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(54) Pump action dispenser

(57) A delivery device (3), adapted to deliver multi-mould type pastes (4) comprises a rigid tank (10) adapted to contain at least one of the components (5,6) of the pastes, an eject pipe (76) in order to deliver the paste (4) to the atmosphere, and an elastic diaphragm (52), being associated to the tank (10), and able to deform from a shape-retaining configuration to a deformed configuration so as to pump the paste (4) through the eject pipe (76). The elastic diaphragm (52) is provided with a surface adapted to be pressed by an operator, and the delivery device (3) comprises fastening means (51) for the eject pipe (76), so that the eject pipe (76) in its shape-retaining configuration is substantially parallel to the eject pipe (76) in its deformed configuration.

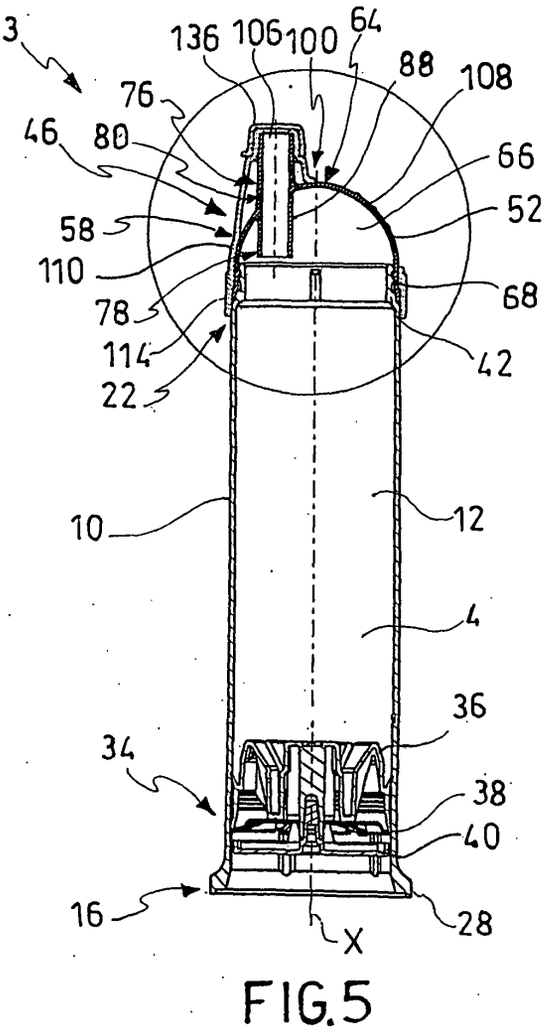

FIG.5

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Description

[0001] The present invention relates to a delivery device adapted to deliver a pasty product; particularly, the present invention relates to a delivery device adapted to deliver a type of multi-mould pastes, i.e. comprising a main body and minor bodies which are distinguishable from the main body.

[0002] In the field of multi-mould pastes, particularly of toothpaste, there is required a paste having cleaning and polishing qualities as well as a good visual attracting. For example, there is required a paste having a main body which consists of an opaque material containing a polishing agent and at least a minor body comprising a translucent or transparent gel, which has for example an anti-spot or refreshing ingredient.

[0003] There exist delivery devices adapted to obtain and deliver multi-mould pastes that employ pumping systems based on the use of deformable diaphragms, which not always ensure that the product will be delivered in an acceptable manner. In fact, they often combine the minor body with the main body and in this manner the delivered multi-mould paste not only loses its visual attracting but does not assure a proper dosing between the bodies forming the paste itself. Furthermore, these devices are complex and expensive to be manufactured.

[0004] Therefore, the need for a simple and cost-effective delivery device allowing multi-mould type pastes to be accurately and reliably combined and delivered is felt. The object of the present invention is to provide a delivery device being able to solve the mentioned problems with reference to the prior art.

[0005] This object is achieved by a delivery device according to claim 1.

[0006] Further characteristics and the advantages of the delivery device according to the present invention will be understood from the description herein below of an exemplary and non-limiting embodiment of this device, in which:

figure 1 shows a perspective view of a delivery device according to an embodiment of the invention;
figure 2 shows a side view of the delivery device from figure 1 taken on the side of arrow II from figure 1;
figure 3 shows a top plan view of the delivery device from figure 1, taken on the side of arrow III from figure 1;
figure 4 shows a cutaway perspective view of the delivery device from figure 1;
figure 5 shows a sectional view of the delivery device from figure 1 taken along the plane A from figure 2, according to an embodiment of the invention;
figure 6 shows an enlarged detail from figure 5;
figure 7 shows a sectional view of the delivery device from figure 1 taken along the plane A from figure 2, according to a further embodiment of the invention;
figure 8 shows an enlarged detail from figure 7;
figure 9 shows a sectional view of the delivery device from figure 1 taken along the plane A from figure 2, according to a further embodiment of the invention;
figure 10 shows an enlarged detail from figure 9;
figure 11 shows a sectional view of the delivery device from figure 1 taken along the plane A from figure 2, according to a further embodiment of the invention;
figure 12 shows an enlarged detail from figure 11.

[0007] The elements or element parts in common between the embodiments described below will be designated with the same numerals.

[0008] With reference to the annexed figures, with 3 has been globally indicated a delivery device, adapted to deliver a fluid or a pasty product, particularly a multi-mould paste 4, comprising at least two components, such as, for example, a main body 5 and at least a minor body 6 which is distinguishable from the main body 5.

[0009] This multi-mould paste may comprise either a main body 5 being preliminarily combined with at least a minor body 6, such as the pastes of the 'deep stripes' prior art, or a main body 5 being preliminarily separated from a minor body 6 and able to combine with it while delivering, such as the pastes of the 'surface stripes' prior art.

[0010] According to an embodiment, the delivery device 3 comprises a tank 10, being preferably of a cylindrical shape, which extends along a longitudinal prevalent direction defining an X-axis.

[0011] Preferably, the tank 10 is rigid and hollow, so as to identify a main volume 12 adapted to contain a paste to be delivered, particularly the main body 5 of a multi-mould paste.

[0012] With the term rigid is meant that during the starting of the delivery device 3 in order to deliver the paste, the tank 10 does not have any substantially change in its volume and shape, i.e. it is not deformed by using the deliverer, thus maintaining a shape-retaining cylindrical configuration and its concentricity with X-axis.

[0013] The tank 10 extends from a first end 16 to a second end 22, which are opposite to X-axis.

[0014] At the first end 16, the tank 10 comprises a support base 28 for the delivery device 3 as well as a thrust unit 34.

[0015] According to an embodiment known in the art, which is shown for example in figure 5, the thrust unit 34 comprises for example a sliding piston 36 inside the tank 10, a flexible ring 38, which is preferably made in aluminium and works as a non-return valve, allowing the piston 36 only to move to the prevalent direction from the first end 16 to the second end 22 and a hard disk 40 which allows the flexible ring 38 to be held in position by connecting itself to the piston 36.

[0016] At the second end 22, the tank 10 provides a coupler portion 42, being substantially of a cylindrical and hollow shape and axial-symmetrical relative to X-axis of the tank 10, having a diameter which is lower than the diameter of the tank 10.

[0017] According to an embodiment, as shown for example in figures 6, 8 and 10, the coupler portion 42 comprises on a lateral external surface thereof a couple of circular projections 44 defining or delimiting a notch 45 which is substantially of a toroidal shape.

