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(54) **POURER WITH IMPROVED LOCKING AND CAP EQUIPPED WITH SAME**

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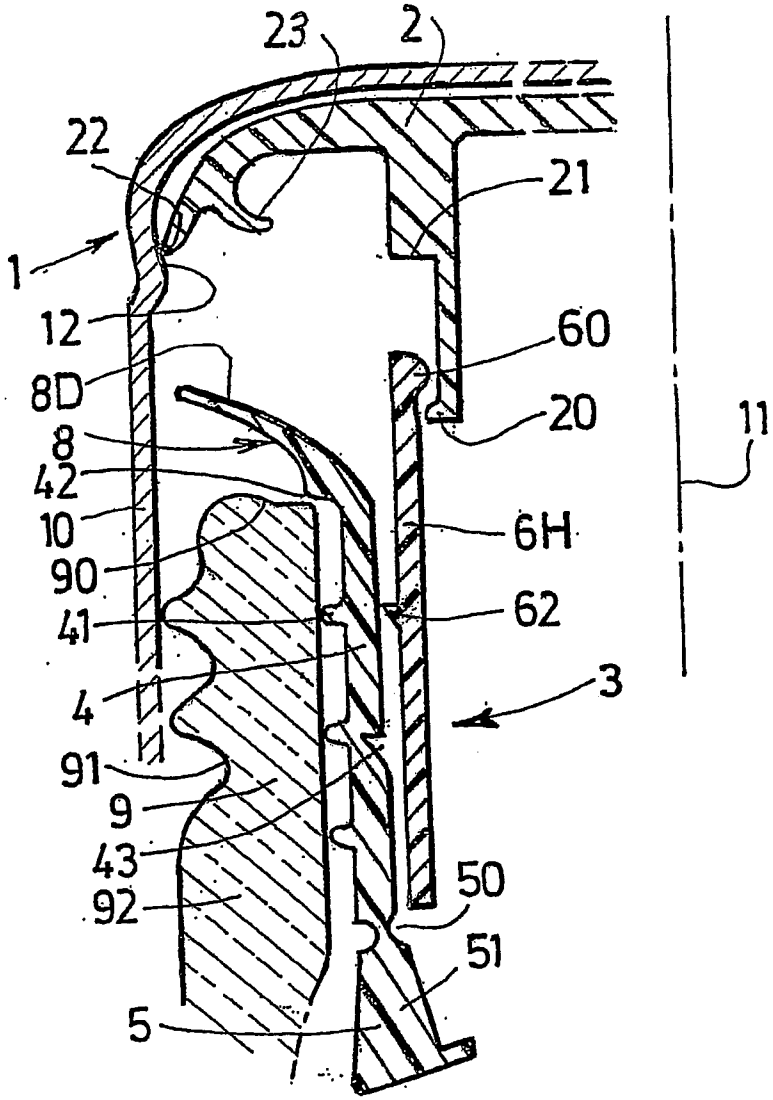
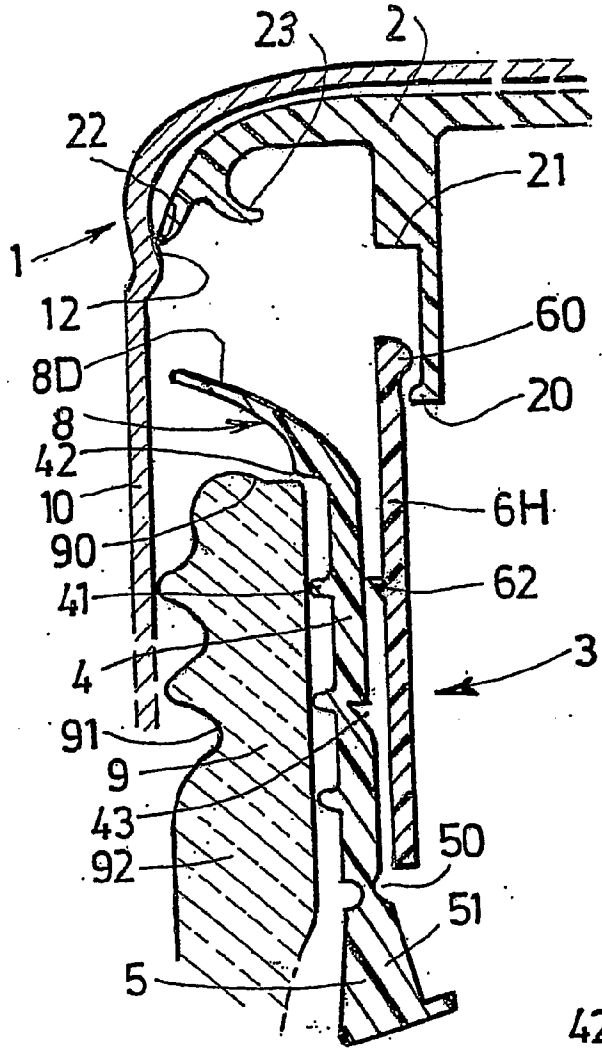
(52) **U.S. Cl.** **222/545**; 222/569

(57) **ABSTRACT**

The invention concerns a pourer (**3**) associated with a closure cap (**1**) and designed to be fixed inside a container neck (**9**), comprising a peripheral skirt (**4**), a pouring element (**8**), and means for temporarily assembling said pourer and said closure cap. The invention is characterised in that: a) said peripheral skirt (**4**) comprises a lower part (**5**) capable of being radially spaced apart for the pourer to be fixed to the neck; b) the pourer (**3**) comprises a rigid component (**6**) axially mobile downwards, inside the peripheral skirt (**4**); c) the pourer (**3**) comprises means for causing the lower part (**5**) and the rigid component (**6**) to co-operate so as to transform the axial movement of the rigid component (**6**) into a radial movement of the lower part (**1**).




23
2
22
21
1
12
60
8D
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8
42
10
6H
90
41
62
4
3
91
9
43
50
92
51
5

FIG.1A

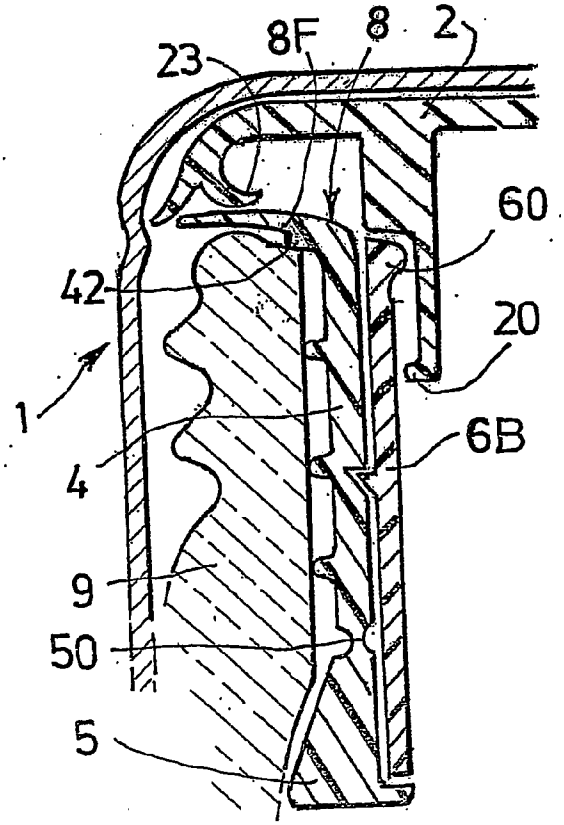
23
8F
8
2
60
42
20
1
6B
4
9
50
5

FIG.1B

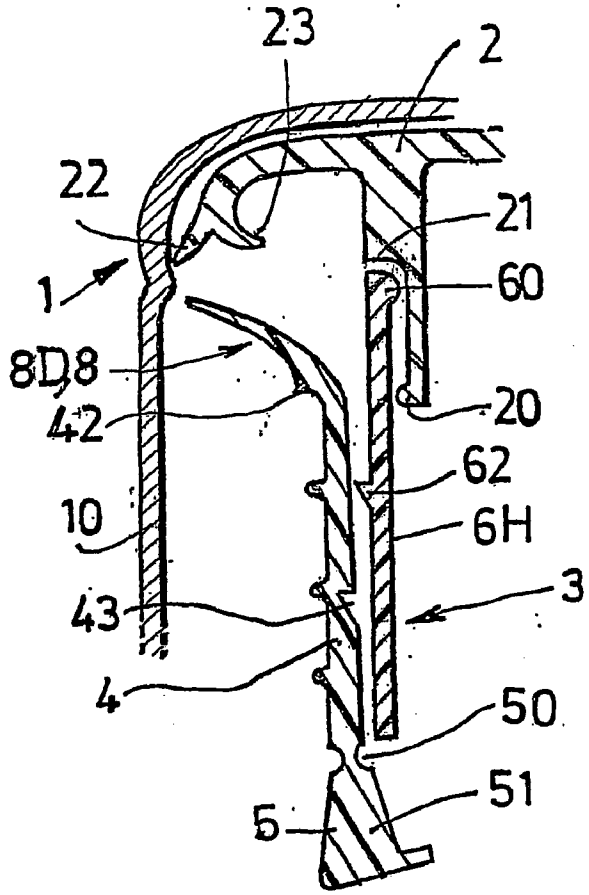
23
2
22
21
1
60
8D,8
20
42
62
10
6H
3
43
4
50
51
5

