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(54) **Improvements to trigger sprayers**

(57) A method of manufacturing a trigger sprayer in which the spray head (2) is supported by the plunger (12) instead of the dip tubes (14) during movement of the spray head to the filling point so that the dip tubes do not become damaged during manufacture. The trigger sprayer may also be provided with a closure mechanism (fig. 9-11) which improves orientation of the spray head with respect to the container.

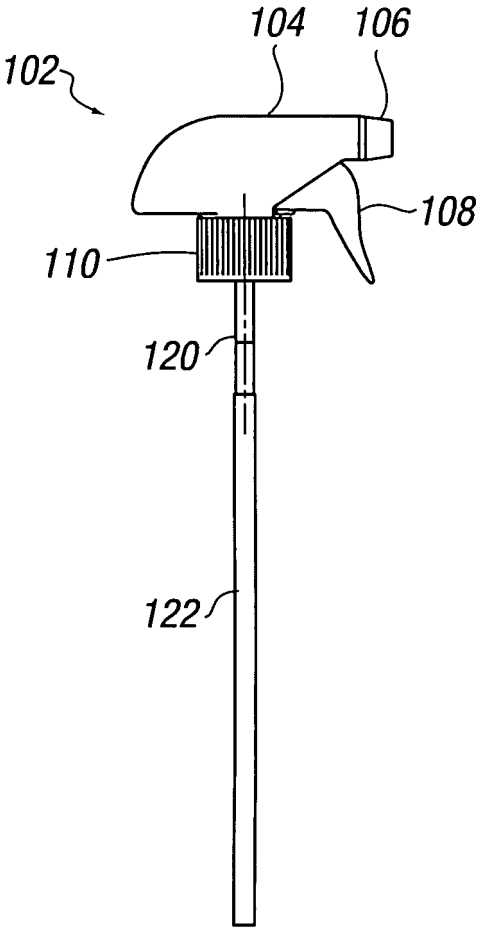

FIG. 2a

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Description

[0001] The invention to which this application relates is improvements to trigger sprayer products and methods of manufacturing thereof.

[0002] Conventional trigger sprayer products comprise two parts, a spray head which includes the dispensing apparatus, and a container to which the spray head is affixed and from which material is dispensed. The spray head is provided with a handle which actuates a plunger to draw up fluid through a dip tube connected thereto and extending in the container, and expelled via a nozzle.

[0003] Typically during the manufacture of such products the spray heads are transported down a production line to a filling station, at which point the containers are filled with fluid and the spray head is connected to the container to form the finished product.

[0004] During transportation down a production line, the spray head is typically held by the end of the dip tube to maintain the spray head in a particular alignment ready for connection with the container. However, as the dip tubes are typically flexible, it is possible for the spray head to become misaligned if the tubes bend as they are moved down the line. In addition, the tubes can become damaged if they are pushed too far or misaligned with the container when they are insetted.

[0005] Furthermore, when the spray head is connected to the container, a belt is often used to guide or push the components together. Whete the nozzle is moveable between an on position and an off position, if the belt catches the nozzle during the connecting operation, the nozzle can be left partially or fully in the on position, such that leakage occurs during transportation.

[0006] Similarly, when the casing is erected around the products to package the items for transportation the erection means can knock the nozzle into the on position.

[0007] A further problem in manufacturing trigger spray products is realised at the point at which the spray head is connected to the container. Conventionally the two parts are provided with inter-engaging components, and the two parts are forced together such that they are locked together in a particular orientation, often in a non-releasable manner.

[0008] However, the problem with this method is that if the two parts are not correctly aligned when they are associated, damage can be caused to the parts when they are forced together, or when they are forced together they are locked in an incorrect orientation which may have further implications in processing the product further and may make if difficult to transport. For example, where spray heads are connected to containers with flat surfaces, if the spray head is locked at an acute angle relative to the flat surface, the products cannot be packed as efficiently because the head protrudes at an angle preventing the products fitting together as well.

[0009] An aim of the present invention is to provide a method of manufacturing a trigger sprayer so that it does not become damaged during manufacture.

