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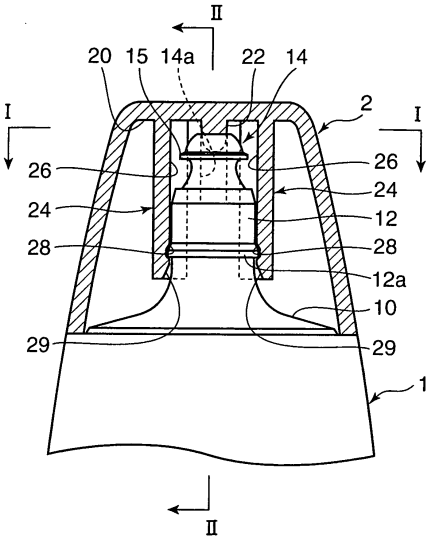
(54) LIQUID CONTAINER

(57) A liquid container comprises a container body (1) and a cap (2). A circular tubular neck portion (12) of the container main body (1) is formed to have an outer diameter dimension greater than a maximum diameter dimension of a nozzle portion (14), and a locking protrusion (124) for the cap (2) is provided on an outer peripheral surface of the circular tubular neck portion. The cap (2) has a pair of lockable arms (24). During an operation of attaching the cap (2) to the container body (1), the lockable arms (24) are locked onto the locking protrusion (12a). Opposing surfaces (26) of the lockable arms (24) are formed as guide surfaces which are adapted, during the cap attaching operation, to come into contact with the outer peripheral surface of the circular tubular neck portion (12) to guide the cap (2) along the circular tubular neck portion (12) so as to allow a plug protrusion (22) of the cap (2) and a nozzle hole (14a) to become opposed to each other.

FIG.1A



EP 2 287 083 A1

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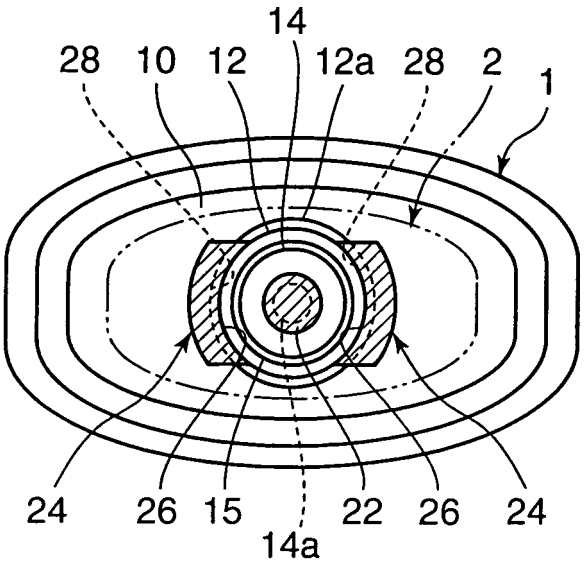
FIG.1B



Description

TECHNICAL FIELD

[0001] The present invention relates to a liquid container useful as a container for an eye drop (ophthalmic solution), a nose drop (nasal solution), a contact-lens cleaning solution or the like.

BACKGROUND ART

[0002] Heretofore, as a container for an eye drop or the like, there has been commonly known a type which comprises a container body having a nozzle, and a cap detachably attachable to the container body, wherein it is designed to allow a medical solution to be instilled (dropped) from a tip end of the nozzle through an operation of gently pressing the container body while orienting the tip end of the nozzle downwardly under a condition that the cap is detached.

[0003] Particularly, a so-called twist cap-type liquid container having a lockable arm provided on an inner peripheral surface of a cap is widely used as the container for an eye drop or the like, wherein it is designed such that the cap is attached to a container body by locking the lockable arm onto a locking protrusion formed on the container body, and then the cap is detached by releasing the locked state of the lockable arm through an operation of twisting the cap with respect to the container body, as described in the following Patent Document 1.

[0004] Meanwhile, the container for an eye drop or the like is often taken along a user, and thereby it is necessary to reliably prevent liquid leakage from the nozzle. Therefore, the container of the Patent Document 1 is designed to prevent liquid leakage in such a manner as to provide a plug protrusion (sealing portion) on an inner top region of the cap and allow the plug protrusion to be inserted into a nozzle hole, and to allow the plug protrusion to be smoothly inserted into the nozzle hole during the cap attaching operation in such a manner as to provide a guide portion around the plug protrusion to adjust respective positions of the nozzle and the plug protrusion.

[0005] However, in the container described in the Patent Document 1, during the cap attaching operation, a nozzle portion is guided while being brought into contact along a guide portion provided on the cap, so that repetition of the cap attaching/detaching operations would be likely to cause deformation or the like in the nozzle, which poses a problem for droplet formation. Particularly, in a container (for example, the following Patent Document 2) where a ring-shaped protrusion is formed on an outer periphery of a nozzle to prevent dripping (dribbling) from the nozzle and adequately form a droplet irrespective of a posture (instillation angle) of a container body to improve instillation performance, a distal end of the ring-shaped protrusion is guided along a guide portion of a cap, so that repetition of cap attaching/detaching operations would be likely to cause deformation or the like in the ring-shaped protrusion, which harms the anti-dripping function and the droplet-forming function. Moreover, only the distal end of the ring-shaped protrusion is brought into contact along the guide portion of the cap in the above manner, so that there is another problem of difficulty in stably guiding the nozzle along the guide portion during the cap attaching operation. Thus, it is expected to improve these problems based on a rational structure.