[0018] At the second end 22, the tank 10 is associated to a pumping device 46.

[0019] The pumping device 46 comprises operating means 50 and fastening means 51; preferably, said operating means 50 comprise an elastic diaphragm 52 and said fastening means 51 comprise a rigid jig 58.

[0020] According to an embodiment, the elastic diaphragm 52 provides a cap portion 64, which is substantially hollow and identifies a secondary volume 66 adapted to accommodate a minor body 6 of the multi-mould paste, according to an embodiment illustrated for example in figures 9, 10, 11 and 12.

[0021] The cap portion 64 is adapted to be fitted onto the coupler portion 42 of the tank 10. For example, the cap portion 64 comprises at a lower edge 68 a circular rib 70 adapted to coupling with said notch 45 of the coupler portion 42 of the tank 10, so as to allow the cap portion 64 to be fixed on the second end 22 of the tank 10; this fixing is adapted to assure the fluid preservation of the paste contained in the tank 10 and the cap portion 64.

[0022] The elastic diaphragm 52 is associated to an eject pipe 76, i.e. interacts with said eject pipe which is adapted to deliver the multi-mould paste. Particularly, the elastic diaphragm 52 is in fluid cooperation with the eject pipe 76, in order to convey the paste through the eject pipe 76. According to an embodiment, the elastic diaphragm 52 comprises the eject pipe 76, for example of a cylindrical shape, passing through the cap portion 64; the cylindrical eject pipe 76 has an own Y-axis which is separate from the X-axis of the tank 10 and parallel to the latter.

[0023] The eject pipe 76 comprises a first portion 78 and a second portion 80, preferably of a cylindrical shape and coaxial between themselves and with said Y-axis.

[0024] Preferably, said Y-axis is a symmetry axis for said eject pipe 76.

[0025] Preferably, the cap portion 64 and the eject pipe 76 are as one piece between themselves.

[0026] The first portion 78 of the eject pipe 76 is overhanging from the cap portion 64 to the lower edge 68 of the cap portion 64, i.e. inside the secondary volume 66 contained in the cap portion 64.

[0027] The second portion 80 is overhanging from the cap portion 64 on the opposite side of the first portion 78, i.e. on the opposite side of the lower edge 68 of the cap portion 64 and the second end 22 of the combined tank 10.

[0028] The first portion 78 of the eject pipe 76 extends within the secondary volume 66.

[0029] The first portion 78 of the eject pipe 76 is provided with an inlet aperture 82 at the end of itself, adapted to convey the paste into the eject pipe 76.

[0030] The inlet aperture 82 of the eject pipe 76, through which the paste flows in order to come out to the atmosphere, is not on axis with the X-axis of the tank 10.

[0031] According to a further embodiment of the invention, as shown for example in figures 7 and 8, the first portion 78 of the eject pipe 76 is provided with a substantially truncated cone shape, having a diameter increasing towards the inlet aperture 82. In this construction, the inlet aperture 82 is not on axis with the second portion 80 of the eject pipe 76; i.e. the inlet aperture has a W-axis which is separate from the Y-axis of the second portion 80. Preferably, the inlet aperture 82 is crossed by said Y-axis of the second portion 80 of the eject pipe 76. According to an embodiment, a side edge 84 of the inlet aperture 82 substantially intersects said X-axis of the tank 10, preferably the side edge 84 is tangent to X-axis. In other words, the inlet aperture 82 is offset relative to the second portion 80 of the eject pipe 76, said W-axis, relative to a sectional plane crossing X-axis of the tank 10, being included between X-axis and Y-axis.

[0032] According to an embodiment, as shown in figures 9, 10, 11 and 12, adapted to pastes comprising an only minor body 6, at a sidewall 88 of the first portion 78, there is provided at least a hole, preferably a plurality of holes 94, passing through the sidewall 88 and adapted to allow said minor body 6 to flow into the eject pipe 76; said minor body 6 being preferably housed inside the secondary volume 66 which is defined by the cap portion 64.

[0033] In this construction, the minor body 6 is inserted into the cap portion 64 so as to fill the portion of the secondary volume included between a vertex 100 of the cap which is opposite to the lower edge 68 relative to X-axis, and the inlet aperture 82.

[0034] The second portion 80 of the eject pipe 76 is provided with an eject aperture 106 at one end opposite to the cap portion 64, being adapted to deliver the multi-mould paste outside the delivery device 3.

[0035] An operating portion 108 of the cap 64 that is not involved by the eject pipe 76 is adapted to allow a user's finger to be leant in order to cause the cap portion 64 to be deformed and obtain the delivery of the paste through the eject pipe 76.

[0036] The operating portion 108 of the elastic diaphragm 52 is clear from the eject pipe 76; in other words, the eject pipe 76 is set in a portion of the elastic diaphragm which is not involved by the pressure operation from a user. For example, as it can be seen in figure 3, by dividing the cap portion 64 into two mid-halves by means of a diameter D, the eject pipe 76 and the oper-

ating portion 108 are each located in one of said mid-halves.

[0037] Preferably, the operating portion 108 comprises grip means, such as ribs, being adapted to facilitate the gripping for a user.

[0038] With the term elastic diaphragm is indicated a diaphragm having such a thickness and material to be able to deform itself, i.e. pressed by a user, in order to start the delivery device 3; with the cease of the pressure operation from the user, the elastic diaphragm elastically returns to its shape-retaining cap configuration.

[0039] The rigid jig 58 provides a central body 110 adapted to connect the cap portion 64 of the elastic diaphragm 52 to the tank 10. Advantageously, the rigid jig 58 is at least partially counter-shaped relative to the elastic diaphragm 52, so as to fasten the deforming thereof and assure the substantial parallelism of the eject pipe 76 while passing from the shape-retaining configuration to the deformed configuration, subsequent to the operating of the elastic diaphragm 52.

[0040] Advantageously, the fastening means 51 assure that the Y-axis of the eject pipe 76 is the same while passing from the shape-retaining configuration to the deformed configuration; in other words, the fastening means assure the substantial immobility of the eject pipe 76 so that the eject pipe 76 is parallel to itself and fastened in position while passing from the shape-retaining configuration to the deformed configuration of the elastic diaphragm 52; in other further words, following the deforming of the elastic diaphragm 52, the Y-axis of the eject pipe 76 and the X-axis of the tank 10 are parallel and in equal distance between themselves.

[0041] Preferably, the central body 110 is at least partially counter-shaped relative to said elastic diaphragm 52.

[0042] For example, the central body 110 is provided with a wholly cap shape and is adapted to cover at least partially the cap portion 64 of the elastic diaphragm 52. Preferably, in an assembly configuration of the rigid jig 58 onto the elastic diaphragm 52, the rigid jig 58 is at least partially in connection with the elastic diaphragm 52 so as to assure that in the deformed configuration of the elastic diaphragm 52, the latter is not deformed at least at the contact position with the rigid jig 58. Preferably, the rigid jig is counter-shaped relative to the portion of the elastic diaphragm comprising the eject pipe 76, so that in a deformed configuration of the elastic diaphragm 52, the portion of the elastic diaphragm 52 comprising the eject pipe 76 does not substantially change its own shape; in other words, the rigid jig 58 assures the substantial shape-retaining ability of that portion of the elastic diaphragm 52 in direct contact with it. Preferably, the portion of the elastic diaphragm 52 being in direct contact with the rigid jig 58 comprises the eject pipe 76, so as to assure that the eject pipe 76 in the shape-retaining configuration is parallel to the eject pipe 76 in the deformed configuration.