[0010] A further aim of the invention is to provide a closure mechanism which improves orientation of the spray head with the container.

[0011] In a first aspect of the invention, there is provided a method of manufacturing a trigger sprayer product including the steps of:-

providing a spray head with a plunger;
moving the spray head to a filling point;
inserting a dip tube into the spray head;
associating the spray head with the container;
characterised in that the spray head is supported by the plunger during said moving thereof.

[0012] In one embodiment the length of the plunger is range-taking. Thus the length of the plunger can be varied to suit the production line apparatus without affecting the dosage provided thereby.

[0013] Typically the length of the plunger ranges from around 20mm to around 100mm although it will be appreciated that these dimensions will also vary depending on the size of the container.

[0014] Typically the diameter of the plunger is substantially constant along the portion thereof which is variable in length. Thus the portion of the plunger which is used to pick up the spray head only varies in length which makes it easier to handle during movement down the production line, as the production line apparatus does not have to be adapted to gripping products of different diameters.

[0015] In one embodiment the spray head is provided with a housing, and the plunger extends therebeyond.

[0016] In one embodiment the dip tube is applied at the filling point.

[0017] Thus the method allows the spray head to be supported by the mote resilient plunger during transportation thereof in the manufacturing system, and as the dip tubes are not inserted into the plungers until they reach the filling point there is less risk that they will become damaged during manufacture.

[0018] In one embodiment the plunger is provided with an internal barb for retaining the dip tube therein.

[0019] In a further embodiment the dip tube is provided with an external barb to allow the dip tube to be retained externally on the plunger. The advantage of this embodiment is that if the material from which the dip tube expands or swells more than that of the material from which the plunger is made, in response to exposure to different temperatures or chemicals, the risk of cracking the outer of the two components is reduced.

[0020] In one embodiment the dip tube and plunger are made from substantially the same material.

[0021] In one embodiment at least a part of the plunger is made from low density polyethylene (LDPE) which is a relatively flexible material. Typically the dip tube is made from LDPE.

[0022] In one embodiment at least a part of the plunger is made from polypropylene (PP), which is a relatively

stiff material.

[0023] Thus in a two-part plunger, the upper part can be made from LDPE to provide better sealing properties, whereas the lower part can be made from PP to increase the resilience of the plunger.

[0024] In one embodiment the plunger is provided with an internal shoulder to prevent further insertion of the dip tube.

[0025] In one embodiment the spray head is provided with a nozzle, said nozzle provided with locking means.

[0026] Typically the nozzle is rotatably mounted on the body of the spray head. Typically the nozzle is moveable between an on position and an off position.

[0027] In one embodiment the locking means includes one or more protrusions and/or recesses on the nozzle for engaging one or more protrusions and/or recesses on the body. Typically the nozzle is frictionally locked in position when the protrusions on one of the nozzle or body are engaged with corresponding recesses on the other. Typically the nozzle is unlocked by overcoming the frictional forces holding the nozzle in position.

[0028] Thus the nozzle is maintained in the off position during production and transportation, and is maintained in the on position when being used by a user.

[0029] In one embodiment the outer perimeter of the nozzle is substantially square or rectangular, the nozzle being provided with four faces corresponding to four internal recesses. In one embodiment two protrusions are provided on the body for engaging the recesses to lock the nozzle in the on or off position.

[0030] In one embodiment the faces are impressed with on and/or off indicators/symbols, which can typically be felt by touch of a user. Grooves or other gripping means on the corners of the nozzle can be provided to increase the grip a user can exert on the nozzle to turn the same between the positions.

[0031] In a further aspect of the invention there is provided a trigger sprayer product including a spray head fitted to a container via a closure mechanism,
said closure mechanism comprising an outer closure part and an inner closure part,
said inner closure part being provided with a plurality of moveable lugs,
said lugs being resiliently biased outwardly, and capable of being forced inwardly by the outer closure when the outer closure is forced thereover on connccting the spray head to the container,
the outer closure being provided with a first plurality of protrusions for retaining the inner closure in an unassembled configuration, and a second plurality of protrusions for retaining the inner closure in an assembled configuration,
characterised in that the lugs retain the spray head on the container.

