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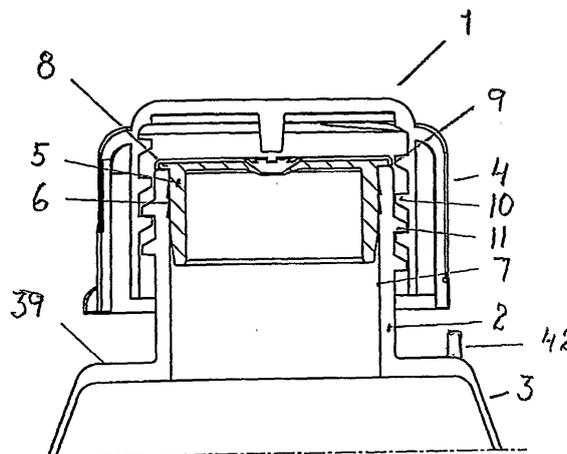
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(54) **Child protecting safety cap with ventilating function**

(57) A capsule (1), which comprises an insert (5), which is mounted on a bottle neck (2), and an outer capsule (4), the outer capsule cooperating with the bottle neck, the outer capsule being caught and locked in its almost closed position by the bottle neck, the capsule then again being able to be opened up, but not until it

has been turned further towards its closed position, a force in this position being applied, which presses inwards two resilient portions (21) on the envelope surface of the outer capsule, the capsule subsequently being able to be opened up, the pressure on the resilient portions being maintained, to a final opened up position.

Fig. 1



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Description

[0001] The present invention relates to a child proof safety capsule of the type described in the preamble of claim 1.

[0002] Such childproof safety capsules can be designed in various ways. The safety capsules, which have been developed during the last few years, will in certain cases be able to meet the requirements of the earlier applicable ISO norm ISO 8317:2003, but it has been found, that these capsules in a few cases, despite this, have resulted in the occurrence of near-accidents.

[0003] Regarding the modern childproof safety capsules - called capsules from now on - there exists also another problem, connected to the containers or bottles - called bottles from now on - , which the modern capsules are mounted on. In a few cases, related to the contents in these bottles, a negative pressure may develop, which the modern capsules cannot counteract. To prevent the negative effects of a negative pressure the usual measure then is to reinforce the bottle, to make the walls of the bottle thicker. This means in its turn, that the modern capsule constructions and their associated bottles must be reinforced to be able to meet the operational requirements, and the final result will be a more expensive bottle.

[0004] The main object of the present invention is to always be able to guarantee a completely satisfactory, reliable protection against an improper opening-up of the capsule and consequently, the bottle has been provided with a neck, which is designed in a special way and which cooperates with the used capsule. Thus, the present invention relates to a combination of a new capsule and a new adapter on the bottle or another type of package.

[0005] The present invention attains substantial improvements regarding the above-mentioned problems or the existing problems and risks have been eliminated. Also, the invention develops the state of the art in this technical field in various respects.

[0006] These improvements are implemented according to the invention by mainly designing a capsule with the matching adapter on the bottle of the type mentioned in the introduction, as is set forth in the characterizing clause of claim 1.

[0007] Additional characterizing features and advantages of the present invention are set forth in the following description, reference being made to the enclosed drawings, which depict a preferred but not limiting embodiment in a partially schematic way.

[0008] The present invention is shown in detail in diametrically opposed axial cross-sections, which are slightly schematic for the sake of clarity:

Fig. 1 shows a cross-sectional view through a capsule, partially mounted on a bottle neck;

Fig. 2a and 2b show exterior and perspective views of the outer capsule on the capsule;

Fig. 3 shows a perspective and cross-sectional view of the insert of the capsule;

Fig. 4 shows views of the bottle neck; and

Fig. 5 shows a sectional view through a capsule with a mounted insert.

[0009] In Fig. 1 a complete childproof capsule is shown, which is mounted on a package, usually some type of bottle 3.

[0010] The complete capsule comprises a bottle neck 2, which constitutes the terminating upper portion of bottle 3. Bottle neck 2 and its construction is described in detail, reference being made to Fig. 4.

[0011] The capsule also comprises an outer capsule 4 and an insert 5. Insert 5 is mounted in bottle neck 2, insert 5 being pressed inwards and downwards in bottle neck 2. The measures on insert 5 and its outer diameter 6 have been tested and chosen, insert 5 being securely fixed against bottle neck 2 and its inner diameter 7, also upper flange portion 8 of the insert, in the ready mounted position, being applied completely tight against bottle neck 2 and its upper end surface 9.

[0012] Outer capsule 4 is mounted on bottle neck 2 by providing the outer capsule with an inner thread 10, which cooperates with an opposite thread 11 on bottle neck 2.

[0013] Fig. 2a shows exterior and perspective views of outer capsule 4 and Fig. 2b shows a cross-section through the outer capsule.

[0014] Outer capsule 4 comprises two cylindrical portions 12 and 13 respectively, which in their upper portion change into a common lid portion 14.

[0015] Cylindrical portion 12 is the drawings shown with a grooved outer surface 15, which will allow an improved grip. This design must only be considered as one embodiment of the design and not limiting the present invention per se.