Patent Document 1: JP 10-329855A
Patent Document 2: JP 2004-196417A

DISCLOSURE OF THE INVENTION

[0006] The present invention has been made in view of the above circumstances, and an object thereof is to allow a cap to be adequately guided and attached to a container body, while preventing a disadvantage such as deformation of a nozzle.

[0007] In order to achieve this object, the present invention provides a liquid container which comprises: a container body having a tubular neck portion and a nozzle portion integrally provided on a top end of the tubular neck portion; and a top-closed tubular cap having a sealing portion to seal a nozzle hole of the nozzle portion, said cap being attachable to the container body to cover the nozzle portion and the tubular neck portion. In the liquid container, the container body is configured such that the tubular neck portion is formed to have an outer diameter dimension greater than a maximum diameter dimension of the nozzle portion, and a protrusion for locking the cap is provided on an outer peripheral surface of the tubular neck portion, and the cap has a pair of lockable pieces provided on an inner top region thereof to extend along the tubular neck portion and arranged in a diametral direction of the tubular neck portion, wherein the cap is adapted to be locked with respect to the container body, in such a manner that, during an operation of attaching the cap to the container body along an axial direction of the tubular neck portion, the tubular neck portion is inserted between the lockable pieces, and the locking protrusion is inserted into a pair of locking concave portions formed in respective opposing surfaces of the lockable pieces, wherein the lockable pieces have respective guide surfaces which are adapted, during the operation of attaching the cap to the container body, to come into contact with the outer peripheral surface of the tubular neck portion to guide the cap along the tubular neck portion so as to allow the nozzle hole and the sealing portion to become opposed to each other.

[0008] In this liquid container, when the cap is attached along the axial direction of the tubular neck portion of the container body, the nozzle portion and the tubular neck portion are inserted between the pair of lockable pieces provided on the inner top region of the cap, and the respective guide surfaces of the lockable pieces come into contact with the outer peripheral surface of the tubular

neck portion to guide the cap along the axial direction of the tubular neck portion. The cap is guided along the guide surfaces of the lockable pieces in the above manner, so that the nozzle hole is aligned with the sealing portion. Then, when the cap is pushed along the axial direction of the tubular neck portion to a given dead end position, the locking protrusion of the tubular neck portion is inserted into the locking concave portions formed in the opposing surfaces of the lockable pieces, and thereby the cap is locked with respect to the container body. Thus, this liquid container is free of guiding the nozzle portion while bringing it into contact along a guide portion provided on the cap as in the conventional container, so that it becomes possible to prevent deformation or the like in the nozzle due to the contact. In addition, the guide surfaces for the tubular neck portion are integrally provided on the lockable pieces for locking the cap to the container body, so that the aforementioned effects can be obtained with a rational structure.

[0009] As a specific structure, the guide surface of each of the lockable pieces may have a shape which corresponds to a cross-sectional shape of the outer peripheral surface of the tubular neck portion so as to allow the guide surface to come into contact with the outer peripheral surface continuously in a circumferential direction thereof, or may be formed to come into contact with the outer peripheral surface of the tubular neck portion intermittently in the circumferential direction thereof.

[0010] The above structure is useful particularly in a liquid container where the nozzle portion has a ring-shaped protrusion formed on an outer periphery thereof as a portion having the maximum diameter dimension.

[0011] Specifically, the ring-shaped protrusion is formed on the outer periphery of the nozzle portion to prevent dripping from the nozzle portion and allow a droplet to be adequately formed irrespective of a posture (instillation angle) of the container body to improve instillation performance. The above structure is free of guiding the nozzle portion while bringing it into contact along a guide portion provided on the cap, during the cap attaching operation, so that it becomes possible to prevent deformation or the like in the ring-shaped protrusion and thus adequately maintain the aforementioned functions on a long-term basis.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG. 1 is a schematic sectional view showing a substantial part of a liquid container according to the present invention, wherein FIG. 1(a) is a vertical sectional view, and FIG. 1(b) is a horizontal sectional view (sectional view taken along the line I-I in FIG. 1(a)).

FIG. 2 is a vertical sectional view (sectional view taken along the line II-II in FIG. 1(a)) showing the substantial part of the liquid container.

FIG. 3 is a vertical sectional view (corresponding to FIG. 1(a)) of the liquid container, wherein it illustrated a state during a cap attaching operation.

FIG. 4 is a sectional view (corresponding to FIG. 1 (a)) showing a substantial part of another liquid container which is different in shape of a nozzle portion.

