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(72) Inventors:
• **Campbell, Stephen
Thornliebank Ind. State
Glasgow G46 8JR (GB)**
• **Campbell, Wallace
Thornliebank Ind. State
Glasgow G46 8JR (GB)**

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(74) Representative: **Wilson, Gary et al
Marks & Clerk Scotland
19 Royal Exchange Square
Glasgow G1 3AE (GB)**

(71) Applicant: **Artex-Rawlplug Limited
Thornliebank Industrial Estate
Glasgow G46 8JR (GB)**

(54) **Piston retention unit**

(57) The present invention relates to apparatus for the storing and dispensing of products. In particular, the present invention relates to apparatus for the storing and dispensing of products wherein the apparatus comprises means for retaining a piston member within the dispensing apparatus.

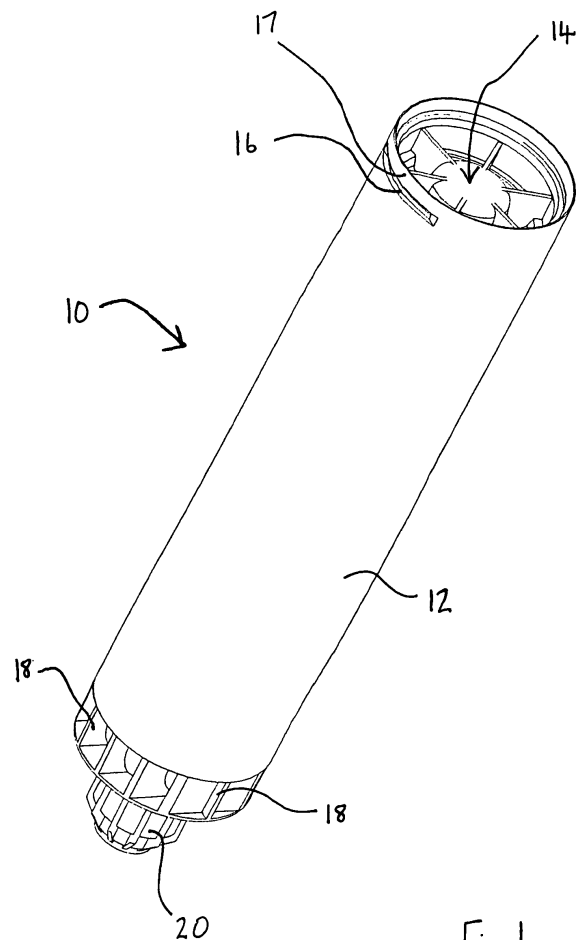


Fig. 1

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Description**FIELD OF THE INVENTION**

[0001] The present invention relates to apparatus for the storing and dispensing of products. In particular, the present invention relates to apparatus for the storing and dispensing of products wherein the apparatus comprises means for retaining a piston member within the dispensing apparatus.

BACKGROUND OF THE INVENTION

[0002] In the use of dispensing apparatus, there is the problem that a piston which is used to dispense the products may fall out, thereby leading to spillage of the products contained within a casing. This is obviously uneconomical leading to a user requiring to buy a further replacement casing. As the piston falls out, spillage may occur which may cause damage to clothing. There is presently no means in which to retain a piston member within a casing which is both simple to manufacture and simple to use.

[0003] It is an object of at least aspect of the present invention to obviate or mitigate at least one or more of the aforementioned problems.

[0004] It is a further object of at least one aspect of the present invention to provide dispensing apparatus which comprises a piston retention means.

SUMMARY OF THE INVENTION

[0005] According to a first aspect of the present invention there is provided a casing for storing and dispensing a product, said casing comprising:

at least one opening, said at least one opening adapted to engage with at least part of a piston member; wherein said at least one opening may engage with and act as a stop to prevent the piston member from falling out of the casing.

[0006] The at least one opening may be provided on an outer wall forming the casing and may be of any suitable shape such as a slot. The slot may be symmetrical or asymmetrical. Typically, the slot may be substantially crescent-like in shape, arcuate, elliptical, semi-circular or substantially 'D'-shaped. Preferably, the at least one opening may have a substantially flat edge which prevents the piston member from falling out of the casing.

[0007] Typically, the at least one opening may have a circumferential length around the casing of about 0.5 to 10 cms and preferably about 3 cms. The at least one opening may have a height of about 0.1 to 10 mm and preferably about 3 mm. Preferably, the at least one opening is deep enough for at least part of the piston member to partially extend into and engage with.

[0008] Typically, there may be two openings at one

end and at substantially opposite sides of the casing. The at least one opening may be adapted to engage with at least part of the piston member which has a slightly larger diameter than the rest of the piston member.

5 **[0009]** The part of the piston member which is intended to interact and engage with the at least one opening may have a diameter of about 0.05 to 10 mm, 0.1 to 6 mm, 4mm or preferably about 2 mm greater than the majority of the piston member. Conveniently, both the top and
10 bottom parts of the piston member may have a diameter which is slightly larger than the rest of the piston member. Preferably, the piston member may therefore have a waist-like portion of slightly smaller diameter than the ends of the piston.

15 **[0010]** Typically, the parts of the piston member with an enlarged diameter may extend the whole way around the piston member. This may occur at both the top and bottom parts of the piston member. Alternatively, the part of the piston member with an enlarged diameter may extend only partially around the circumference of the piston member.

20 **[0011]** The part of the piston member adapted to engage with the at least one opening may be any form of protruding member such as an outwardly extending radial portion which may interact and engage with, for example, at least one of the surfaces forming the at least one opening.

25 **[0012]** Preferably, the at least one of the surfaces forming the opening which interacts and engages with the piston member may be substantially flat and may be adapted to prevent the piston member from falling out. The interengaging surface of the at least one opening may typically not be rounded to enhance the engagement and prevent the piston member from falling out.

30 **[0013]** The at least one opening may be located about 0.05 to 5 cm, 0.2 to 1.0 cm or preferably about 0.4 cm from an end of the casing. Typically, there are two openings which may be located on substantially opposite sides of a casing and at substantially the same distance
40 from the same end of the casing to thereby allow both openings to function substantially together, and at the same time, to prevent the piston member from falling out.

45 **[0014]** The part of the casing, in the form of a lip portion or flap, between the at least one opening and the nearest end of the casing may distort and flatten inwards, in comparison to the rest of the casing, as the protruding member of the piston member approaches and starts to fall out. This effect may occur as the part of the piston member adapted to engage with the at least one opening may
50 have a larger diameter, albeit slightly, than the inner diameter of the casing. Although the larger diameter part of the piston member may have the function of temporarily expanding the part of the casing which it is traversing at a specific time, the presence of the at least one opening prevents the part of the casing (i.e. the lip or flap) above the at least one opening expanding to the same size of the larger diameter part of the piston member. The part of the casing above the at least one opening,

such as the leading and nearest surface, may therefore have a smaller diameter than a part of the piston member thereby allowing the part of the casing above the at least one opening to act as a stop and prevent the piston member from falling out.

[0015] The distortion and flattening may be greatest when the opening is located very close to the end of the casing. Due to this distortion and flattening, the diameter of the part of the casing above the at least one opening may be less than a part of the piston member thereby enabling the part of the casing above the at least one opening to form a stop and prevent the piston from falling out of the casing. Typically, the difference in diameter caused by the distortion may be about 0.1 to 10 mm and preferably about 2 mm.

[0016] Preferably, the part of the piston member adapted to engage with the at least one opening may be configured so that the piston member may be pushed past the at least one opening in one direction but may not be pushed back through in the opposite direction. This prevents the piston member from falling out but allows the piston member to be pushed into the main body of the casing. Conveniently, the part of the piston member adapted to engage with the at least one opening, such as the protruding member, may be angled in substantially one direction only to prevent the piston falling out of the casing and thereby only allow one direction of movement i.e. into the main body of the casing. Typically, the protruding member may be chamfered or bevelled. The angle of the protruding member may be about 2 to 60 degrees and preferably 5 to 20 degrees relative to the longitudinal axis of the casing. The angled protruding member may therefore allow the piston member to be pushed along and slid by the at least one opening down into the main body of the casing but does not allow the piston member to pass back along and by the at least one opening. This therefore prevents the piston falling out.