[0016] Cylindrical portion 12 is provided with a few, preferably 4, slits 16, which implies, that cylindrical portion 12 will comprise a few - in this case 2 - segments 28, which extend all the way from end surface 17 of the outer capsule and up to the position, where portion 12 of the outer capsule changes into a bent zone 18, which is bent inwards towards the center of the outer capsule. Inner radius 19 - which preferably is about 2 mm - of this bent zone 18 is connected to the other cylindrical portion 13 and its outer diameter 20. The two cylindrical portions 12 and 13 change into a common lid portion 14, which of course may have different radii and thicknesses, which are not completely specified in the present text, since it is not important for the final functioning of the capsule. Of course, the chosen dimensions will always secure a completely reliable functioning of the complete capsule.

[0017] Cylindrical portion 12 is provided with segments 28 but also preferably two resilient portions 21, which constitute two diametrically opposed portions of cylindrical portion 12 of the outer capsule. These resilient por-

tions 21 are able, thanks to slits 16, to be resilient inwards towards the center of the outer capsule, when a force exerts a pressure on them. The slits extend from cylindrical portion 12 and its end surface 17 up to bent zone 18.

[0018] The outer capsule will obtain shape stability by mutually backing up the two cylindrical portions 12 and 13 by stiffening webs 36. Said stiffening webs, preferably 3 per segment/portion, namely 3 webs on one of the respectively segments 28, said stiffening webs 36 extending preferably 60-75 % of the length of segment 28, whereas stiffening webs 41 on resilient portion 21 only is about 10-20 % of portion 21 and its length, in the two cases the lengths being counted from the top of bent surface 18 on outer capsule 4. Also, said resilient portions are provided with a protruding portion 22, which will cooperate with corresponding portions on bottle neck 2 and which in a ready mounted position of outer capsule 4 on bottle neck 2 means, that said cooperating portions 22 of the outer capsule and the cooperating oblique plane 23 on the bottle neck will snap into a cooperating position, which will prevent the outer capsule from being screwed away from bottle neck 2.

[0019] This locking position is obtained thanks to the fact, that resilient portion 21, at the same time as the capsule is threaded downwards on the bottle neck, is able to spring inwards towards the center of the capsule, when the capsule during its rotation reaches the position, when protruding portion 22 is forced inwards towards the center of bottle neck 2 and its oblique plane 23.

[0020] The two cooperating portions 22 and 23 are designed with grooves, which provide a locked mutual position for the outer capsule in relation to the bottle neck. Thus, protruding portion 22 of the outer capsule has a groove 24, which receives cooperating oblique plane 23 and its protruding portion 25, at the same time as nose 26 on protruding portion 22 ends up in groove 27 in oblique plane 23. The height of these two cooperating portions 22 and 23 is about 1-5 mm and preferably 2 mm.

[0021] To be able to disassemble the capsule it is initially necessary to rotate the capsule "in the wrong direction", the protruding portion 22 being detached from oblique plane 23, and then it is necessary to press resilient portions 21 inwards allowing the protruding portions to be rotated past the obstacles, which oblique planes 23 constitute. Thus, only when the capsule has been rotated so far, that portions 22 and 23 have left their mutual engagement, it is possible, by retaining resilient portions 21, to partially thread away the capsule from the bottle neck.

[0022] In outer capsule 4 there is a recess 35, which is situated in lid portion 14 of the outer capsule and which constitutes a cylindrical portion with a depth of 0.2 - 1 mm, i.e. the groove lying above the stop surface of the outer capsule against the bottle neck, i.e. that surface, which constitutes lid portion 14 and its inner surface 30, the outer diameter of the groove being slightly larger than insert 5 and its upper plane 37. The advantage with groove 35 is the fact, that the outer capsule obtains a

centering effect in relation to insert 5.

[0023] The outer capsule is provided with the centrally placed inner pin 29, with its largest outer diameter at the interface of the pin against lid portion 14 and its inner surface 30.

[0024] The pin is designed with a conicity of 10 - 30 degrees and a length of 2 - 7 mm, preferably 4 mm, and with a largest diameter of 2 - 10 mm, preferably 4 mm.

[0025] Fig. 3 shows exterior and perspective views as well as a sectional view of insert 5. The insert has a number of different functions.

a) One function is to seal, i.e. to stop the medium in the bottle from flowing outwards, when the capsule is in its closed position.

b) Another function is to ventilate the bottle, in case a negative pressure might result in the bottle.

[0026] The constructive design of insert 5 is shown in Fig. 3.

[0027] The insert has an outer diameter 6, which of course is adjusted to bottle neck 2 and its inner diameter. Also, there are a number of - preferably 2 or 3 - sealing lips or sealing rings 31 on the outer diameter, which guarantee, that no leakage arises between the bottle neck and the insert. Also, the outer diameter of the insert is slightly conical, i.e. the insert narrows downwards, a certain build-in tension in the insert being obtained, when it is mounted on the bottle neck, the result being, that the insert so to speak is glued onto the bottle neck.