[0043] The central body 110 comprises a fixing portion 114, preferably of a cylindrical shape, adapted to fasten the central body 110 at the second end 22 of the tank 10, so as to block in position the lower edge 68 of the diaphragm 52 in contact with the tank 10.

[0044] In other words, in an assembly configuration of the rigid jig 58 onto the second end 22 of the tank 10, the fixing portion 114 covers the coupler portion 42 of the tank 10 according to a forced coupling, so as to press the lower edge 68 of the cap portion 64 against said coupler portion 42.

[0045] Particularly, the fixing portion 114 assures the seat blocking of the circular projections 44 of the diaphragm in its respective notch 45 of the tank 10; the lower edge 68 of the cap portion 64 is stapled between the fixing portion 114 and the coupler portion 42.

[0046] Furthermore, the fixing portion 114 contributes to confer rigidity to the lower edge 68 of the diaphragm so as to avoid possible paste drawings through the lower edge itself.

[0047] Advantageously, the rigid jig 58 provides a window 118, so that in an assembly configuration of the rigid jig onto the elastic diaphragm, this window overlaps at least partially said operating portion 108 of the cap 64.

[0048] In this manner, the operating portion 108 of the cap 64 is easy to be reached by an operator through the window, so as to allow a finger to be leant in order to cause the cap to be deformed and obtain the delivery of the paste through the eject pipe.

[0049] The rigid jig 58 comprises a ring 122, being substantially hollow and rigidly connected to the central body 110, and adapted to coupling at least partially with said eject pipe, particularly with the second portion 80 of the eject pipe 76.

[0050] Said ring 122 at one end opposite to the fixing portion 114 comprises a cylindrical length 126 ending with a lid 128 having a hole 130 so that in an assembly configuration of the rigid jig onto the elastic diaphragm, said hole 130 overlaps the eject aperture 106.

[0051] The lid 128 has a circular ring shape so as to form a cut-off for the second portion 80 of the eject pipe 76 towards the Y-axis and in a removal direction from the cap itself.

[0052] The cylindrical length 126 is adapted to accommodate at least partially the second portion of the eject pipe, preferably according to a coupling without backlash, so as to fasten the shifting of the eject pipe to a plane perpendicular to the Y-axis.

[0053] Preferably, a cap 136 is associated to said ring 122, and it is adapted to stop the hole 130 and the eject pipe 106.

[0054] With the term rigid jig is indicated a jig having such a material and configuration that it is not deformed during the starting of the delivery device 3 i.e. while the elastic diaphragm 52 is passing from the shape-retaining configuration to the deformed configuration.

[0055] In other words, the function of the rigid jig 58 is to control the deforming of the elastic diaphragm 52 while operating; for example, the ring 122 prevents that

the eject pipe 76 may be moved or inclined so that the Y-axis of the eject pipe is substantially parallel to the X-axis of the tank 10.

[0056] According to a further embodiment, as illustrated for example in figures 11 and 12, the rigid jig 58 and the elastic diaphragm 52 are enbloc moulded, for example by means of double-moulding techniques.

[0057] In this case, the eject pipe is not part of the elastic diaphragm 52, but it belongs to the rigid jig 58. The elastic diaphragm 52 comprises a housing 138 which the eject pipe 76 is associated to.

[0058] According to an embodiment, the cylindrical length 126 of the rigid jig 58 is integrally connected with the second portion 80 of the eject pipe 76.

[0059] In other words, the eject pipe 76 is connected or cantilevered relative to the rigid jig 58, i.e. the second portion 80 of the eject pipe 76 is rigidly connected to the cylindrical length 126 of the rigid jig 58, whereas the first portion 78 penetrates into the elastic diaphragm 52 through said housing 138, without being connected with the elastic diaphragm 52. Accordingly, the first portion 78 is cantilevered relative to the second portion 80 which is rigidly fastened to the rigid jig 58.

[0060] Preferably, the ring 122 comprises a stiffening wall 140 which cooperates with the cap 136 at one end in the direction of the second portion 80, and substantially abuts on the vertex 100 of the cap portion at one end in the direction of the cap portion 64, so as to fasten the deforming of the cap portion along the X-axis. Preferably, said stiffening wall 140 is included between said X-axis and Y-axis.

[0061] The operation of the delivery device according to the invention will be now described herein below.

[0062] Preliminarily, the cap 136 is open, then the operator presses for example the elastic diaphragm 52 by one finger in the direction of the thrust unit 34.

[0063] The piston 36 of the thrust unit 34 is supported by the flexible ring 38, thus it can not move to the first end 16 of the tank 10 along the X-axis.

[0064] Therefore, the paste contained in the tank 10 is raised steam and obliged to flow through the first portion 78 of the eject pipe 76.

[0065] Particularly, the volume of the paste ejected is substantially equal to the volume obtained by deforming the cap portion 64, i.e. the difference between the volumes of the shape-retaining cap portion 64 and the deformed cap portion 64.

[0066] In the case of a delivery device 3 for pastes with one minor body 6, as illustrated for example in figures 9, 10, 11 and 12, the minor body 6 flows through the holes 94 of the eject pipe 76 combining with the main body 5 which is conveyed through the inlet aperture 82 to the eject pipe 76.

[0067] In the case of a delivery device 3 comprising a multi-mould paste 4 having several bodies in the tank 10, as illustrated for example in figures 5, 6, 7 and 8, the paste is conveyed to the inlet aperture 82 of the eject pipe 76.

[0068] When the operator releases the elastic diaphragm 52, the latter regains its original shape, due to its elasticity; therefore, a vacuum is generated inside the tank 10, i.e. a pressure lower than the pressure acting on the piston 36 of the thrust unit 34, on the side turned out.

[0069] This vacuum has the effect of pushing the piston 36 towards the second end 22 of the tank 10, causing the feed of the piston itself.

[0070] Furthermore, said vacuum being generated inside the delivery device has the effect of drawing in an amount of air through the eject aperture 106 so as to push an amount of paste that is in the eject pipe towards the inlet aperture 82 of the pipe itself. The length and section of the eject pipe are set up by physical and geometrical parameters of the paste and the tank, as known in the art, so as to assure that the eject pipe is never completely empty, thus preventing that the air may enter the tank.

[0071] Furthermore, the feed of the piston assures that the outlet length, i.e. the second portion 80 of the eject pipe 76 is always filled at the end of each paste pumping, so as to avoid the forming of vortex which would irreparably endanger the visual aspect as well as the paste composition.

[0072] Preliminarily, before using the delivery device, the eject pipe is at least partially filled with paste, so that when the elastic diaphragm is first put into operation, the paste completely fills up the eject pipe, thus preventing that the air may enter during the following intake or vacuum step.

[0073] During the pumping step the presence of fastening means 51, particularly of the rigid jig 58 assures that the eject pipe 76 in its shape-retaining condition is parallel to the eject pipe 76 in its deformed configuration.

[0074] As it can be appreciated from what has been stated, the delivery device 3 according to the invention allows drawbacks that may exist in the delivery devices of the prior art to be overcome.

[0075] Unusually, the described delivery device allows a multi-mould type paste to be delivered by assuring the composition and the desired aesthetical aspect thereof.

