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

(11) EP 0 725 012 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.08.1996 Bulletin 1996/32

(51) Int Cl.[6]: **B65D 50/04**

(21) Application number: **96300651.5**

(22) Date of filing: **30.01.1996**

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **02.02.1995 JP 35895/95**
28.04.1995 JP 127441/95

(71) Applicant: **CANYON CORPORATION**
Tokyo (JP)

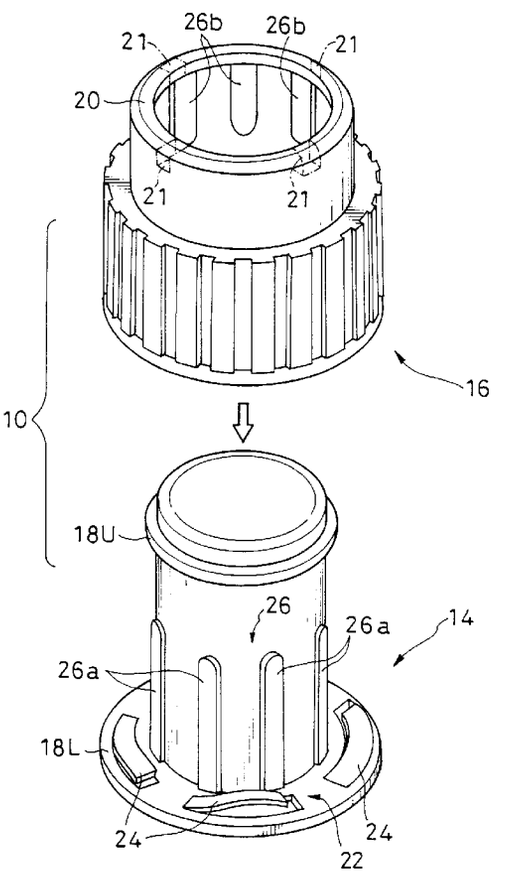
(72) Inventors:
- **Tada, Tetsuya**
  Tokyo (JP)
- **Murao, Keizo**
  Ube-shi, Yamagushi-Ken (JP)

(74) Representative: **Greenwood, John David et al**
Graham Watt & Co.
Riverhead
Sevenoaks Kent TN13 2BN (GB)

(54) Bottle cap with a child-proof mechanism

(57) A bottle cap (10) comprising a cap body (14) and a ring (16). The cap body (14) can be mounted on the neck of a container. The ring (16) is mounted on the cap body (14) and can be rotated. Usually, the ring (16) is pushed upward by the leaf springs (24) formed integral with a flange (18L) which is provided at the lower end of the cap body (14). Two groups of vertical projections (26a, 26b) are provided on the outer surface of the cap body (14) and the inner surface of the ring (16), respectively. While the ring (16) remains at the usual position, the projections (26b) formed on the ring (16) are spaced apart from the projections (26a) formed on the cap body (14), and the cap body (14) does not rotate even if the ring (16) is rotated. When the ring (16) is pushed down against the bias of the leaf springs (24), the projections (26b) of the ring (16) come into engagement with the projections (26a) of the cap body (14). In this condition, the cap body (14) can rotate as the ring (16) is rotated, whereby the bottle cap (10) can be attached to and removed from the neck of the container.

FIG. 1



EP 0 725 012 A1

Description

The present invention relates to a bottle cap adapted to be attached to the neck of a container, in screw engagement therewith.

Various types of containers made of plastics or glass are used to contain medicine, spices, food, soft drinks, liquids (e.g., shampoo), pills, powder and the like. The top portion of each container is narrowed, forming a neck. The neck has a male screw in its outer surface. A cap is attached to the neck, in screw engagement therewith. The cap is generally known as "bottle cap".

Generally, a bottle cap is attached to the neck of the container, sealing the interior of the container from outside and preventing liquid from leaking out of the container and moisture from entering the container. The bottle cap is also used to connect to the neck of the container a trigger-type dispenser (e.g., the dispenser disclosed in U.S. Patent No. 4,982,900) and a pump-type dispenser (e.g., the dispenser disclosed in U.S. Patent No. 5,219,098).

Every time the trigger on a trigger-type dispenser is squeezed, the liquid is ejected from the container in the form of a jet, spray or foam jet. Similarly, when the push button on a pump-type dispenser is pushed, the liquid is ejected from the container in the form of a jet, spray or foam jet.

The bottle cap is used in great numbers because it can be easily attached to the neck of a container when it is rotated only once. This means, however, that the bottle cap may be easily removed from the neck of the container when it is turned only once.

The liquid, powder or the like contained in the container may be one which is harmful when taken in large quantities (e.g., medicines) or one which is harmful when applied to eyes or skin (e.g., insecticides or detergents). Cares should therefore be taken to prevent the content from leaking out of the container. When a user topples or drops the container by mistake, the bottle cap may get loose, possibly allowing the harmful content to contact the user and causing injury.

When a dispenser is connected by the bottle cap to the neck of the container, the container is more likely to topple over than otherwise. This is because the center of gravity of the entire structure is located at an upper position. Further, the smaller the amount of, for example, liquid contained in the container, the higher the possibility that the container topples over.

Infants may remove the bottle cap from the neck of the container and may take an excessive amount of the medicine or the like from the container, when their parents fail to keep watching them. To make matters worse, children cannot correctly distinguish things edible from things inedible. They may remove the bottle cap from the neck of, for example, a medicine container which contains buttons instead, and may take some buttons out of the container and swallow buttons.

It is therefore essentially required that the container be put out of children's reach.

Recently it is demanded that any bottle cap be equipped with a mechanism which prevents serious accident when children manipulate the bottle cap. This type of a mechanism is called "child-proof mechanisms".

Products equipped with child-proof mechanisms are commercially available in various fields. The child-proof mechanism on each product works in normal condition, inhibiting the product from being used for its own function and, thus, protecting children against serious accidents. After the child-proof mechanism is released, the product can then perform its function.

Certainly the product with a child-proof mechanism serves well to protect children against accidents. However, it would not perform its proper function unless and until the child-proof mechanism is released. It may be cumbersome and time-consuming for the user to release the mechanism. If so, the product will be far from easy to use. The product of this type should therefore be designed so as to protect children against accidents and the child-proof mechanism easily released.

The present invention is claimed in the claims.

An embodiment of the present invention comprises two components, i.e., a cap body and a ring. The cap body is adapted to be attached to the neck of a container in screw engagement therewith. The ring is rotatably mounted on the cap body. The ring is usually at its upper position with respect to the cap body. While at the upper position, the ring can rotate, but not rotating the cap body.

When the ring is pushed down to its lower position, it comes into engagement with the cap body. For example, a projection formed on the inner surface of the ring abuts on a projection formed on the outer surface of the cap body. Once set in engagement with the ring, the cap body is rotated as the user rotates the ring.

As long as the ring remains at the upper (usual) position, it is rotated, without rotating the cap body. However much the ring is rotated, the cap body is neither loosened nor removed from the neck of the container. Should the container be toppled over or dropped by mistake, the content would not leak or spill out of the container, provided that the ring is set at the upper position. Furthermore, should children happen to rotate the ring, the content would not leak or spill from the container, thus protecting the children from serious accidents, so long as the ring stays at the upper position.

Nonetheless, the cap body can be easily rotated by rotating the ring while pushing the ring down to the lower position. Thus, it is easy for the user to release the child-proof mechanism.