[0028] The tightness function of the capsule is guaranteed through a cooperation between insert 5 and outer capsule 4. When the insert is mounted in bottle neck 2 and the outer capsule is threaded downwards on the bottle neck, pin 29 on the outer capsule will be inserted into center hole 32 in insert 5.

[0029] This hole 32 has a diameter, which will allow pin 29 with its conical outer surface to catch the insert and press its center portion slightly downwards and inwards and in this way a surface pressure is obtained between these portions, the insert sealing against pin 29,

[0030] The insert has a recessed zone 33 in the center of lid 34. This zone has a diameter, which preferably is 2 - 7 times as large as center hole 32. In this zone the material thickness is also successively decreasing from the material thickness, which is present in lid 34 of the insert, downwards to only 10 - 30 % - preferably 20 % - of the thickness in the zone with center hole 32.

[0031] This material thinning results in a flexibility in lid 34, which is important for the sealing as well as the ventilation function.

[0032] Lid 34 is also provided with a number of grooves 38 or recesses on its upper side. These grooves have a depth, which is about 1/3 of the total thickness of the lid and preferably the same width and the grooves extend all the way from recessed zone 33 outwards to the periphery of the lid. The grooves preferably have a fan-

shaped position and their number suitably is 2 - 10, preferably 6 - 8.

[0033] The constructive design of the lid of the insert guarantees the functions sealing and ventilation. The sealing against the outer capsule and its pin 29 is reinforced, in case the contents of the bottle is subjected to a positive pressure. In this operational situation recessed zone 33 will spring outwards from bottle 3, the result being, that the surface pressure between inner edge 40 on center hole 32 and pin 29 increases, a reinforced sealing resulting.

[0034] In case a negative pressure would arise in the bottle, lid 34 with its recessed zone 33 will curve inwards towards the bottle, since there will be a higher static pressure on the upper side of the lid and then a distance between inner edge 40 on the center hole and center pin 29 of the outer capsule will be obtained.

[0035] As soon as the contact between these portions disappears, air can flow into the bottle, the air flowing inwards from the periphery of the insert via grooves 38, the pressure difference being evened out and consequently the line contact between center hole 32 and pin 29 being obtained again.

[0036] Fig. 4 shows in principal figures, how bottle neck 2 is constructed.

[0037] The bottle neck naturally is provided with some type of thread. Its type and design is not described in detail in the present text, since it is common knowledge how to thread together a capsule on a bottle or the like.

[0038] What is distinctive regarding the bottle neck according to the present invention is, that there are a few portions on flange surface 39 on the bottle neck, which surface is turned upwards towards the threaded portion of the bottle neck, which portions are very important for the functioning of the invention. On the flange surface there is a number of, preferably two, sections, in which an oblique plane has been designed, which is provided with a designed locking function or a design, which catches the outer capsule, when it is threaded downwards to its closed lower position on the bottle neck. At the same time as the outer capsule is threaded downwards on the bottle neck, the outer capsule will, before it has reached its absolutely final lowermost position, in its final closing position, be forced to spring inwards towards the center of the capsule due to the protruding portions 22 on resilient portions 21 on outer capsule 4 of the capsule and its periphery must pass across or rather past the cooperating oblique plane 23, which is provided on bottle neck 2 and its flange surface 39. These cooperating oblique planes are positioned in a radial direction and designed in such a way, that they allow the outer capsule to glide past. When the outer capsule and its protruding portions 22 have passed the cooperating oblique plane 23, portion 21 springs outwards again to the same diameter, as the outer capsule has in an unloaded position. It is now possible to turn back the capsule into a position, in which the protruding portions 22 are caught by a protruding portion 25, with associated grooves 27, on stop lug 42. The pro-

truding portion 25 is designed to allow it to fit into groove 24 in portion 22 on the outer capsule and in the same way nose 26 will fit into groove 27.

[0039] In Fig. 4 two embodiments are shown, explaining how the physical design of oblique plane 23 and the design of the protruding portion 25 and groove 27 respectively can be constructed. The present text does not exclude any of these alternatives, but the functioning of the complete capsule is guaranteed with the two alternatives.

[0040] Fig. 4a is only shown in a perspective view, whereas the alternative according to Fig. 4b is shown in 3 views.

[0041] When the capsule is mounted on the bottle neck, according to the description above, it is not possible to open up the capsule without carrying out several moments, which require the experience of a grown-up.

[0042] To be able to open up the capsule the locking between protruding portions 22 on outer capsule 4 and protruding portions 25 on bottle neck 2 and its flange surface 39 must be detached.

[0043] This can only be done by initially rotating the capsule towards its closed position = clockwise, looking downwards towards the top of the bottle, in this way detaching the engagement between protruding portions 22 of the outer capsule and protruding portions 25 of the bottle neck and in a second step having to press resilient portions 21 inwards against the center of the capsule and at the same time rotate the capsule in the opening-up-direction = counter-clockwise, portions 22 passing protruding portions 25.

[0044] The above described design of cooperating portions 22 and 23 with associated portions 24-27 can of course be designed in different ways, as regards the design of the details, within the scope of the present invention.