[0017] Typically, the part of the piston member which has a slightly enlarged diameter may also be adapted to interact with the inner surface of the casing thereby tightly and securely retaining the piston member within the casing during use, as the contents of the casing are dispensed. Preferably, the larger diameter part of the piston member may have a slightly larger diameter than the inner diameter of the casing. The diameter of the piston member may be larger than the inner diameter of the casing by about 0.1 to 10 mm, 0.1 to 6 mm, 4 mm or preferably about 2 mm. The piston member may partially distort at least part of the casing into, for example, an elliptical form once the piston has traversed that part of the casing. The distorted section of the casing may also help to prevent the piston from moving back along the traversed part of the casing and therefore falling out. Typically, the casing may be distorted by about 0.05 to 10 mm, 0.1 to 6mm, 4mm or preferably about 2 mm into a variety of shapes such as an elliptical section.

[0018] The parts of the piston member which have a slightly larger diameter may therefore form an interfer-

ence fit with the inside surface of the casing. For the best interference fit, there are preferably enlarged diameter sections at both the top and bottom parts of the piston member.

5 **[0019]** Conveniently, the parts of the piston member which have a slightly larger diameter therefore have the dual function of interacting with the at least one opening to prevent the piston from falling out of the casing and forming an interference fit with the inside surface of the casing.

10 **[0020]** The casing may be substantially tubular in shape and may be formed from any suitable plastics material. The plastics material may allow for a slight amount of expansion to thereby accommodate the interference fit. Furthermore, the casing may be formed from a material which allows the part of the casing (i.e. the lip or flap) above the at least one opening to distort and flatten and thereby act as a stop and prevent the piston from falling out. The casing material may also be chosen to allow for some distortion once the piston member has passed. As discussed above, the distortion may help to retain the piston in the casing. The casing may be formed from material having a thickness of about 0.01 to 5 mm and preferably about 1 mm. The casing may have a diameter of about 1 to 20 cm, 2 to 10 cm or preferably about 5 cm. The casing may have a diameter which may be at least less than part of the piston member to thereby allow the at least one opening to function as a stop and prevent the piston member from falling out, and also to form an interference fit with the piston member.

20 **[0021]** Typically, any suitable form of dispensing gun such as a standard mastic gun as available from DIY stores may be used to dispense material contained within the casing.

25 **[0022]** In a particular embodiment, a sausage-like tubular member in the form of a cartridge may be contained within the casing. The cartridge may contain a plurality of different chambers, each different chamber containing different compounds which are intended to be mixed. The different compounds may be epoxies, resins etc. which on mixing may act as a cementing material.

30 **[0023]** The casing may be used to provide dispensed products for use in chemical anchors, sealants, food processing and medical applications. Uses of chemical anchors included securing bolts in concrete/masonry, forming a stud socket and post-installed rebar connections.

35 **[0024]** Typically, the different contents of the cartridge may be sealed within separate chambers within the cartridge by a single sealing means such as crimping, gluing, heat sealing or any form of cap or tie. In particular, the sealing means may comprise a single sealing clip formed from any suitable type of metal or alloy which is releasable under pressure thereby enabling the different contents of the cartridge to be substantially simultaneously mixed. Prior to the sealing means rupturing and enabling the different contents of the cartridge to mix, the cartridge may partially expand into an expansion chamber formed

at an end of the casing. This allows hydrostatic pressure to build up at one end of the cartridge, eventually forcing the sealing clip off and allowing the dispensing and mixing to occur. The different compounds are therefore efficiently mixed which minimises any wastage.

[0025] According to a second aspect of the present invention there is provided apparatus for storing and dispensing a product, the apparatus comprising a piston retention means, said apparatus comprising:

at least one opening in a casing, said opening adapted to engage with at least part of a piston member; wherein said at least one opening may engage with and act as a stop to prevent the piston member from falling out of the casing.

[0026] According to a third aspect of the present invention, there is provided a method for retaining a piston member within a casing used for storing and dispensing a product, said method comprising:

providing at least one opening in a casing, said at least one opening being adapted to engage with at least part of a piston member; wherein said at least one opening may engage with and act as a stop to prevent the piston member from falling out of the casing.

[0027] Typically, there may be two openings, for example slots, on either side of the casing.

[0028] In particular, at least part of the piston member may have a diameter larger than the rest of the piston member. Typically, the part of the piston member which has a slightly larger diameter may be about 0.05 to 10 mm, 0.1 to 6 mm or preferably about 2 mm larger than the rest of the piston member. In particular, at least part of the top and bottom of the piston member may have a slightly larger diameter.

[0029] As the piston member starts to fall out of the casing, the part of the casing above the at least one opening may not expand to the same size as the larger diameter part of the piston member, meaning that the part of the casing above the at least one opening may act as a stop and prevent the piston member from falling out.

[0030] The larger diameter part of the piston member may be shaped to allow insertion of the piston member into the main body of the casing and by the at least one opening, but is adapted and shaped to interact against a leading surface of the part of the casing above the at least one opening.

[0031] According to a fourth of the present invention, there is provided a kit comprising:

a casing according to the first aspect;
said casing having a piston member inserted therein;
and
a dispensing gun.

[0032] Typically, the kit may also comprise a nozzle for attachment to the casing to facilitate the dispensing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

- 10 Figure 1 is a perspective view of a casing according to an embodiment of the present invention;
Figure 2 is a side view of the casing shown in Figure 1;
Figure 3 is a further side view of the casing shown in Figure 2 which has been rotated by 90°;
15 Figure 4 is an enlarged view of the casing shown in Figures 1 to 3;
Figure 5 is a schematic sectional view of the casing shown in Figures 1 to 4;
20 Figure 6 is a perspective sectional view of the casing shown in Figures 1 to 5 which has a sausage-like cartridge in the casing;
Figure 7 is an enlarged view of the casing shown in Figures 1 to 6 which illustrates the piston retention means;
25 Figure 8 is an end view of the casing shown in Figures 1 to 7 which shows a slight distortion in the casing;
Figure 9 is a perspective end view of the casing shown in Figures 1 to 8 which also shows the distortion in the casing;
30 Figure 10 is a perspective end view of a casing according to a second embodiment of the present invention;
Figure 11 is a side view of the casing shown in Figure 10; and
35 Figure 12 is a further side view of the casing shown in Figure 11 which has been rotated by 90°.

DETAILED DESCRIPTION

[0034] Referring to Figures 1 to 3, there is a schematic representation of dispensing apparatus, generally designated 10. The dispensing apparatus 10 comprises a substantially cylindrical casing 12 which comprises two slots 16 at one end and at substantially opposite sides of the casing 12. The part of the casing 12 above the slots is identified as portion 17.

[0035] The cylindrical casing 12 is formed from any suitable plastics material which allows a slight amount of expansion and a resulting distortion to occur. The material forming the casing 12 has a thickness of about 1 mm.

[0036] Figure 1 also shows a piston 14 which is used to contain a cartridge within the cylindrical casing 12. The cylindrical casing 12 also comprises moulded inserts 18 at an end of the cylindrical casing 12. The moulded inserts 18 form an expansion chamber (not shown) within the cylindrical casing 12 into which a cartridge may partially expand into prior to releasing the contents of the car-

tridge. The cylindrical casing 12 has a cap 20 to securely seal the contents of the casing 12. The cap 20 prevents any possibility of spillage during transit of the casing 12.

[0037] Figures 4 and 5 are enlarged views of the end of the casing 12 comprising the piston 14. The piston 14 includes a central disc section 22 with supporting elements 24 extending from the central disc section 22 to an outer wall 15 of the piston 14. The outer wall 15 is described in more detail below.

[0038] Figure 5 is a sectional side view of the casing 12 with no sausage-like cartridge and Figure 6 is a perspective sectional view of the cylindrical casing 12 containing a cartridge 28. Figure 5 shows that the piston 14 comprises an annular support section 26 which engages and abuts against the cartridge 28. The annular support section 26 is substantially 'U'-shaped so that an end 30 of the cartridge 28 is not damaged or unduly compressed during the action of the piston 14 on the cartridge 28. The cartridge 28 comprises two separate chambers which contain different compounds. The different compounds are intended to be mixed once a sealing clip (not shown) at the opposite end of the cartridge 28 shown in Figure 5 is forced off by application of pressure from a mastic gun. During the application of pressure, the cartridge 28 partially expands into an expansion chamber (not shown) whereupon hydrostatic pressure in the cartridge is increased to the point that the clip is progressively forced off the outer material of the cartridge 28 whereby the contents are then substantially simultaneously mixed.

[0039] Figure 6 shows that the cartridge 28 is sealed at end 30 with a clip 32. The clip 32 is formed from wound wire. Clip 32 does not come off during the extrusion of the material from the cartridge 28.

