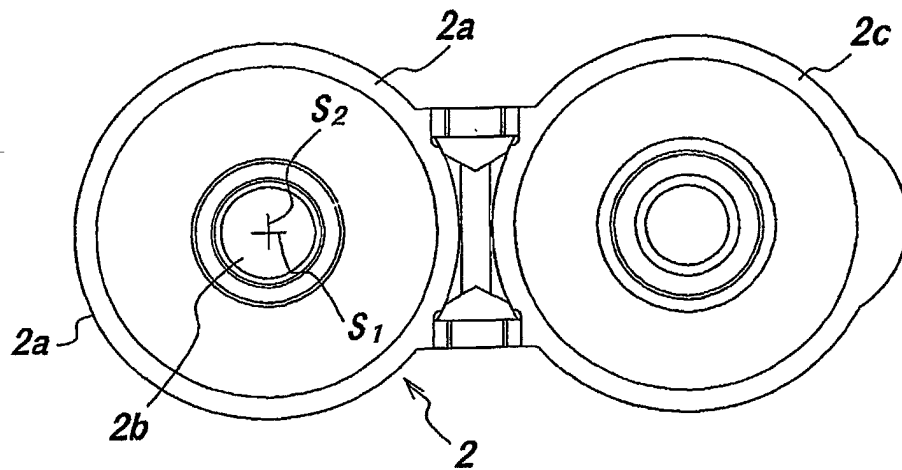


FIG. 2B

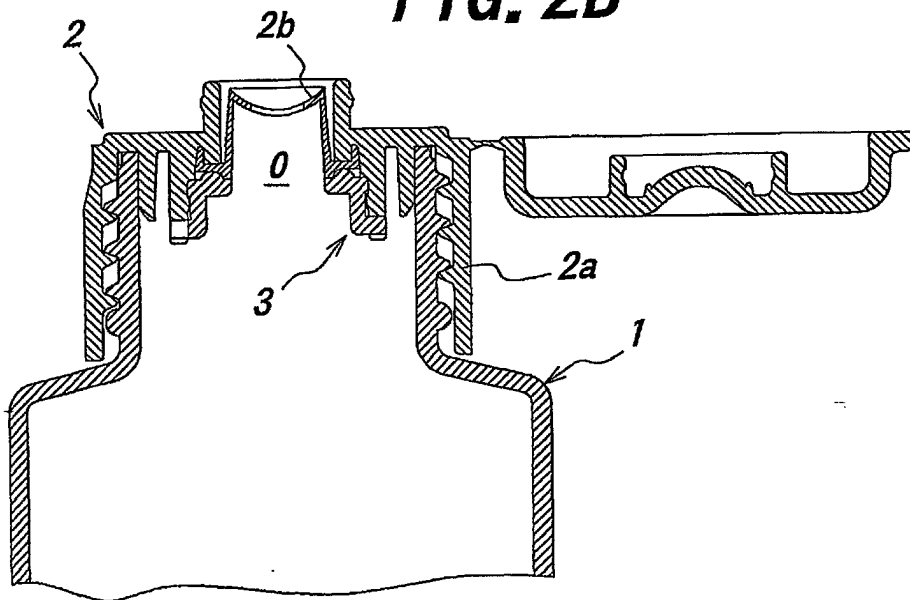


FIG. 3

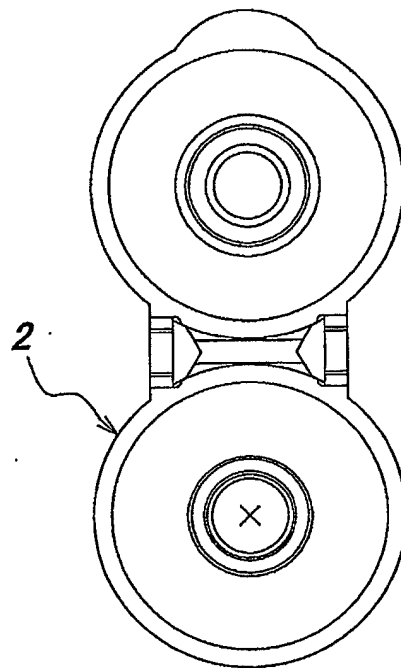


FIG. 4

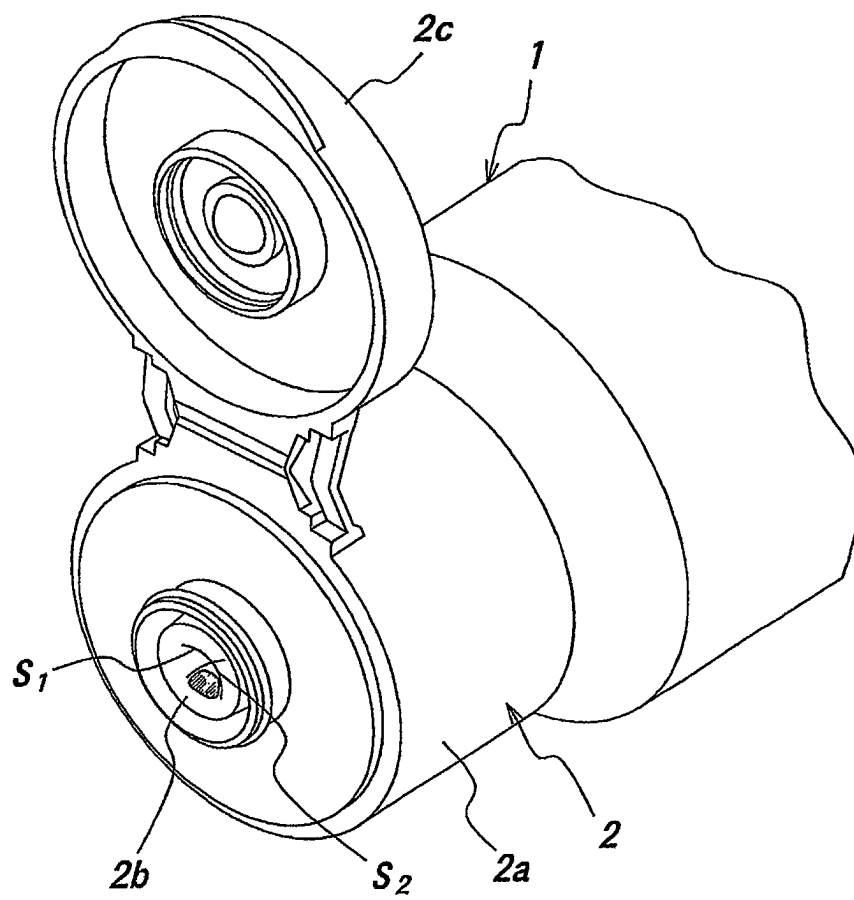


FIG. 5A

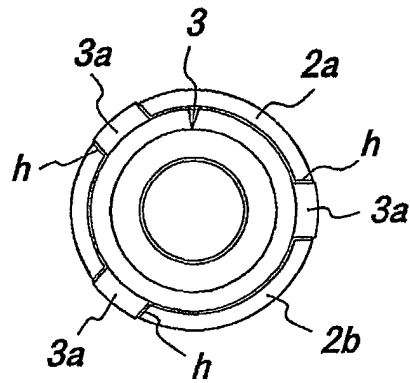


FIG. 5B

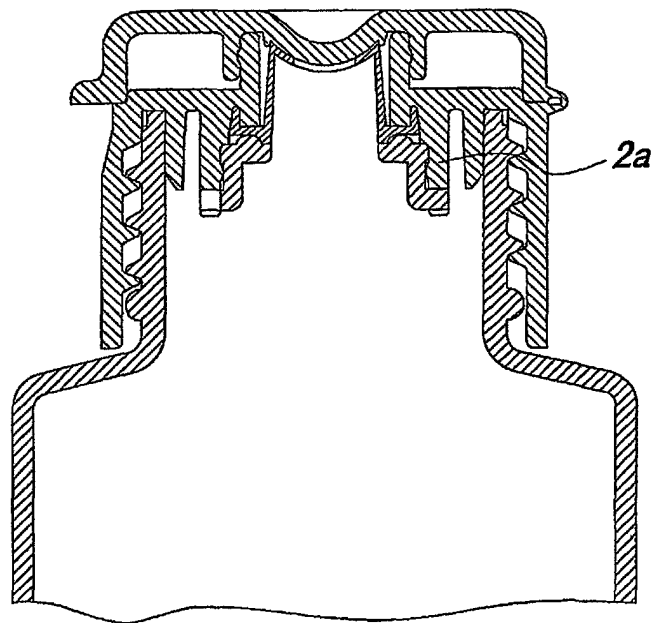