[0045] Fig. 5 shows the working position of the capsule, when it is closed. In this position outer capsule 4 is screwed downwards on the bottle neck into its lower position and this means, that insert 5 and its flange portion 8 contact outer capsule 4 and its lid portion 14 with its inner surface 30.

[0046] The mounting process for the complete capsule involves the step of initially mounting insert 5 in bottle neck 2 and then the step of threading outer capsule 4 onto the bottle neck.

[0047] When the complete capsule construction is designed, it is necessary to consider the operational cases, which might create a negative pressure in the bottle. To be able also in these operational cases to use bottles with small material thicknesses, without causing a deformation of the bottle, the bottle is designed to allow an air flow into the bottle. This is done by providing insert 5 with a number of grooves 38 in lid 34. These grooves allow air to pass from the threaded portion of the bottle neck inwards to the inner portions of the insert and then also into bottle 3. In case grooves 38 are not provided, the air is unable to pass between the upper interface of insert 5

and inner surface 30 of the outer capsule.

[0048] When a negative pressure arises in the bottle, lid 34 of insert 5 will be sucked downwards towards the bottle, since a negative pressure arises in relation to the surroundings of the bottle.

[0049] In case a negative pressure arises in the bottle, air flows via thread 11 of the bottle neck upwards towards grooves 38 in lid 34 and into recessed zone 33 and into bottle 3, a pressure balancing taking place between the inner and the outer pressure, which influences the bottle and consequently the bottle does not have to be constructed per se to be able to cope with an operational case with negative pressure. Thus, the construction of the capsule facilitates the manufacture of a thin-walled bottle, and it is not for this reason necessary to lower the requirement as to shape permanence in all operational cases.

ITEM LIST

[0050]

1= capsule
 3= bottle
 5= insert
 7= inner diameter
 9= upper end surface
 11= thread
 13= cylindrical portion
 15= outer surface
 17= lower end surface
 19= inner diameter
 21= resilient portion
 23= cooperating oblique plane
 25= protruding portion
 27= groove
 29= pin (inner pin)
 31= sealing lips
 33= recessed zone
 35= recess
 37= plane
 39= flange surface
 41= stiffening web

2= bottle neck
 4= outer capsule
 6= outer diameter
 8= flange portion
 10= thread
 12= cylindrical portion
 14= lid portion
 16= slit(s)
 18= bent zone
 20= outer diameter
 22= protruding portion
 24= groove
 26= nose
 28= segments

30= inner surface
 32= center hole
 34= lid
 36= stiffening web
 5 38= groove
 40= inner edge
 42= stop lug

10 Claims

1. A device designed to be mounted on a package, preferably on a bottle (3), the device comprising a bottle neck (2), in which in its interior an insert (5) is mounted, the device also comprising an outer capsule (4), said portions jointly constituting a complete capsule (1) and the outer capsule (4) preferably being provided with two resilient portions (21), which constitute two against each other preferably diametrically opposed portions of a cylindrical portion (12) of the outer capsule, on these resilient portions (21) a protruding portion (22) being provided, which, at the same time as the outer capsule (4) is threaded downwards on the bottle neck (2) to its almost closed lowermost position, cooperates with an oblique plane (23) on the bottle neck (2), which means, that the cooperating portions (22) on the outer capsule (4) snap into a protruding portion (25) of said oblique plane (23), and which in this mounting position brings about a locked mutual position for the outer capsule (4) in relation to the bottle neck (2), the protruding portion (22) of the outer capsule being provided with a groove (24), which receives the cooperating oblique plane (23) and a portion (25), which protrudes from the same, at the same time as a nose (26) on the protruding portion (22) ends up in a groove (27) on the oblique plane (23), the outer capsule (4) in this position also being provided with a center pin (29), which has produced a satisfactory sealing of a center hole (32) in the insert (5), **characterized in that** the capsule (1) is opened up by rotating the outer capsule (4) towards the closing position, i.e. clockwise, the protruding portions (22) of the outer capsule leaving their engagement position on the protruding portion (25) on the bottle neck, the resilient portions (21) of the outer capsule (4) subsequently being pressed towards the center of the capsule, the outer capsule, with a maintained pressure on the resilient portions, subsequently being rotated towards its opening position, i.e. counter-clockwise, the capsule subsequently being threaded off completely and without using any force against the center of the capsule, as soon as the cooperating portions (22) and (25) are not mutually engaged any longer, through this design a childproof safety capsule being obtained, with a built-in ventilation function, in case there is a negative pressure in the bottle (3).