FIG.1c

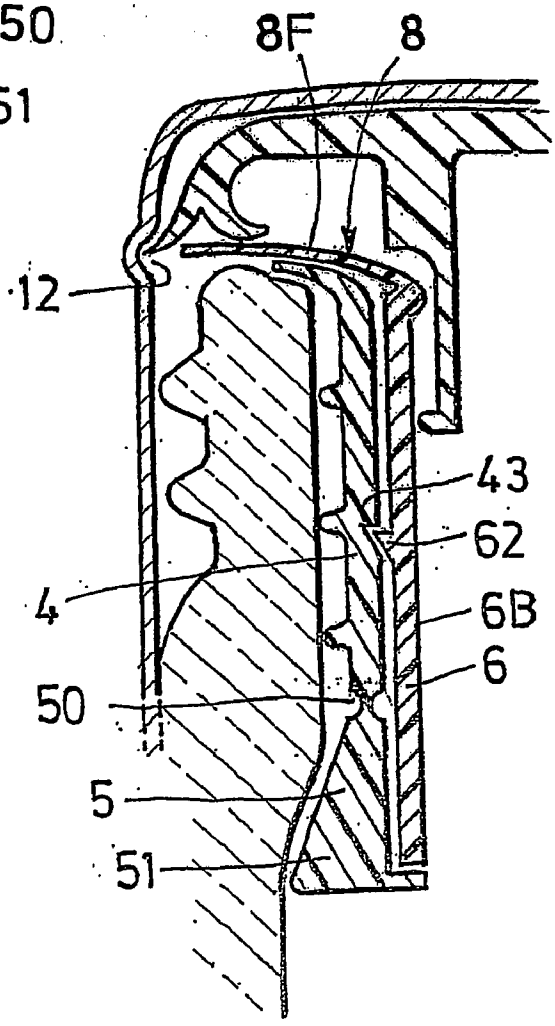
8F
8
12
43
62
4
6B
6
50
5
51

FIG.2

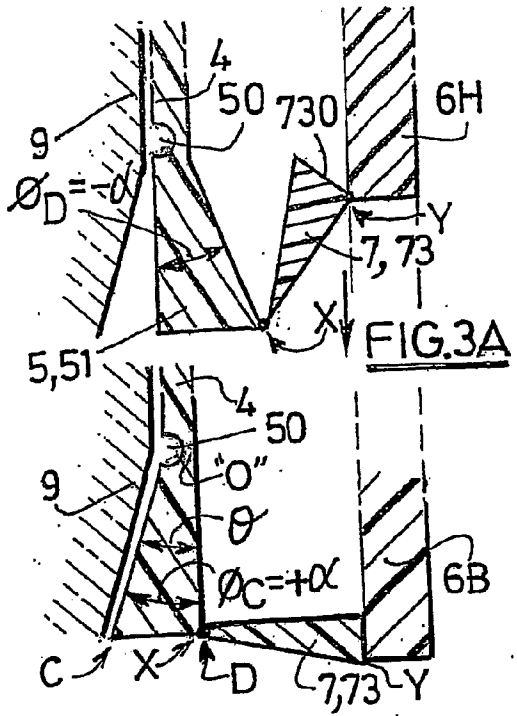

FIG.3A

FIG.3B

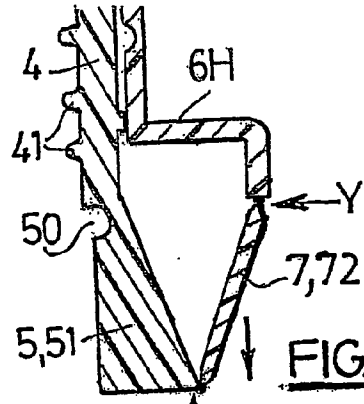

FIG.4A

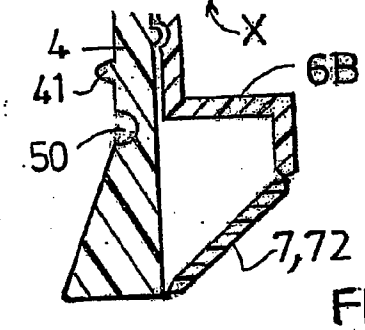

FIG.4B

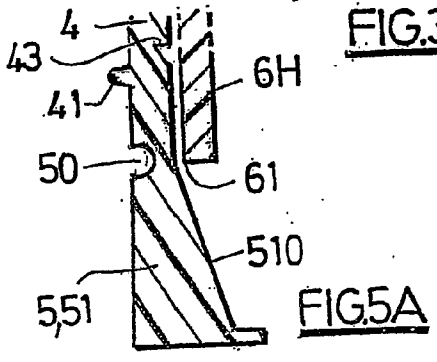

FIG.5A

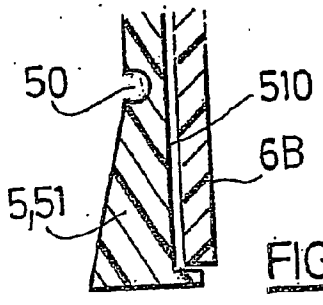

FIG.5B

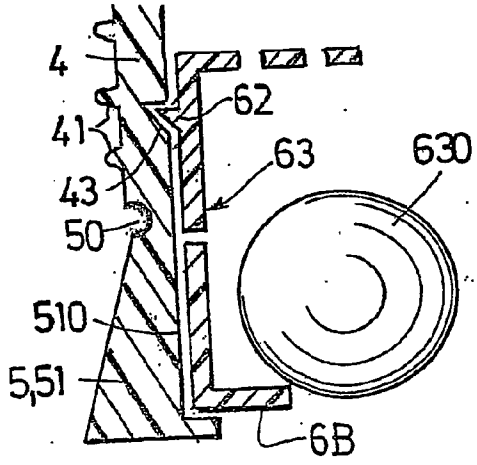

FIG.6

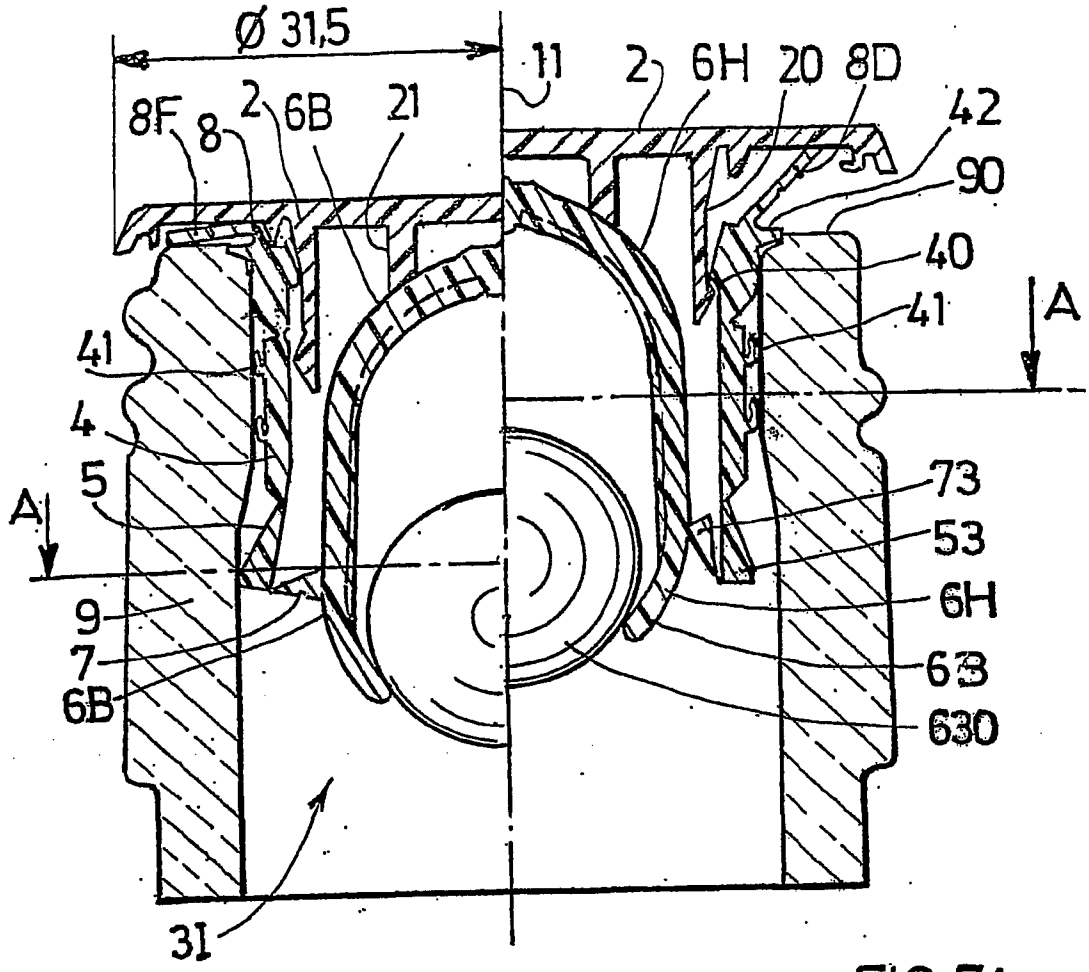
Ø 31,5
11
2
6H
20
8D
42
90
40
41
A
8F
8
2
6B
21
41
4
5
A
73
53
6H
63
630
9
7
6B
31