[0040] Figure 7 is an expanded view of part of the casing 12 and piston 14. Figure 7 clearly shows that part of the outer wall 15 of the piston 14 comprises a protruding radial portion 34 which has a slightly larger diameter than the majority of the piston 14 and also slightly larger diameter than the inner diameter of the casing 12. The diameter is larger by about 2 mm. The protruding radial portion 34 extends around the top of the piston 14.

[0041] The protruding radial portion 34 is adapted to fit and partially extend through the slots 16. The protruding radial portion 34 is angled (i.e. sloped) in only one direction. The angle is about 10 degrees relative to the longitudinal axis of the casing 12. The protruding radial portion 34 allows the piston 14 to be pushed into the main body of the casing 12 beyond the faces 16a, 16b of slot 16.

[0042] In use, due to the shape of the protruding member 34, the piston 14 is prevented from falling out of the casing 12. In the event that the piston 14 starts to fall out of the casing 12, the end 34a of the protruding radial portion 34 abuts and engages against the face 16b of the slot 16. This prevents the piston 14 from falling out. This effect occurs as the diameter of the casing 12 between portions 17 formed above the two slots 16, is less than the diameter of the protruding radial portion 34. The diameter is smallest between the mid-parts of portions

17. Corresponding parts of the casing 12 with no slots below, expand to the diameter of the protruding radial portion 34. The difference in diameter between that formed between the portions 17 and the protruding radial portion 34 is about 2mm. The two portions 17 which have a height of about 4 mm and a length of about 3 cm therefore have the effect of acting as a stop.

[0043] The two portions 17 are slightly distorted and flattened in shape inwards as the protruding radial portion 34 approaches and the piston 14 starts to fall out. The diameter between the strips 17 does not extend to the diameter of the protruding radial portion 34. Figures 5 and 7 clearly show that the diameter between the portions 17 is less due to this distortion. The diameter is smallest between the mid-parts of both portions 17 as these are the most unsupported parts and are the most distorted i.e. the most flattened. If the piston 14 therefore starts to fall out, as the diameter between the two portions 17 formed above slots 16 will be less than the diameter of the protruding radial portion 34, the end 34a of protruding radial portion 34 will snag and catch against the face 16b of the slot 16. Face 16b is on the bottom surface of portion 17 and forms a substantially sharp edge. This action occurs in both of the slots 16 at substantially the same time.

[0044] The cut-away parts of the casing 12 forming the slots 16 allows the diameter between the portions 17 to be less at this part of the casing 12 in comparison to the diameter between parts of casing 12 which do not have slots below them.

[0045] As the piston 14 is forced into the casing 12 by a dispensing gun such as a standard mastic gun (not shown), the protruding radial portion 34 is forced along the length of the inner surface of the casing 12. During this action the contents of the cartridge 28 are dispensed.

As clearly shown in Figures 5 and 6, the piston 14 also has a secondary protruding radial portion 36 which also engages with the inner surface of the casing 12. The secondary protruding radial portion 36 may also have a larger diameter of about 2mm than the rest of the piston member 14 and the inner diameter of the casing 12.

[0046] As the protruding radial portions 34, 36 are forced along the length of the casing 12, the protruding radial portions 34, 36 tightly engage against the inner surface of the casing 12 which may have the effect of partially distorting the casing 12 once the piston 14 has traversed that part of the casing 12. This partial distortion is shown in Figures 8 and 9 by the elliptical section 50. This function helps to progressively lock the piston member 14 as the contents of the cartridge 28 are dispensed.

[0047] The protruding radial portion 34 therefore has the dual function of engaging and interacting with the slot 16 to prevent the piston 14 from falling out of the casing and to engage with the inner surface of the casing 12 to securely engage and fasten the piston 14 as it is moved along the longitudinal length of the casing 12.

[0048] Figures 10 to 12 represent a second embodiment of the present invention wherein the dispensing apparatus is generally designated 100. The dispensing ap-

paratus 100 comprises a casing 112, a piston member 114, two slots 116, moulded inserts 188 at an end of the casing 112 and a cap 120. There are also portions 117 of the casing 112 above the slots 116.

[0049] The arcuate shape of the slots 116 facilitates the insertion of the piston member 114 into the main body of the casing 112. This occurs due to the curvature on one end of the slots 116. However, the slots 116 still comprise a substantially flat edge/surface to engage with the piston 114 if the piston 114 starts to fall out.

[0050] Whilst specific embodiments of the invention have been described above, it will be appreciated that departures from the described embodiments may still fall within the scope of the invention. For example, any type of shape and size of openings may be used to interact and engage with at least part of the piston. Furthermore, the part of the piston which has a slightly larger diameter may be of any shape which is suitable for interacting and engaging with the at least one opening. Moreover, the apparatus described above may be used for any type of cartridge which contains components to be dispensed. The cartridge may contain a single compound or compounds stored in separate chambers which are intended to be mixed on release of, for example, a single sealing means such as a clip.

Claims

1. A casing for storing and dispensing a product, said casing comprising:
 - at least one opening, said at least one opening adapted to engage with at least part of a piston member;
 - wherein said at least one opening is capable of engaging with and acting as a stop to prevent the piston member from falling out of the casing.
2. A casing for storing and dispensing a product according to claim 1, wherein the at least one opening is provided on an outer wall of the casing.
3. A casing for storing and dispensing a product according to any of claims 1 or 2, wherein the at least one opening is a crescent-shaped slot, an arcuate shaped slot, an elliptical shaped slot, a semi-circular shaped slot or a 'D'-shaped slot.
4. A casing for storing and dispensing a product according to any preceding claim, wherein the at least one opening comprises a substantially flat edge which prevents the piston member from falling out of the casing.
5. A casing for storing and dispensing a product according to any preceding claim, wherein the at least one opening is deep enough for at least part of the piston member to partially extend into and engage therewith.
6. A casing for storing and dispensing a product according to any preceding claim, wherein there are two openings at one end and at substantially opposite sides of the casing.
7. A casing for storing and dispensing a product according to any preceding claim, wherein the at least one opening is adapted to engage with at least part of the piston member which has a larger diameter than the rest of piston member.
8. A casing for storing and dispensing a product according to any preceding claim, wherein a part of the piston member which is intended to interact and engage with the at least one opening has a diameter of about 2 mm greater than the majority of the piston member.
9. A casing for storing and dispensing a product according to any preceding claim, wherein the at least part of the piston member adapted to engage with the at least one opening is an outwardly extending radial portion which interacts and engages with the at least one opening.
10. A casing for storing and dispensing a product according to any preceding claim, wherein the at least one opening comprises at least one substantially flat surface which interacts and engages with the piston member and thereby prevents the piston member from falling out.
11. A casing for storing and dispensing a product according to any preceding claim, wherein a part of the casing between the at least one opening and a nearest end of the casing distorts and flattens inwards, in comparison to the rest of the casing, as a protruding member of the piston member approaches and starts to fall out.
12. A casing for storing and dispensing a product according to any preceding claim, wherein the at least part of the piston member adapted to engage with the at least one opening is configured so that the piston member may be pushed past the at least one opening in one direction but may not fall back out in the opposite direction.
13. A casing for storing and dispensing a product according to any preceding claim, wherein the part of the piston member adapted to engage with the at least one opening is angled in substantially one direction only to prevent the piston member falling out of the casing.

14. A casing for storing and dispensing a product according to any preceding claim, wherein a part of the piston member which has an enlarged diameter is adapted to interact with an inner surface of the casing thereby tightly and securely retaining the piston member within the casing during use. 5
15. A casing for storing and dispensing a product according to any preceding claim, wherein parts of the piston member which have a slightly larger diameter have the dual function of interacting with the at least one opening to prevent the piston from falling out of the casing and forming an interference fit with an inside surface of the casing. 10
15
16. A casing for storing and dispensing a product according to any preceding claim, wherein the casing is formed from a plastics material which allows a part of the casing substantially above the at least one opening to distort and flatten and thereby act as a stop and prevent the piston member from falling out. 20
17. Apparatus for storing and dispensing a product, the apparatus comprising a piston retention means, said apparatus comprising: 25
- at least one opening in a casing, said opening adapted to engage with at least part of a piston member; 30
- wherein said at least one opening engages with and acts as a stop to prevent the piston member from falling out. 30
18. A method for retaining a piston member within a casing used for storing and dispensing a product, said method comprising: 35
- providing at least one opening in a casing, said at least one opening adapted to engage with at least part of the piston member; 40
- wherein said at least one opening engages with and acts as a stop to prevent the piston member from falling out of the casing. 40
19. A method for retaining a piston member within a casing used for storing and dispensing a product according to claim 18, wherein there are two openings on either side of a casing. 45
20. A method for retaining a piston member within a casing used for storing and dispensing a product according to any of claims 18 or 19, wherein at least part of the piston member has a diameter larger than the rest of the piston member and interacts and engages with the at least opening thereby preventing the piston member from falling out. 50
55
21. A method for retaining a piston member within a cas-
- ing used for storing and dispensing a product according to any of claims 18 to 20, wherein a larger diameter part of the piston member is shaped to allow insertion of the piston member into a main body of the casing and is adapted and shaped to interact and prevent the piston member falling out.
22. A kit comprising:
- a casing according to any of claims 1 to 17; a piston member; and a dispensing gun.