2. A device according to claim 1, **characterized in that** the outer capsule (4) is provided with a lid portion (14) with an inner, centrally placed conical pin (29), with a small diameter at the bottom at its point, the pin cooperating with a center hole (32) in the insert (5), a guaranteed sealing being obtained, when the outer capsule has been threaded downwards into its final mounting position. 5
3. A device according to claim 1, **characterized in that** the insert (5) has an outer diameter (6), which is adjusted to the bottle neck (2) and its inner diameter, a number of sealing lips (31) or sealing rings being provided on the outer diameter (6) of the insert and the outer diameter (6) of the insert being slightly conical, its smaller diameter at the bottom, and the design in this way guaranteeing, that no leakage takes place between the bottle neck (2) and the insert (5). 10 15
4. A device according to claim 1, **characterized in that** the insert (5) is provided with a flange portion (8) and a lid (34), in which a number of grooves (38) have been provided on the upper side of the flange and the lid, the grooves corresponding to about 1/3 of the flange/lid thickness and the grooves preferably having a fan-shaped design and preferably the number of which being 6-8, and the grooves extending from the center outwards towards the periphery of the lid and consequently guaranteeing an air flow into the capsule and the interior of the bottle. 20 25 30
5. A device according to claims 1 and 4, **characterized in that** air is allowed to pass via a thread (11) on the bottle neck into the insert (5) and further into the interior of the bottle in those operational cases, when a negative pressure arises in the bottle, the negative pressure influencing the lid (34) on the insert (5), the lid being sucked downwards towards the bottle, the sealing between the pin (29) and the center hole (32) ceasing and consequently air flowing into the bottle and the pressure being balanced, the lid (34) and the center hole (32) then returning to the sealing active position. 35 40
6. A device according to claim 1, **characterized in that** the insert (5) and its lid (34) are provided with a recessed zone (33) in the center of the lid, the recess having a diameter, which is about 2-3 times as large as the center hole (32) and the material thickness in the recessed zone being successfully reduced from the material thickness of the lid (34) downwards to 10 - 30 % of the same, this material thinning providing a flexibility in the lid (34), which guarantees the sealing and ventilation function of the complete capsule. 45 50 55