[0076] In the case of a delivery device for pastes having one main body and one minor body, the main body is contained in the tank and the minor body in the cap portion. By acting on the cap portion, the piston pushes the main body into the eject pipe and the elastic diaphragm directly conveys the minor body to the same duct, so as to provide a multi-mould paste having for example a die consisting of the main body and a certain number of stripes, equal to the number of holes that are on the sidewall of the eject pipe, being composed by the minor body and in equal distance from the die of the main body. The fastening means of the eject pipe assure the blocking in position of the eject pipe and the desired aesthetical aspect for the delivered paste.

[0077] In the case of a delivery device for pastes hav-

ing a main body and several minor bodies, the various bodies are contained in the tank, comprising for example a central pipe containing the main body and a lateral tube nest containing the various main bodies. By acting on the cap portion, the piston pushes the various bodies in the eject pipe so as to provide the desired multi-mould configuration; following the operation of the elastic diaphragm, the parallelism of the eject pipe assures the preservation of the paste thus combined in the duct itself.

[0078] Therefore, the parallelism of the eject pipe with the X-axis of the tank, while passing from the shape-retaining configuration to the deformed configuration and vice versa assures that the main body is properly combined with the minor bodies, thus avoiding the forming of vortex inside the paste, which would endanger the aesthetical aspect and the delivered paste composition.

[0079] Moreover, the delivery device is cost-effective in order to be embodied and assembled.

[0080] Obviously, aiming at satisfying contingent and specific needs, those skilled in the art will be able to carry out several modifications and variants to the described herein above, all of them being contemplated within the scope of the invention such as defined in the claims below.

Claims

1. A delivery device (3), adapted to deliver a multi-mould type paste comprising at least two components (5,6), said device comprising

   - a rigid tank (10) adapted to contain at least one of said components (5,6),
   - an eject pipe (76), in fluid communication with said tank (10), and adapted to deliver said paste to the atmosphere,
   - an elastic diaphragm (52), being associated to said tank (10), said elastic diaphragm (52) comprising a deformable operating portion (108) adapted to be pressed by an operator in order to pass from a shape-retaining configuration to a deformed configuration, so as to pump said paste through said eject pipe (76),

   characterized by the fact that
   said device (3) comprises fastening means (51) for said eject pipe (76), adapted to fasten the eject pipe so that the eject pipe (76) in the shape-retaining configuration of the elastic diaphragm (52) is substantially parallel to the eject pipe (76) in the deformed configuration of the elastic diaphragm (52).

2. The delivery device (3) according to claim 1, wherein said fastening means (51) comprise a rigid jig (58) being at least partially counter-shaped relative to said elastic diaphragm (52), so as to fasten at least partially the deforming of the elastic diaphragm (52) while passing from the shape-retaining configuration to the deformed configuration.

3. The delivery device (3) according to any preceding claim, wherein said elastic diaphragm (52) provides a cap portion (64), adapted to be fitted onto a coupler portion (42) of the tank (10), said cap portion (64) being substantially hollow, so as to identify a secondary volume (66) adapted to accommodate at least one body (5,6) of the multi-mould paste (4).

4. The delivery device (3) according to claim 3, wherein said eject pipe (76) is passing through said cap portion (64).

5. The delivery device (3) according to claim 3 or 4, wherein said cap portion (64) comprises a circular rib (70), adapted to couple with a notch (45) of said coupler portion (42) of the tank (10), so as to allow the cap portion (64) to be fixed on the tank (10).

6. The delivery device (3) according to any preceding claim, wherein said eject pipe (76) is substantially of a cylindrical shape around an axis (Y) that is substantially parallel to an extension axis (X) of the tank (10).

7. The delivery device (3) according to any claim 3 to 6, wherein said eject pipe (76) comprises a first portion (78) overhanging from the cap portion (64) to a lower edge (68) of the cap portion (64) and a second portion (80) overhanging from the cap portion (64) on the opposite side relative to the first portion (78).

8. The delivery device (3) according to claim 7, wherein said first portion (78) of the eject pipe (76) is provided at the end with an inlet aperture (82) adapted to convey the paste into the eject pipe (76), and said second portion (80) is provided with an eject aperture (106) adapted to deliver said paste.

9. The delivery device (3) according to any claim 7 to 8, wherein said first and second portion (78,80) are as one piece between themselves.

10. The delivery device (3) according to any claim 7 to 9, wherein said first and second portion (78,80) are cylindrical-shaped and coaxial relative to said axis (Y).

11. The delivery device (3) according to any claim 8 to 10, wherein said inlet aperture (82) is coaxial with said axis (Y) and separate from said axis (X) of the tank (10).

12. The delivery device (3) according to any claim 8 to 11, wherein said inlet aperture (82) and said eject

aperture (106) are coaxial between themselves.

13. The delivery device (3) according to any claim 7 to 12, wherein said first portion (78) of the eject pipe (76) is substantially truncated cone shaped, having a diameter increasing in an opposite direction to said second portion (80).

14. The delivery device (3) according to claim 13, wherein said inlet aperture (82) is provided with an axis (W) which is separate from said axis (Y) of the second portion (80).

15. The delivery device (3) according to any claim 8 to 14, wherein said inlet aperture (82) is crossed by said axis (Y) of the second portion (80) of the eject pipe (76) .

16. The delivery device (3) according to any claim 7 to 15, wherein at a sidewall (88) of the second portion (80) there is provided at least one hole (94), passing through said sidewall (88), and adapted to allow said minor body (6) to flow into the eject pipe (76).

17. The delivery device (3) according to any claim 3 to 16, wherein at least one minor body (6) is inserted into the cap portion (64) so as to fill a portion of the secondary volume (66) included between a vertex (100) of the cap portion (64) opposite to the lower edge (68) relative to the axis (X) and the inlet aperture (82) of the eject pipe (76).

18. The delivery device (3) according to any claim 3 to 17, wherein said cap portion (64) comprises an operating portion (108), which is not involved by the eject pipe (76), adapted to allow a user's finger to be leant in order to allow the cap portion (64) to be deformed.

19. The delivery device (3) according to claim 18, wherein said operating portion (108) comprises grip means adapted to facilitate the gripping for a user.

20. The delivery device (3) according to any preceding claim, wherein said elastic diaphragm (52) comprises as one piece said eject pipe (76).

21. The delivery device (3) according to any claim 3 to 20, wherein said rigid jig (58) comprises a central body (110) being at least partially counter-shaped relative to said cap portion (64) of the elastic diaphragm (52).

22. The delivery device (3) according to claim 21, wherein the central body (110) comprises a fixing portion (114) adapted to fasten the rigid jig (58) to the tank (10), so as to block a lower edge (68) of the elastic diaphragm (52) in contact with the tank (10).

23. The delivery device (3) according to claim 21 or 22, wherein said central body (110) comprises a window (118) so that in an assembly configuration of the rigid jig (58) onto the elastic diaphragm (52), said window (118) overlaps at least partially said operating portion (108) of the cap (64), allowing a user to have access to the operating portion (108).

24. The delivery device (3) according to any claim 21 to 23, wherein said rigid jig (58) comprises a ring (122), being rigidly connected to the central body (110) and adapted to couple at least partially with said second portion (80) of the eject pipe (76).

