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Amended claims in accordance with Rule 86 (2) EPC.

(54) Drinking caps for beverage containers

(57) A drinking cap constituting a one-piece moulding of polymeric material includes a first circular section tubular portion (2) with a first radius for connection to the mouth of the beverage container and a second circular section tubular portion (6) with a second radius smaller than the first radius. One end of the first tubular portion (2) is connected to one end of the second tubular portion (6) by a resilient annular integral web (4), in which one or more flow openings (18) are formed. The width of the web is equal to or greater than the difference between the first and second radii. The other end of the second tubular portion (6) is closed. The web (4) carries a projecting annular first sealing flange (20). The first and second tubular portions (2, 4) are coaxial and relatively moveable in the axial direction between an open position, in which the second tubular portion (6) is located outside the first tubular portion (2) and the flow openings (18) are unobstructed, and a closed position, in which the said one end of the second tubular portion (6) is located within the said one end of the first tubular portion (2) and the sealing flange (20) is in engagement with the internal surface of the first tubular portion (2), whereby the flow openings (18) are prevented from communicating with the interior of the first tubular portion (2) by the sealing engagement of the sealing flange (20) with the internal surface of the first tubular portion.

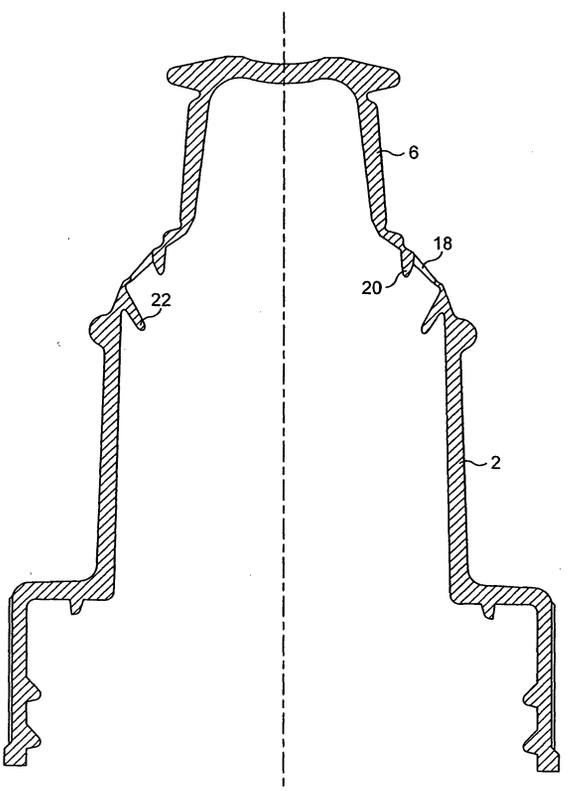

FIG. 3

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Description

[0001] The present invention relates to drinking caps for beverage bottles or other beverage containers. Such drinking caps typically include two moulded plastic components which are connected together and are relatively movable between a first position, in which the bottle, to which the cap is connected, is sealed and a second position, in which the interior of the bottle communicates with the exterior through one or more openings through which a liquid in the bottle may flow. Such caps thus provide a resealing facility and the ability to drink from the bottle without removing the cap.

[0002] Various different constructions of drinking cap are known but these all include at least two components which must be moulded separately and then connected together. This is both time-consuming and expensive.

[0003] It is therefore the object of the invention to provide a drinking cap which is both simple and cheap and, in particular, constitutes a one-piece plastic moulding.

[0004] According to the present invention, a drinking cap constitutes a one-piece moulding of polymeric material, such as polypropylene, and includes a first circular section tubular portion with a first radius for connection to the mouth of a beverage container and a second circular section tubular portion with a second radius smaller than the first radius, one end of the first tubular portion being connected to one end of the second tubular portion by a resilient, annular, integral web, in which one or more flow openings are formed, the width of the web being equal to or greater than the difference between the first and second radii, the other end of the second tubular portion being closed, one of the web and the internal surface of the first tubular portion adjacent the said one end thereof carrying a projecting annular first sealing flange, the first and second tubular portions being coaxial and relatively movable in the axial direction between an open position, in which the second tubular portion is located outside the first tubular portion and the flow openings are unobstructed, and a closed position, in which the said one end of the second tubular portion is located within the said one end of the first tubular portion and the sealing flange is in sealing engagement with the other of the web and the internal surface of the first tubular portion, whereby the flow openings are prevented from communicating with the interior of the first tubular portion by the sealing engagement of the first sealing flange with the other of the web and the internal surface of the first tubular portion.