FIG.7A

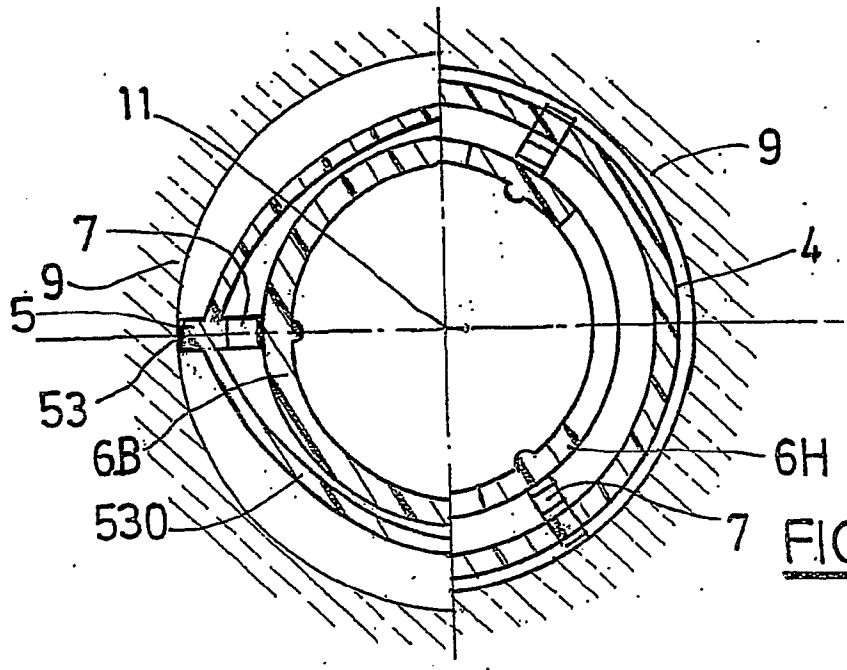
11
9
7
4
9
5
53
6B
6H
530
7

FIG.7B

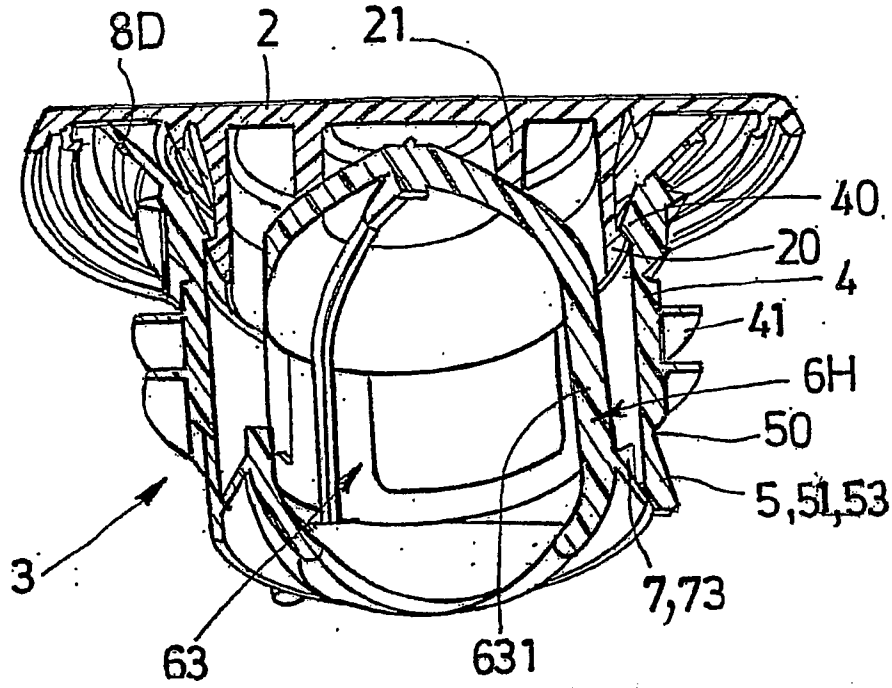

FIG.8A

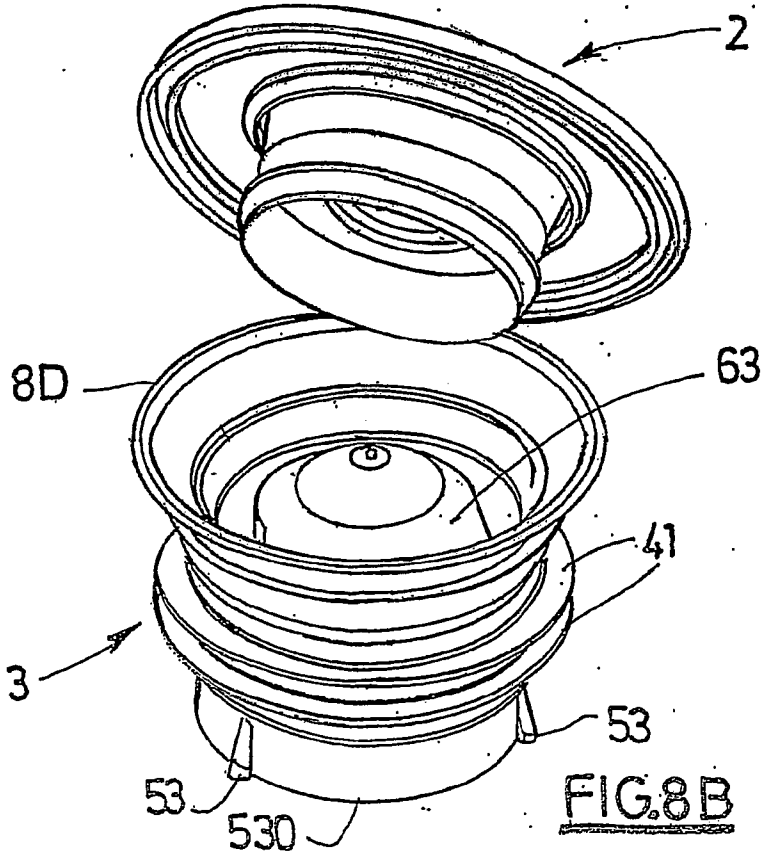

FIG.8B

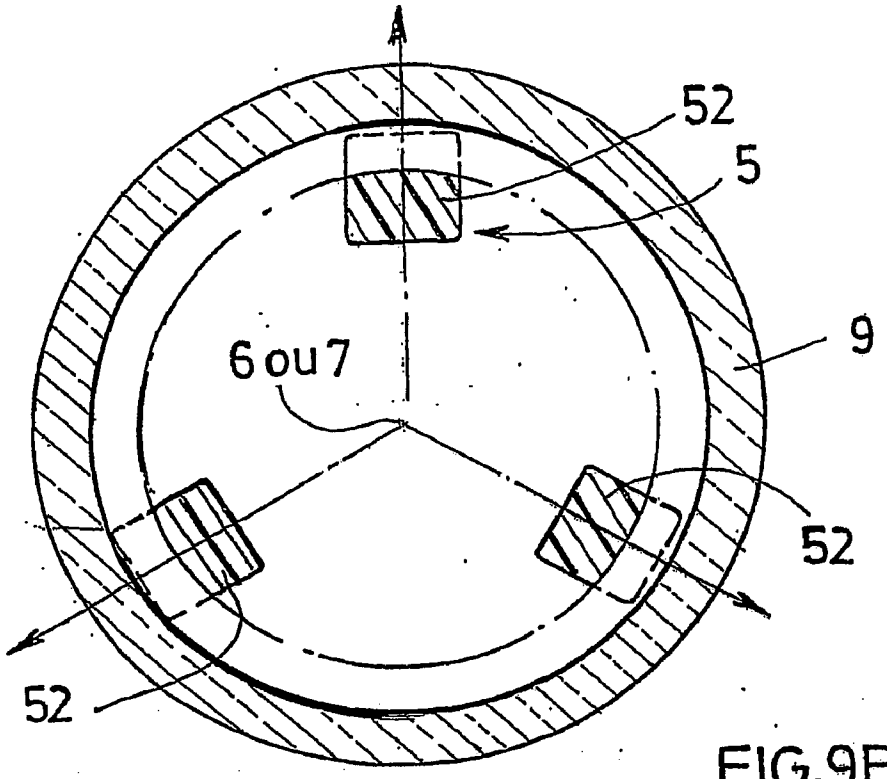

FIG.9B

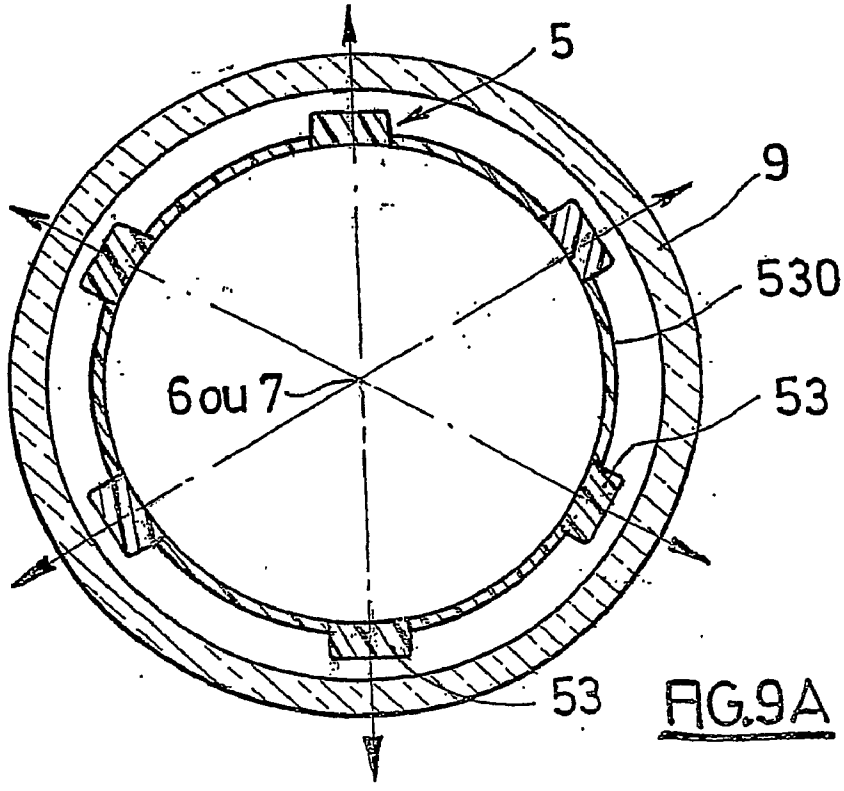

FIG.9A

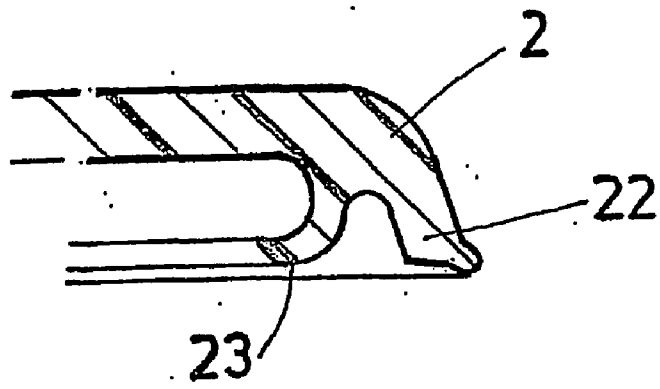

FIG.10A

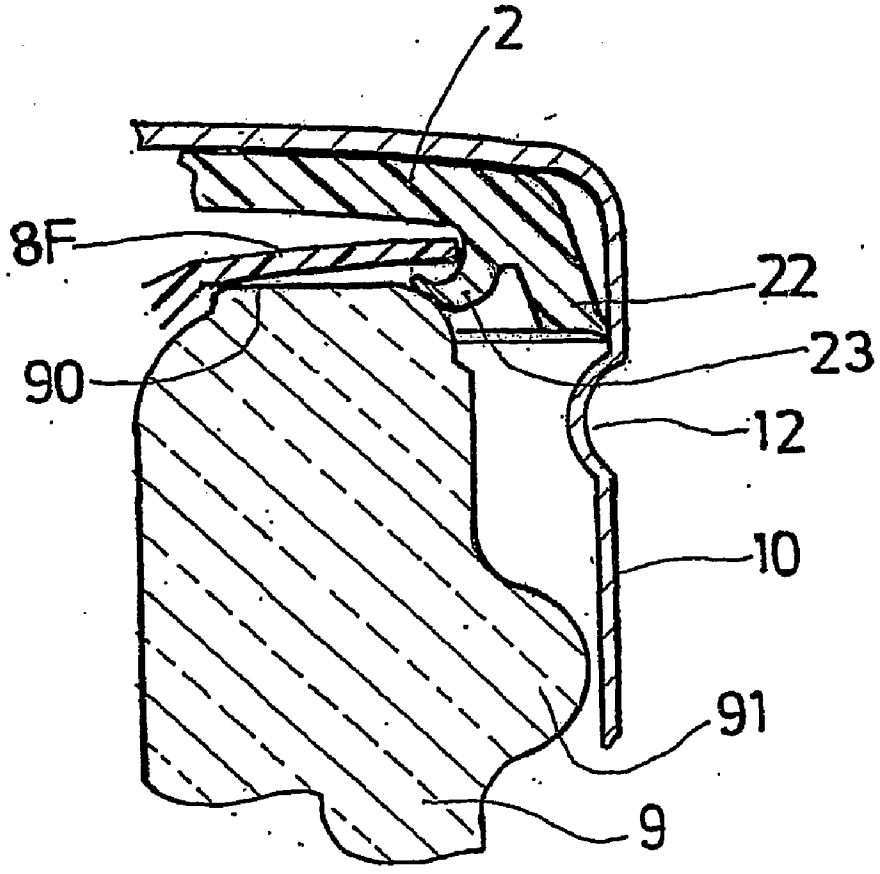

FIG.10B

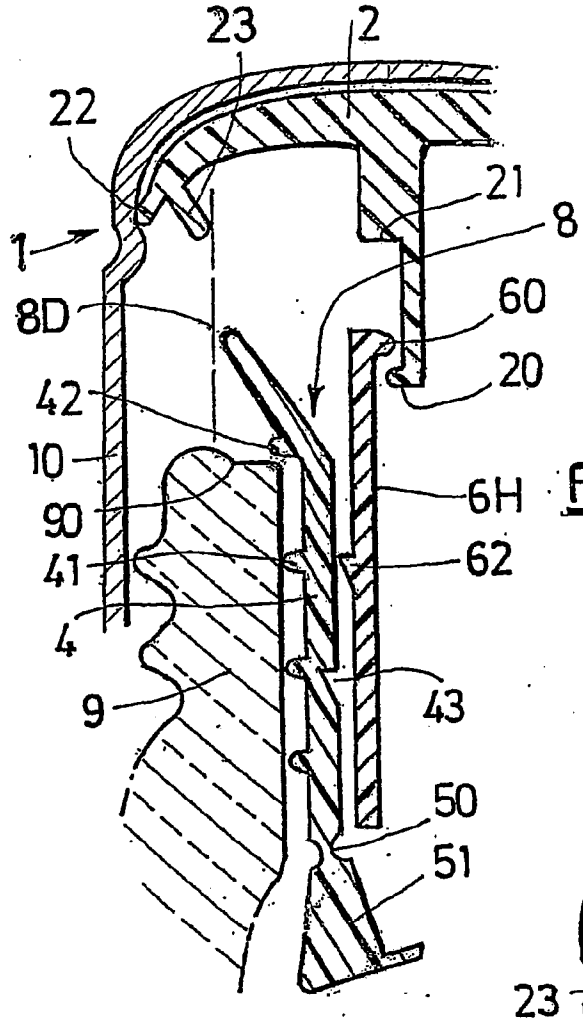

FIG.11A

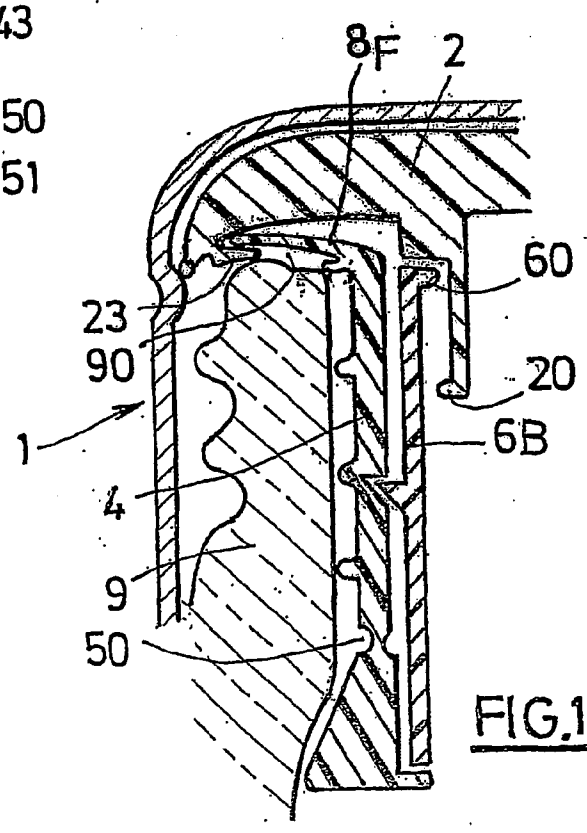

FIG.11B

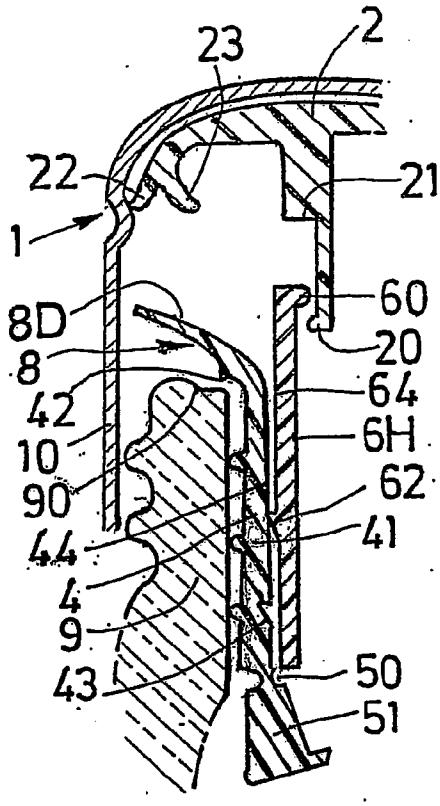

FIG.12A

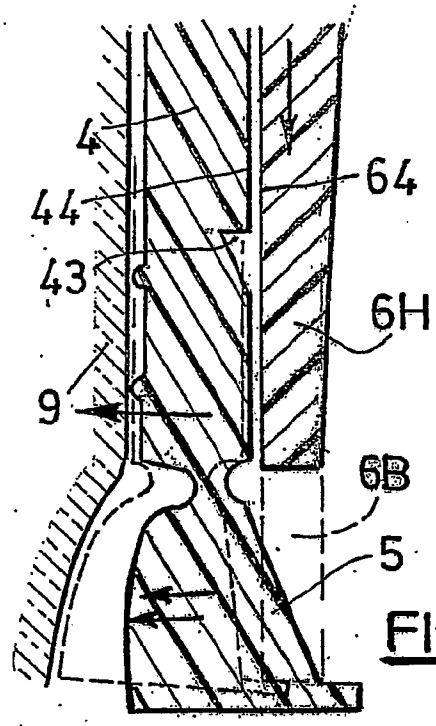

FIG.12B

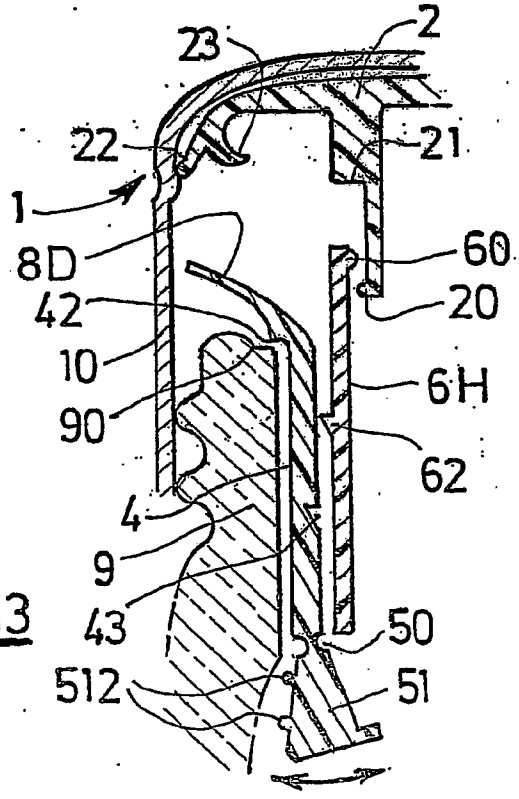

FIG.13

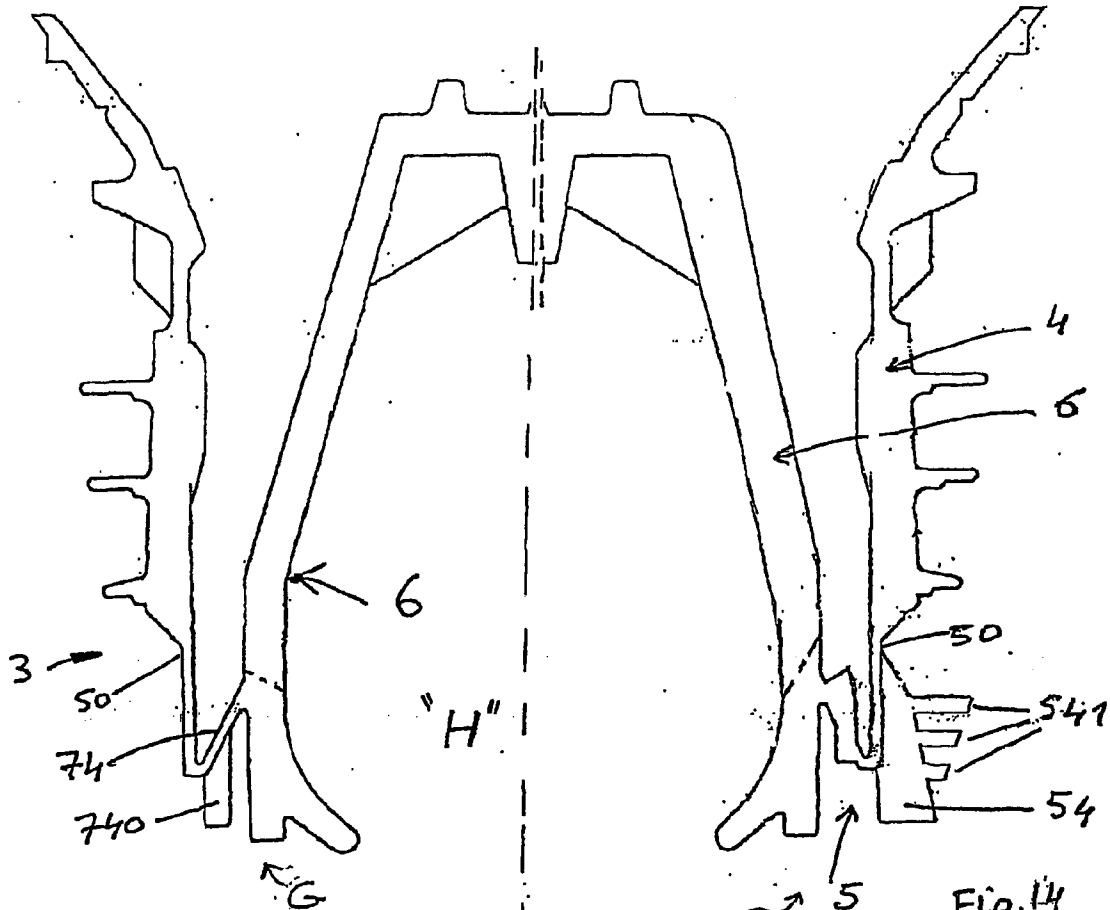

Fig. 14

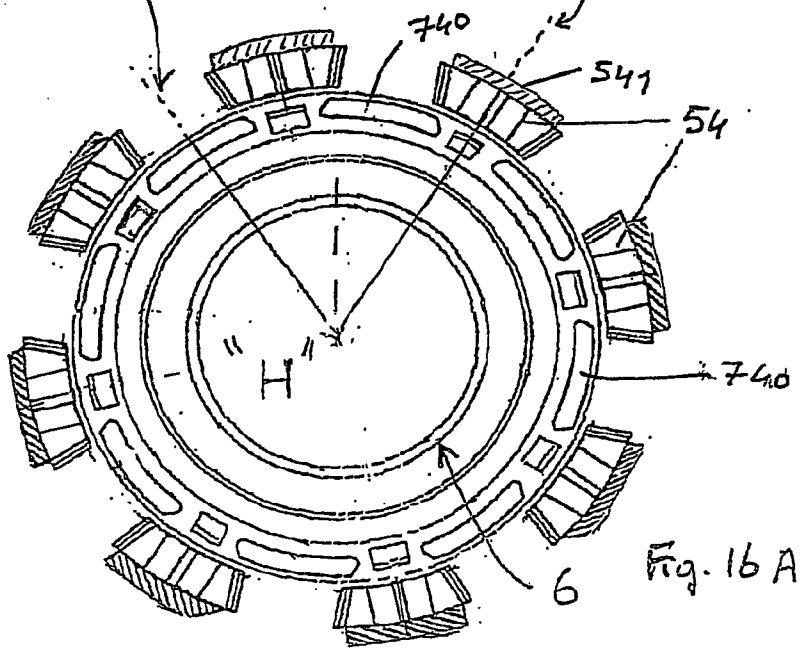

Fig. 16 A

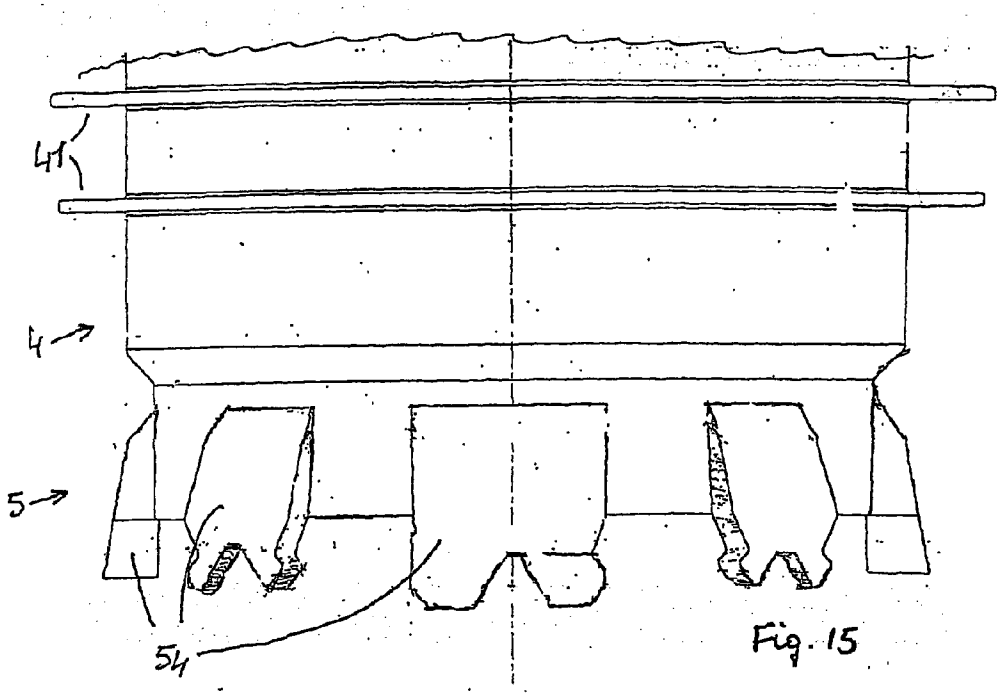

Fig. 15

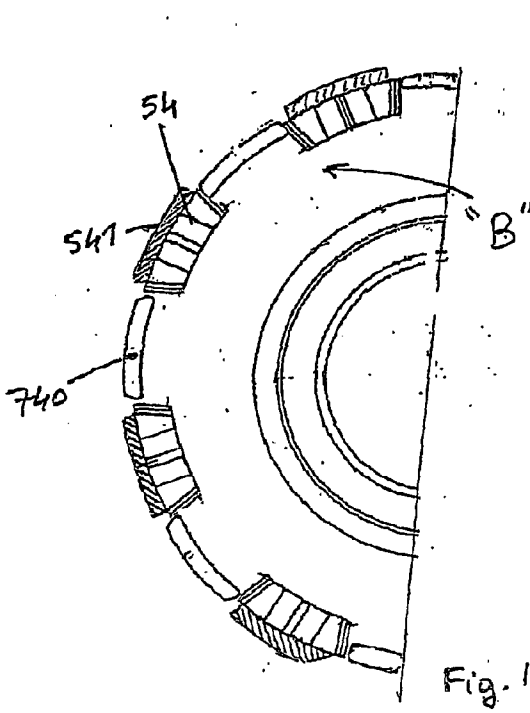

Fig. 16 B

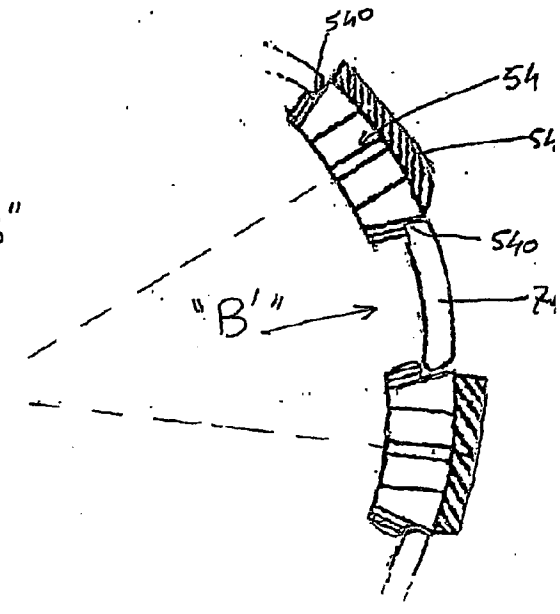

Fig 16 C

POURER WITH IMPROVED LOCKING AND CAP EQUIPPED WITH SAME

FIELD OF THE INVENTION

[0001] The invention relates to the field of containers, usually bottles, the orifice of which is provided with a pourer, typically for packaging liquors, aperitifs, alcohol.

STATE OF THE ART

[0002] Many different types of pourers associated with closure caps are already known, distinguished particularly by their method of attachment to the container neck and by the pouring element itself.

[0003] The pouring element itself may either have a fixed configuration as shown in **FIGS. 1 and 2** or a variable configuration, and particularly an axially mobile configuration as described in patents FR 2.057.345, GB 922,188, U.S. Pat. No. 3,217,935 and U.S. Pat. No. 4,569,464.

[0004] Concerning the method of attachment to the container neck, the pourer may be force fitted into the neck, being usually provided with circular sealing ribs as shown in **FIG. 2** and described in patents FR 2.057.345, GB 922,188 and U.S. Pat. No. 3,217,935.

[0005] Problem that Arises