FIG. 5 is a sectional view (corresponding to FIG. 1 (a)) showing a substantial part of yet another liquid container which is different in shape of the nozzle portion.

FIG. 6 is a fragmentary sectional view (corresponding to FIG. 1(a)) showing a substantial part of still another liquid container which is different in shape of lockable arms (opposing surfaces).

BEST MODE FOR CARRYING OUT THE INVENTION

[0013] FIGS. 1 and 2 illustrate a substantial part of a liquid container according to the present invention.

[0014] The liquid container (hereinafter abbreviated as "container") illustrated in FIGS. 1 and 2 is a so-called twist cap-type container. In this embodiment, this container is an eye drop container which comprises a container body 1 having a nozzle portion 14, and a cap 2 detachably attachable to the container body 1 to cover the nozzle portion 14, wherein it is designed, during instillation, to allow a medical solution contained in the container body 1 to be instilled from a tip end of the nozzle portion through an operation of gently pressing the container body 1 while orienting the tip end of the nozzle portion downwardly under a condition that the cap 2 is detached.

[0015] As shown in FIG. 1(b), the container body 1 is formed in a flat shape in a forward-rearward direction (upward-downward direction in FIG. 1(b)). The container body 1 is configured such that a circular tubular neck portion 12 having a cross-sectionally circular shape is provided in a central position of an upper portion thereof through a shoulder portion 10, and the nozzle portion 14 is provided on a top of the circular tubular neck portion 12, wherein a portion other than the nozzle portion 14 is integrally molded using a synthetic resin, such as polypropylene, polyethylene or polyethylene terephthalate.

[0016] The nozzle portion 14 is integrally provided in the container body 1 by press-fitting a shaft-shaped nozzle body formed separately from the circular tubular neck portion 12 and others, into the circular tubular neck portion 12. The nozzle portion 14 is molded using a soft synthetic resin, such as low-density polyethylene, linear low-density polyethylene, high-density polyethylene or polypropylene.

[0017] As shown in FIGS. 1 and 2, the nozzle portion 14 has a ring-shaped protrusion 15 provided on an outer periphery thereof, and a constricted region provided on the side of a base end (on a lower side) thereof with respect to the ring-shaped protrusion 15. In other words, it is configured to prevent dripping from the nozzle portion 14 by the ring-shaped protrusion 15, while allowing a

droplet to be adequately formed in a region of the ring-shaped protrusion 15 during instillation, irrespective of a posture (instillation angle) of the container body 1.

[0018] An outer diameter dimension of the circular tubular neck portion 12 is set to be greater than a maximum diameter dimension of the nozzle portion 14 (in this embodiment, an outer diameter of the ring-shaped protrusion 15), so that, in a state after the cap 2 is attached to the container body 1 (hereinafter referred to simply as "cap-attached state"), a gap is defined between an aftermentioned lockable arm 24 and the nozzle portion 14 to allow the cap 2 and the ring-shaped protrusion 15 to be maintained in non-contact relation.

[0019] As shown in FIG. 1 (in FIG. 1(b), only a part of the cap 2 is illustrated by the solid line for the sake of simplicity) and FIG. 2, the cap 2 is formed in a top-closed tubular shape to cover a region above the shoulder portion 10. Further, it is configured such that, in the state after being attached to the container body 2, a lateral surface of the container body 1 and a lateral surface of the cap 2 form a continuous smooth contour line in an upward-downward direction, as shown in FIGS. 1 and 2. While the cap 2 is made from a synthetic resin, such as polypropylene, polyethylene or polystyrene, as with the container body 1, it is formed in a slightly harder structure than the container body 1.

[0020] The cap 2 has a plug protrusion 22 (which is equivalent to "sealing portion" of the present invention) provided on a central region of an inner top surface 20 thereof to protrude downwardly, so that, in the cap-attached state, the plug protrusion 22 is inserted in a nozzle hole 14a of the nozzle portion 14 in close contact relation with an inner peripheral surface of the nozzle hole 14a, and thereby the nozzle hole 14a is sealed.

[0021] The cap 2 also has a pair of lockable arms 24 (which is equivalent to "lockable pieces" of the present invention) integrally formed on the inner top surface 20 at respective positions on both sides of the plug protrusion 22.

[0022] The lockable arms 24 are provided to extend along an axial direction of the circular tubular neck portion 12, and formed with a pair of locking concave portions 28 in respective distal end regions of opposing surfaces 26 thereof, so that, in the cap-attached state, the nozzle portion 14 and the circular tubular neck portion 12 are inserted between the lockable arms 24, and a locking protrusion 12a formed on a base end of the circular tubular neck portion 12 is inserted in the locking concave portions 28, whereby the cap 2 is locked to the container body 1 through the lockable arms 24, as shown in FIG. 1(a).