[0005] Thus the drinking cap in accordance with the invention includes two circular section tubular portions of different radius, one end of each of which is connected by a resilient web whose width, that is to say length in the generally radial direction, is equal to or greater than the difference between the two radii. The other end of the tubular portion of greater radius is adapted for connection to the mouth of a bottle or the like whilst the other end of the tubular portion of lesser radius is closed. The resilient web has at least one and preferably a number of spaced flow openings formed in it. Either the web or the internal surface of the tubular portion of greater diameter carries a sealing flange. The tubular portion of lesser diameter is thus movable in the axial direction with respect to the other tubular portion between an open position, in which it is situated wholly outside the tubular portion of greater diameter and the flow openings are unobstructed, and a closed position in which its end connected to the web is situated inside the adjacent end of the tubular portion of greater diameter. In this closed position, the flow apertures are situated within the tubular portion of greater diameter and the sealing flange is in sealing engagement with the other of the web and the internal surface of the tubular portion of greater diameter, thereby sealing the flow openings from the interior of the tubular portions. This means that the bottle to which the drinking cap is connected is also sealed and thus that no liquid may leave it.

[0006] It will be appreciated that when the two tubular portions are in the open position and a force is applied to the tubular portion of smaller diameter to move it into the closed position, the initial movement of the tubular portion of the smaller diameter will necessarily result in compression and/or deformation of the web due to the fact that its length is greater than the difference between the radii of the two tubular portions. This compression and/or deformation will result in the web exerting a restoring force on the tubular portion of lesser diameter urging it back towards the open position. However, as the closing force continues to be exerted, the tubular portion of smaller diameter will move progressively in the axial direction towards the tubular portion of greater diameter. As it passes through the position in which the web extends substantially in the radial direction, the force exerted by the web on the tubular portion of smaller diameter will act on it to urge it towards the closed position. The tubular portion of smaller diameter is thus effectively bistable and if no external force is applied to it it will automatically move to either the open or the closed position. The sealing flange is positioned and dimensioned such that it is moved into sealing contact with the opposing surface on either the internal surface of the tubular portion of larger diameter or the web before the web has reached the fully relaxed position. This means that, in the closed position, the sealing flange is biased into contact with the opposing surface and forms a constant substantially line seal with it.

[0007] It is preferred that the first sealing flange is integral with the web. It is preferred further that the first sealing flange projects from the web in a direction substantially parallel to the axis of the first and second tubular portions, when they are in the open position. This is particularly convenient because it enables the drinking cap to be readily removed from an injection mould at the end of the injection moulding process in the axial direction. It is also convenient because the web, and thus the first sealing flange integral with it, will typically

rotate through about 90° when moving from the open to the closed position, which means that if the first sealing flange extends in the axial direction, when the cap is in the open position, it will extend in the generally radial direction, when the cap is in the closed position, which will mean that its free edge will form a substantially line seal with the opposing surface.

[0008] Whilst the first sealing flange may form a seal directly with the internal surface of the tubular portion of greater diameter, it is preferred that the internal surface of the first tubular portion carries a resilient annular second sealing flange, which projects at an acute angle to the axis of the first of the first and second tubular portions and away from the second tubular portion and is positioned so that it is sealingly engaged by the first sealing flange, when the first and second tubular portions are in the closed position. This second sealing flange will be caused to yield somewhat in the generally radial direction by the engagement of the first sealing flange and this is found to result in a further enhancement of the sealing integrity.

[0009] In order to permit the user readily to grasp the tubular portion of smaller diameter to move it from the closed position to the open position, it is preferred that the first tubular portion carries a radially projecting annular projection.