25. The delivery device (3) according to claim 24, wherein said ring (122) at one end opposite to the fixing portion (114) comprises a cylindrical length (126) having a lid (128) with a hole (130) which is substantially coaxial with said axis (Y), so that in an assembly configuration of the rigid jig (58) onto the elastic diaphragm (52), said hole (130) substantially overlaps the eject aperture (106).

26. The delivery device (3) according to claim 25, wherein said lid (128), having a circular ring shape forms a cut-off for the second portion (80) of the eject pipe (76) towards the axis (Y) and in a removal direction from the cap portion (64).

27. The delivery device (3) according to claim 25 or 26, wherein said cylindrical length (126) is adapted to accommodate at least partially the second portion (80) of the eject pipe (76) according to a forced coupling, so as to fasten the shifting of the eject pipe (76) to a plane perpendicular to the axis (Y).

28. The delivery device (3) according to any claim 24 to 27, wherein a cap (136) is associated to said ring (122) and it is adapted to stop the hole (130) of the lid (128).

29. The delivery device (3) according to any claim 21 to 28, wherein said rigid jig (58) comprises said eject pipe (76).

30. The delivery device (3) according to claim 29, wherein said rigid jig (58) is integrally connected with the second portion (80) of the eject pipe (76).

31. The delivery device (3) according to claim 29 or 30, wherein said rigid jig (58) is as one piece with the second portion (80) of the eject pipe (76).

32. The delivery device (3) according to any claim 29 to 31, wherein said elastic diaphragm (52) comprises a housing (138) which said eject pipe (76) is as-

sociated to.

33. The delivery device (3) according to any claim 29 to 32, wherein said eject pipe (76) is cantilevered relative to said rigid jig (58).

34. The delivery device (3) according to claim 33, wherein the second portion (80) of the eject pipe (76) is rigidly connected to the cylindrical length (126) and the first portion (78) penetrates into the elastic diaphragm (52) so as to be cantilevered relative to the second portion (80).

35. The delivery device (3) according to any claim 29 to 34, wherein the rigid jig (58) and the elastic diaphragm (52) are enbloc moulded by means of double-moulding.

36. The delivery device (3) according to any claim 24 to 35, wherein said ring (122) comprises a stiffening wall (140) which abuts on the vertex (100) of the cap portion (64) at one end in the direction of the cap portion (64), so as to fasten the deforming of the cap portion (64) along said axis (X).

37. The delivery device (3) according to claim 36, wherein said stiffening wall (140) is included between said axis (X) and (Y).

38. The delivery device (3) according to any preceding claim, wherein the axis (Y) of the eject pipe (76) in the shape-retaining configuration of the elastic diaphragm (52) coincide with the axis (Y) of the eject pipe (76) in the deformed configuration of the elastic diaphragm (52).