[0023] Each of the opposing surfaces 26 of the lockable arms 24 is formed in a cross-sectionally arc shape corresponding to a shape of an outer peripheral surface of the circular tubular neck portion 12, over the entire region thereof in a longitudinal direction of the lockable arm, and a distance between the lockable arms 24 is set to allow the opposing surfaces 26 to come into contact with the outer peripheral surface of the circular tubular neck portion 12 from laterally opposite sides. Based on this structure, during a cap attaching operation, the plug protrusion 22 and the nozzle hole 14a are aligned with each other, as described later. Thus, in this embodiment, the opposing surfaces 26 are equivalent to "guide surfaces" of the present invention. Each of the opposing surfaces 26 of the lockable arms 24 has a distal end formed in a rounded taper 29 to allow the nozzle portion 14 to be smoothly inserted between the lockable arms 24 during the cap attaching operation.

[0024] In the container configured as described above, during instillation, the cap 2 is detached from the container body 1 through an operation of turning the cap 1 from the cap-attached state illustrated in FIG. 1(a), about the circular tubular neck portion 12 by about 90°. Specifically, when the cap 2 is turned, the cap 2 is brought into riding contact with the shoulder portion 10 of the container body 1, and, along with the riding contact, the cap 2 is pushed upwardly, so that the locked state between the circular tubular neck portion 12 and each of the lockable arms 24 is released. Thus, subsequently, the cap 2 can be detached from the container body 1 along the circular tubular neck portion 12 to perform instillation.

[0025] Then, after use, the cap 2 is attached along the circular tubular neck portion 12 of the container body 1. In this operation, when the cap 2 is manually attached along the circular tubular neck portion 12, the nozzle portion 14 and the circular tubular neck portion 12 are inserted between the lockable arms 24, and the opposing surfaces 26 of the lockable arms 24 come into contact with the outer peripheral surface of the circular tubular neck portion 12 to allow the cap 2 to be guided along the circular tubular neck portion 12, as shown in FIG. 3. Based on guiding the cap 2 along the opposing surfaces 26 of the lockable arms 24, the nozzle hole 14a is aligned with the plug protrusion 22, so that the plug protrusion 22 is adequately inserted into the nozzle hole 14a. During this operation, each of the lockable arms 24 never comes into contact with the ring-shaped protrusion 15, because the outer diameter dimension of the circular tubular neck portion 12 is set to be greater than the maximum diameter dimension of the nozzle portion 14 (outer diameter dimension of the ring-shaped protrusion 15).

[0026] Then, when the cap 2 is pushed along the circular tubular neck portion 12 to a given dead end position, each of the lockable arms 24 is elastically displaced moderately, so that the locking protrusion 12a of the circular tubular neck portion 12 is inserted into the locking concave portions 28 of the lockable arms 24, and thereby the cap 2 is locked to the container body 1.

[0027] As just described, the above container is designed such that, during the cap attaching operation, the plug protrusion 22 is inserted into the nozzle hole 14a while guiding the cap 2 by causing the lockable arms 24 to come into contact with the circular tubular neck portion 12, so that it is free of the risk of deformation or the like in the nozzle portion due to the cap attaching/detaching

operations as in the conventional container designed to guide the nozzle portion along a guide surface provided on the cap while bringing it into contact with the guide surface. Thus, it becomes possible to prevent a disadvantage of deterioration in medical-solution instillation performance due to deformation or the like in the nozzle portion 14.

[0028] Particularly, in the above container, the nozzle portion 14 is provided with the plug protrusion 22 to prevent dripping from the nozzle portion 14 by the plug protrusion 22, and to allow a droplet to be adequately formed in a region of the ring-shaped protrusion 15 during instillation, irrespective of a posture (dripping angle) of the container body 1, to improve the instillation performance, and this instillation performance can be adequately maintained on a long-term basis, because this container can prevent deformation or the like in the nozzle portion 14 (particularly, in the ring-shaped protrusion 15) due to attachment/detachment of the cap 2, as mentioned above.

[0029] In addition, the cap 2 is guided along the circular tubular neck portion 12 under the condition that the opposing surfaces 26 each having an arc shape corresponding to the circular tubular neck portion 12 is in wide contact with the outer peripheral surface of the circular tubular neck portion 12, so that, during the cap attaching operation, the plug protrusion 22 can be inserted into the nozzle hole 14a while stably guiding the cap 2 along the circular tubular neck portion 12.

[0030] Further, with a focus on the lockable arms 24 as an element unique to the twist cap-type container, the above container is designed to guide the cap 2 along the circular tubular neck portion 12 by using the opposing surfaces 26 of the lockable arms 24 as a guided surface, which also provides an advantage of being able to obtain the above functions/effects with a rational structure.