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is an exploded perspective view of a bottle

cap according to an embodiment of the present invention;

FIG. 2A is a front view of a cap body of the bottle cap shown in FIG. 1;

FIG. 2B is a bottom plan view of the cap body of the bottle cap;

FIG. 2C is a sectional view of the cap body, taken along line C-C in FIG. 2B;

FIG. 3A is a front view of a ring of the bottle cap shown in FIG. 1;

FIG. 3B is a vertical sectional view of the ring of the bottle cap;

FIG. 4A is a sectional view of the bottle cap, showing the ring set at the upper position;

FIG. 4B is a sectional view of the bottle cap, showing the ring pushed down to the lower position;

FIG. 4C is an enlarged sectional view of that part of the bottle cap which is indicated by an arrow in FIG. 4A;

FIG. 5 is an exploded perspective view of the bottle cap according to another embodiment of the invention;

FIG. 6A is a sectional view of the bottle cap shown in FIG. 5, showing the ring set at the upper position;

FIG. 6B is a sectional view of the bottle cap shown in FIG. 5, showing the ring pushed down to the lower position;

FIG. 7A is a sectional view of a part of the bottle cap shown in FIG. 5, showing the ring being rotated in the tightening direction before pushed down to the lower position;

FIG 7B is a sectional view of a part of the bottle cap shown in FIG. 5, showing the ring being rotated in the loosening direction before pushed down to the lower position;

FIG. 8 is a sectional view of a part of the bottle cap shown in FIG. 5, showing the ring after pushed down to the lower position.

FIGS. 1 to 4C illustrate a bottle cap 10 according to a first embodiment of this invention. As shown in FIG. 1, the bottle cap 10 comprises two components, i.e., a cap body 14 and a ring 16. The cap body 14 has a female screw 14a on its inner surface. It may be mounted on the neck 13 of a container 12, with the female screw 14a set in engagement with the male screw formed on the outer surface of the neck 13 (see FIGS. 4A and 4B). The ring 16 is mounted on the cap body 14, pushed downwards in the direction of the arrow shown in FIG. 1. Both the cap body 14 and the ring 16 are made of plastics such as polypropylene by means of injection molding. Alternatively, they may be made of other material such as glass, metal, ceramics and the like.

As can be well understood from FIG. 1 and FIGS. 2A to 2C, two stoppers 18U and 18L are provided at the upper and lower ends of the cap body 14, respectively, for preventing the ring 16 from slipping off the cap body 14. The stopper 18L is a flange formed integral with the lower end of the cap body 14, whereas the stopper 18U is a ring wrapped around the upper end of the cap body 14. The stoppers 18L and 18U, each being a single component, may be replaced by one of any other type, for example a stopper comprised of discrete projections.

As can be better seen from FIG. 1 and FIGS. 3A and 3B, the ring 16 consists of a thin upper half and a thick lower half, having a stepped portion at the junction of the halves. The top of the ring 16 has an annular extension 20. The lower half of the ring 16 is knurled on its outer surface so that it may be firmly gripped.

As shown in FIG. 4A, the ring 16 is mounted on the cap body 14, pushed down beyond the stopper 18U which is provided at the upper end of the cap body 14. Once mounted on the body cap 14, the ring 16 can hardly be pulled up and removed from the body cap 14. The upper edge 18' of the stopper 18U of the cap body 14 is inclined, forming a guide surface, and the lower edge 20' of the annular extension 20 of the ring 16 is inclined, forming a guide surface. It is therefore easy to mount the ring 16 on the cap body 14. On the other hand, the lower edge 18U" of the annular extension 20 is horizontal, and the upper edge 20" of the ring 16 is also horizontal. This reliably prevents the ring 16 from being removed from cap body 14.

The guide surfaces (i.e., the upper edge 18U' of the stopper 18U and the lower edge 20' of the annular extension 20) may be curved, not inclined, to facilitate the mounting of the ring 16 onto the cap body 14.

The annular extension 20 of the ring 16 may have notches 21 as shown in FIG. 1. If the extension 20 has notches 21, it can more easily be bent than otherwise. This would render it easier to push down the ring 16 on the cap body 14, beyond the stopper 18U provided at the upper end of the cap body 14.

As illustrated in FIG. 1, the bottle cap 10 is equipped with a child-proof mechanism 22. The mechanism 22 comprises bias means 24 and engagement means 26. The bias means 24 biases the ring 16 upward, pressing the ring 16 onto the stopper 18U of the cap body 14. The engagement means 26 allows the cap body 14 to rotate when the ring 16 is rotated.

As mentioned above, the cap body 14 is made of plastics by means of injection molding, and the stopper 18L is a flange formed integral with the lower end of the cap body 14. Formed integral with the stopper 18L are a plurality of leaf springs 24, which constitute the bias means. The leaf springs 24 are spaced apart at equal angular intervals so as to apply a bias uniformly to the ring 16. To be more precise, four leaf springs 24 are spaced apart at angular intervals of 90°, as is best shown in FIG. 2B. The bias means 24 may have two, three, five, or more leaf springs, instead of four, which are spaced apart at equal angular intervals.

Biased upward by the bias means (leaf springs) 24, the ring 16 is pressed onto the stopper 18U of the cap body 14. Thus, the ring 16 assumes a usual position as shown in FIG. 4A.

Integral with the cap body 14, the leaf springs 24 can be made by injection molding, simultaneously with the cap body 14. No leaf springs separated from the cap body 14 are required at all. The leaf spring 24 may, of course, be replaced by leaf springs which are secured by fusing, for example, to either the flange 18L of the cap body 14 or the lower end of the ring 16.

The bias means 24 is not limited to leaf springs, provided that it pushes the ring 16 upward onto the stopper 18U. For instance, it may comprise compression coil spring 24' interposed between the lower end of the ring 16 and the flange 18L as indicated in FIG. 2A. Alternatively, it may be a cylindrical spring made of plastics, and annular waving spring, or a rubber ring having many holes and made elastic, interposed between the lower end of the ring 16 and the flange 18L.

As indicated above, the bias means 24 is provided between the flange 18L of the cap body 14 and the lower end of the ring 16. Instead, an annular extension may be formed on the inner surface of the ring 16, and the bias means 24 may be interposed between this annular extension and the flange 18L so as to apply a bias to the annular extension.

The engagement means 26 is constituted by two groups of vertical projections. The projections 26a of the first group are formed on the outer surface of the cap body 14, while the projections 26b of the second group are formed on the inner surface of the ring 16, respectively. The projections 26a and 26b are spaced apart in direction as long as the ring 16 remains in the usual position as shown in FIG. 4A. The projections 26b comes into engagement with the projections 26a when the ring 16 is pushed down as shown in FIG. 4B against the bias of the leaf springs (bias means) 24.

The projections 26a and 26b which constitute the engagement means 26 can be formed integral with the cap body 14 and the ring 16, respectively, in the case where both components 14 and 16 are made of plastics by means of injection molding.

The projections 26a and 26b remain out of engagement as long as the ring 16 stays at the usual position due to the upward bias the leaf springs 24. when the ring 16 is rotated in this condition, its rotation is not transmitted to the cap body 14. Therefore, the cap body 14 is not rotated at all. when the ring 16 is rotated while being pushed down against the bias of the leaf springs (bias means) 24, the rotation of the ring 16 is transmitted to the cap body 14 since the projections 26b are now set in engagement with the projection 26a. As a result, the cap body 14 is rotated as the ring 16 is rotated.