[0006] These pourers are associated with a closure cap and are therefore fixed to the neck when the closure cap associated with the said pourer is being crimped, by application of a relatively high axial force on the head of the closure cap, varying from 80 to 100 daN being necessary to irreversibly fix the said pourer to the neck.

[0007] Under these conditions, some closure caps may be damaged as a result of the magnitude of this force, particularly by buckling of the skirt or modification of easy opening means.

[0008] Therefore, the problem to be solved is to have a pourer which can be attached to the neck by a relatively low axial force, typically less than 20 daN, so that the said pourer can be associated with any type of closure cap, even the least mechanically resistant caps, due to the continuing trend towards reducing the thicknesses of packaging materials and weights.

DESCRIPTION OF THE INVENTION

[0009] According to the invention, the pourer associated with a closure cap and that will be fixed inside the neck of a container, comprises a peripheral skirt provided with a leak tight means of attachment to the neck, a pouring element and a temporary means of assembly of the said pourer and the said closure cap, and is characterised in that,

[0010] a) the said peripheral skirt comprises a lower part capable of being radially spaced apart for the pourer to be fixed to the said neck,

[0011] b) the said pourer comprises a rigid component axially mobile downwards inside the said peripheral skirt, by typically irreversible changeover from a said high position H to a said stable low position B during attachment of the said pourer and said cap to the said neck,

[0012] c) the said pourer comprises a means for causing the said lower part and the said rigid component to co-operate so as to transform the axial displacement of the said rigid component into a radial displacement of the said lower part, the said axial displacement not beginning until the said pourer is in place in the said neck, the axial force required by the axial displacement of the said rigid component with respect to the said peripheral skirt being greater than the force necessary to insert the said pourer into the said neck.