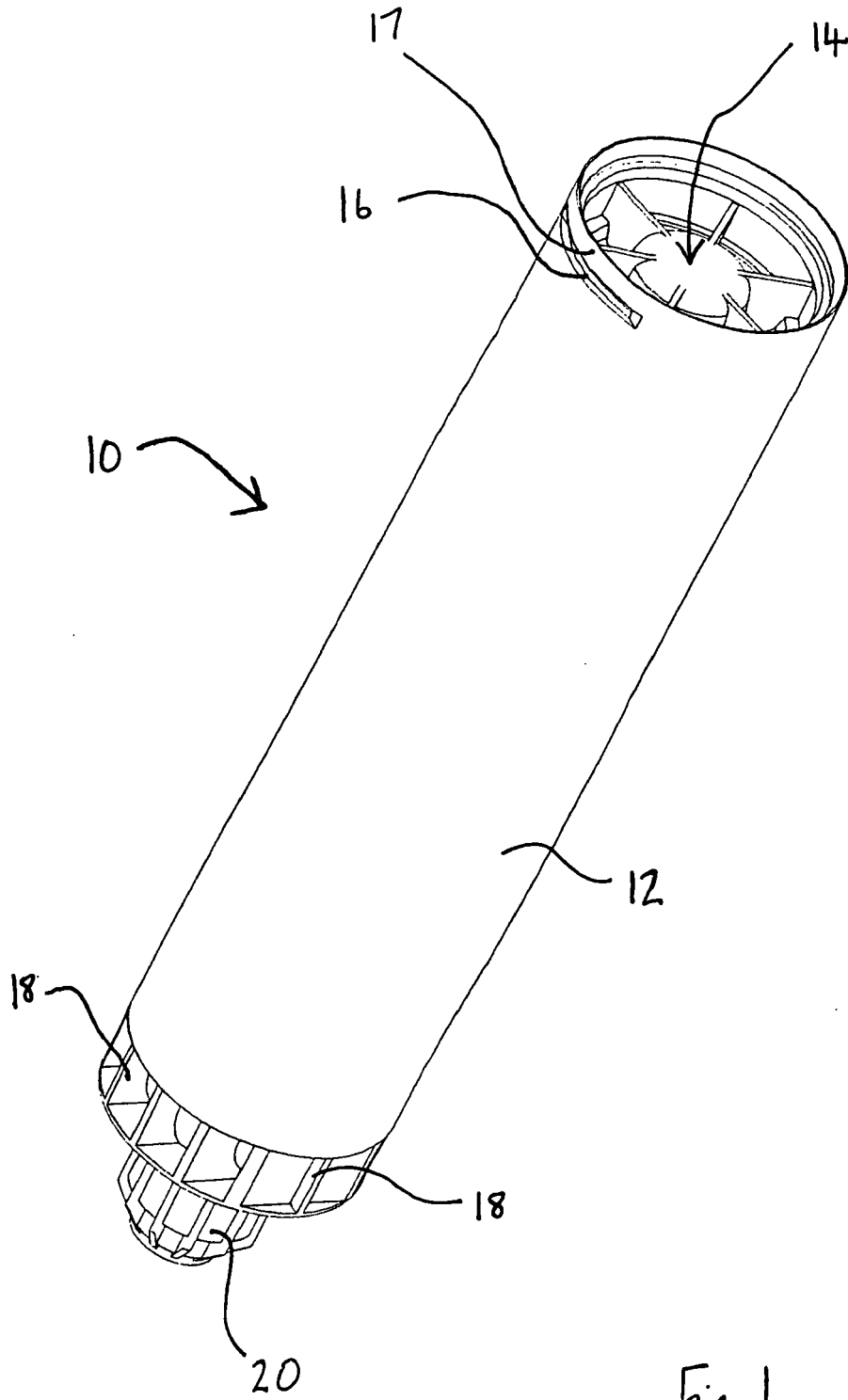


Fig. 1

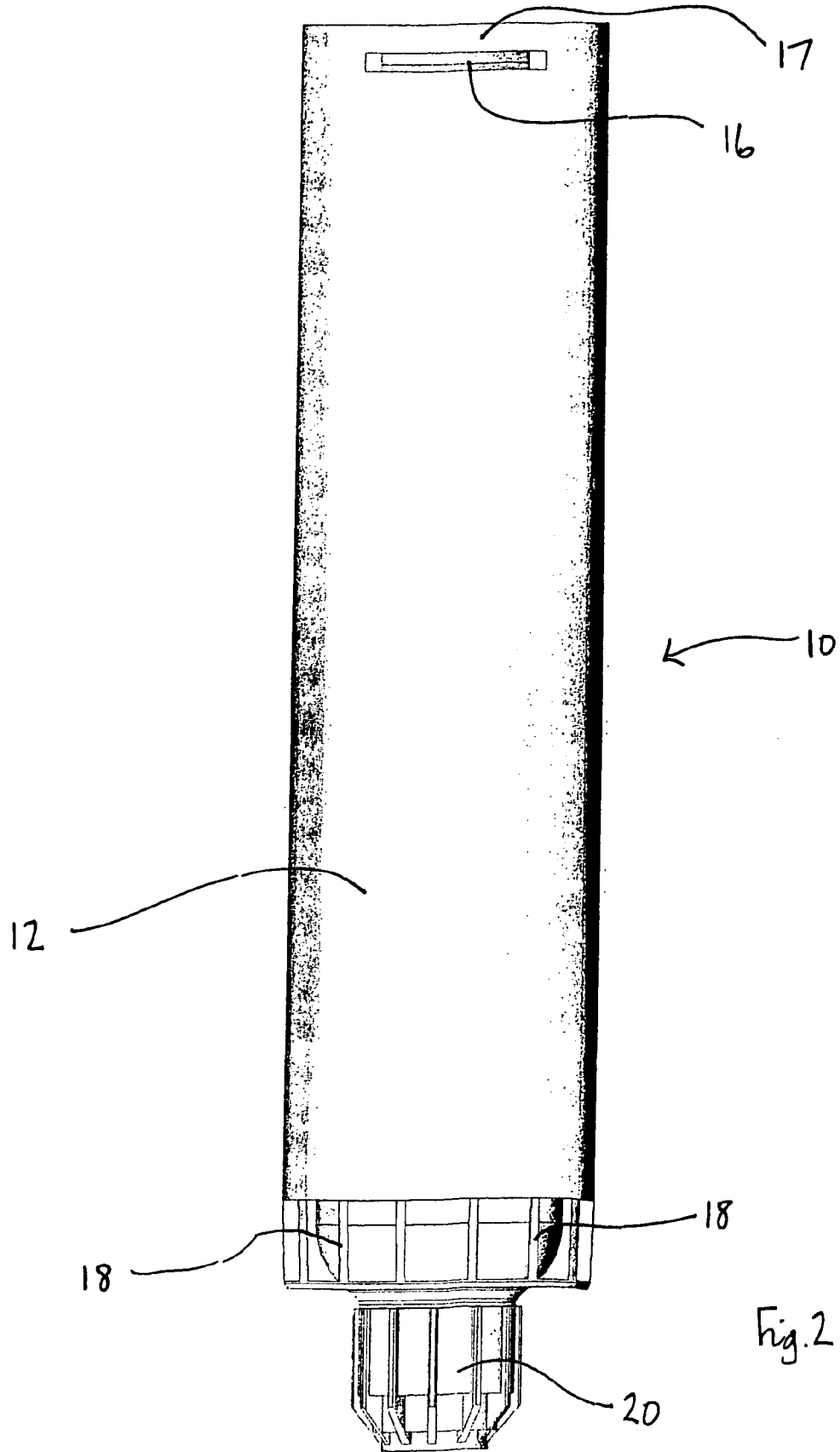