[0010] In order to minimise the risk that the tubular portion of greater diameter might be deformed by physical engagement, when in the closed position, thereby breaking the seal, it is preferred that the first tubular portion carries an external annular stiffening or reinforcing bead adjacent its connection with the web. This stiffening bead will resist deformation forces and thus minimise the risk of inadvertent leakage occurring.

[0011] Further features and details of the invention will be apparent from the following description of one specific embodiment of drinking cap in accordance with the invention, which is given by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a side view of the drinking cap, when open;

Figure 2 is a side view of the drinking cap, when closed;

Figure 3 is an axial sectional view of the drinking cap when open; and

Figure 4 is an axial sectional view of the drinking cap, when closed.

[0012] The drinking cap is a one-piece injection moulded component of polymeric material, such as polypropylene, and comprises a first circular section tubular portion 2 of relatively large diameter, which is integrally connected at one end by a resilient, flexible web 4 to one end of a second circular section tubular portion 6 of relatively smaller diameter.

[0013] The larger tubular portion 2 is adapted to be connected to the neck of a bottle. For this purpose, its diameter may be substantially the same as that of the neck of the bottle to which it is to be connected or, as in this case, it may be integral with a circular section connector portion 8 of yet greater diameter, that is to say with an internal diameter substantially equal to the external diameter of the neck of the bottle. The connector portion 8 may be connected to the bottle in any convenient manner but in the present case it is provided with internal screw threads 10 for cooperation with corresponding screw threads on the exterior of the neck of the bottle, which is illustrated in part and designated 12 in Figure 2. The upper end of the smaller diameter tubular portion 6 is closed by an integral lid 14, the diameter of which is greater than that of the tubular portion 6, whereby its radially outer edge constitutes a projecting flange or lip 16, which may be grasped by the user.

[0014] As may be seen in Figure 1, a plurality of holes 18 is formed in the resilient web 4. As best seen in Figure 4, the width of the resilient web 4, that is to say its length between the lower end of the tubular portion 6 and the upper end of the tubular portion 2, is greater than the difference between the radii of the two tubular portions. Integral with the internal surface of the web 4 is a first annular sealing flange 20, which extends substantially in the axial direction, when the cap is in the open position illustrated in Figure 3. Integral with the internal surface of the upper end of the larger tubular portion 2 is a second resilient sealing flange 22, which extends both downwardly, that is to say away from the smaller diameter tubular portion 4, and inwardly towards the axis of the cap, whereby it subtends an acute angle with the axial direction of the cap.

[0015] When the cap is in the open position shown in Figures 1 and 3, the tubular portion 4 is located wholly outside the tubular portion 2. The web 4 also extends upwardly out of the tubular portion 2 and also inwardly in the axial direction and the flow openings 18 communicate with the interior of the cap, whereby liquid in the container to which the cap is connected can flow out through the openings 18. If a downward force is exerted on the cap 14, the tubular portion 6 begins to move downwardly. This results in compression and distortion of the web 4, which thus exerts a restoring force on the tubular portion 16 urging it back towards the full open position. As the force continues to be exerted on the cap 14, the tubular portion 6 moves downwardly until the web 4 extends approximately horizontally, that is to say in the radial direction. As the tubular portion 6 moves through and beyond this "dead centre" position, the force exerted by the web 4 on the tubular portion 6 acts in the downward direction. The tubular portion 6 continues to move downwardly and this is accompanied by continuing rotation of the web 4. This movement continues until the free edge of the sealing flange 40 engages the surface of the resilient sealing flange 22. This occurs

before the web 4 is fully relaxed, whereby when the downward force on the cap 14 is removed, the force exerted by the web 4 continues to urge the two sealing flanges into contact and the free edge of the flange 20 makes sealed line contact with the surface of the sealing flange 22. This contact line is situated below the flow openings 18, which means that these flow openings are sealed from the interior of the cap. The interior of the bottle is thus sealed and no liquid can flow out through the openings 18. If it is desired to reopen the bottle, an upward force is exerted on the annular projection or ledge 16 and the process described above is reversed until the cap is again in the open position illustrated in Figures 1 and 3.