Fig. 1

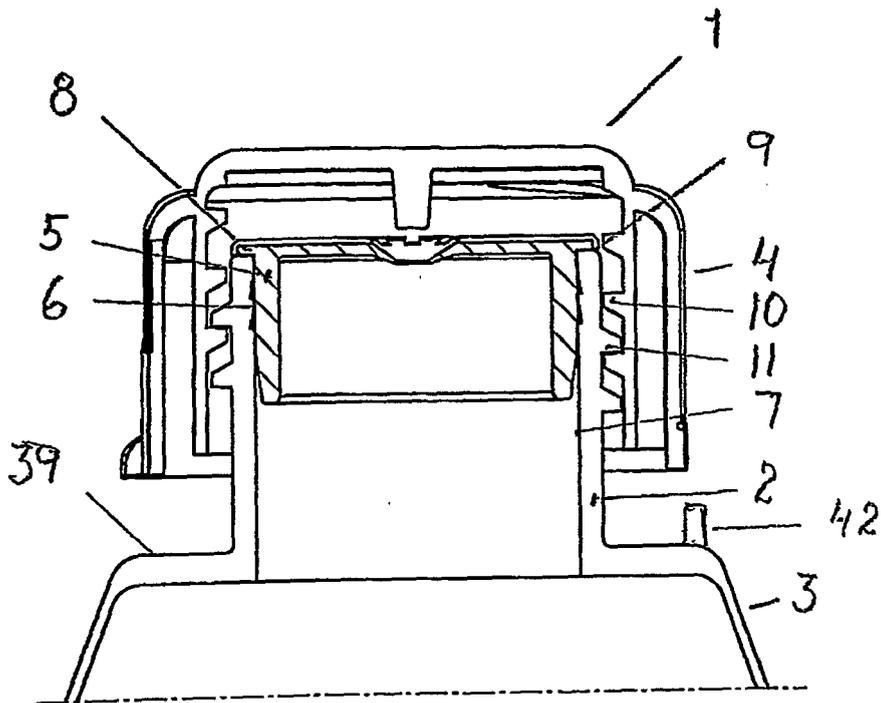


Fig. 2a

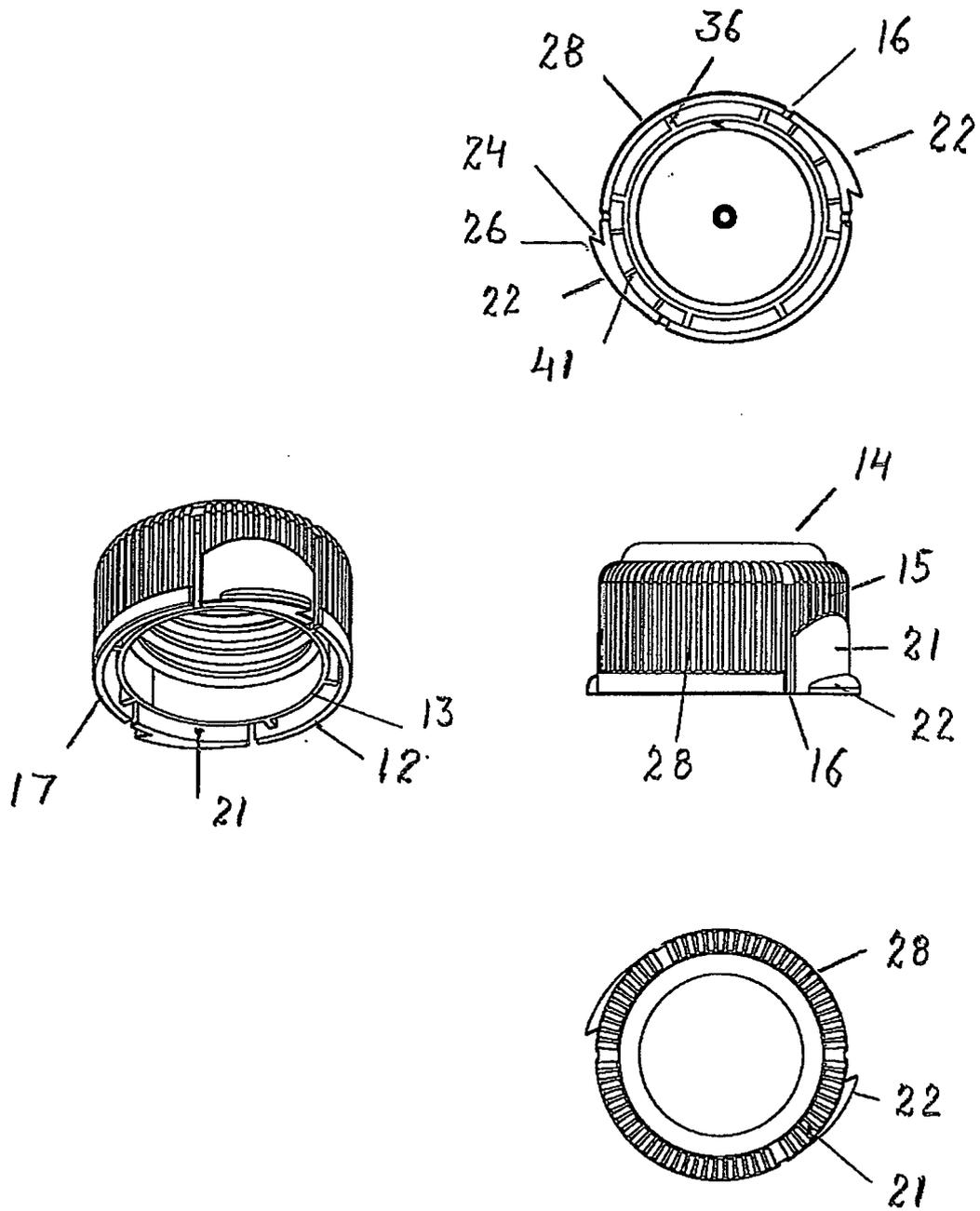


Fig. 2b

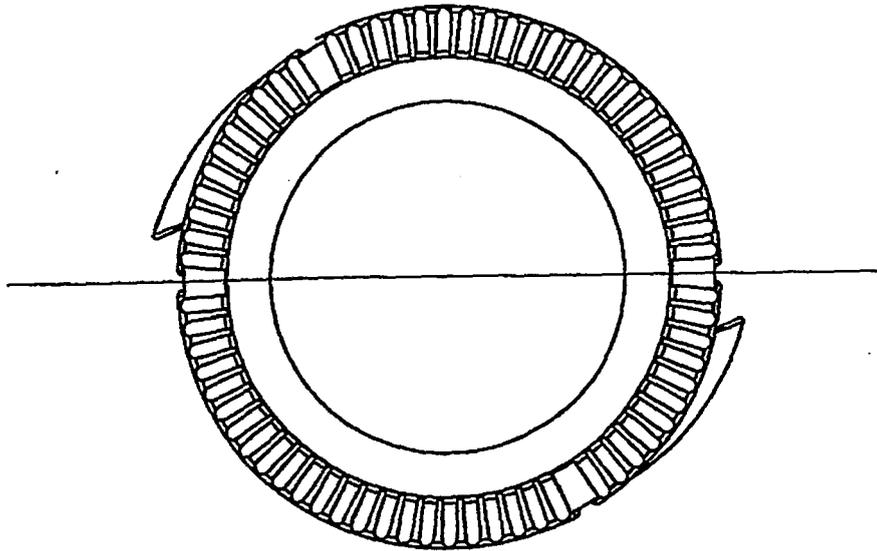
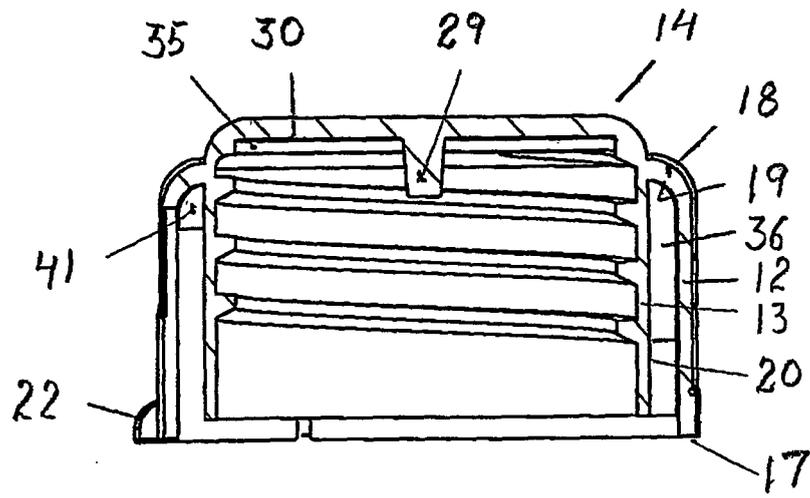