Fig.2

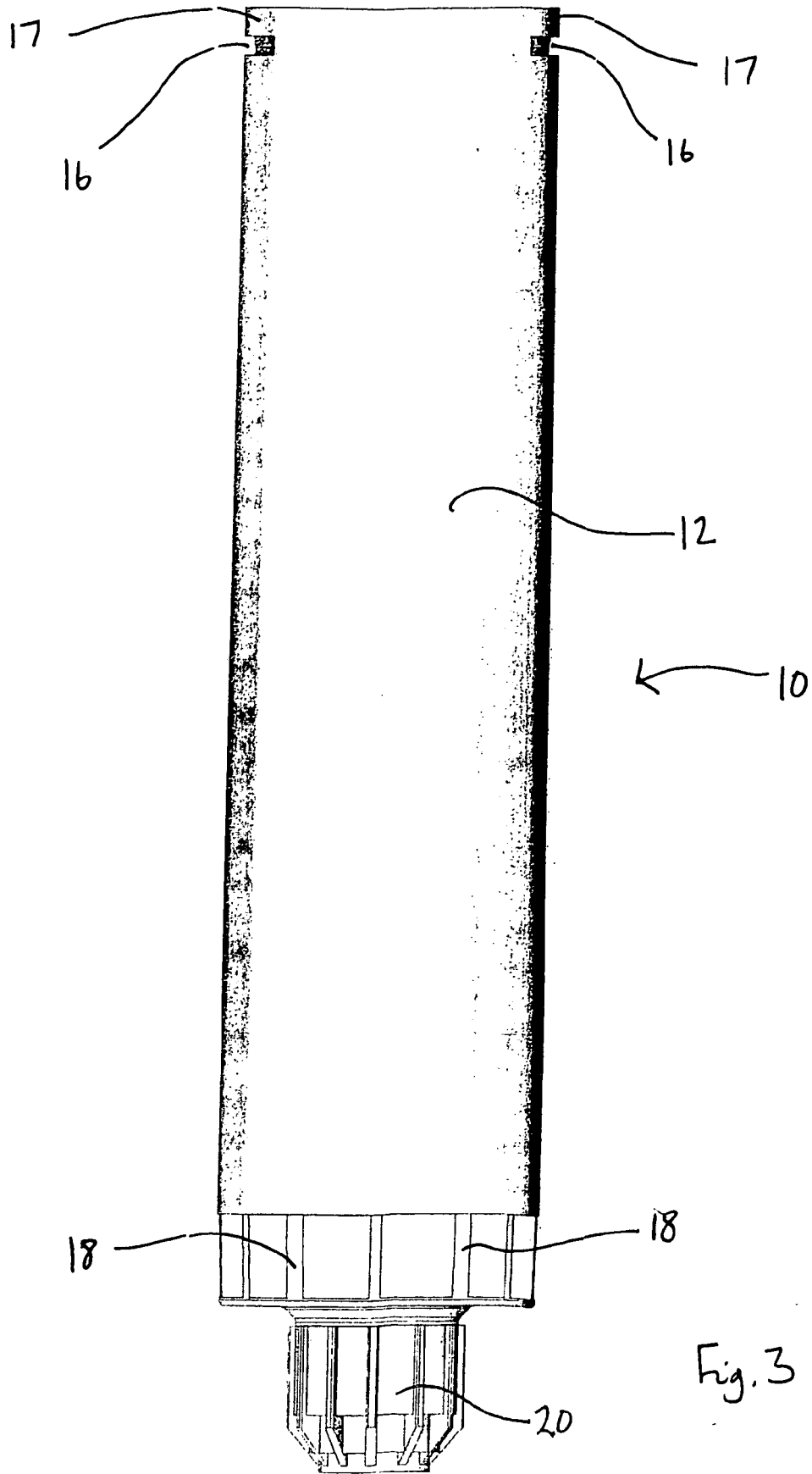


Fig. 3

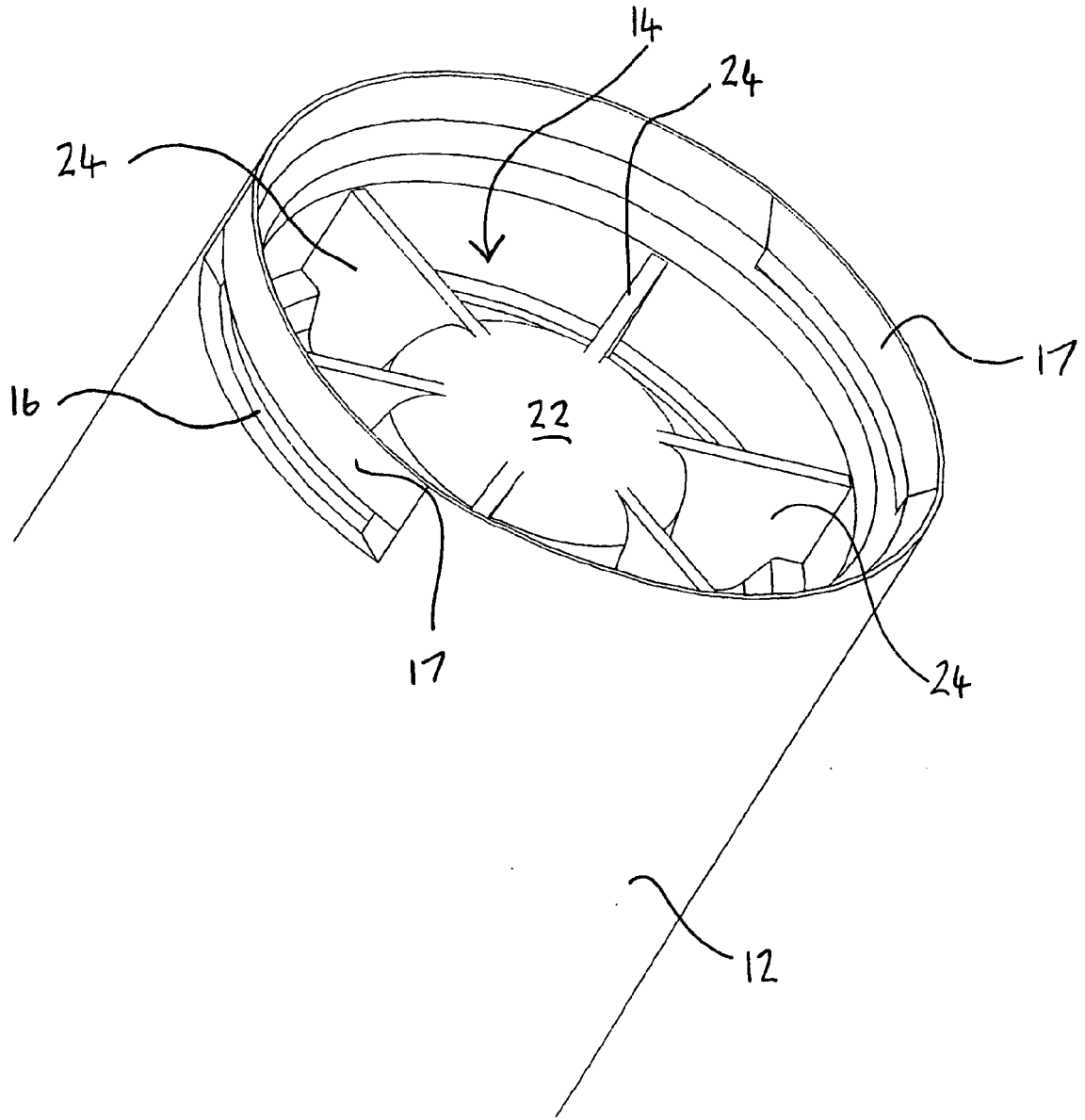