[0031] Additionally, the above container has an advantage of being able to share the cap 2 with a container which is different only in shape of the nozzle portion 14. Specifically, in the conventional container designed to guide the nozzle portion by bringing it into contact along a guide surface provided on the cap, it is necessary to provide a guide surface on the side of the cap correspondingly to a shape of the nozzle portion, and thereby a specially-designed cap is required for each of a plurality of types of container bodies each different in outer diameter dimension of the nozzle portion. In contrast, in a structure designed to guide the cap 2 along the circular tubular neck portion 12 as in the container according to the above embodiment, as long as the maximum diameter dimension of the nozzle portion 14 is less than the outer diameter dimension of the circular tubular neck portion 12, the cap 2 can be adequately guided along the circular tubular neck portion 12, irrespective of a specific shape of the nozzle portion. Specifically, the cap 2 can be sharingly used for a container body 1 having a nozzle portion 14 tapered toward a tip end thereof, as shown in FIG. 4, or a container body 1 having a circular tubular nozzle portion 14 with an approximately constant outer diameter dimension in an axial direction thereof, as shown in FIG. 5, to obtain the same functions/effects as those in the above embodiment. Particularly, in the container body 1 illustrated in FIG. 4, the nozzle portion 14 is formed in a shape tapered toward the tip end thereof (taper shape) to reduce a droplet amount and facilitate setting an instillation target. Thus, in the conventional container designed to guide the nozzle portion while bringing it into contact along a guide portion provided on the cap, it is difficult to stably guide the nozzle portion, so that a sufficient guiding effect cannot be obtained, and the intended functions are likely to deteriorate due to deformation or the like in the nozzle portion caused by cap attaching/detaching operations. The container according to the above embodiment can prevent such a disadvantage. Thus, it becomes possible to share the cap 2 between a plurality of types of container bodies 1 each different only in shape of the nozzle portion 14. This provides an advantage of being able to rationally perform container production, and reduce the burden of stock control.

[0032] The aforementioned container is one example of a preferred embodiment of the liquid container according to the present invention, and a specific structure thereof may be appropriately changed without departing from the spirits and scope of the present invention.

[0033] For example, a specific shape of the nozzle portion 14 may be any suitable shape other than FIGS. 1, 4 and 5, as mentioned above. Further, in the above embodiment, the guided surfaces of the cap 2 are adapted to come into contact with the circular tubular neck portion 12 continuously in a circumferential direction thereof, by forming each of the opposing surfaces 26 of the lockable arms 24 in an arc shape corresponding to the outer peripheral surface of the circular tubular neck portion 12. Alternatively, as shown in FIG. 6, each of the guided surfaces of the cap 2 may be adapted to come into contact with the circular tubular neck portion 12 intermittently in the circumferential direction thereof. Specifically, the lockable arms 24 may have respective opposing surfaces 26 each provided with a line-shaped protrusion 26a protruding therefrom and extending along the circular tubular neck portion 12, in such a manner that the line-shaped protrusions 26a come into contact with the outer peripheral surface of the circular tubular neck portion 12. In this case, the locking concave portion 28 is formed in an intermediate position of each of the line-shaped protrusions 26a.

[0034] In the above embodiment, the plug protrusion 22 is provided on the cap 2 as the sealing portion of the present invention, wherein the plug protrusion 22 is adapted to be inserted into the nozzle hole 14a to seal the nozzle hole 14a. Alternatively, the sealing portion may be a plug protrusion 22 having a shape adapted to be brought into press contact with an edge region of an opening of the nozzle hole 14a to seal the nozzle hole 14a, instead of the above shape adapted to be fully inserted into the nozzle hole 14a.

[0035] In the above embodiment, the pair of lockable arms 24 arranged in a diametral direction of the circular tubular neck portion 12 are provided on the cap 2 as "lockable pieces" of the present invention. Alternatively, an additional one of the pair of lockable arms 24 may be further provided, wherein the two pairs of, or total four, lockable arms 24, are locked to the circular tubular neck portion 12 from four directions. It is understood that three or more pairs of the lockable pieces (lockable arms 24) may be provided.

[0036] In the above embodiment, the circular tubular neck portion 12 having a cross-sectionally circular shape is provided in the container body 1 as "tubular neck portion" of the present invention. Alternatively, a shape of the tubular neck portion may be a polygonal shape, such as a cross-sectionally hexagonal or octagonal shape.

[0037] Although the above embodiment has been described based on an example where the liquid container of the present invention is used as an eye drop container, it is understood that the liquid container of the present invention is usable as a container for a liquid other than an eye drop, such as a container for a nose drop or a contact-lens cleaning solution. The molding materials for the container body 1 and the cap 2, mentioned in the description of the above embodiment, are an example of a preferred material for an eye drop container, and a specific molding material for the container body 1 or other element may be appropriately selected depending on an intended purpose of the container, etc.

INDUSTRIAL APPLICABILITY

[0038] As above, the liquid container according to the present invention is useful as a container for an eye drop, a nose drop, a contact-lens cleaning solution or the like, and suited to adequately maintaining attachability to a container body while preventing a disadvantage such as deformation in a nozzle.