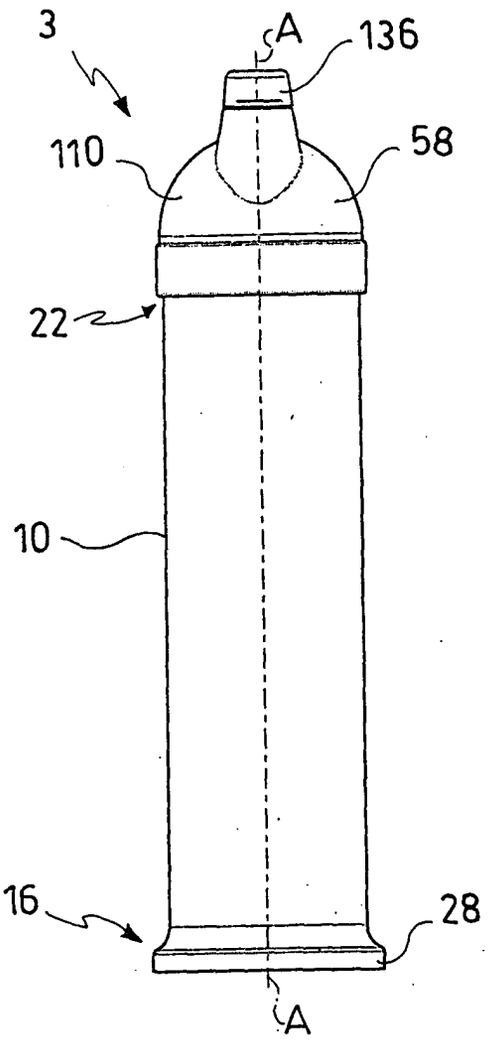


FIG. 2

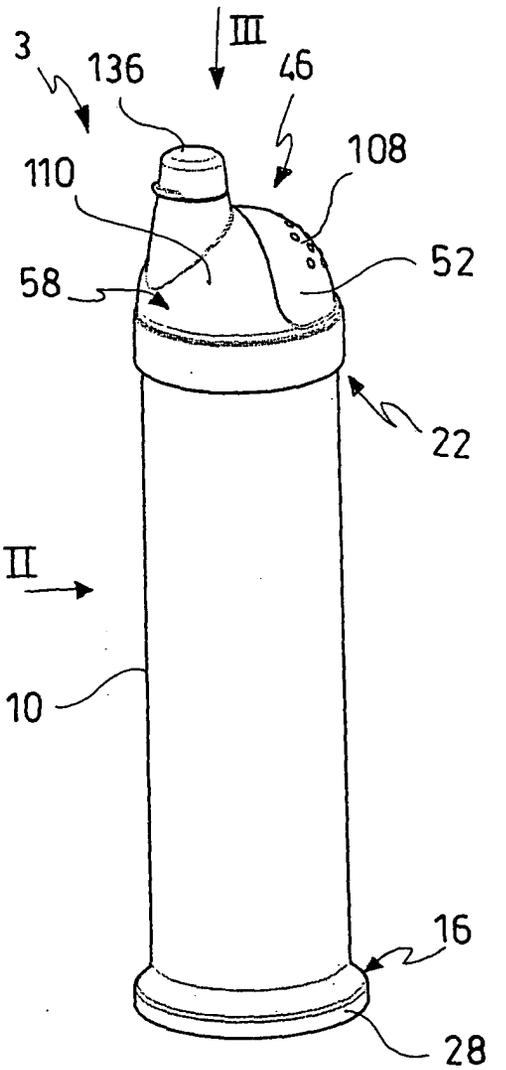


FIG. 1

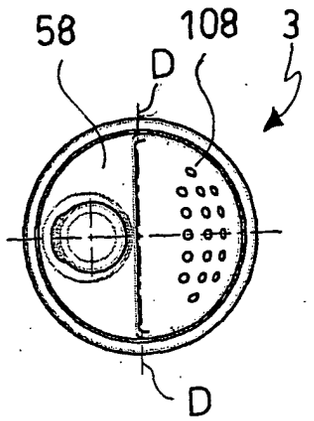


FIG. 3

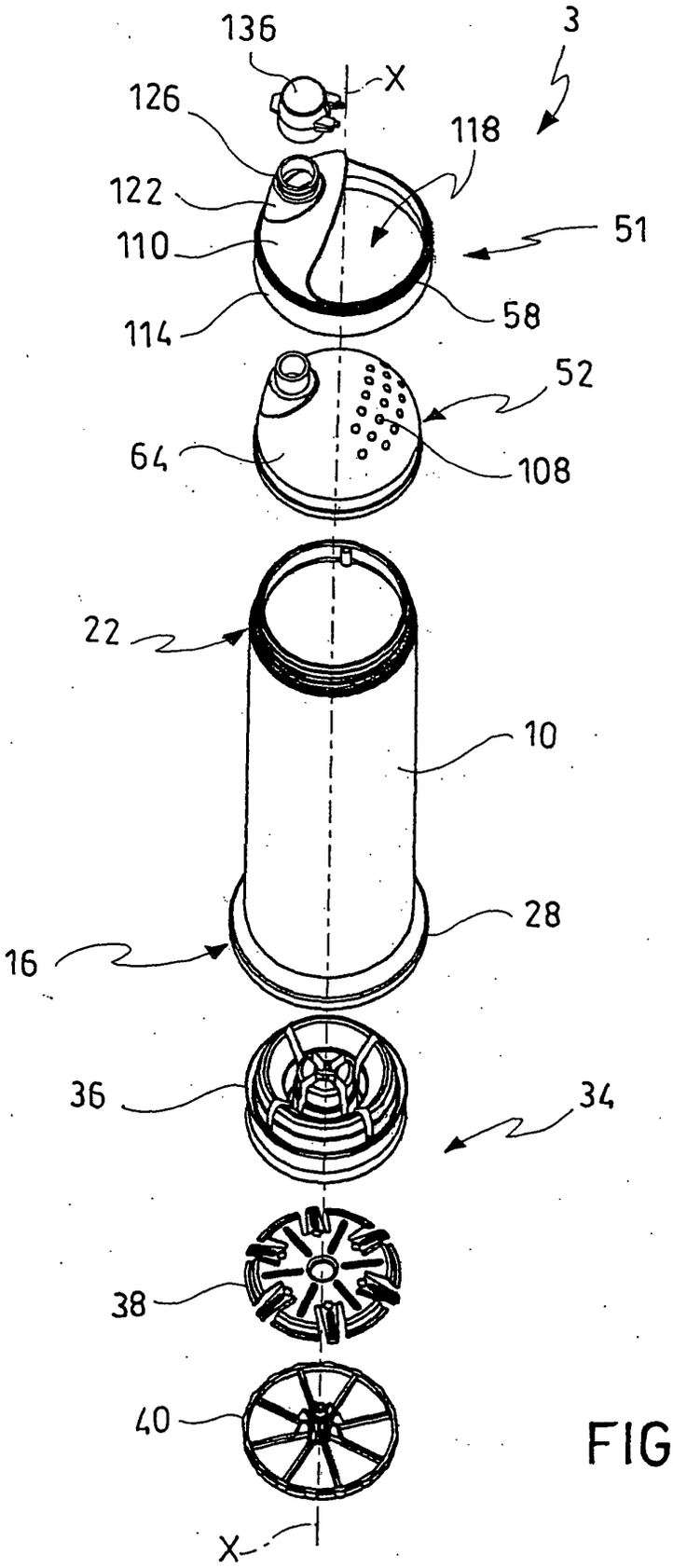


FIG. 4

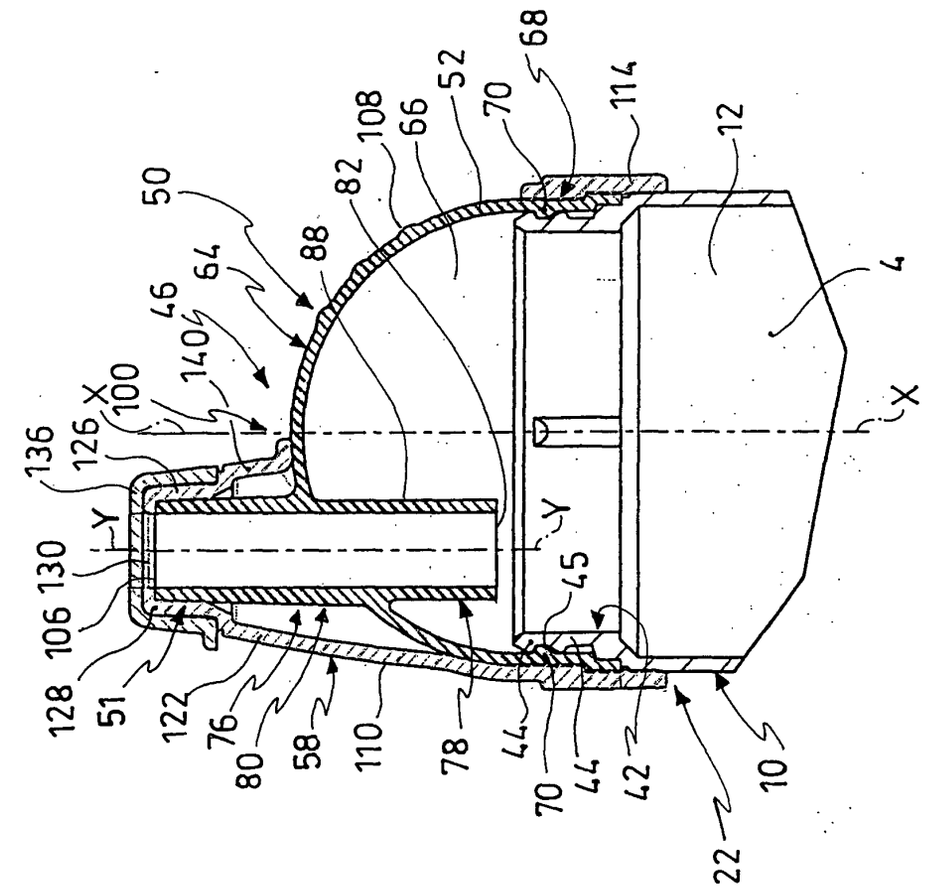

50
88
64
46
140
100
X
126
136
Y
130
106
128
51
122
76
80
58
110
78
44
70
44
42
22
10
45
4
12
114
68
52
66
108
82

FIG.6

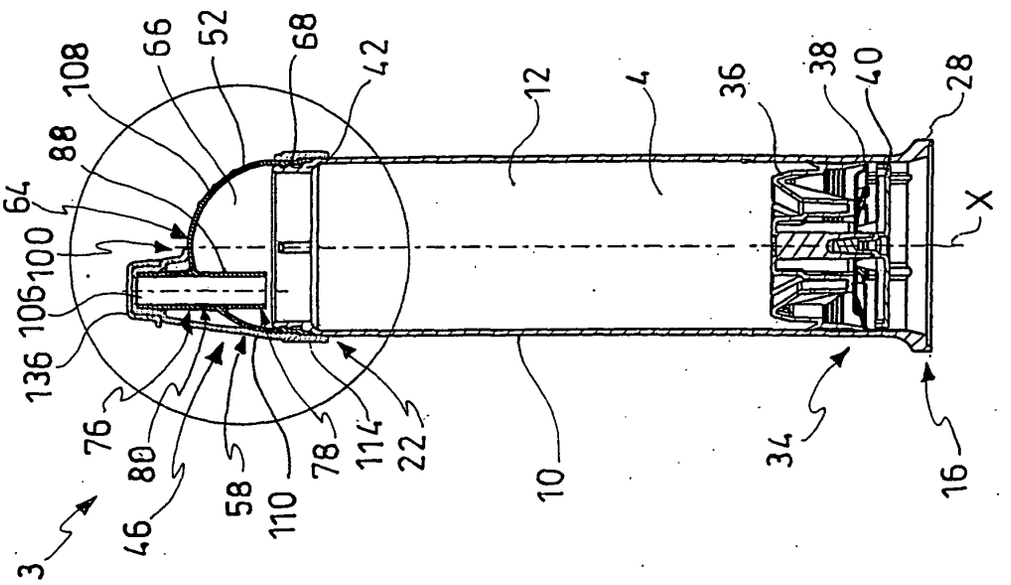

3
46
80
76
136