[0013] The invention solves the problem that arises. With the means according to the invention, the cap and the associated pourer can be inserted into the neck by the application of a force of only F_I, called the "insertion force" that is relatively low considering the choice of the outside dimensions of the peripheral skirt with respect to the inside dimensions of the neck. Secondly, the axial displacement following insertion of the pourer into the neck undoubtedly requires an axial force called the "displacement force" F_D, that is greater than F_I such that the said axial displacement cannot begin until the pourer has been correctly inserted into the neck, but this displacement force F_D remains very much lower than the force necessary for caps with pourers according to the state of the art.

DESCRIPTION OF THE FIGURES

[0014] All figures are related to the invention.

[0015] **FIG. 1A** is a partial view of a cap (**1**) provided with its insert (**2**) and associated with a pourer (**3**), shown in an axial section along the vertical axis (**11**) of the cap, the pourer being inserted into the neck (**9**) of a container, the rigid component (**6**H) of the pourer still being in the high position before attachment of the pourer to the neck and therefore before any axial displacement of this rigid component (**6**).

[0016] **FIG. 1B** corresponds to **FIG. 1**A, but with the rigid component (**6**B) in the low position after it has been displaced axially.

[0017] **FIG. 1C** corresponds to **FIG. 1**A and represents the cap (**1**) provided with its insert (**2**) and its pourer (**3**) before being inserted in the neck (**9**).

[0018] **FIG. 2** corresponds to **FIG. 1**B, but is different in that the flexible circular lip (**80**) is fixed to the rigid component (**6**) and not to the peripheral skirt (**4**) as in **FIGS. 1A and 1B**.