Fig. 4

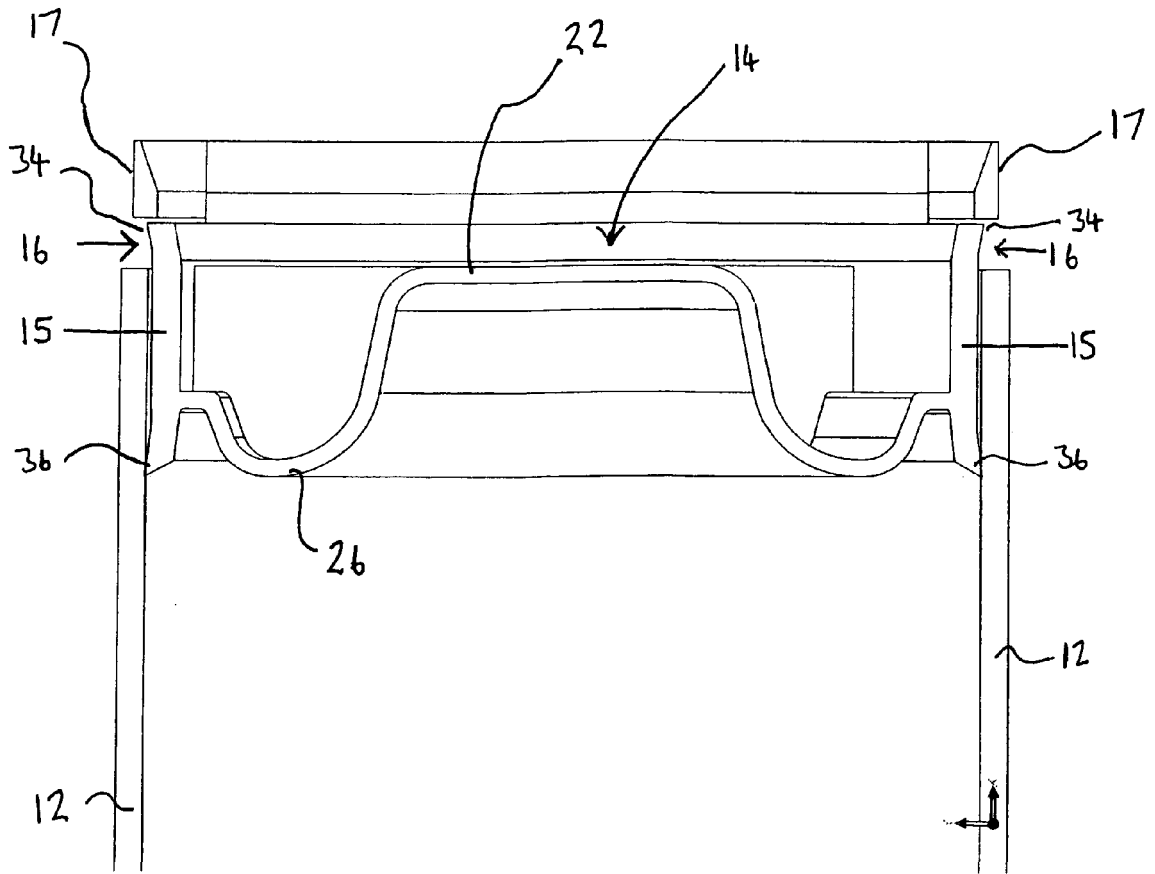
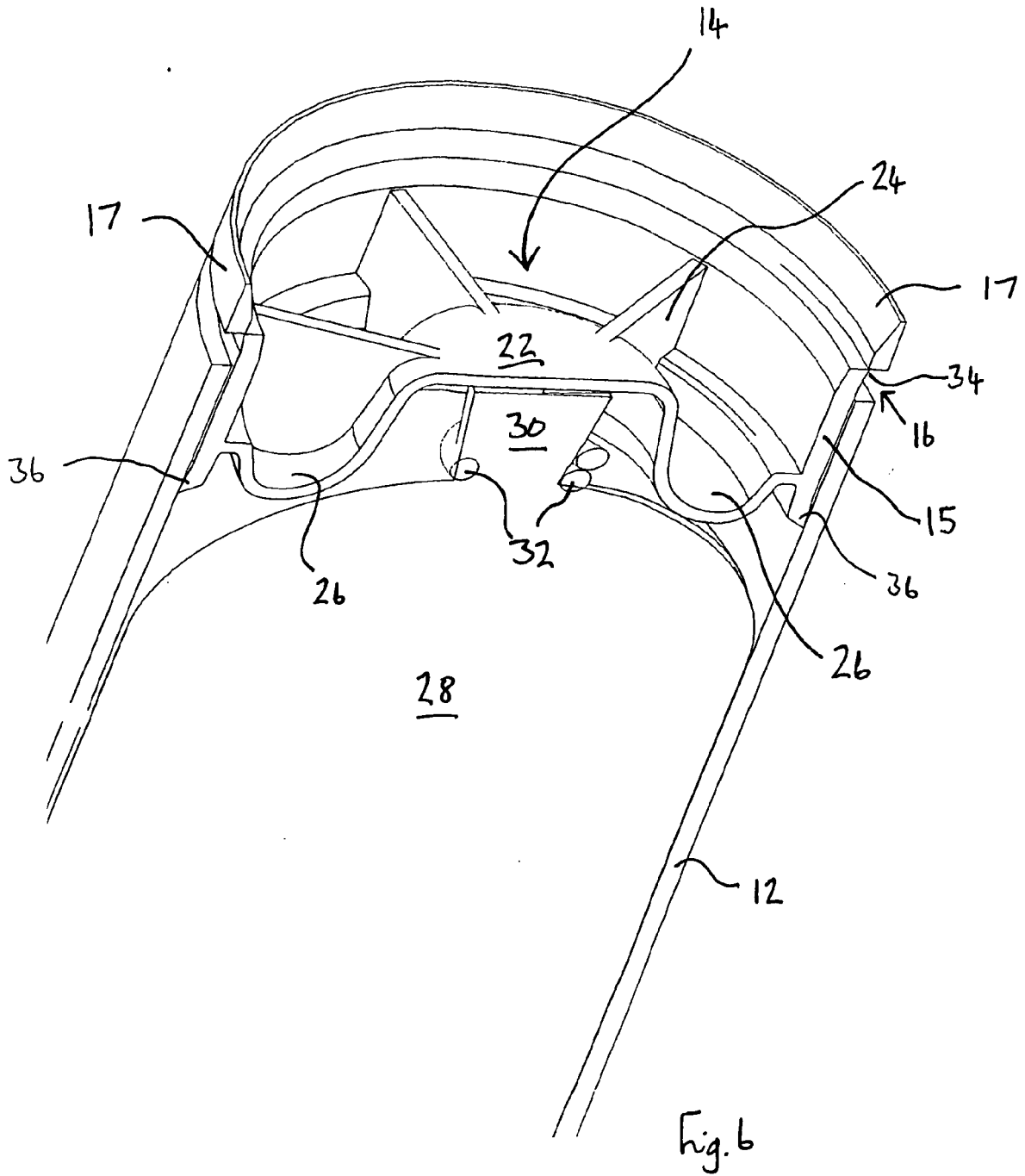