The child-proof mechanism 22 prevents the cap body 14 from rotating on the neck 13 of the container 12 when the ring 16 is rotated while staying at the usual position. The mechanism 22 allows the cap body 14 to rotate when the ring 16 is rotated while kept pushed down, whereby the cap body 14 can be loosened or removed from the neck 13 of the container 12.

Children may rotate the ring 16 on the cap body 14, but would not rotate the ring 16 while keeping it pushed down. Hence, the bottle cap 10 would be neither loosened nor removed from the neck 13 of the container 12. The child-proof mechanism 22 can reliably protect children from serious accidents.

Moreover, when the container 12 is toppled over or is dropped onto the floor, it is next to impossible that the ring 16 is pushed down and rotated at the same time. In this case, too, there is no danger that the bottle cap 10 is unnecessarily loosened or removed from the neck 13 of the container 12.

As described above, the child-proof mechanism 22 performs its function as long as the ring 16 remains at its usual (upper) position. While at the usual position, the ring 16 can be rotated but would not rotate the cap body 14 at all. The bottle cap 10 would not be unnecessarily loosened or removed from the neck 13 of the container 12 even if the container is toppled over or dropped or if a child tries to loosen or remove it from the neck of the container. Thus, the mechanism 22 reliably prevents serious accidents.

To mount the bottle cap 10 onto the neck 13 of the container 13 or remove it therefrom, it suffices to rotate the ring 16 while keeping the ring 16 pushed down at the lower position. In other words, the child-proof mechanism 22 is released merely by pushing down the ring 16 from the usual position, enabling the bottle cap 10 to perform its own function smoothly.

The bottle cap 10, i.e., the first embodiment of the invention is still simple in structure, though equipped with the child-proof mechanism 22 which can be released merely by pushing the ring 16 down from the usual position.

Bottle caps are automatically attached to the necks of containers 12 in most cases. The bottle cap 10 according to the first embodiment of the invention can be readily attached to the neck 13 of the container 12 in automatic procedure, too. This is because the ring 16 only needs to be rotated while kept pushed downwards, so as to be mounted on the neck 13 of the container 12 in screw engagement therewith.

The engagement means 26 may be of any structure other than the above-described one which comprises projections 26a and 26b, provided that it set the ring 16 into engagement with the cap body 14.

It suffices for a child-proof mechanism to prevent a bottle cap from being loosening or removed from the neck of a container when the container is toppled over or dropped or when children try to loosen or remove the bottle cap from the neck of the container. Therefore, the child-proof mechanism may be designed to allow the bottle cap to rotate in one direction to be tightened, but not in the opposite direction without being released.

A bottle cap 110 with a child-proof mechanism 122 of this type, which is a second embodiment of the invention, will be described with reference to FIGS. 5 to 8.

As shown in FIGS. 5 and 6A, the bottle cap 110 comprises two components, i.e., a cap body 114 and a ring

116. As in the first embodiment, the cap body 114 has a female screw 114a on its inner surface. Two stoppers 118U and 118L are provided at the upper and lower ends of the cap body 114, respectively, for preventing the ring 116 from slipping out of the cap body 14. The stopper 118U is shaped like an umbrella, whereas the stopper 18L is a flange formed integral with the lower end of the cap body 14. The ring 116 is mounted on the cap body 14, pushed down beyond the stopper 118U.

The top of the ring 116 has an annular extension 120. The annular extension 120 abuts on the stopper 118U of the cap body 114, whereby the ring 116 is prevented from falling. The stopper 11 8U need not be shaped like an umbrella, provided that it prevents the ring 116 from falling down. Hence, the stopper 118U may be a ring which is wrapped around the upper end of the cap body 114, like the stopper 18U used in the first embodiment.

Both the cap body 114 and the ring 116 are made of plastics such as polypropylene by means of injection molding.

The child-proof mechanism 122 comprises a plurality of leaf springs 28 which are formed integral with the flange 118L of the cap body 114. The leaf springs 28 function as bias means. Each leaf spring 28 is secured at one end to the upper surface of the flange 118L and has a projection 28a at the free end. The projections 28a abut on the surface 30 of a stepped portion provided on the inner surface of the ring 116. The leaf springs 28 therefore bias the ring 116 upwards.

The leaf springs (bias means) 28 are spaced apart at equal angular intervals so as to apply a bias uniformly to the ring 116. To be more precise, four leaf springs 28 are spaced apart at angular intervals of 90°. The number of springs 28 is not limited to four. Instead, two, three, five, or more leaf springs may be formed integral with the flange 118L, spaced apart at equal angular intervals.

Contacting the projections 28a provided at the free ends of the leaf springs 28, the ring 116 is pressed onto the stopper 118U of the cap body 114 as illustrated in FIG. 6A. The ring 116 assumes a usual position as shown in FIG. 6A.

As can be understood from FIGS. 7A and 7B, the surface 30 of the stepped portion provided on the inner surface of the ring 116 has vertical portions 30a. The projections 28a provided at the free ends of the leaf springs 28 abut on the vertical portions 30a when the ring 116 is rotated in the direction to tighten the bottle cap 110 on the neck 13 of a container. The projections 28a and the vertical portions 30a of the surface 30 constitute first engagement means of the bottle cap 110. Namely, the leaf springs 28 function not only as bias means, but also as part of the first engagement means.

When the ring 116 is rotated in the direction of the arrows shown in FIG. 7A, the cap body 114 is rotated in the same direction, since the projections 28a provided at the free ends of the leaf springs 28 which are formed integral with the cap body 114 abut on the vertical portions 30a of the surface 30. As a result of this, the bottle cap 110 is tightened on the neck 13 of the container 12.

As shown in from FIGS. 7A and 7B, too, the surface 30 of the stepped portion provided on the inner surface of the ring 116 has inclined portions 30b, each facing one vertical portion 30a. The inclined portions 30b allow the ring 116 to rotate in the direction indicated by the arrow shown in FIG. 7B, without rotating the cap body 116 in the same direction. More specifically, when the ring 116 is rotated to loosen the bottle cap 110 on the neck 13 of the container 12, while remaining at the usual position shown in FIG. 6A due to the upward bias of the leaf springs 28, the leaf springs 28 are bent down as the projections 28a slip on the inclined portions 30b of the surface 30. Therefore, the ring 116 rotated, but would not rotate the cap body 114 at all.

As seen from FIG. 5, teeth 32a are provided on the outer surface of the cap body 114, and teeth 32b are provided on the inner surface of the ring 116. More correctly, the teeth 32a are formed on the upper end of the stepped portion of the cap body 114, while the teeth 32b are provided on the lower end of the annular extension 120. The teeth 32b come into engagement with the teeth 32a when the ring 116 is pushed down against the bias of the leaf springs 28. The teeth 32a and the teeth 32b constitute second engagement means 32.

As can be understood from FIG. 8, the teeth 32a and 32b are formed such that any teeth 32b on the ring 116 abuts on the vertical edge of one teeth 32a on the cap body 114 when the ring 116 is rotated to loosen the bottle cap 110 while being kept pushed down. Thus, the teeth 32b can be easily set in firm engagement with the teeth 32a as the ring 116 is rotated to loosen the bottle cap 110.