[0019] **FIGS. 3A** to **3**B are enlarged partial axial sectional views along the vertical axis (**11**) of the cap, showing other embodiments of the invention in which a cooperation means (**7**) is used to transform the axial displacement of the rigid component (**6**) into a radial displacement of the lower part (**5**).

[0020] In **FIGS. 3A and 3B**, the means (**7**) is a rigid element with a triangular section (**73**), whereas in **FIGS. 4A and 4B**, this means (**7**) is a rod or rigid plane element (**72**). In **FIGS. 3A and 4A**, the rigid component (**6**) is in the high position and is denoted **6**H, while in **FIGS. 4A and 4B** it is in the low position and is denoted **6**B.

[0021] **FIGS. 5A** to **6** correspond to **FIGS. 3A** to **4**B, and describe other embodiments of the invention in which the

rigid component (**6**) bears directly on the lower part (**5**), and more specifically on its inside (**510**).

[**0022**] In **FIGS. 5A and 5B** corresponding to **FIGS. 3A and 3B**, the rigid component (**6**) is a typically cylindrical skirt, whereas in **FIG. 6** that corresponds to **FIG. 5**B, this rigid skirt forms a cage (**63**) containing a ball (**630**) that makes it impossible to refill the pourer.

[**0023**] **FIGS. 7A** to **9**B show another embodiment of a non-refillable pourer corresponding to that in **FIG. 6**, in which the rigid component (**6**) forms a cage (**63**).

[**0024**] **FIGS. 7A** to **8**B relate to the same pourer embodiment:

[**0025**] **FIG. 7A** is a view on which the right part corresponds to **FIG. 1A** (rigid component (**6**) in the high position), whereas the left part corresponds to **FIG. 1B** (rigid component (**6**) in the low position), the metallic part (**10**) of the cap (**1**) not being shown.

[**0026**] **FIG. 7B** is a sectional view along A-A in **FIG. 7**A, with the right and left parts of **FIGS. 7A and 7B** corresponding to each other.

[**0027**] **FIG. 8A** is an exploded lateral perspective view of the insert (**2**) and the associated pourer (**3**), the rigid component (**6**) being in the high position (**6**H) before the pourer is inserted into the neck. It shows that the cage (**63**) comprises three arches (**631**) to clamp the ball (**630**).

[**0028**] The pourer (**3**) is associated with the insert due to temporary assembly means (**20**) and (**40**) supported by a tab on the insert (**2**) and by the top end of the peripheral skirt (**4**), respectively.

[**0029**] **FIG. 8B** is a lateral perspective view of the insert (**2**) and the pourer (**3**) before these two parts are temporarily assembled.

[**0030**] **FIGS. 9A and 9B** illustrate two embodiments of the lower part (**5**), in a sectional view in a horizontal plane perpendicular to the axis (**11**).

[**0031**] In **FIG. 9**A, this lower part (**5**) comprises six rigid tabs (**53**) connected to each other by a thin skirt (**530**), whereas the pourer in **FIGS. 7B and 8B** only has 3 tabs (**53**).

[**0032**] In **FIG. 9**B, this lower part (**5**) comprises three isolated tabs (**52**).

[**0033**] **FIGS. 10A and 10B** are partial sectional views along axis (**11**) of the insert (**2**), with the insert alone in **FIG. 10**A and with the insert when the closure cap has closed the neck (**9**).

[**0034**] **FIGS. 11A and 11B** correspond to **FIGS. 1A and 1B**. They are different in that in the case shown in **FIGS. 11A and 11B**, the diameter and flexibility of the flexible circular lip (**80**) and the sealing lip (**23**) are such that the sealing lip bears directly on the edge (**90**) of the neck (**9**).

[**0035**] **FIGS. 12A and 12B** correspond to **FIGS. 1A and 1B**. They are different in that the peripheral skirt (**4**) and the rigid component (**6**) comprise truncated cone shaped surfaces denoted (**44**) and (**64**) respectively, and **FIG. 12B** is an enlarged view of **FIG. 12A**.

[**0036**] **FIG. 13** corresponds to **FIG. 1**A, and differs from it in that leak tightness is made by ribs (**512**) formed on the lower part (**5**).

[**0037**] FIGS. **14** to **16**C illustrate another embodiment of the pourer (**3**) according to the invention.

[**0038**] **FIG. 14** comprises two views (left G and right D) of a pourer (**3**), in an axial half-section, in which the lower part (**5**) comprises a circular alternation of articulated rigid rods (**74**) carrying a rigid heel (**740**) and rigid heels (**54**) on which fins (**541**) are fixed.

[**0039**] **FIG. 15** is a partial elevation of the side of the pourer (**3**), illustrating the arrangement of rigid heels (**54**) with no fins.

[**0040**] **FIGS. 16A** to **16**C show diagrammatic views of the underside (partial views in the case of **FIGS. 16B and 16C**), the rigid component (**6**) being in the high position H in **FIG. 16**A, and in the low position B in **FIG. 16**B, where the 8 rigid locks (**54**) and the 8 rigid heels (**740**) are spaced and interlock with each other radially. **FIG. 16C** illustrates a variant in which each lock (**54**) comprises two side recesses (**541**) that block the heels (**740**) in the axial direction.

DETAILED DESCRIPTION OF THE INVENTION

[**0041**] According to the invention, the lower part (**5**) may be rigid and may be hinged with respect to the peripheral skirt (**4**), typically by means of a thinned part (**50**) forming a hinge O and connecting the lower part (**5**) to the peripheral skirt (**4**), and forms a hinged element (**51**) typically in the form of an angular sector with an angle θ limited by the outside OC and the inside OD, each forming an angle Φ_C and Φ_D respectively from the vertical, and in which typically the end of the rigid component (**6**) cooperates typically with the inside OD of the lower part (**5**), so that the downwards axial displacement of the rigid component (**6**) causes rotation of the said hinged element or the angular sector (**51**), the angle Φ_C typically being equal to 0° and the angle Φ_D typically being equal to $-\alpha°$ before the said axial displacement, the angle Φ_C typically being equal to $+\alpha°$ and the angle Φ_D being equal to 0° after the said axial displacement, where α is typically between 5 and 25°.

[**0042**] "Rigid" means that after the said axial displacement, the lower part (**5**) moves radially pivoting around the hinge O, without any significant plastic deformation of this lower part (**5**).

[**0043**] **FIGS. 1A and 1B**, **3**A and **3**B, **4***a* and **4**B, **7**A, **11**A and **11**B illustrate these rotations of the lower part (**5**).

[**0044**] According to one embodiment of the invention, the rigid component (**6**) may co-operate with the lower part (**5**) through a rigid element (**72**, **73**) forming a cooperation means (**7**) and hinged at its ends X and Y, one of the ends X being fixed or made to be fixed to the lower part (**5**), the other end Y being fixed or made to be fixed to the rigid component (**6**) such that when the inclination of the said hinged element (**51**) is varied to reach the said stable position and as the end Y moves downwards, the said axial displacement of the rigid element (**72**, **73**), pushes the end X radially outwards, thus forming the said changeover from the high position H to the low position B.

[**0045**] This embodiment is illustrated in **FIGS. 3A** to **4**B and **7**A to **9**B.

[0046] In one variant of a pourer illustrated in **FIGS. 3A, 3B** and **7**A, and in order to obtain firstly the said stable position, the height Z_{YH} of the said end Y in the high position before the said axial displacement may typically be greater than the height Z_X of the said end X, whereas the height Z_{YB} of the said end Y in the low position after the said axial displacement may typically be less than the height Z_X of the said end X, and secondly the said rigid element (**73**) may have a typically triangular section, the end Y forming a vertex of this triangle, such that in the low position, a side (**730**) adjacent to this vertex stops in contact with the rigid component (**6**) and thus limits the said downwards axial displacement.

[0047] Advantageously, as illustrated in FIGS. **14** to **16**C, the said lower part (**5**) may include hinged elements (**51**) consisting of rigid tabs (**53**) or rigid heels (**54**) with a uniform spacing, the number n of these elements varying from 3 to 10 and typically from 4 to 8, at each tab (**53**) or heel (**54**) corresponding to a distinct rigid element (**72**, **73**). In FIGS. **14** to **16**C, n is equal to 8.

[0048] Preferably, a lock (**740**) may be inserted at an angle between two of the said consecutive rigid heels (**54**) by means of a locking rod (**74**) corresponding to the said rigid element (**72**, **73**), so as to block the angular position of the said rigid heels by the said locks when the said rigid component (**6**) is in the said low position.

[0049] As illustrated in **FIG. 16**C, the said locks (**740**) and the said rigid heels (**54**) can co-operate, typically by means of a click fit notch (**540**), so as to reinforce the attachment of the pourer (**3**) to the neck (**9**).

[0050] It is also advantageous if the said rigid heels (**54**) comprise fins (**541**) so as to reinforce the attachment of the pourer (**3**) to the said neck (**9**).

[0051] In the case of the pourers shown in **FIGS. 3A** to **4**B, **7**A to **9**A and **14** to **16**C, the pourer (**3**) is preferably made in a single piece.

[0052] According to another embodiment of the invention, the lower end (**61**) of the rigid component (**6**) can come into direct contact on an inner side (**510**) of the lower part (**5**), so as to form the said cooperation means. This embodiment was illustrated in **FIGS. 1A, 1B, 2, 5**A, 5B, **6, 11**A to **13**.

[0053] Typically, the rigid component (**6**) and the peripheral skirt (**4**) may comprise male and female elements (**62**, **43**) that co-operate and irreversibly click fit together, so as to obtain the said stable position as illustrated in **FIGS. 1A and 1B** as examples. Regardless of which embodiment of the invention is used, it is usually preferable if the pourer remains fixed to the neck once it has been placed in the neck.

[0054] It is advantageous if the closure cap (**1**), which is typically metallic, is provided with a plastic insert (**2**), that seals the closure cap (**1**) and includes a temporary assembly means (**20**) and a means of axial displacement (**21**) of the rigid component (**6**), these two means possibly being partially coincident, the temporary assembly means (**20**), typically in the form of a ring, forming temporary co-operation of the insert (**2**) fixed to the cap (**1**), and the pourer (**3**), the axial means (**21**) of displacement of the insert being in direct contact on the rigid component (**6**H) in the said high position.

[0055] Although the pourers according to the invention are already very attractive in themselves, the greatest attractiveness results from the association of a pourer and a closure cap, since the pourer according to the invention was developed to solve a problem related to this type of association.

[0056] For the conditioner, the cap fitted with a pourer is used on a bottling machine practically in the same way as a standard cap not fitted with a pourer, without any risk of damaging this cap, which illustrates the main advantage of the invention.