106
100
64
88
108
66
52
68
42
58
110
78
114
22
10
12
4
36
38
40
28
X
34
16

FIG.5

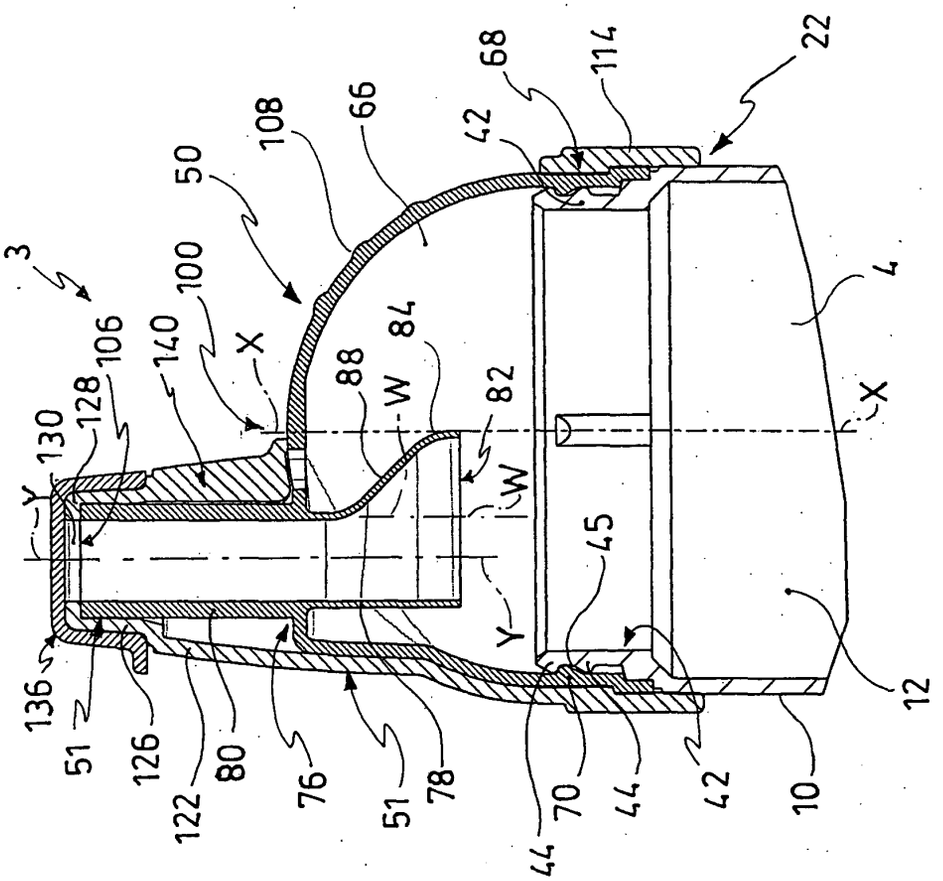
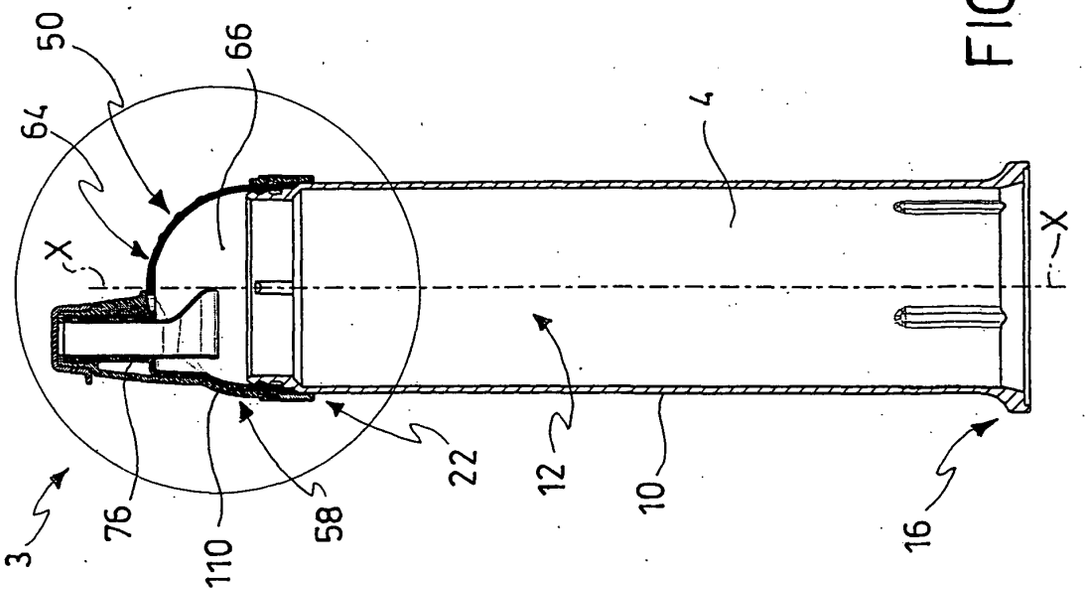

3
50
108
66
42
68
114
22
4
100
106
140
X
88
84
W
82
128
130
Y
45
136
51
126
122
80
76
51
78
44
70
44
42
10
12

FIG. 8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66
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4
X
3
76
110
58
22
12
10
16