Claims

1. A liquid container comprising: a container body which has a tubular neck portion and a nozzle portion integrally provided on a top end of the tubular neck portion; and a top-closed tubular cap having a sealing portion to seal a nozzle hole of the nozzle portion, said cap being attachable to the container body to cover the nozzle portion and the tubular neck portion, **characterized in that**:

   the container body is configured such that the tubular neck portion is formed to have an outer diameter dimension greater than a maximum diameter dimension of the nozzle portion, and a protrusion for locking the cap is provided on an outer peripheral surface of the tubular neck portion; and

   the cap has a pair of lockable pieces provided on an inner top region thereof to extend along the tubular neck portion and arranged in a diametral direction of the tubular neck portion, the cap being adapted to be locked with respect to the container body, in such a manner that, during an operation of attaching the cap to the container body along an axial direction of the tubular neck portion, the tubular neck portion is inserted between the lockable pieces, and the locking protrusion is inserted into a pair of locking concave portions formed in respective opposing surfaces of the lockable pieces,

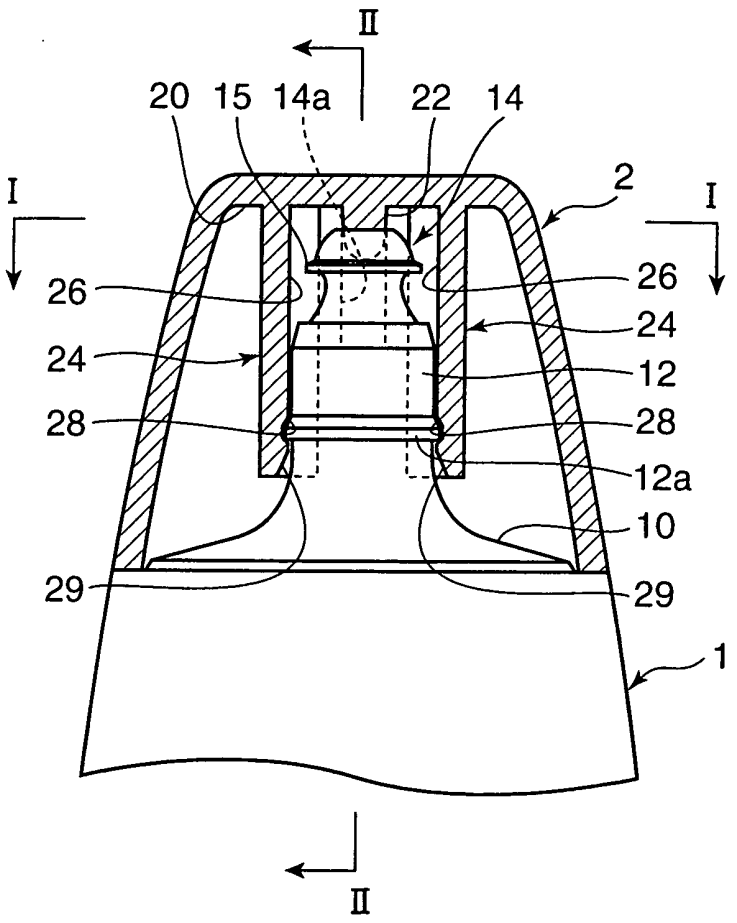
   wherein the lockable pieces have respective guide surfaces which are adapted, during the operation of attaching the cap to the container body, to come into contact with the outer peripheral surface of the tubular neck portion to guide the cap along the tubular neck portion so as to allow the nozzle hole and the sealing portion to become opposed to each other.

2. The liquid container as defined in claim 1, **characterized in that** the guide surface of each of the lockable pieces has a shape which corresponds to a cross-sectional shape of the outer peripheral surface of the tubular neck portion so as to allow the guide surface to come into contact with the outer peripheral surface continuously in a circumferential direction thereof.

3. The liquid container as defined in claim 1, **characterized in that** the guide surface of each of the lockable pieces is formed to come into contact with the outer peripheral surface of the tubular neck portion intermittently in a circumferential direction thereof.

4. The liquid container as defined in any one of claims 1 to 3, **characterized in that** the nozzle portion has a ring-shaped protrusion formed on an outer periphery thereof as a portion having the maximum diameter dimension.

FIG.1A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II

FIG.1B

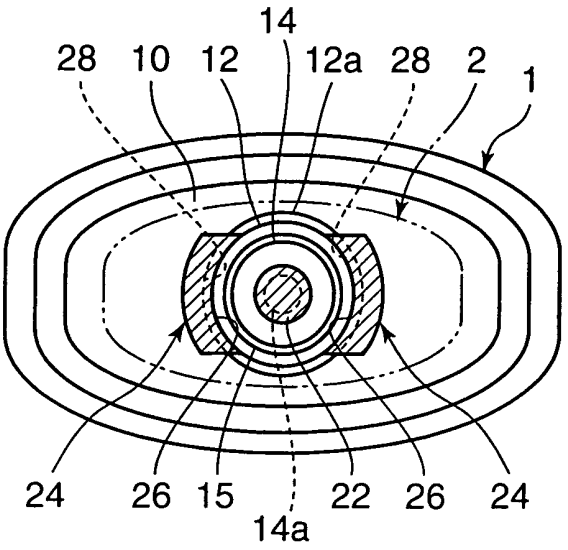
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FIG.2