Fig. 5



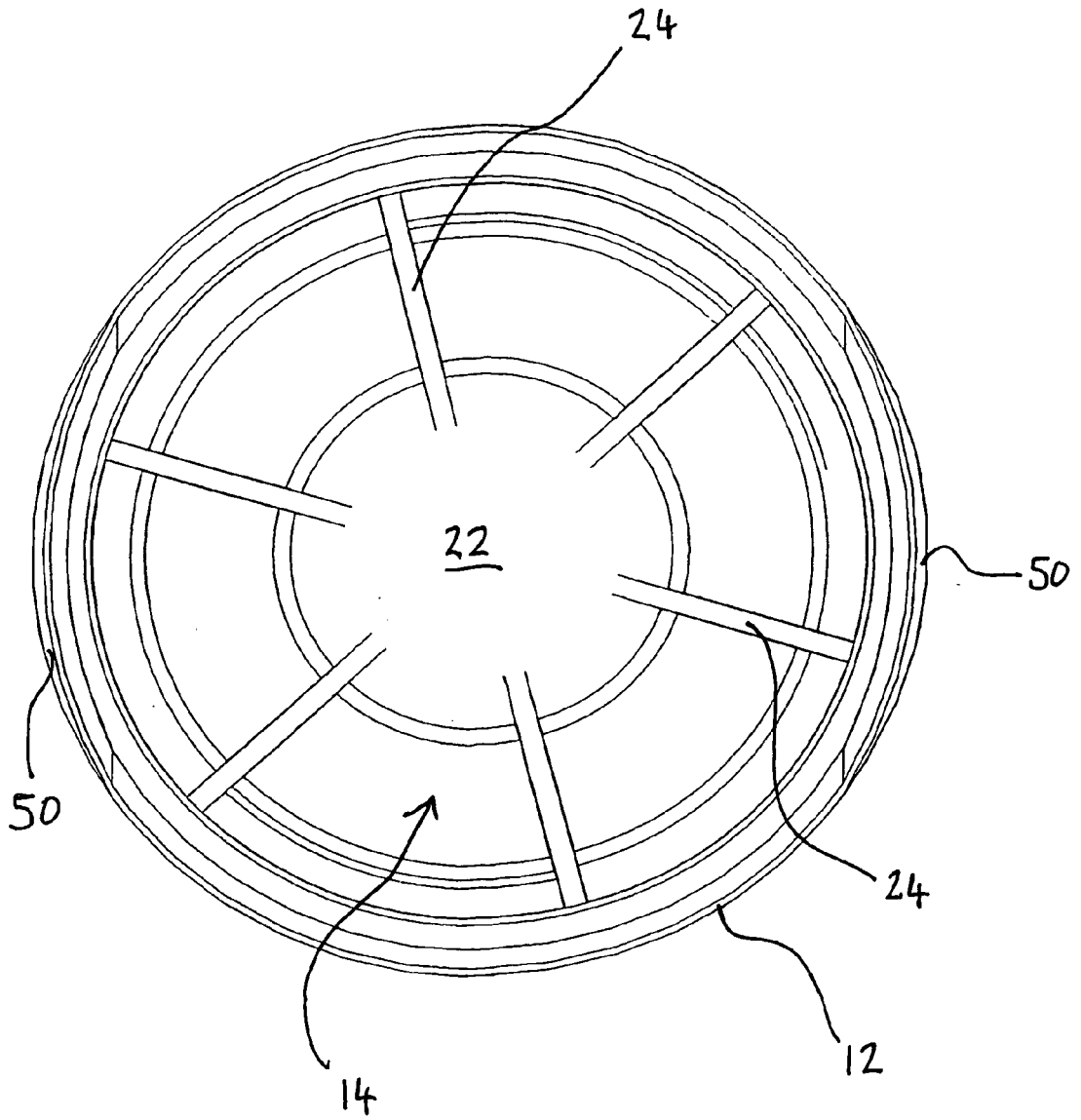


Fig. 8

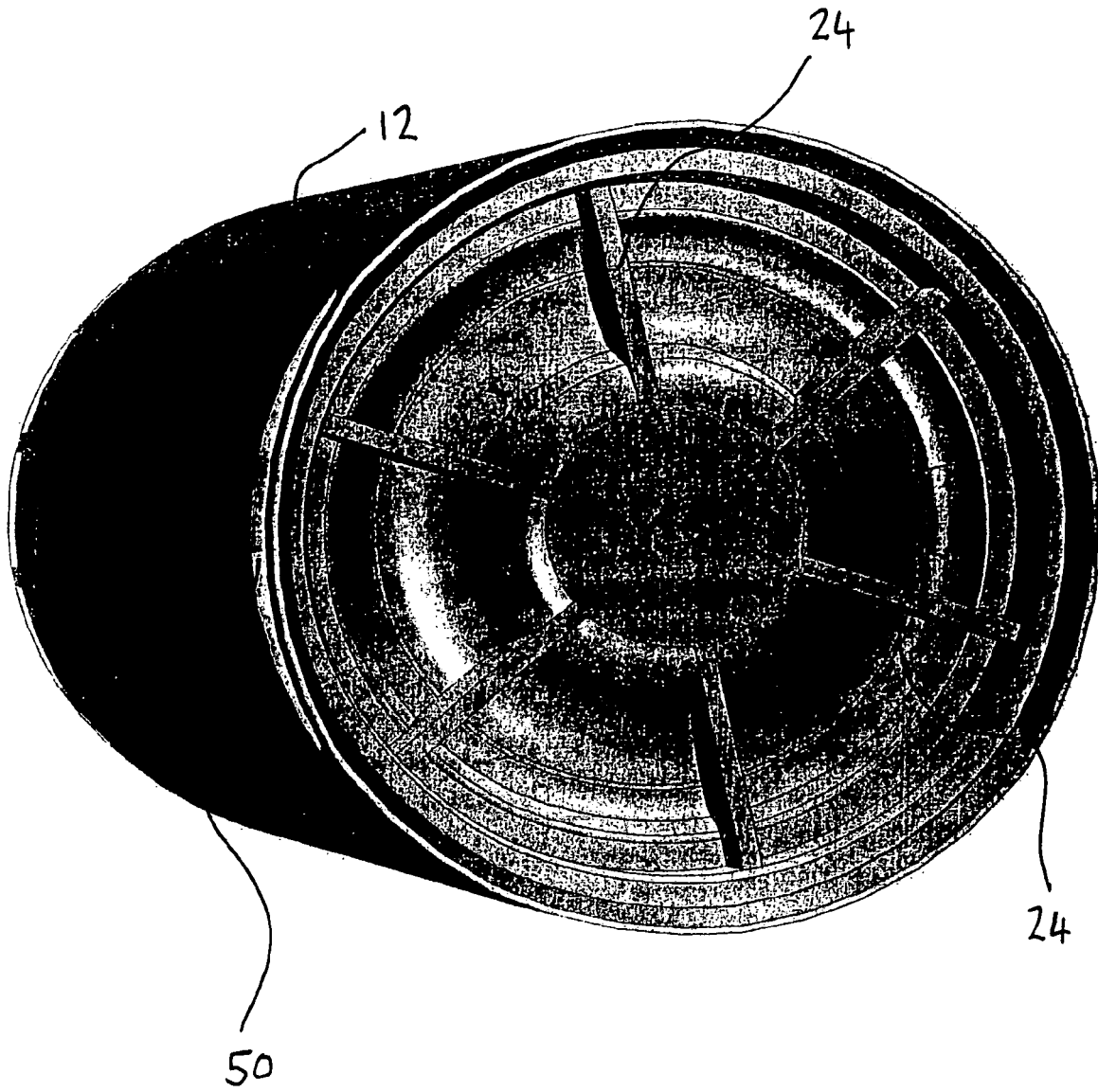


Fig. 9