[0057] The peripheral skirt (**4**) of the pourer may include at least one circular rib (**41**) making the pourer (**4**) leaktight with the neck (**9**), the width, number and flexibility of the ribs (**41**) being chosen so as to obtain fairly high friction with the neck to achieve the said leak tightness, but remaining sufficiently low so that the peripheral skirt (**4**) can be inserted in its final place in the neck (**9**) by pressing on the cap in the axial direction before the said downwards axial displacement of the rigid component (**6**) begins, when the pourer and the associated closure cap are fixed. Most figures (except **FIG. 3**) illustrate this embodiment.

[0058] Friction can be chosen so that the force F_I necessary to insert the pourer and its peripheral skirt into the neck is typically less than 10 daN, and that a force F_D greater than F_I and typically greater than 10 daN, and preferably between 10 and 20 daN, is necessary to achieve the said axial displacement.

[0059] As illustrated in the figures, the peripheral skirt (**4**) may comprise an upper rim (**42**) that bears on all or part of the edge (**90**) of the neck (**9**) when the peripheral skirt (**4**) of the pourer (**3**) is in place in the neck (**9**). Thus, it is convenient if the pourer, to which an axial force F_I is applied, comes into contact with the edge (**90**) so as to prevent axial displacement of the peripheral skirt (**4**) of the pourer.

[0060] The pouring element may also be fixed either to the peripheral skirt (**4**) or to the rigid component (**6**). It has been shown fixed to the peripheral skirt (**4**) in all figures concerned, except in **FIG. 3** where it was shown fixed with the rigid component (**6**).

[0061] As illustrated for example in **FIGS. 1A and 1B**, the pouring element may comprise a flexible circular lip (**8**) in the deflected state (**8**F) typically in contact with the edge of the neck when the neck (**9**) is closed by the closure cap (**1**), or in the deployed state (**8**D) when the pourer (**3**) has to be used, the closure cap (**1**) typically a screw cap, having been removed.

[0062] As illustrated in **FIGS. 10A and 10B**, apart from a solidarisation lip (**22**) fixing the insert (**2**) to the metallic part (**10**) of the cap (**1**), the insert (**2**) may comprise a sealing lip (**23**) facing towards the inside of the neck (**9**) and that will bear on the edge (**90**) of the neck (**9**) or on the circular lip (**8**F) forming the pouring element if the pouring element extends on the said edge, so as to close the neck (**9**) in a sealed manner.

[0063] As illustrated in **FIGS. 11A and 11B**, the outer diameter of the flexible circular lip (**8**) in the deployed state (**8**D) may be less than the inside diameter of the sealing lip (**23**), so that when the neck (**9**) is closed by the closure cap (**1**), the circular lip changes from the deflected state (**8**F) by

being forced into contact with the sealing lip (**23**), itself forced into contact with the edge (**90**) of the neck.

[**0064**] According to one variant of the invention illustrated in **FIG. 13**, all or some of the leak tightness of the said leak tight attachment means between the pourer (**3**) and the neck (**9**) may be achieved by at least one external rib (**512**) supported on the lower part (**5**).

[**0065**] According to another variant of the invention illustrated in **FIGS. 12A and 12B**, the peripheral skirt (**4**) and the rigid component (**6**) may co-operate on tapered surfaces (**44, 64**) such that the said axial displacement causes a radial spacing of the peripheral skirt (**4**) so as to increase the attachment and/or leak tightness between the neck (**9**) and the pourer (**3**).

[**0066**] In all the figures, the main functions of the insert (**2**) are to create a leak tight closure of the neck, and temporarily assemble the pourer. However, the insert (**2**) may also be threaded, and in this case it comprises a threaded skirt that will co-operate with the thread of the neck.

[**0067**] According to another embodiment of the invention illustrated in **FIGS. 6 and 7**A to 9B, the rigid component (**6**) may form a cage (**63**) for a ball (**630**) so as to form a non-refillable pourer (**3**I).

[**0068**] Another purpose of the invention consists of a closure cap temporarily fixed to a pourer according to the invention by the cooperation of a temporary assembly means (**20**) supported by the insert (**2**), and a temporary assembly means (**40, 60**) supported by the pourer (**3**). This type of object is shown in **FIG. 1C**.

[**0069**] The shell of the cap is typically metallic (**10**), but the invention is not limited to metallic cap shells. The shell of the cap may also be made of plastic.

[**0070**] The inserts (**2**) and the pourers (**3**) may be made of moulded plastic. They may be made of any type of plastic that can be moulded, chosen as a function of its cost and the required mechanical characteristics, but typically of a polyolefin such as PE, PP and other thermoplastic materials such as PA, PET, PS (possibly modified to make it sufficiently supple) or an elastomer material such as SBS or other synthetic rubbers. The inserts and pourers may be formed from a single part or single piece, except when two separate parts are provided, for example such as with pourers in **FIGS. 1A** to **2** and **5**A to **6**. In this case, there will preferably be a peripheral skirt (**4**) and the lower part (**5**) will be made of an elastomer material, in this case the lower part (**5**) being made rigid due to the thickness of the material whereas the rigid component (**6**) will be made of a harder and stiffer material, with other mechanical characteristics, for example made of PP, so as to guarantee a leak tight attachment of the peripheral skirt (**4**) to the neck (**9**). In this case the required leak tightness is such that when the pourer is used, all the poured liquid actually pours through the pouring element (**8**) without any liquid flowing or sweating between the inside wall of the neck and the pourer.

[**0071**] However, when the pourers are formed from a single piece and are provided with hinges to enable articulation of a cooperation means (**7**) between the lower part (**5**) of the peripheral skirt and the rigid component (**6**) of the pourer, as is the case of the pourers in **FIGS. 3A** to **4**B, **7**A and **8**A, the hinges are obtained by thinning of the wall and vice versa, and like the rigid component (**6**), the more rigid components are obtained by varying the material thickness.

[**0072**] Pourers or pouring elements (**4** and **5**) may also be formed in a single piece with at least two different materials by insert moulding. Thus, for example, the pouring element (**8**) and/or the lower part (**5**) forming an angular sector (**51**) may be made from a material different from the material forming the peripheral skirt (**4**).

EXAMPLE EMBODIMENTS

[**0073**] The figures show example embodiments of caps (**1**) fitted with inserts (**2**) and with pourers (**3**) according to the invention.

[**0074**] In these examples, all caps and pourers were made for closing necks with an outside diameter of 31.5 mm—see **FIG. 7A**.

[**0075**] A conventional shell, typically made of aluminium, was used for the metallic part (**10**) of the cap.

[**0076**] As can be seen in the Figures, all the inserts (**2**) include the following elements:

[**0077**] 1—a peripheral lip (**22**) to rigidly fix the insert with the metallic part (**10**) by means of an annular groove (**12**), otherwise the insert would have to be glued to the head of the metallic part (**10**),

[**0078**] 2—a sealing lip (**23**) facing inwards and which is preferably compressed in contact with the edge (**90**) as illustrated in **FIGS. 10B** to **11**B, but possibly in contact with the flexible lip (**8**F) as illustrated in the other figures.

[**0079**] 3—a temporary means of assembling the insert (**2**) to the pourer (**3**) that solidarises the cap and the pourer as long as the pourer is not fixed to the neck of a bottle, which makes it much easier to perform the capping operation. In these examples, the chosen assembly means is chosen in cooperation by click fitting flexible elements, the ends of which are provided with relief (**20**) and (**40, 60**).

[**0080**] 4—and a means (**21**) of axially displacing the rigid component (**6**) of the pourer (**3**), when the pourer (**3**) is inserted in the neck (**9**) that takes place when the cap is being fitted.

[**0081**] The inserts (**2**) were moulded from PE or an elastomer material.

[**0082**] All the manufactured pourers (**3**) comprise:

[**0083**] a—a peripheral skirt (**4**) provided with sealing ribs (**41**)—except in **FIG. 13**, in which the sealing ribs (**512**) are supported on the lower part (**5**), and possibly fitted with a shoulder (**40**) to form the temporary assembly with the insert (see **FIG. 8A**),

[**0084**] b—a rigid lower part (**5**) prolonging the peripheral skirt (**4**), that can move radially outwards, particularly due to the thinned part (**50**) forming a hinge O. Tests were carried out with an angular sector (**51**) with an angle θ equal to 15°, **20°**, **25°**,

[**0085**] c—a pouring element (**8**) that is in the form of a flexible lip, which when relaxed is in the deployed

position (8D), and which when stressed, typically by the pressure exerted by the cap in the closed position, is in the deflected position (8F). This pouring element (8) is usually an extension of the upper end of the peripheral skirt (4) or, as in the case of the pourer in FIG. 2, of the rigid component (6), and in this case a thinned part (65) can act as a hinge so that the flexible lip can pivot from one state position to the other,

[0086] d—a rigid component (6), the axial displacement of which causes a radial spacing of the lower part (5), possibly due to specific cooperation means (7, 72, 73). This rigid component may carry a shoulder (60) to form a temporary means of assembly with the insert (2).

[0087] In the case of the pourers in FIGS. 1A to 2, 5A to 6B, 11A to 13, and 5B, a single piece composed of the peripheral skirt (4) fitted with the pouring element (8) and its lower part made of PE or elastomer, was made separately. In particular, when this component is made of elastomer, the lower part (5) may form a complete ring, which can move radially outwards during the downward axial movement of the rigid component (6), which is also made separately by moulding of PP.

[0088] In the case of the pourers in FIGS. 3A to 4B, 7A to 9B and 14 to 16C, the pourer is in a single piece, which was made by moulding from transparent PP or PP containing a mineral powder filler such as talc. The glass ball (630) was force fitted into the pourer.

[0089] FIGS. 9A and 9B show methods applicable to the rigid lower part (5). As already mentioned, this lower part (5) may form a ring but in this case it forms several tabs that are either insulated (52) as shown in FIG. 9B or not insulated (53) since they are fixed by a thin skirt (530) as shown in FIG. 9A and in FIG. 8B.

[0090] The arrows marked 6 or 7 in FIGS. 9A and 9B represent the radial spacing between the tabs (52, 53) and either the rigid component (6) alone or the cooperation means (7), depending on the case, as a result of the direct thrust.

[0091] The tests carried out using caps with a pourer made in this way demonstrated the major advantage of the invention, both on the capping line and with consumers.

ADVANTAGES OF THE INVENTION

[0092] Firstly, the invention considerably reduces problems encountered on the capping line in that caps are no longer damaged without any need to modify the capping lines, thus avoiding production stoppages and losses of products resulting from these problems.

[0093] Furthermore, the invention describes means of adapting the pourer to any type of cap and any type of diameter.

[0094] Furthermore, the invention can be used to insert a complementary function such as non-refillability, without any significant extra cost. In this case, the pourer according to the invention comprises means that make it impossible, or at least difficult, to extract the pourer from the neck, in order to reduce possibilities of fraud.