As long as the ring 116 stays at the usual positions biased upward by the leaf springs 28, as shown in FIGS. 6A, 7A and 7B, the teeth 32b are out of engagement with the teeth 32a. In this condition, the projections 28a provided at the free ends of the leaf springs 28 contact either the vertical portions 30a or inclined portions 30b of the surface 30 of the stepped portion which is provided on the inner surface of the ring 116. If the ring 116 is rotated to loosen the bottle cap 110 as shown in FIG. 7B, its rotation is not transmitted to the cap body 114, preventing the cap body 114 from rotating to loosen the bottle cap 110. On the other hand, if the ring 116 is rotated to tighten the bottle cap 110 as shown in FIG. 7A, its rotation is transmitted to the cap body 114. allowing the cap body 114 to rotate to tighten the bottle cap 110.

when the ring 116 is pushed down from the usual position, against the bias of the leaf springs 28, the teeth 32b come into engagement with the teeth 32a as shown in FIG. 6B and FIG. 8. As the ring 116 is rotate in this condition to loosen the bottle cap 110, the cap body 114 is rotated in the same direction. The bottle cap 110 is thereby loosened and can be removed from the neck 13 of the container 12.

The child-proof mechanism 122 described above

inhibits the bottle cap 110 from rotating to be loosened on the neck 13 of the container 12 when the ring 116 is rotated to loosen the bottle cap 110, while remaining at its usual position. The mechanism 122 enables the bottle cap 110 to be rotated to be loosened or removed from the neck 13 of the container 12, when the ring 116 is rotated to loosen the cap 110 while being kept pushed down to its lower position.

The child-proof mechanism 122 performs its function as long as the ring 116 remains at its usual (upper) position. While at the usual position, the ring 116 can be rotated to tighten the bottle cap 110, but cannot be rotated to loosen the bottle cap 110 on the neck 13 of the container 12 or to remove the bottle cap 110 therefrom. The bottle cap 110 would not be unnecessarily loosened or removed from the neck 13 of the container 12 even if the container is toppled over or dropped or if a child tries to loosen or remove it from the neck 13 of the container 12. The mechanism 122 reliably prevents serious accidents.

To attach the bottle cap 110 to the neck 13 of the container 12, the user only needs to rotate the ring 116 in the direction to tighten the bottle cap 110. It is unnecessary for him or her to push the ring 116 down from the usual position to the lower position. In other words, the bottle cap 110 can be tightened on the neck 13 of the container 12, without pushing down the ring 116, and can therefore be more easily attached to the neck 13 ofthe container 12.

Furthermore, the bottle cap 110 can be automatically attached to the neck 13 of the container 12 as easily as the conventional ones. This is because the bottle cap 110 can be tightened on the neck 13 only by rotating the ring 116.

The teeth 32a and the teeth 32b ofthe second engagement means 32 serve not only to keep the ring 116 in engagement with the cap body 114 while the ring 116 is being rotated to loosen the bottle cap 110. But also do they serve to transmit the rotation of the ring 116 to the cap body 114 while the ring 116 is being rotated to tighten the bottle cap 110. It is therefore possible to attach the bottle cap 110 to the neck 13 of the container 12, while the ring 116 is being set at the lower position. That is, the bottle cap 110 can be easily attached to the neck 13, no matter whether the ring 116 takes the usual (upper) position or the lower position.

The teeth 32a and the teeth 32b, which constitute the second engagement means 32, need only to engage together when the ring 116 is pushed down against the upward bias of the leaf springs 28. Hence, their shape is not limited to the one illustrated in FIGS. 7A, 7B and 8. Moreover, the teeth 32a and 32b may be replaced by vertical projections of the same type as the projections 26a and 26b used in the first embodiment.

The embodiments described above are no more than examples for illustrating the present invention, not limiting the invention at all. Needless to say, various changes and modifications can be made within the technical scope of the present invention.

In the present invention, the child-proof mechanism performs its function as long as the ring remains at its usual (upper) position. While at the usual position, the ring can be rotated, but cannot rotate the cap body. Thus, the bottle cap would not be unnecessarily loosened or removed from the neck of the container even if the container is toppled over or dropped or if a child tries to loosen or remove it from the neck of the container. Therefore, the child-proof mechanism reliably prevents serious accidents.

The child-proof mechanism is released, merely by pushing the ring down from the usual position. Once the mechanism is thus released, the ring can rotate the cap body as it is rotated. Namely, the ring can perform its own function, to attach the bottle cap to the neck of the container and remove the bottle cap therefrom.

In addition, the bottle cap according to the invention is still simple in structure, though equipped with a child-proof mechanism which can be released only by pushing the ring down from the usual position.

Moreover, the present invention can provide a bottle cap equipped with a child-proof mechanism which performs its function when the ring is rotated to loosen the bottle cap on the neck of a container, This child-proof mechanism makes it possible to tighten the bottle cap on the neck of the container, without the necessity of pushing the ring down. It helps to attach the bottle cap to the neck of the container more easily.

Claims

1. A bottle cap comprising a cap body including a female screw adapted to engage with a male screw formed on the neck of a container or the like, a ring rotatably mounted on the cap body, and a child-proof mechanism for preventing the cap body from being rotated together with the ring, in which:

   the cap body (14) further includes upper and lower stoppers (18U, 18L) provided at upper and lower ends, respectively, to prevent the ring (16) from slipping off the cap body (14),
   the ring (16) is located between the upper and lower stoppers (18U, 18L) of the cap body (14); and
   the child-proof mechanism (22) includes bias means (24) biasing the ring (16) upward onto the upper stopper (18U) of the cap body (14), and engagement means (26) for connecting the ring (16) to the cap body (14) to rotate the cap body (14) together with the ring (16).

2. A bottle cap comprising a cap body including a female screw adapted to engage with a male screw formed on the neck of a container or the like, a ring rotatably mounted on the cap body, and a child-

proof mechanism for preventing the cap body from being rotated together with the ring, in which:

the cap body (14) further includes a flange (18L) and a stopper (18U) provided at lower and upper ends, respectively, to prevent the ring (16) from slipping off the cap body (14),
the ring (16) is pushed down beyond the stopper (18U) of the cap body (14) to be located between the stopper (18U) and the flange (18L); and
the child-proof mechanism (22) includes bias means (24) provided between the flange (18L) and the stopper (18U) and biasing the ring (16) upward onto the stopper (18U) of the cap body (14), and engagement means (26) provided between an outer surface of the cap body (14) and an inner surface of the ring (16) for connecting the ring (16) to the cap body (14) to rotate the cap body (14) together with the ring (16), when the ring (16) is pushed down from the stopper (18U) against the bias of the bias means (24).

3. The bottle cap according to claim 2, wherein the bias means (24) comprises leaf springs provided on the flange (18L), contacting a lower end of the ring (16) and pushing the ring (16) upward, and the engagement means (26) comprises a first group of projections (26a) which are provided on the outer surface of the cap body (14) and a second group of projections (26b) which are provided on the inner surface of the ring (16) to engage with the projections (26a) of the first group.

4. The bottle cap according to claim 2, wherein the cap body (14) and the ring (16) are made of plastics by means of injection molding, the bias means (24) comprises leaf springs formed integral with the flange (18L), contacting a lower end of the ring (16) and pushing the ring (16) upward, and the engagement means (26) comprises a first group of projections (26a) which are provided on the outer surface of the cap body (14) and formed integral therewith and a second group of projections (26b) which are provided on the inner surface of the ring (16) and formed integral therewith to engage with the projections (26a) of the first group.