FIG. 6

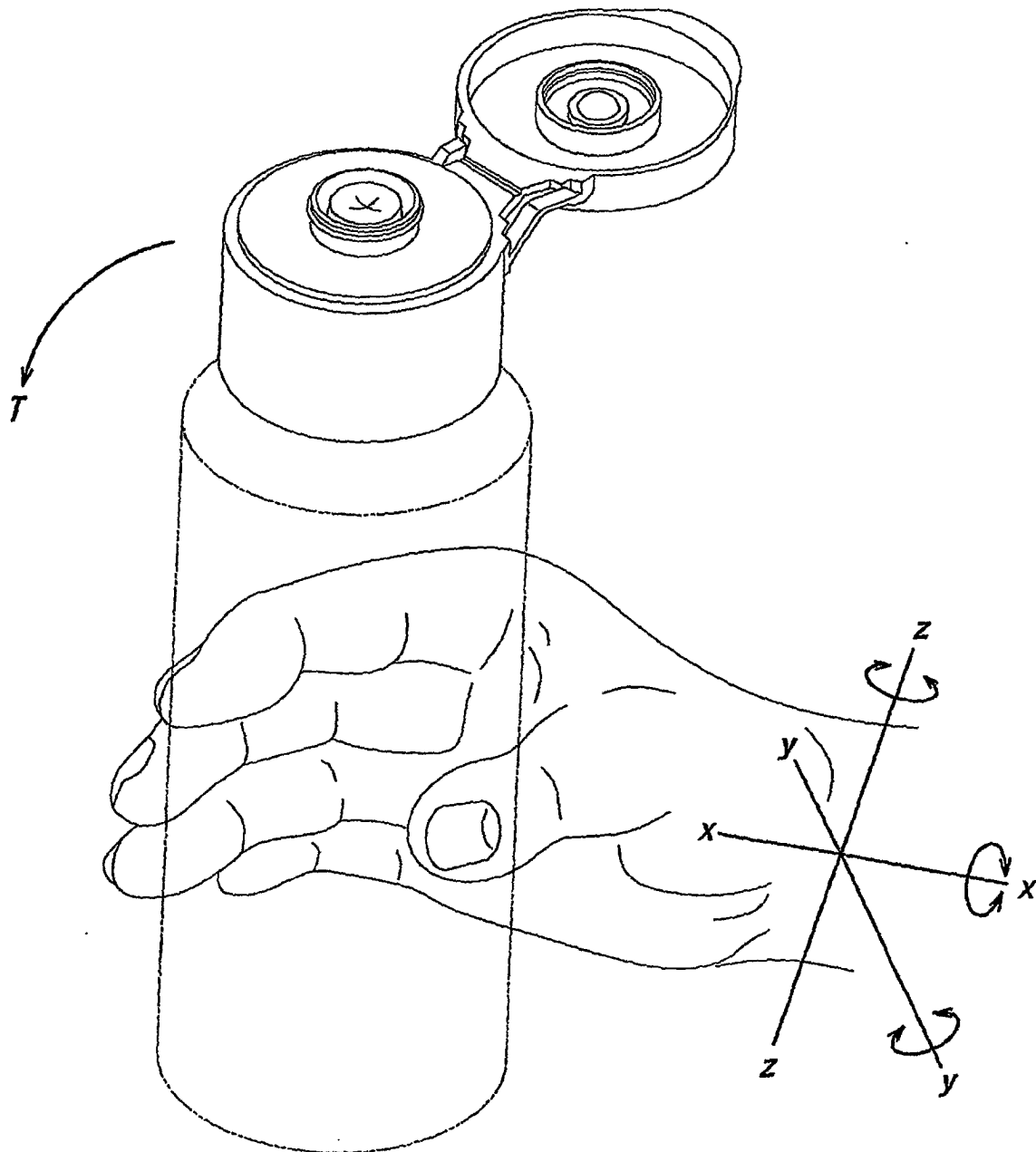
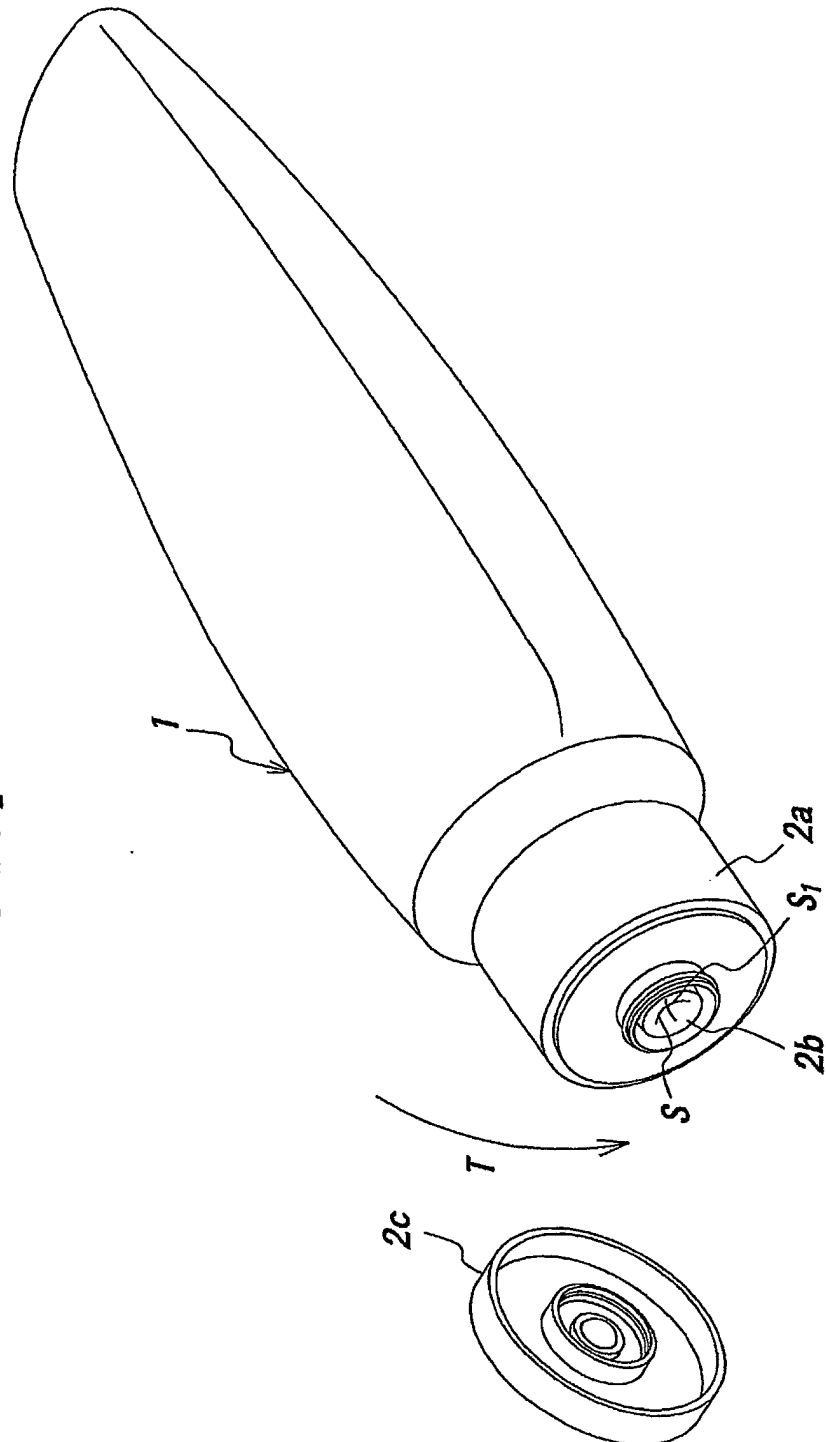


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/05218

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl ⁷ B65D47/20, B65D47/08, B65D35/52		
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) Int.Cl ⁷ B65D47/20, B65D47/08, B65D35/52		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2002 Kokai Jitsuyo Shinan Koho 1971-2002 Toroku Jitsuyo Shinan Koho 1994-2002		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5632420 A (Zeller Plastik Inc.), 27 May, 1997 (27.05.97), Full text; all drawings (Family: none)	1-6
☐ 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 21 June, 2002 (21.06.02)	Date of mailing of the international search report 09 July, 2002 (09.07.02)	
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