Fig. 3

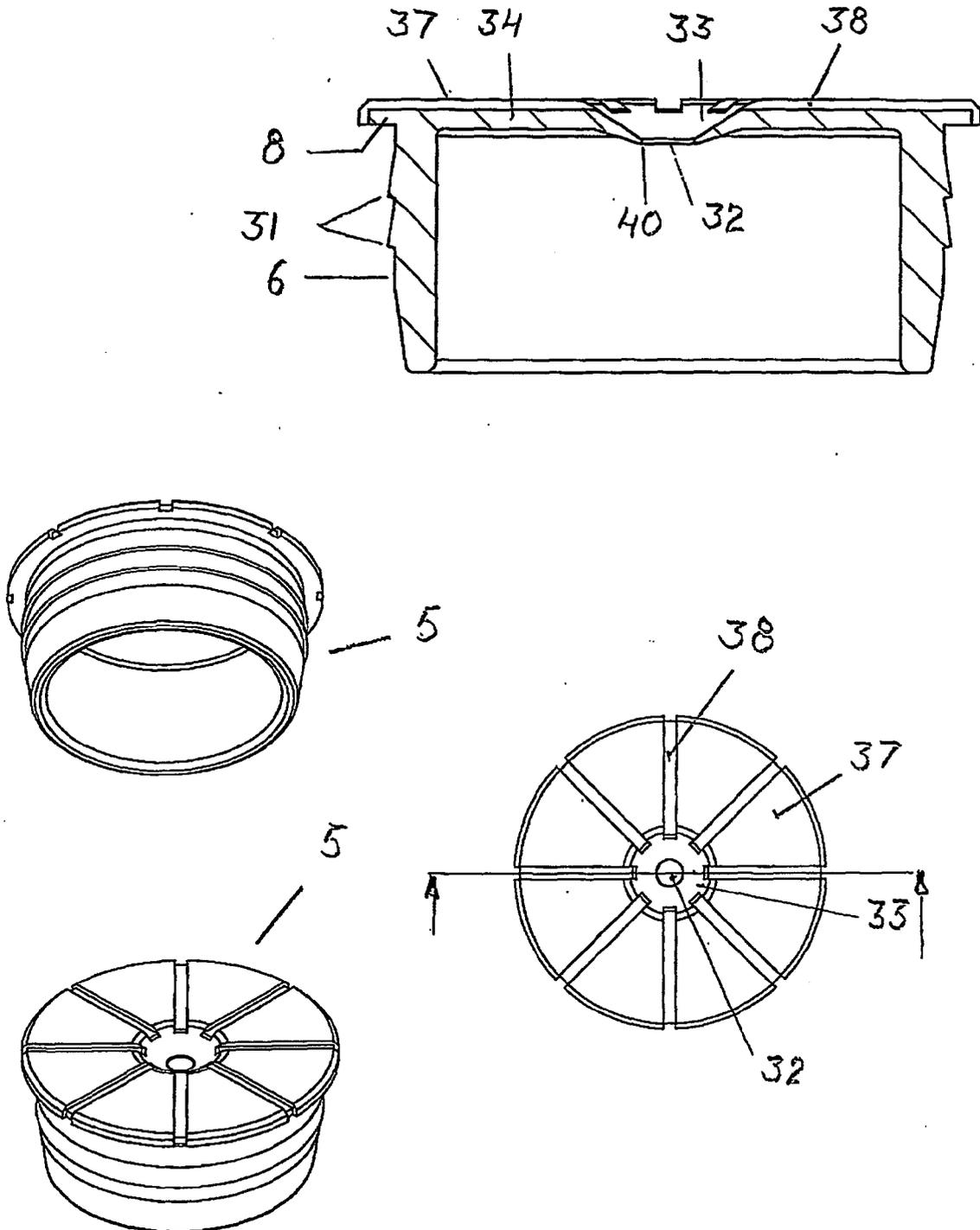


Fig. 4

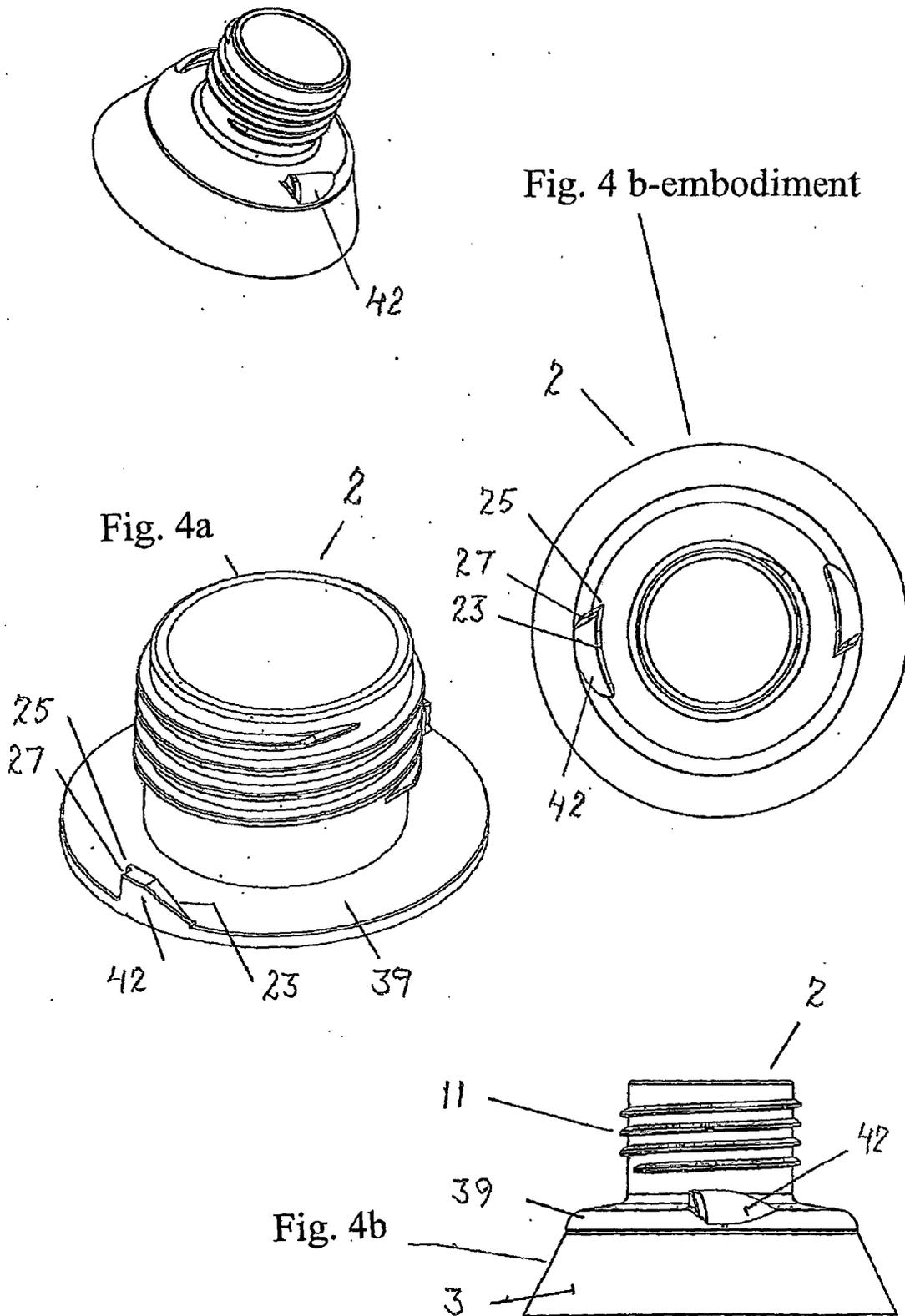