5. The bottle cap according to claim 2, wherein the bias means (24) comprises compression coil spring (24') interposed between the cap body (14) and the ring (16), and the engagement means (26) comprises a first group of projections (26a) which are provided on the outer surface of the cap body (14) and a second group of projections (26b) which are provided on the inner surface of the ring (16) to engage with the projections (26a) of the first group.

6. The bottle cap according to any one of claims 2 to 5, wherein the ring (16) has an extension (20) at an upper end, and a lower edge (20') of the extension (20) and an upper edge (18') of the stopper (18U) are shaped, forming a surface for guiding the ring (16) being pushed down onto the cap body (14).

7. The bottle cap according to any one of claims 2 to 5, wherein the ring (16) has an extension (20) at an upper end, a lower edge (20') of the extension (20) and an upper edge (18') of the stopper (18U) are shaped, forming a surface for guiding the ring (16) being p. shed down onto the cap body (14), notches (21) are made in an edge of the extension (20), rendering the extension (20) able to bend elastically.

8. A bottle cap comprising a cap body including a female screw adapted to engage with a male screw formed on the neck of a container or the like, a ring rotatably mounted on the cap body, and a child-proof mechanism for preventing the cap body from being rotated together with the ring, in which:

the cap body (14) further includes upper and lower stoppers (18U, 18L) provided at upper and lower ends, respectively, to prevent the ring (16) from slipping out of the cap body (14),
the ring (16) is located between the upper and lower stoppers (18U, 18L) of the cap body (14),
the child-proof mechanism (22) includes bias means (24) biasing the ring (16) upward onto the upper stopper (18U) of the cap body (14) and engagement means (26) for connecting the ring (16) to the cap body (14) to rotate the cap body (14) together with the ring (16), when the ring (16) is pushed down from the stopper (18U) against the bias of the bias means (24); and
the cap body (14) and the ring (16) are made of plastics by means of injection molding, the bias means (24) comprises leaf springs formed integral with the lower stopper (18L) provided at the lower end of the cap body (14), contacting a lower end of the ring (16) and pushing the ring (16) upward, and the engagement means (26) comprises a first group of projections (26a) which are provided on the outer surface of the cap body (14) and formed integral therewith and a second group of projections (26b) which are provided on the inner surface of the ring (16) and formed integral therewith to engage with the projections (26a) of the first group.

9. A bottle cap comprising a cap body including a female screw adapted to engage with a male screw formed on the neck of a container or the like, a ring rotatably mounted on the cap body, and a child-proof mechanism for preventing the cap body from being rotated together with the ring, in which :

the cap body (114) further includes a flange (118L) and a stopper (118U) provided at lower and upper ends, respectively, to prevent the ring (116) from slipping out of the cap body (114),
the ring (116) is pushed down beyond the stopper (118U) of the cap body (114) to located between the stopper (118U) and the flange (118L),
the child-proof mechanism (122) includes

bias means (28) serving as first engagement means for engaging with a first surface of the ring (116) to rotate the cap body (114) together with the ring (116) only to tighten the bottle cap, and adapted to abut on a second surface of the ring (116) which is continuous to the first surface, thereby to push the ring (116) upward onto the stopper (118U), and
second engagement means (32) for connecting the ring (116) to the cap body (114) to rotate the cap body (114) together with the ring (116) to loosen the bottle cap, when the ring (116) is pushed down from the stopper (118U) against the bias of the bias means (28); and

the cap body (114) and the ring (116) are made of plastics by means of injection molding, the bias means (28) comprises leaf springs formed integral with the flange (118L) provided at the lower end of the cap body (114), connected at one end to the flange (118L), contacting the second surface of the ring (116) and biasing the ring (116) upward, and the second engagement means (32) comprises a first set of teeth (32a) which are formed on an outer surface of the cap body (114) and a second set of teeth (32b) which are formed on an inner surface of the ring (116) and able to engage with the teeth (32a).

10. The bottle cap according to claim 9, wherein the teeth (32a, 32b) of both sets are formed such that any teeth (32b) on the ring (116) abut on a substantially vertical edge of one teeth (32a) on the cap body (114) when the ring (116) is rotated to loosen the bottle cap while being kept pushed down.