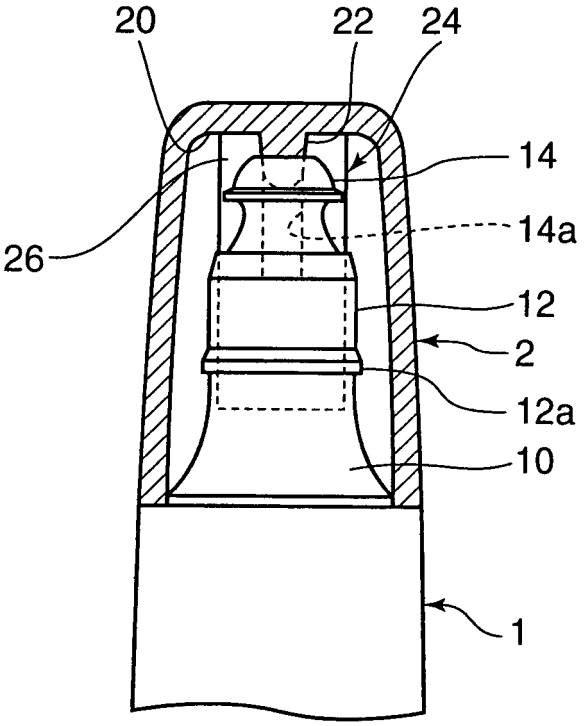


FIG.3

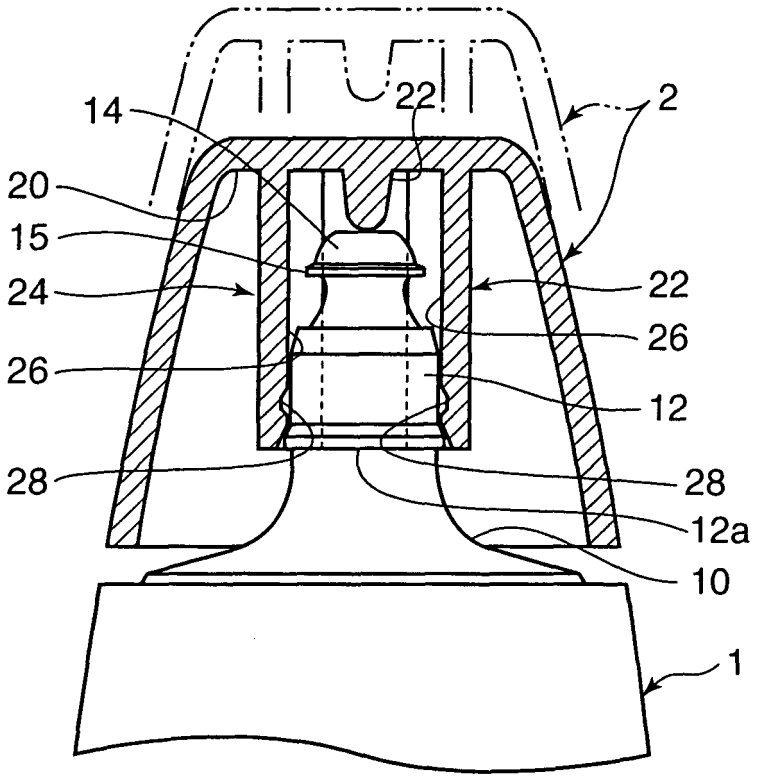


FIG.4

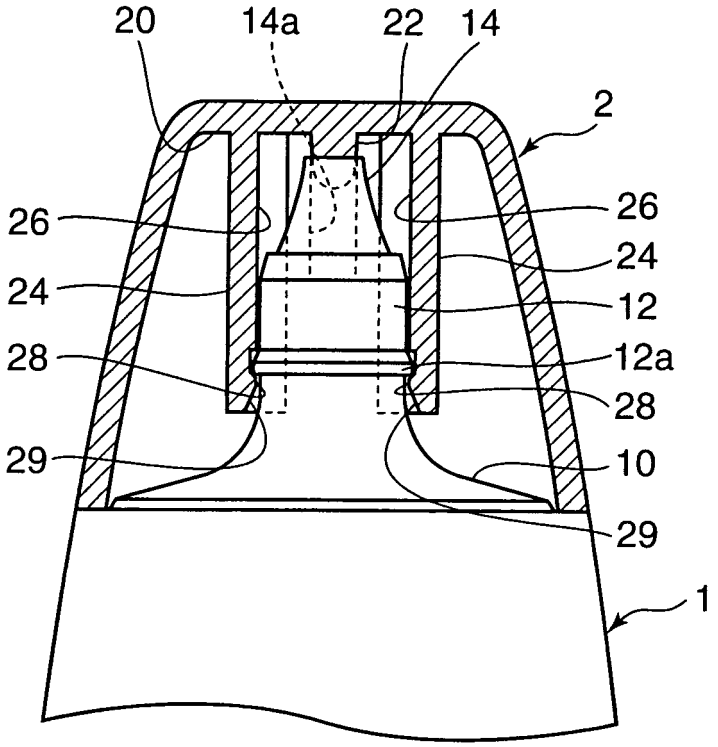


FIG.5

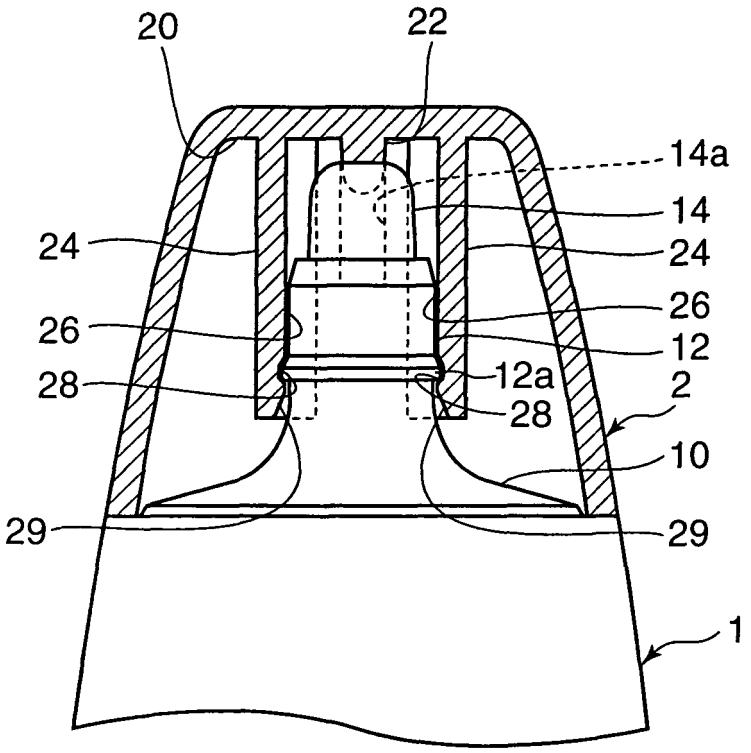
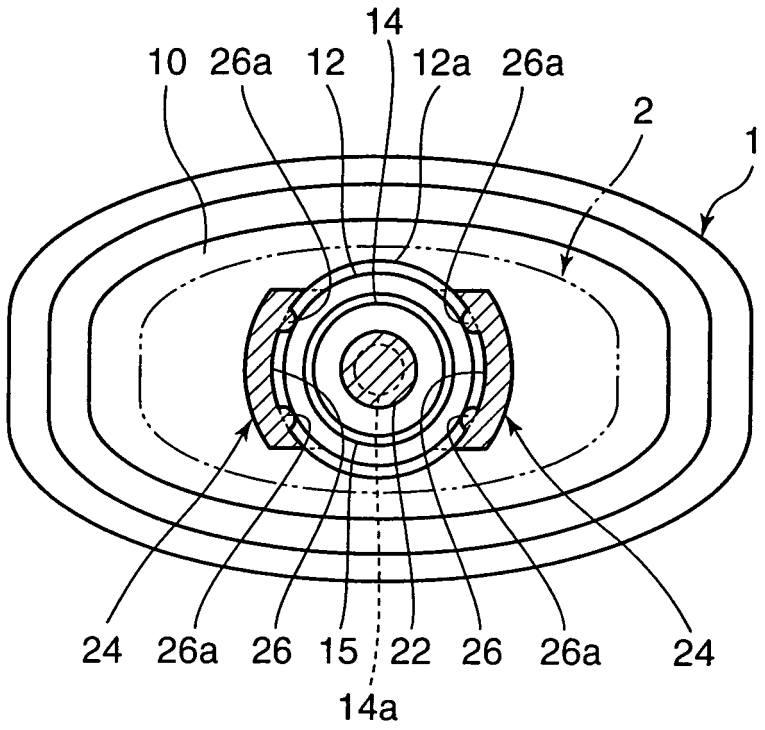


FIG.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2009/056601

A. CLASSIFICATION OF SUBJECT MATTER
B65D47/18(2006.01)i, *A61J1/05*(2006.01)i, *B65D1/02*(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)
B65D47/18, A61J1/05, B65D1/02

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 1996-2009
Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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	JP 10-329855 A (Lion Corp., Yoshino Kogyosho Co., Ltd.), 15 December, 1998 (15.12.98), Column 4, line 23 to column 5, line 32; Fig. 3 (Family: none)	1-4
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 113243/1982(Laid-open No. 19542/1984) (Lion Corp.), 06 February, 1984 (06.02.84), Page 4, line 11 to page 5, line 15; Fig. 6 (Family: none)	1-4

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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12 June, 2009 (12.06.09)	23 June, 2009 (23.06.09)
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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-321758 A (Yoshino Kogyosho Co., Ltd.), 05 November, 2002 (05.11.02), Column 2, lines 12 to 16; Fig. 1 (Family: none)	4

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 10329855 A **[0005]**
- JP 2004196417 A **[0005]**