[0016] As mentioned above, when the cap is in the closed position, the interior of the liquid container is sealed from the exterior. If, however, a significant lateral force were exerted on one side of the tubular portion 2, there is a risk that it could deform sufficiently to break the seal, thereby permitting liquid within the container to escape through the openings 18. This risk is minimised by the provision of an annular external stiffening or reinforcing bead 24 on the upper portion of the tubular portion 2 in the vicinity of its connection to the web 4. This stiffening bead will resist deformation of the tubular portion 2 and thus minimise the risk of leakage occurring.

Claims

1. A drinking cap constituting a one-piece moulding of polymeric material including a first circular section tubular portion with a first radius for connection to the mouth of a beverage container and a second circular section tubular portion with a second radius smaller than the first radius, one end of the first tubular portion being connected to one end of the second tubular portion by a resilient, annular, integral web, in which one or more flow openings are formed, the width of the web being equal to or greater than the difference between the first and second radii, the other end of the second tubular portion being closed, one of the web and the internal surface of the first tubular portion adjacent the said one end thereof carrying a projecting annular first sealing flange, the first and second tubular portions being coaxial and relatively movable in the axial direction between an open position, in which the second tubular portion is located outside the first tubular portion and the flow openings are unobstructed, and a closed position, in which the said one end of the second tubular portion is located within the said one end of the first tubular portion and the sealing flange is in sealing engagement with the other of the web and the internal surface of the first tubular portion, whereby the flow openings are prevented from communicating with the interior of the first tubular portion by the sealing engagement of the first sealing flange with the other of the web and the internal surface of the first tubular portion.

2. A cap as claimed in Claim 1 in which the first sealing flange is integral with the web.

3. A cap as claimed in Claim 2 in which the first sealing flange projects from the web in a direction substantially parallel to the axis of the first and second tubular portions, when they are in the open position.

4. A cap as claimed in Claim 2 or 3 in which the internal surface of the first tubular portion carries a resilient annular second sealing flange, which projects at an acute angle to the axis of the first of the first and second tubular portions and away from the second tubular portion and is positioned so that it is sealingly engaged by the first sealing flange, when the first and second tubular portions are in the closed position.

5. A cap as claimed in any one of the preceding claims in which the closed end of the second tubular portion carries a radially projecting annular projection for engagement by the user to move the second tubular portion relative to the first tubular portion into the open position.

6. A cap as claimed in any one of the preceding claims in which the first tubular portion carries an external annular stiffening bead adjacent its connection with the web.

Amended claims in accordance with Rule 86(2) EPC.

1. A drinking cap constituting a one-piece moulding of polymeric material including a first circular section tubular portion (2) with a first radius for connection to the mouth of a beverage container and a second circular section tubular portion (6) with a second radius smaller than the first radius, one end of the first tubular portion being connected to one end of the second tubular portion by a resilient, annular, integral web (4), in which one or more flow openings (18) are formed, the width of the web being equal to or greater than the difference between the first and second radii, the other end of the second tubular portion (6) being closed, the web (4) and the internal surface of the first tubular portion adjacent the said one end thereof being connected to a projecting annular first sealing flange (20), the first and second tubular portions (2, 6) being coaxial and relatively movable in the axial direction between an open position, in which the second tubular portion (6) is located outside the first tubular portion (6) and the flow openings are unobstructed, and a closed position (2), in which the said one end of the second

tubular portion is located within the said one end of the first tubular portion and the sealing flange (20) is in sealing engagement with the other of the web (4) and the internal surface of the first tubular portion (2), whereby the flow openings (18) are prevented from communicating with the interior of the first tubular portion by the sealing engagement of the first sealing flange (20) with the other of the web (4) and the internal surface of the first tubular portion (21), **characterised in that** the first sealing flange (20) is integrally connected to the web (4) at a point intermediate its ends, as seen in axial sectional view, whereby when the cap is in the closed position the free edge of the first sealing flange (20) forms a substantially line seal with the internal surface of the first tubular portion (2).

2. A cap as claimed in Claim 1 in which the first sealing flange (20) projects from the web (4) in a direction substantially parallel to the axis of the first and second tubular portions (2, 6), when they are in the open position.