FIG. 1

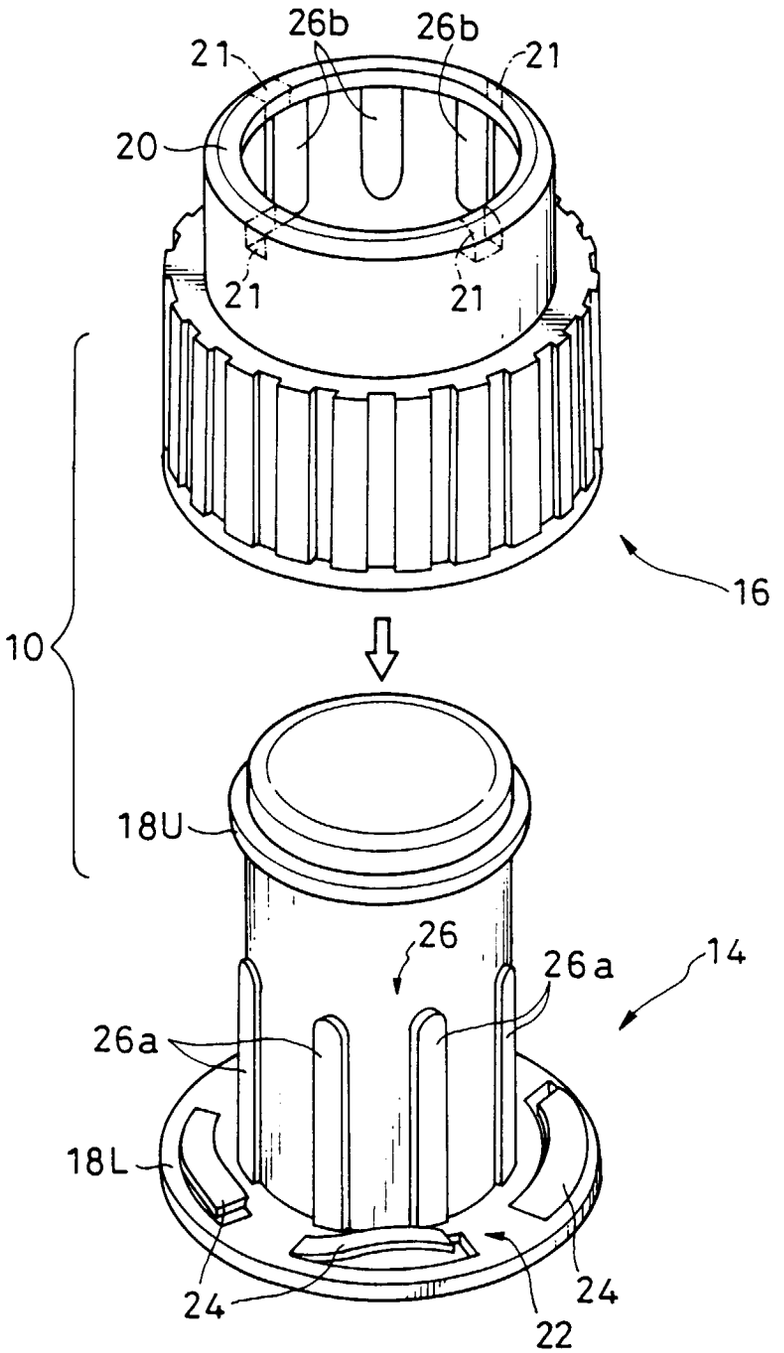


FIG. 2A

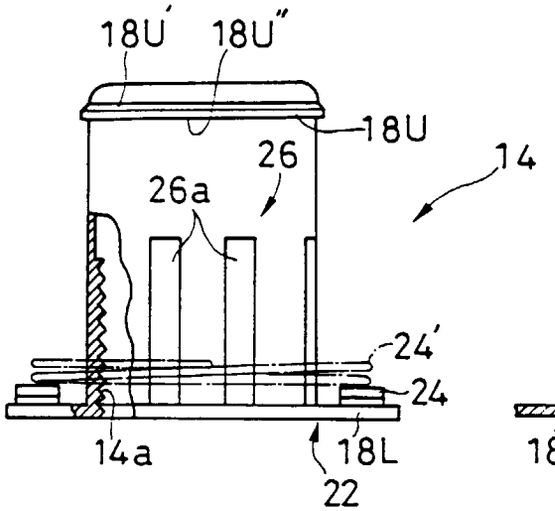


FIG. 2C

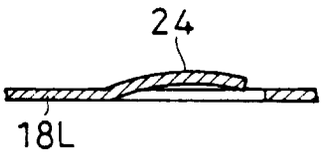


FIG. 2B

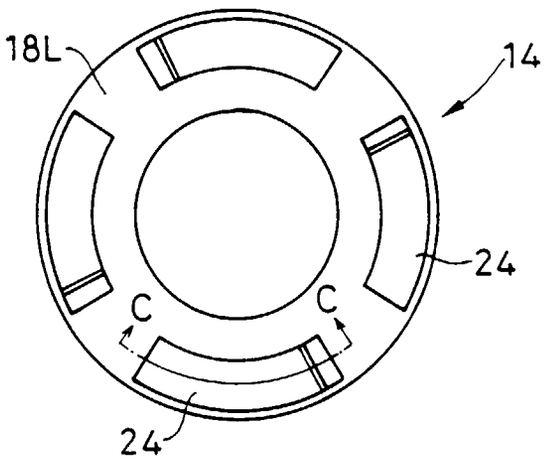


FIG. 3A

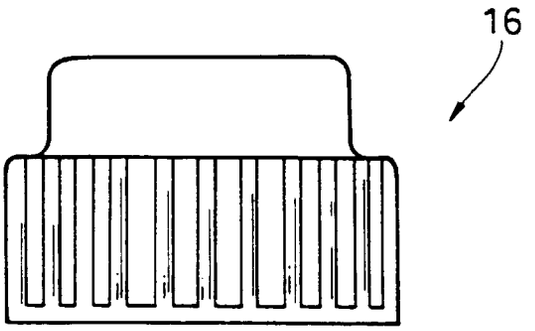
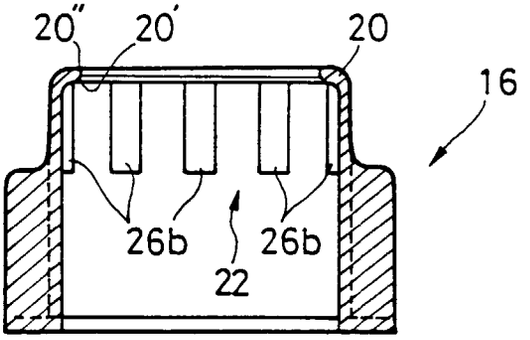