[0095] Finally, during use, the cap and its associated pourer are practical to use since the consumer will not see any significant difference in the height and size of the bottle or the manual opening force, between a standard cap without a pourer and a cap with a pourer according to the invention, particularly to eliminate cooperation between the insert (2) and the pourer (3) through temporary assembly means (20) and (40, 60) that remain within the range of what the consumer considers to be normal.

List of marks	
Closure cap	1
Metallic part	10
Vertical axis	11
Annular solidarisation groove between 10 and 2	12
Insert	2
Temporary assembly means	20
Axial displacement means for 6	21
Solidarisation lip with 10	22
Sealing lip	23
Pourer	3
Non-refillable pourer	3I
Pourer peripheral skirt	4
Temporary assembly means	40
Sealed attachment means - ribs	41
Upper rim	42
Click fit element with 62	43
Skirt with tapered inner wall	44
Rigid lower part of the peripheral skirt	5
Thinned part - Hinge O	50
Hinged element - angular sector	51
Inside OD	510
Outside OC	511
Sealing ribs	512
Insulated rigid tab	52
Rigid tab fixed to a skirt	53
Flexible skirt	530
Rigid heels	54
Click fit notch with 740	540
Fins	541
Rigid component of pourer	6
Rigid component in high position	6H
Rigid component in low position	6B
Temporary assembly means	60
Lower end	61
Click fit element with 43	62
Rigid component or portion of part forming cage	63
Ball contained in cage 6C	630
Cage arch	631
Rigid part with tapered outside skirt	64
Pouring element hinge	65
Cooperation means between 5 and 6	7
Hinge - End A	70
Hinge - End B	71
Rigid element	72
Rigid element with triangular section	73
Side adjacent to end B	730
Rigid locking rod	74
Lock	740
Flexible circular lip forming the pouring element	8
Flexible lip in the deployed state	8D
Flexible lip in the deflected state	8F
Neck of a container	9
Edge	90
Thread	91
Counter-ring	92

1. Pourer (3) associated with a closure cap (1) and designed to be fixed inside a container neck (9), comprising

a peripheral skirt (**4**), fitted with a leak tight means of fastening to the neck (**9**), a pouring element (**8**), and means for temporarily assembling said pourer and said closure cap, characterised in that,

a) the said peripheral skirt (**4**) comprises a lower part (**5**) capable of being radially spaced apart for the pourer to be fixed to the neck (**9**);

b) the pourer (**3**) comprises a rigid component (**6**) axially mobile downwards, inside the peripheral skirt (**4**), by typically irreversible changeover from a said high position H to a said stable low position B during attachment of the pourer (**3**) and the cap (**1**) to the neck (**9**),

c) the pourer (**3**) comprises means for causing the lower part (**5**) and the rigid component (**6**) to co-operate so as to transform the axial movement of the rigid component (**6**) into a radial movement of the lower part (**5**), the said axial displacement not beginning until the pourer (**3**) is in place in the neck (**9**), the axial force F_D required by the axial displacement of the rigid component (**6**) with respect to the peripheral skirt (**4**) being greater than the force F_I necessary to insert the pourer (**3**) into the neck (**9**).

2. Pourer according to claim 1, in which the lower part (**5**) is rigid and hinged with respect to the peripheral skirt (**4**), typically by means of a thinned part (**50**) forming a hinge O and connecting the lower part (**5**) to the peripheral skirt (**4**), and forms a hinged element (**51**) typically in the form of an angular sector with an angle θ limited by the outside OC and the inside OD, each forming an angle Φ_C and Φ_D respectively from the vertical, and in which typically the end of the rigid component (**6**) cooperates typically with the inside OD of the lower part (**5**), so that the downwards axial displacement of the rigid component (**6**) causes rotation of the said angular sector (**51**), the angle Φ_C typically being equal to 0° and the angle Φ_D typically being equal to $-\alpha°$ before the said axial displacement, the angle Φ_C typically being equal to $+\alpha°$ and the angle Φ_D being equal to 0° after the said axial displacement, where α is typically between 5 and 25°.

3. Pourer according to claim 2 in which the rigid component (**6**) co-operates with the lower part (**5**) through a rigid element (**72**, **73**) forming the cooperation means (**7**) and hinged at its ends X and Y, one of the ends X being fixed or made to be fixed to the lower part (**5**), the other end Y being fixed or made to be fixed to the rigid component (**6**) such that when the inclination of the said hinged element (**51**) is varied to reach the said stable position and as the end Y moves downwards, the said axial displacement of the rigid element (**72**, **73**), pushes the end X radially outwards, thus forming the said changeover from the high position H to the low position B.

4. Pourer according to claim 3 in which, in order to obtain the said stable position, firstly the height Z_{YH} of the said end Y in the high position before the said axial displacement is typically greater than the height Z_X of the said end X, whereas the height Z_{YB} of the said end Y in the low position after the said axial displacement is typically less than the height Z_X of the said end X, and secondly the said rigid element (**73**) has a typically triangular section, the end Y forming a vertex of this triangle, such that in the low position, a side (**730**) adjacent to this vertex stops in contact with the rigid component (**6**) and thus limits the said downwards axial displacement.

5. Pourer according to any one of claims 3 to 4 in which the said lower part (**5**) includes hinged elements (**51**) consisting of rigid tabs (**53**) or rigid heels (**54**) with a uniform spacing, the number n of these elements varying from 3 to 10 and typically from 4 to 8, with a distinct rigid element (**72**, **73**) corresponding to each tab (**53**) or heel (**54**)).

6. Pourer according to claim 5 in which a lock (**740**) is inserted at an angle between two of the said consecutive rigid heels (**54**) by means of a locking rod (**74**) corresponding to the said rigid element (**72**, **73**), so as to block the angular position of the said rigid heels by the said locks when the said rigid component (**6**) is in the said low position.

7. Pourer according to claim 6 in which the said locks (**740**) and the said rigid heels (**54**) co-operate, typically by means of a click fit notch (**540**), so as to reinforce the attachment of the pourer (**3**) to the neck (**9**).

8. Pourer according to any one of claims 6 to 7 in which the said rigid heels (**54**) comprise fins (**541**) so as to reinforce the attachment of the pourer (**3**) to the said neck (**9**).

9. Pourer according to any one of claims 3 to 8 made in a single piece.

10. Pourer according to claim 2 in which the lower end (**61**) of the rigid component (**6**) comes into direct contact on the inside (**510**) of the lower part (**5**), so as to form the said cooperation means.

11. Pourer according to any one of claims 3 to 10 in which the rigid component (**6**) and the peripheral skirt (**4**) comprise male and female elements (**62**, **43**) that co-operate and irreversibly click fit together, so as to obtain the said stable position.

12. Pourer according to any one of claims 1 to 11, in which the closure cap (**1**), which is typically metallic, is provided with a plastic insert (**2**), that seals the closure cap (**1**) and includes a temporary assembly means (**20**) and a means of axial displacement (**21**) of the rigid component (**6**), these two means possibly being partially coincident, the temporary assembly means (**20**), typically being in the form of a ring, forming temporary co-operation of the insert (**2**) fixed to the cap (**1**), and the pourer (**3**), the axial means (**21**) of displacement of the insert being in direct contact on the rigid component (**6**H) in the said high position.

13. Pourer according to any one of claims 1 to 12 in which the peripheral skirt (**4**) of the pourer includes at least one circular rib (**41**) making the pourer (**4**) leak tight with the neck (**9**), the width, number and flexibility of the ribs (**41**) being chosen so as to obtain fairly high friction with the neck to achieve the said leak tightness, but remaining sufficiently low so that the peripheral skirt (**4**) can be inserted in its final place in the neck (**9**) by pressing on the cap in the axial direction before the said downwards axial displacement of the rigid component (**6**) begins, when the pourer and the associated closure cap are fixed.

14. Pourer according to claim 13 in which friction is chosen so that the force F_I necessary to insert the pourer and its peripheral skirt into the neck is typically less than 10 daN, and that a force F_D greater than F_I and typically greater than 10 daN, and preferably between 10 and 20 daN, is necessary to achieve the said axial displacement.

15. Pourer according to any one of claims 1 to 14 in which the peripheral skirt (**4**) comprises an upper rim (**42**) that bears on all or part of the edge (**90**) of the neck (**9**) when the peripheral skirt (**4**) of the pourer (**3**) is in place in the neck (**9**).

16. Pourer according to any one of claims 1 to 15 in which the pouring element **(8)** is fixed either to the peripheral skirt **(4)** or to the rigid component **(6)**

17. Pourer according to claim 16 in which the pouring element **(8)** comprises a flexible circular lip in the deflected state **(8F)** typically in contact with the edge of the neck when the neck **(9)** is closed by the closure cap **(1)**, or in the deployed state **(8D)** when the pourer **(3)** has to be used, the closure cap **(1)** typically a screw cap, having been removed.

18. Pourer according to any one of claims 12 to 17 in which the insert **(2)** comprises a sealing lip **(23)** facing towards the inside of the neck **(9)** and that will bear on the edge **(90)** of the neck **(9)** or on the pouring element **(8)** if the pouring element extends on the said edge, in addition to the lip **(22)** rigidly fixing the insert **(2)** to the metallic part **(10)** of the cap **(1)**.

19. Pourer according to claims **17** and **18** in which the outer diameter of the flexible circular lip in the deployed state **(8D)** is less than the inside diameter of the sealing lip **(23)**, so that when the neck **(9)** is closed by the closure cap **(1)**, the circular lip changes to the deflected state **(8F)** by being forced into contact with the sealing lip **(23)**, itself forced into contact with the edge **(90)** of the neck.

20. Pourer according to any one of claims 1 to 19 in which all or some of the leak tightness of the said leak tight attachment means between the pourer **(3)** and the neck **(9)** is achieved by at least one external rib **(512)** supported on the lower part **(5)**.

21. Pourer according to any one of claims 1 to 20 in which the peripheral skirt **(4)** and the rigid component **(6)** co-operate on tapered surfaces **(44, 64)** such that the said axial displacement causes a radial spacing of the peripheral skirt **(4)** so as to increase the attachment and/or leak tightness between the neck **(9)** and the pourer **(3)**.

22. Pourer according to any one of claims 12 to 21 in which the insert **(2)** may be threaded.

23. Pourer according to any one of claims 1 to 22 in which the rigid component **(6)** forms a cage **(63)** for a ball **(630)** so as to form a non-refillable pourer **(3I)**.

24. Pourer according to any one of claims 1 to 23 formed by moulding a transparent plastic with high mechanical characteristics chosen from among PA, PET, PS and PET.

25. Closure cap **(1)** temporarily fixed to a pourer **(3)** according to any one of claims 1 to 24, by a temporary assembly means **(20)** supported by the insert **(2)**, and a temporary assembly means **(40, 60)** supported by the pourer **(3)**.

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