3. A cap as claimed in Claim 1 or 2 in which the internal surface of the first tubular portion (2) carries a resilient annular second sealing flange (22), which projects at an acute angle to the axis of the first and second tubular portions (2, 6) and away from the second tubular portion (6) and is positioned so that it is sealingly engaged by the first sealing flange (20), when the first and second tubular portions are in the closed position.

4. A cap as claimed in any one of the preceding claims in which the closed end (14) of the second tubular portion (6) carries a radially projecting annular projection (16) for engagement by the user to move the second tubular portion (6) relative to the first tubular portion (2) into the open position.

5. A cap as claimed in any one of the preceding claims in which the first tubular portion (2) carries an external annular stiffening bead (24) adjacent its connection with the web.

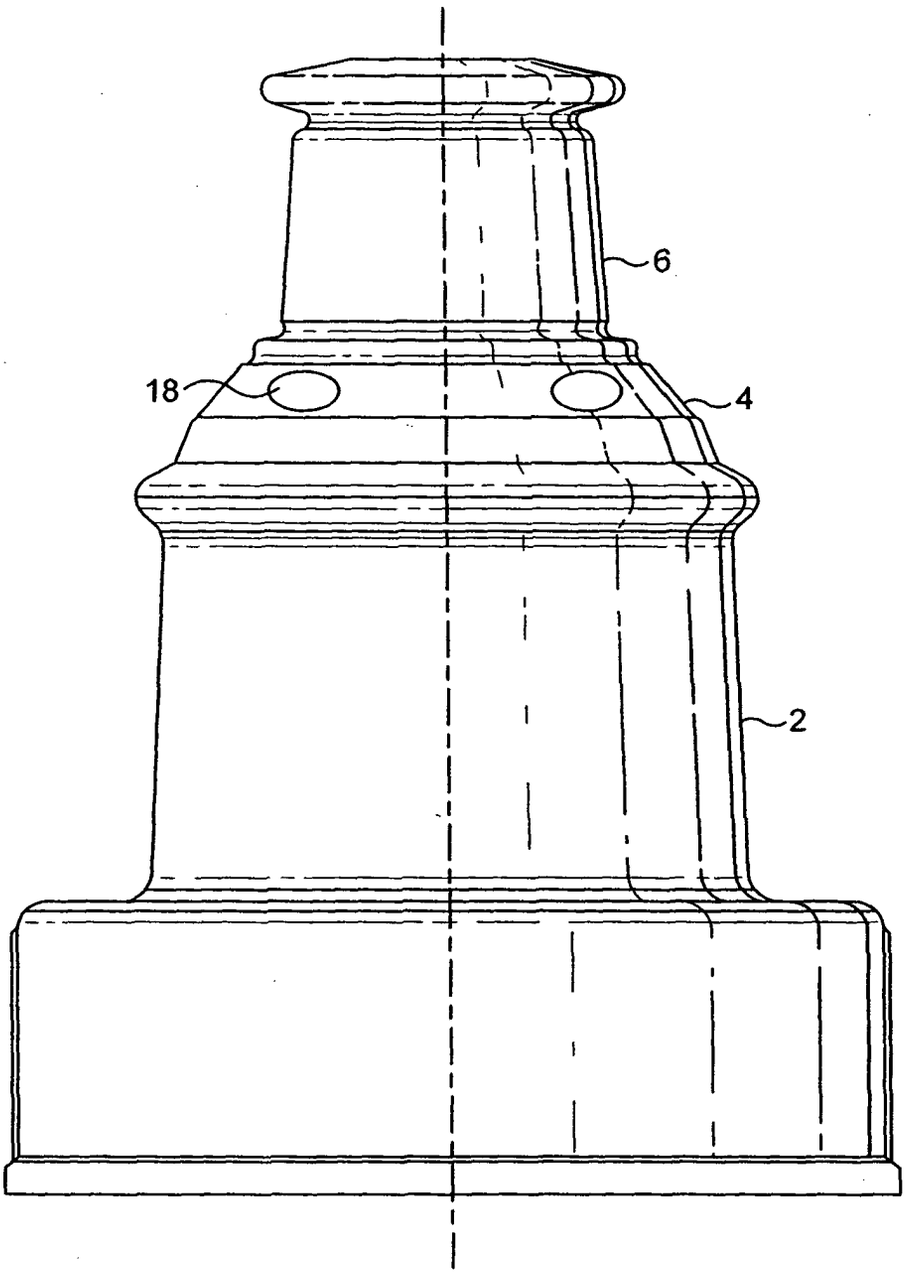

FIG. 1

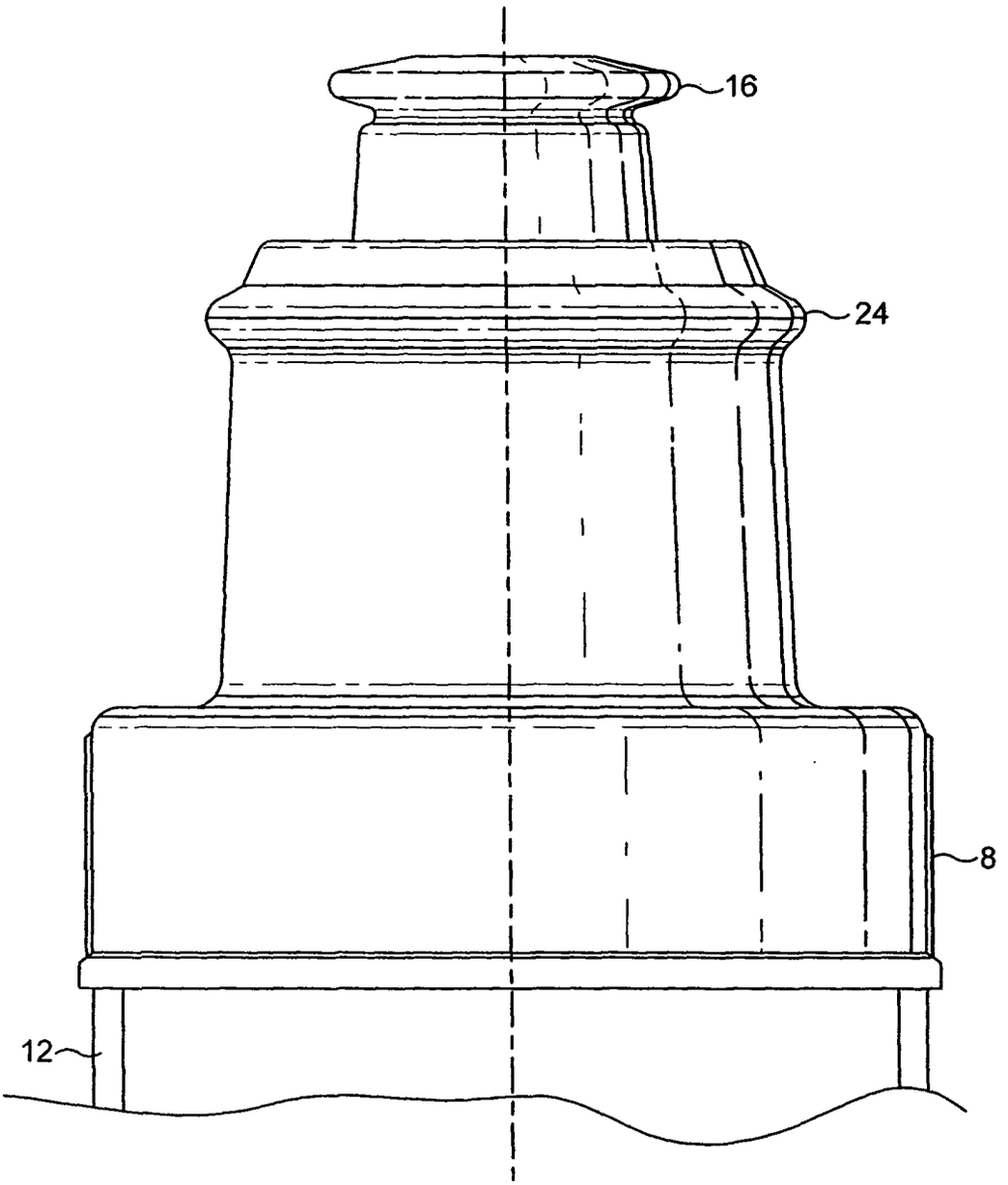

FIG. 2