FIG. 3B



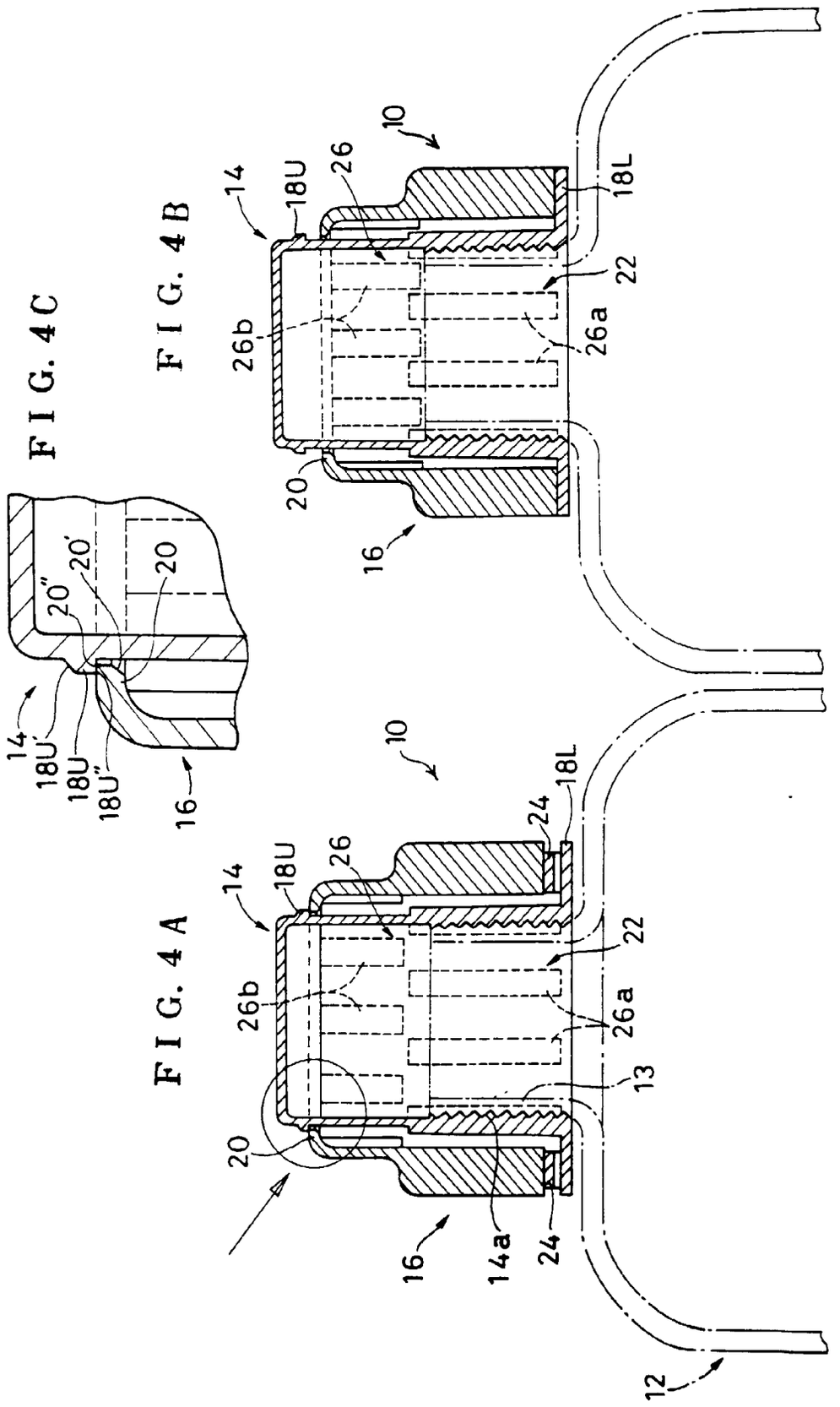


FIG. 4A
FIG. 4B
FIG. 4C
10
12
13
14
14a
16
18U
18U'
18U''
18L
20
20'
20''
22
24
26
26a
26b

FIG. 5

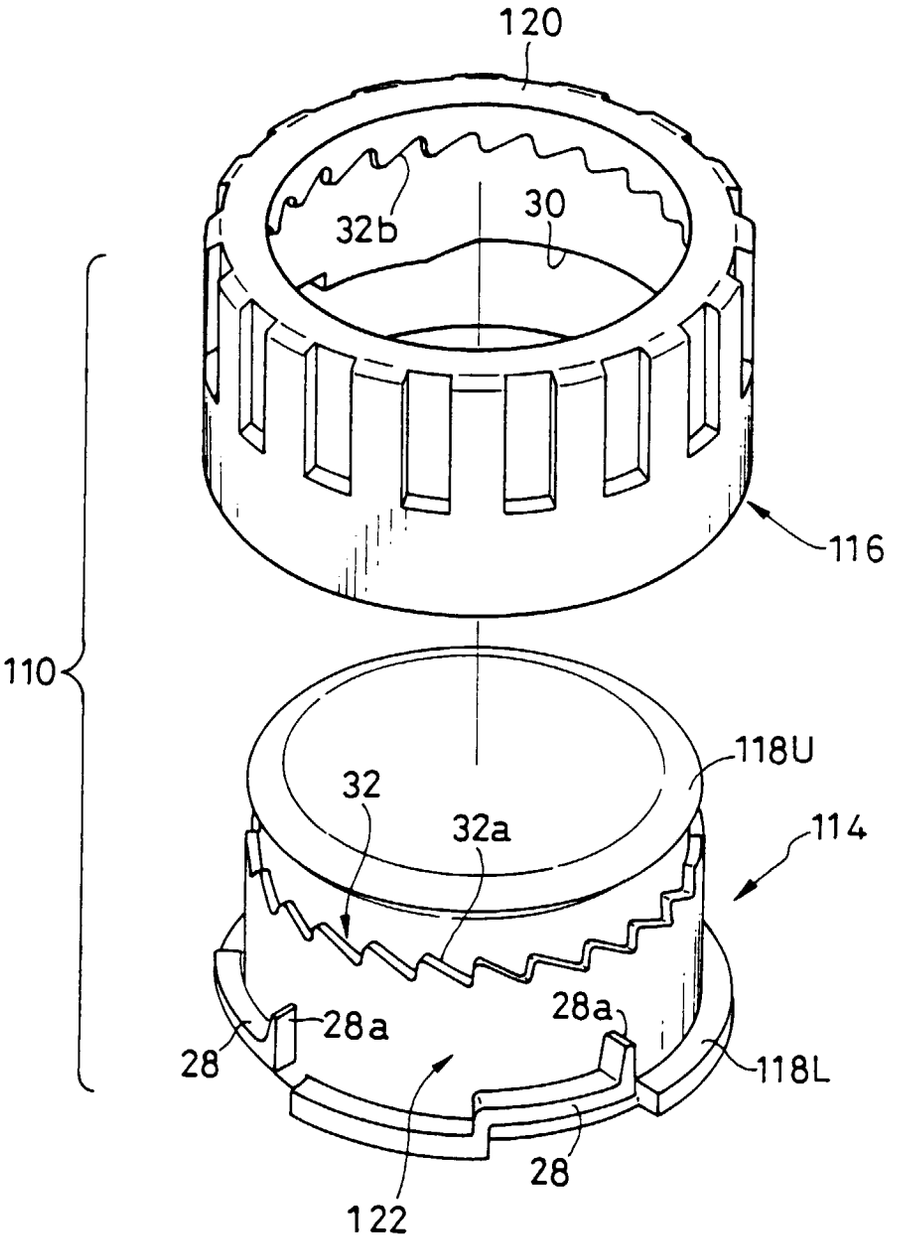


FIG. 6A

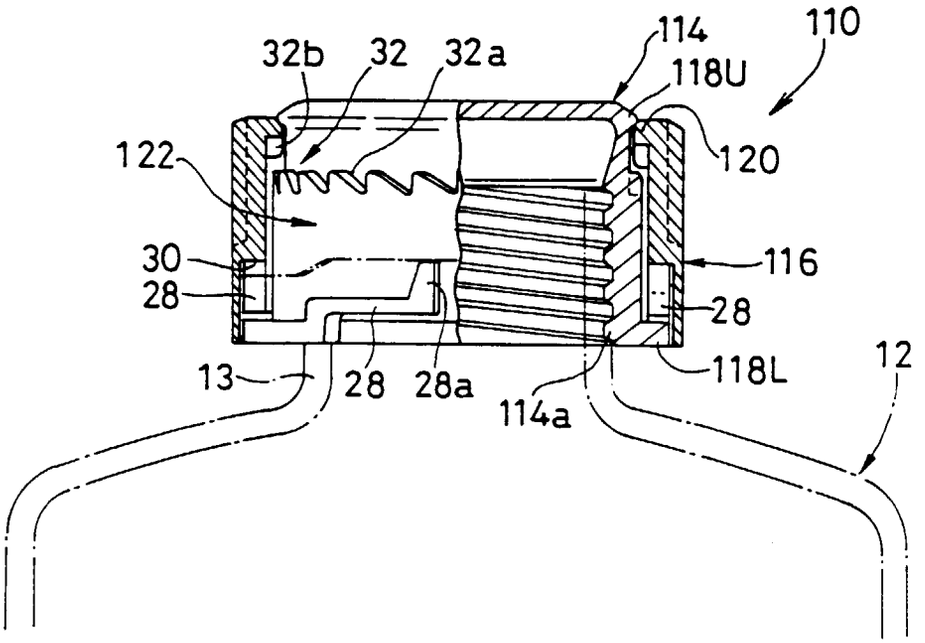

32b
32
32a
114
110
118U
122
120
30
116
28
28
13
28
28a
118L
12
114a

FIG. 6B

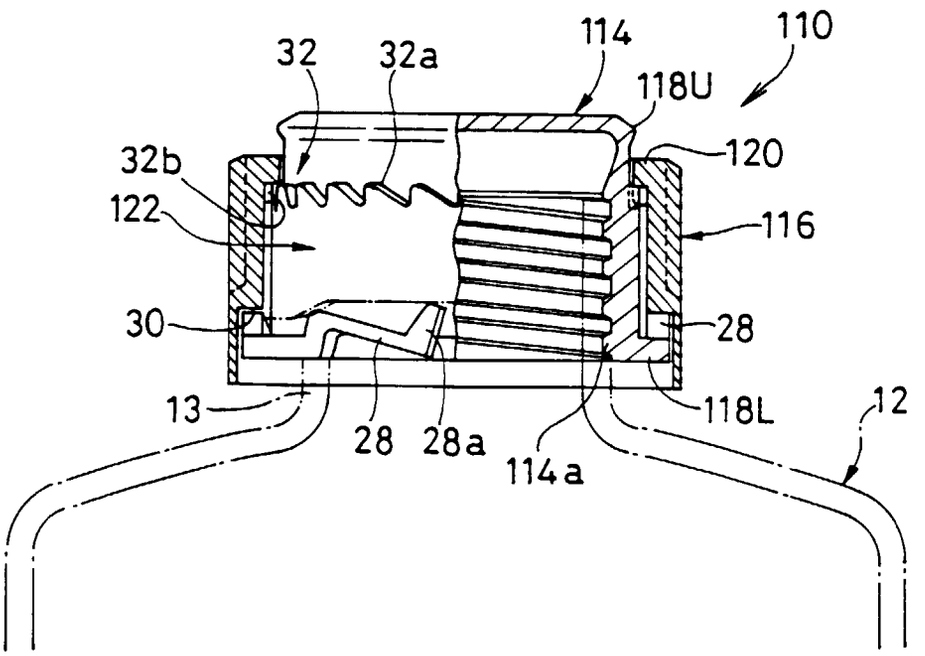

32
32a
114
110
118U
32b
120
122
116
30
28
13
118L
12
28
28a
114a

FIG. 7A

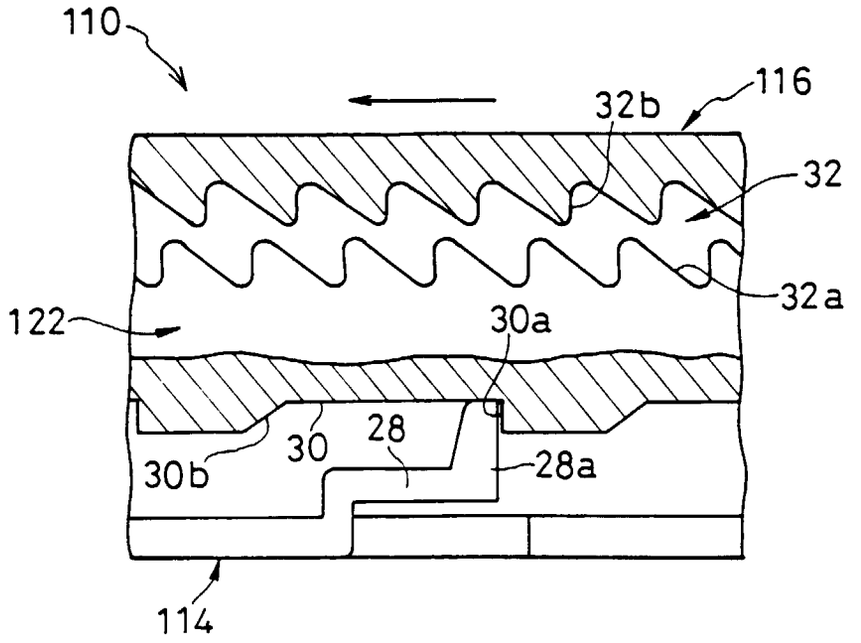

110
116
32b
32
32a
122
30a
30
28
30b
28a
114

FIG. 7B

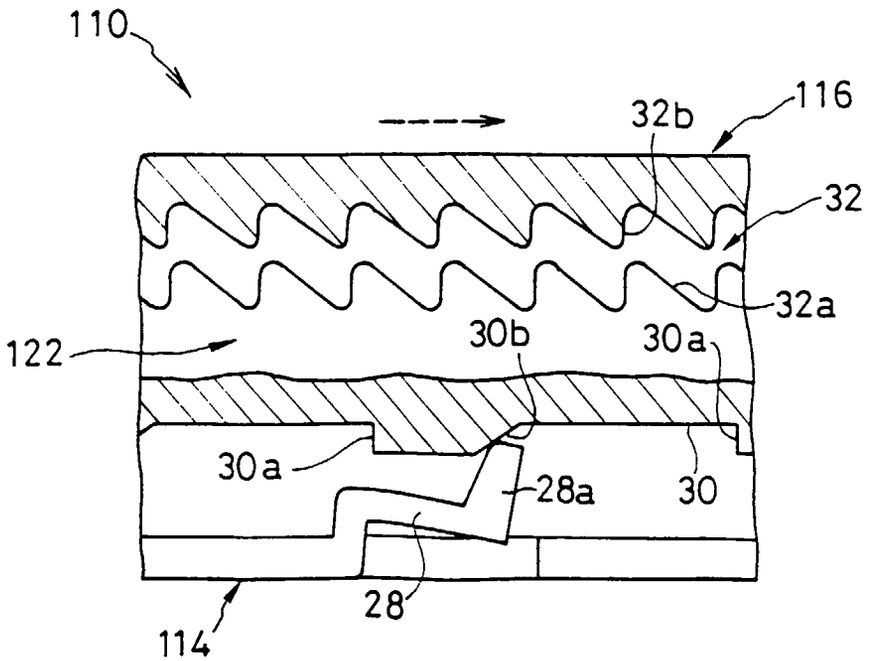
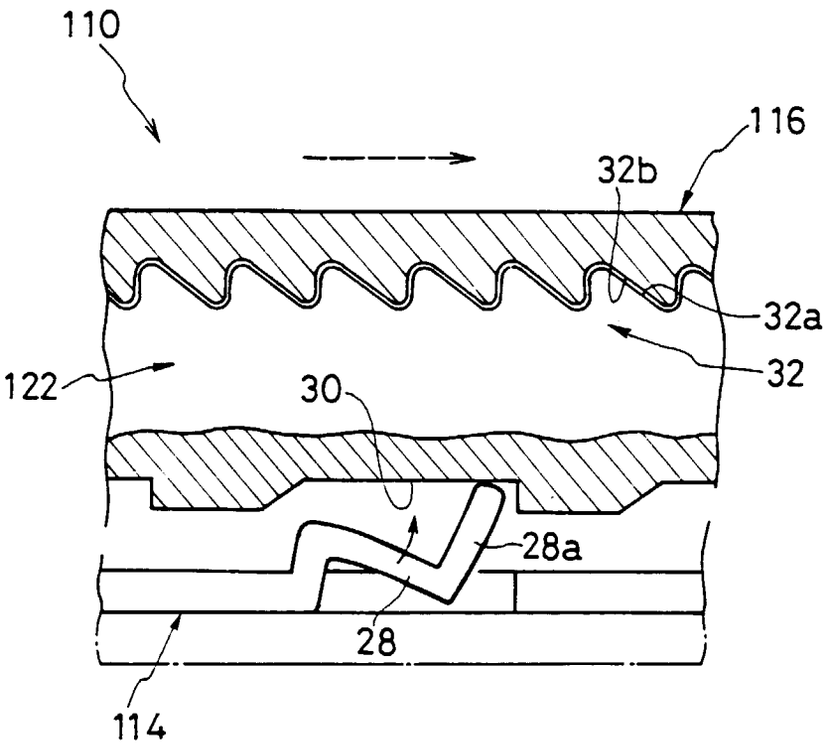

110
116
32b
32
32a
122
30b
30a
30a
28a
30
28
114

FIG. 8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 0651

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR-A-2 663 300 (MOREL) * page 3, line 16 - page 5, line 12; figures 1-3 *	1,2,6	B65D50/04
X Y	US-A-4 634 012 (KELLEY) * column 2, line 55 - column 4, line 6; figures 1-5 *	1,2 3-5,8-10	
X	AU-A-1 561 776 (PETRONELLI) * page 6, line 16 - page 7, line 25; figures 1-5 *	1,2,6	
Y	US-A-5 316 161 (GARGIONE) * column 2, line 39 - column 3, line 8; figures 1-8 *	3,4,8-10	
Y	DE-A-19 06 811 (LEITZ KG) * figures 1,2 *	5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 May 1996	Berrington, N

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