FIG. 7

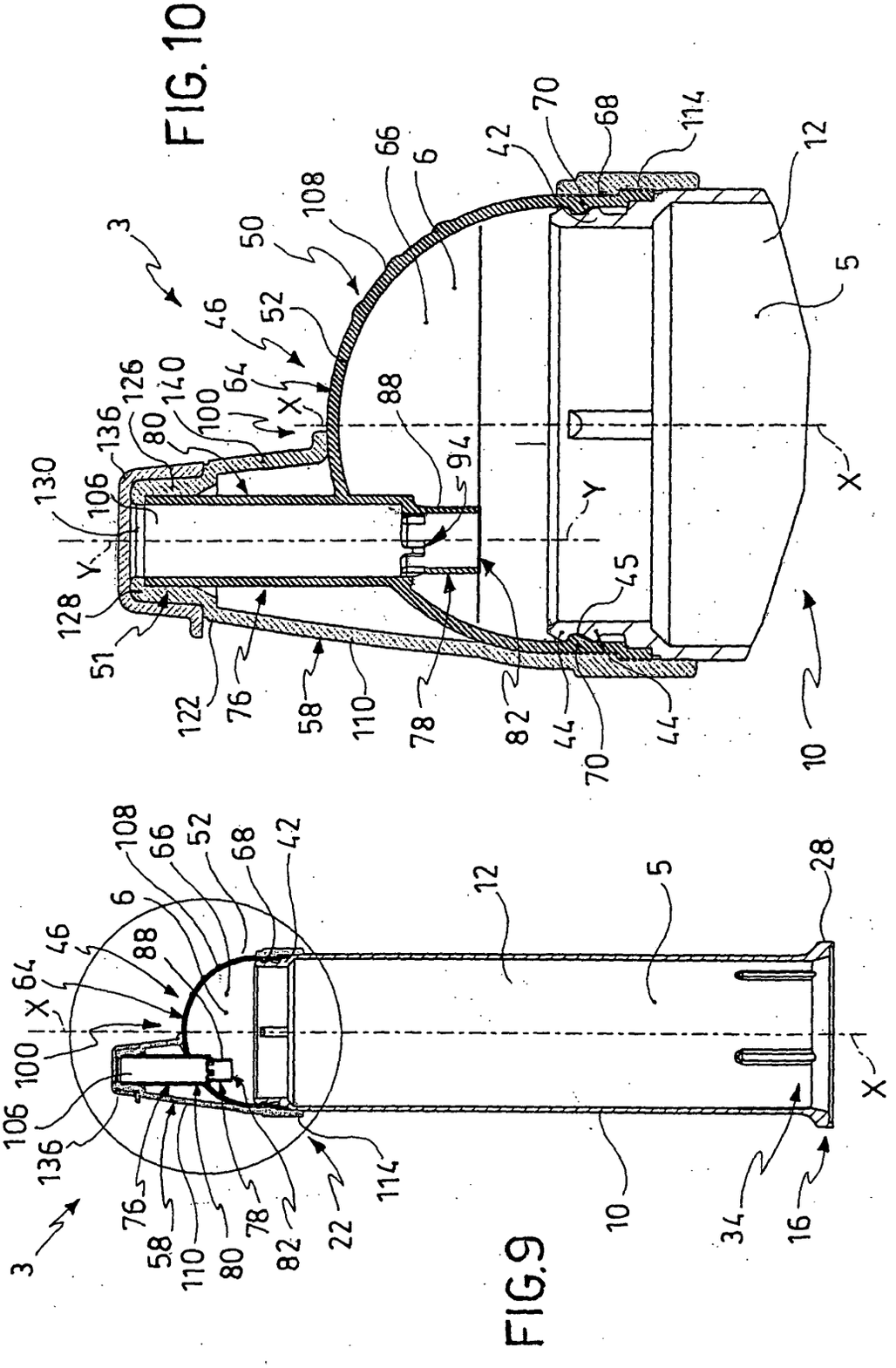
3
106
100
64
X
46
88
6
108
66
52
68
42
12
5
28
136
76
58
110
80
78
82
22
114
10
34
16

FIG.9

3
130
106
Y
128
51
122
76
58
110
78
82
44
70
44
10
X
Y
45
5
12
42
70
68
114
6
66
108
50
46
52
64
100
140
126
136
80
88
94

FIG. 10

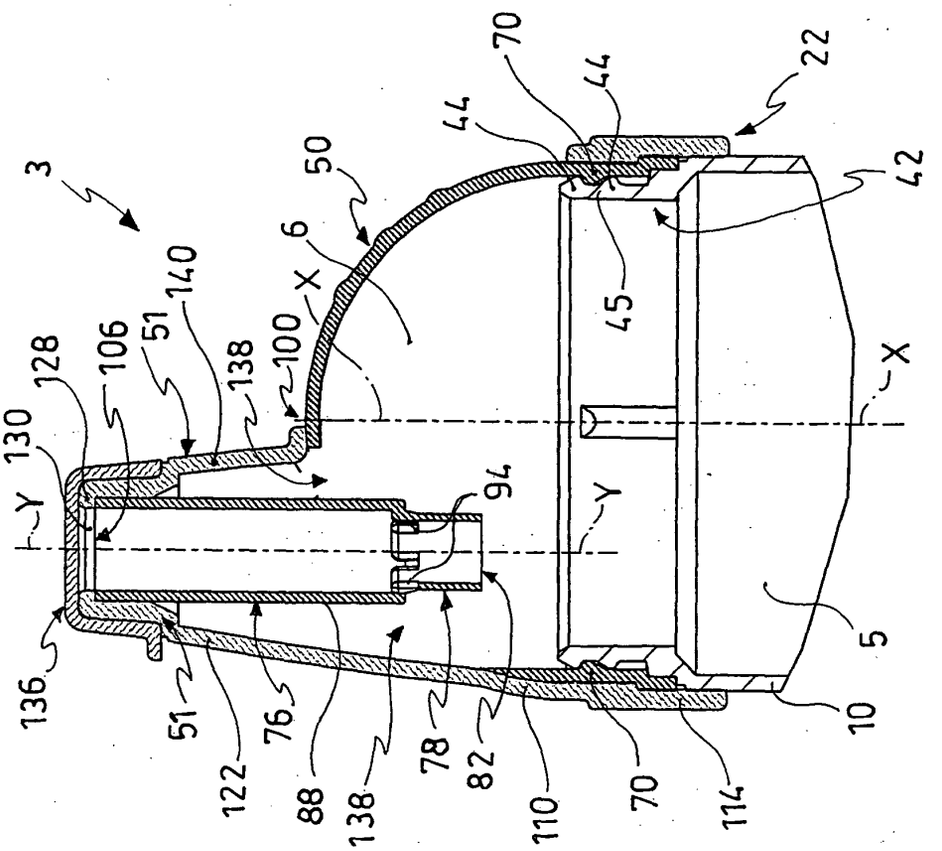
3
140
51
106
128
130
Y
136
138
100
X
6
50
44
70
22
42
45
94
88
122
76
78
82
110
114
10
5

FIG.12

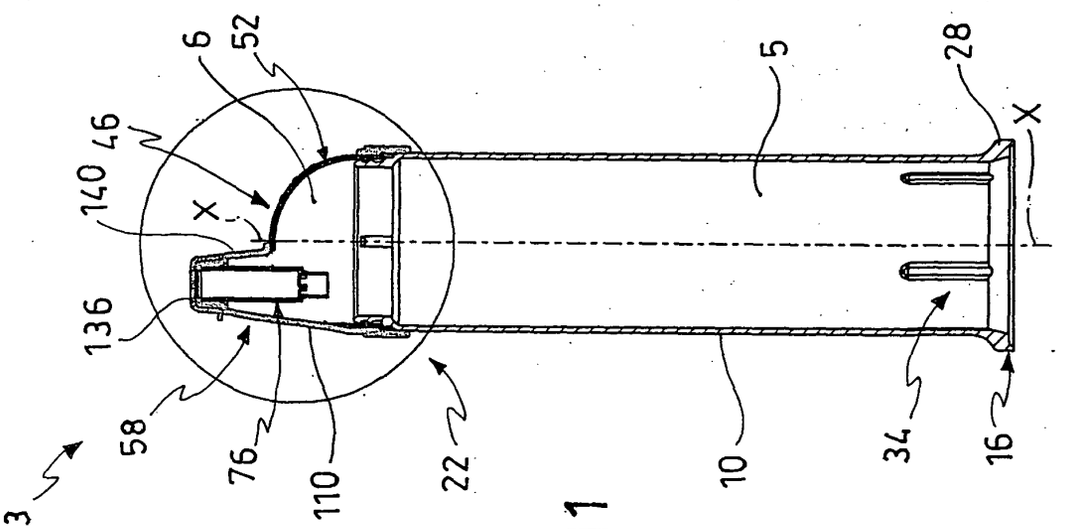
3
6
52
46
140
X
136
58
76
110
22
5
28
10
34
16

FIG.11