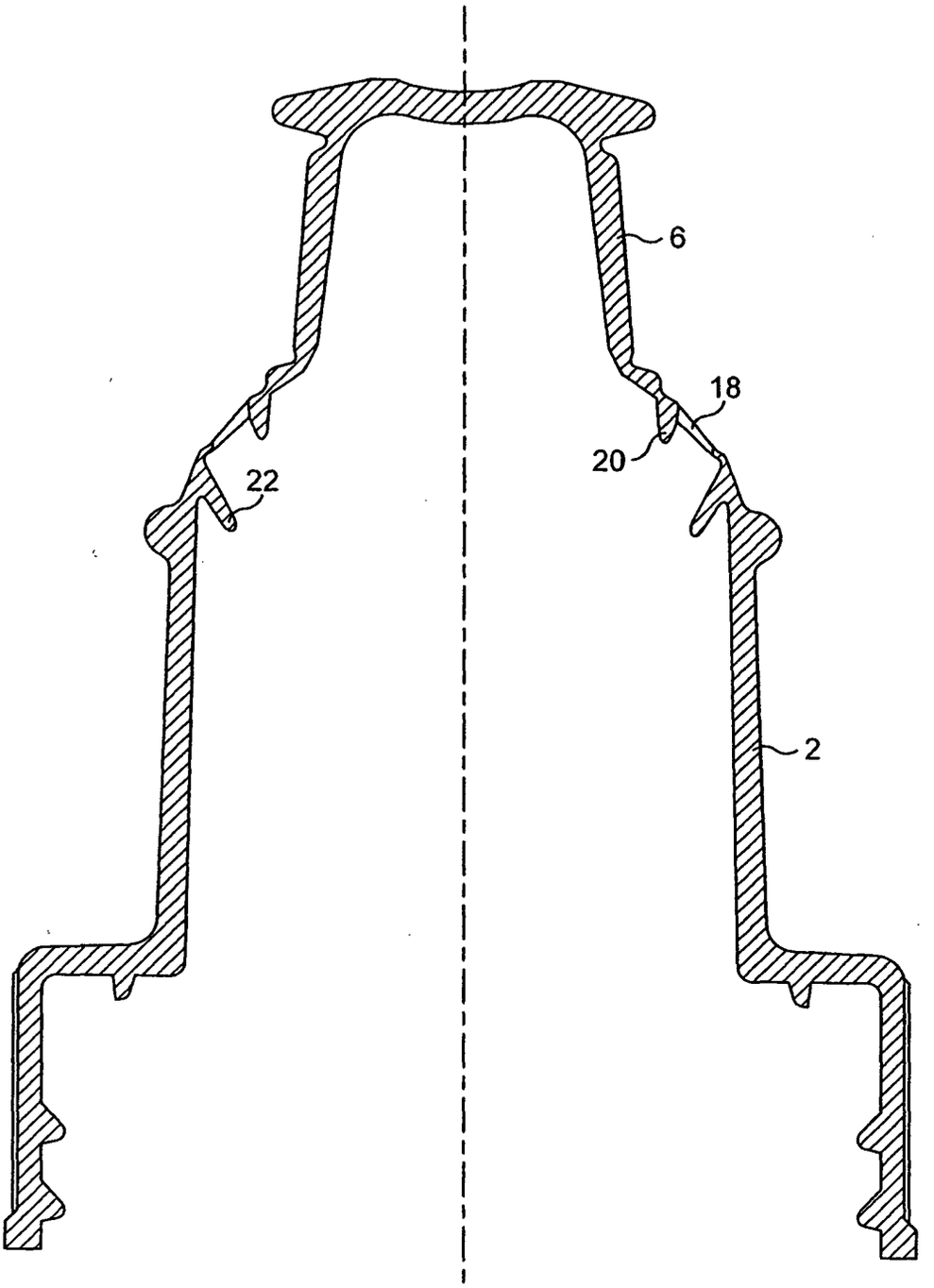

FIG. 3

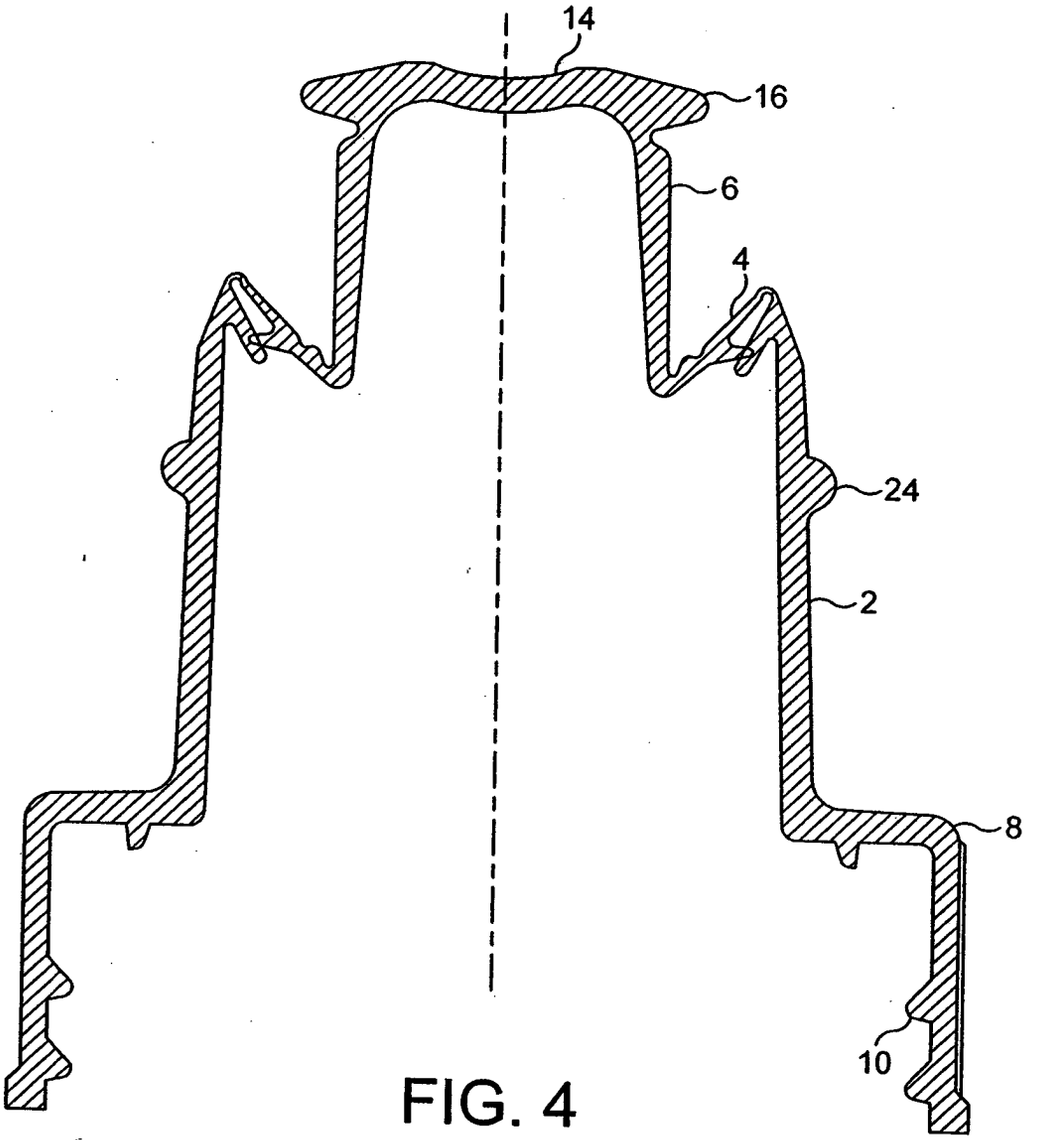

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 04 25 3092

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 November 2004	Bevilacqua, V

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 25 3092

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