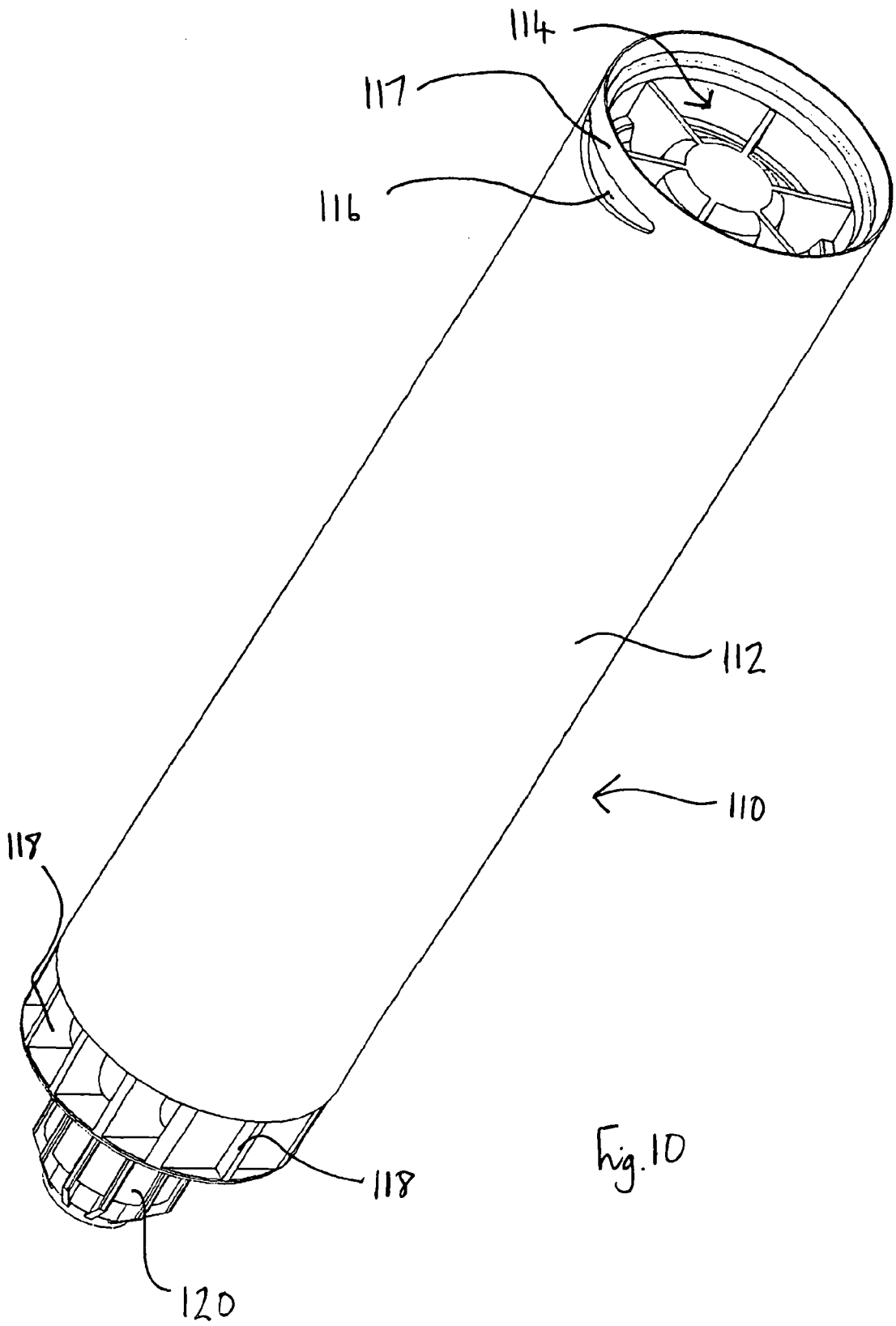


Fig. 10

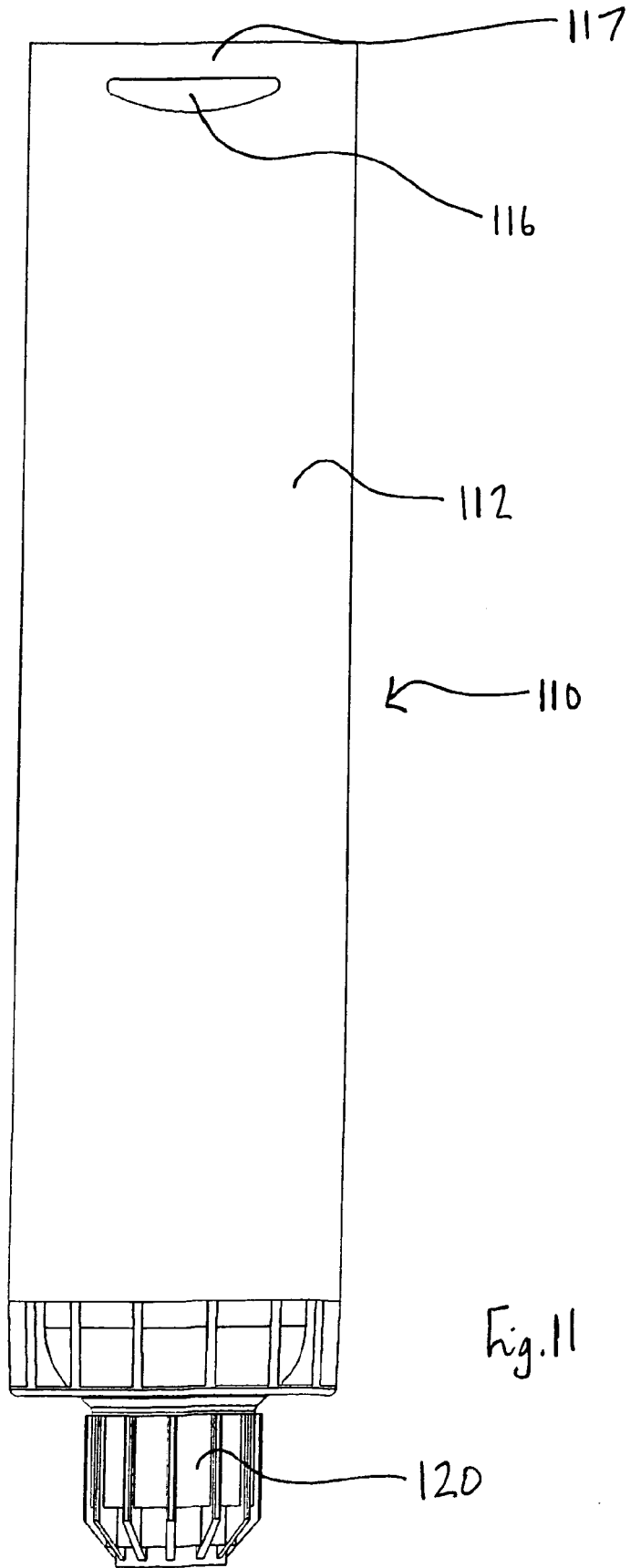


Fig.11

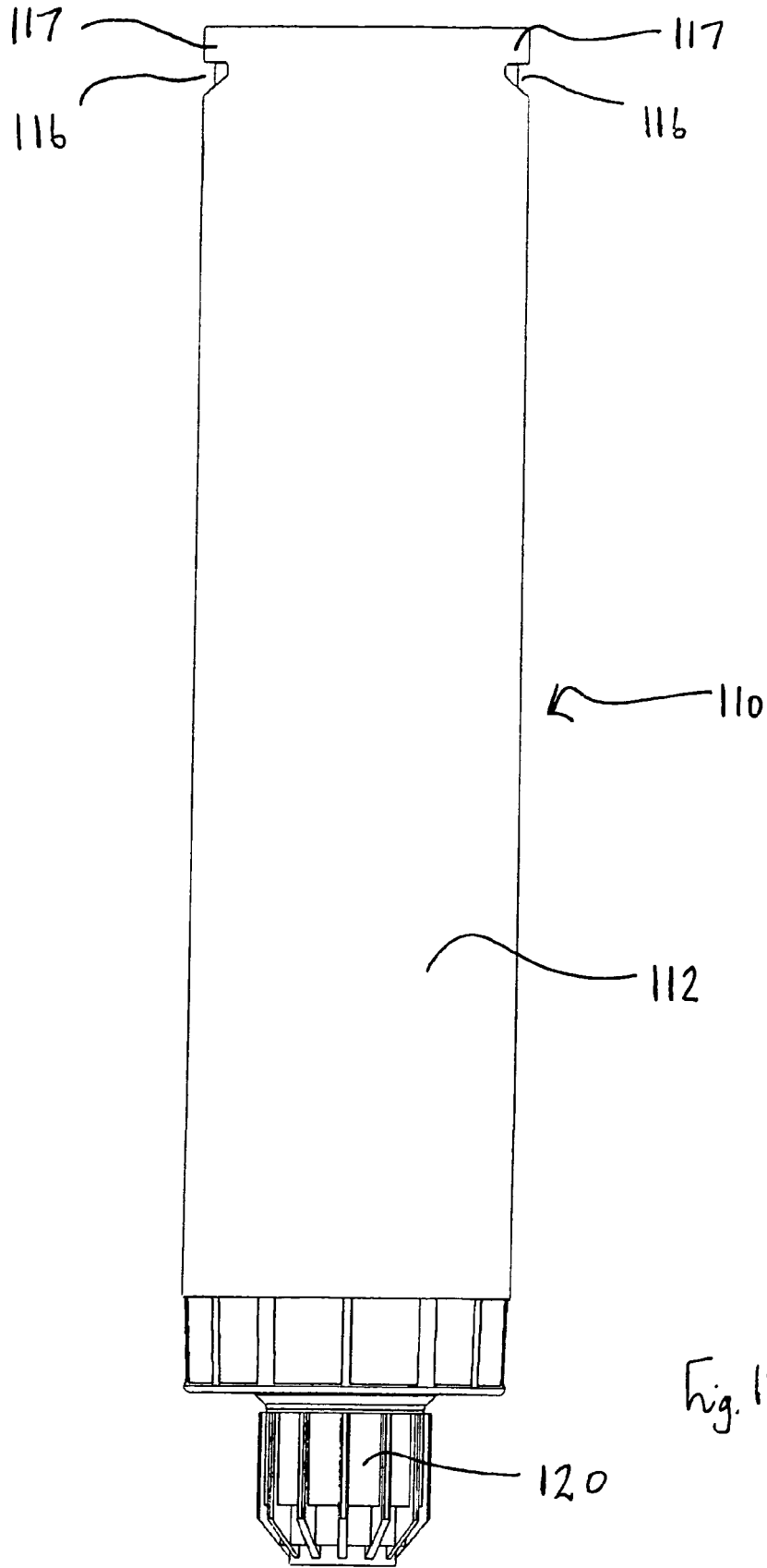


Fig. 12