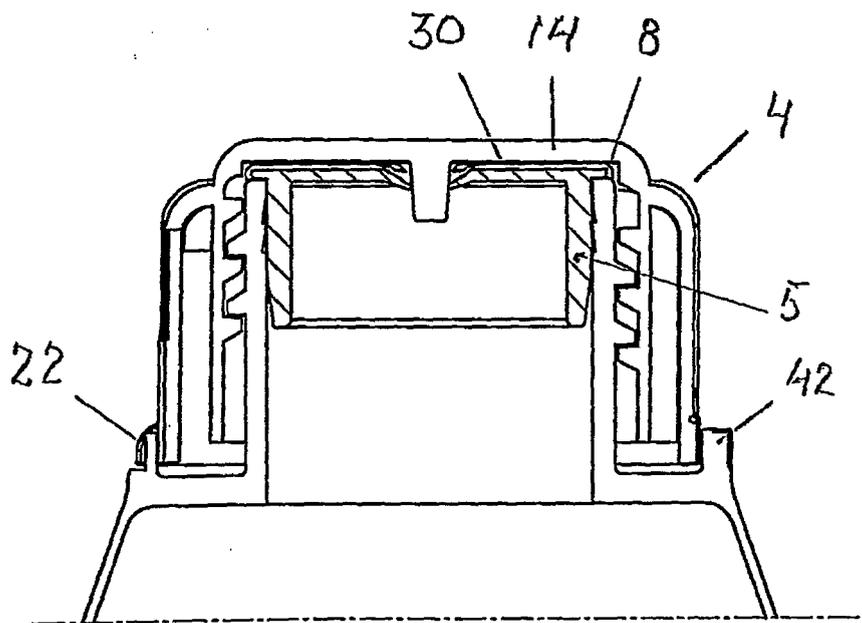


Fig. 5





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