[0032] In one embodiment the container is provided with a neck onto which the spray head is fitted. Typically the neck is provided with a ridge under which the lugs are forced to retain the spray head to the container.

[0033] In one embodiment the lugs and the neck are provided with engagement means for maintaining the spray head in a particular orientation. In one embodiment the engagement means includes a plurality of engaging protrusions and recesses.

[0034] Thus the lugs are forced under the ridge of the container to hold the spray head thereonto, and arc provided with protrusions which engage ridges on the neck so that the orientation of the spray head relative to the container is maintained. It will be appreciated that as the material of the components is typically relatively flexible plastic, and the size of the protrusions and recesses maintaining orientation is relatively small, the orientation can be adjusted by applying enough force to rotate the spray head, as the protrusions click over the neighbouring recesses.

[0035] In one embodiment the inner closure is provided with one or more bore seals for engaging the neck of the container and/or a retaining ring provided on the display head.

[0036] In one embodiment the spray head is releasable from the container, typically by overcoming the retaining force of the second plurality of protrusions retaining the inner closure in an assembled configuration.

[0037] In a further embodiment the spray head includes a weakened section and releasing means to enable the user to actuate the same to break the outer closure, thereby releasing the spray head from the container. As the broken outer closure cannot be refitted to the container this also provides means to detect tampering of the product.

[0038] It will be appreciated that the aspects and embodiments described herein all relate to improvements in trigger sprayer products and can thus be combined in any combination.

[0039] Specific embodiments of the invention are now described wherein:-

Figure 1 illustrates a spray head for a trigger sprayer product with an extended plunger according to a first embodiment of the invention: (a) schematic side view; (b) section view along A-A; (c) isometric view of the plunger; (d) isometric view of the spray head.

Figure 2 illustrates a spray head for a trigger sprayer product with an extended plunger according to a further embodiment of the invention: (a) schematic side view; (b) section view along C-C, (c) isometric view of the plunger; (d) magnified view of circled portion B; (e) isometric view of the spray head; (f) magnified view of circled portion A.

Figure 3 illustrates a spray head for a trigger sprayer product with an extended plunger having an internal barb according to an embodiment of the invention: (a) longitudinal sectional view; (b) isometric view (c) enlarged isometric view of the end of the plunger.

Figure 4 illustrates a spray head for a trigger sprayer product with an extended plunger having an external barb according to an embodiment of the invention: (a) longitudinal sectional view; (b) isometric view (c) enlarged isometric view of the end of the plunger.

Figure 5 illustrates a spray head for a trigger sprayer product with a two-part extended plunger having an internal barb according to an embodiment of the invention: (a) longitudinal sectional view; (b) isometric view (c) enlarged isometric view of the end of the plunger.

Figure 6 illustrates a spray head for a trigger sprayer product with a two-part extended plunger having an external barb according to an embodiment of the invention: (a) longitudinal sectional view; (b) isometric view (c) enlarged isometric view of the end of the plunger.

Figure 7 illustrates a nozzle for a spray head (a) schematic isometric view; (b) longitudinal section view (c) rear view; (d) front view of the spray head body; (e) isometric view of the spray head body; (f) isometric rear view of a nozzle; (g) isometric rear view of a further nozzle.

Figure 8 illustrates a closure mechanism for a spray head (a) schematic unassembled view; (b) schematic assembled view.

Figure 9 illustrates the outer closure part of the closure mechanism (a) cutaway view; (b) isometric view (c) inverted isometric view.

Figure 10 illustrates the inner closure part of the closure mechanism (a) side view; (b) inverted isometric view.

Figure 11 illustrates a container neck for engaging the closure mechanism (a) isometric view of the container neck; (b) part isometric view of the inner closure part and container neck in the unassembled position; (c) close-up view of the engagement means.

With reference to Figures 1a-d, there is illustrated a spray head 2 for a trigger sprayer product, including a body 4, a nozzle 6 from which fluid is expelled, a handle 8 which is actuated to expel the fluid, and a closure 10 for connecting the spray head to a container. The spray head is provided with a plunger 12 for drawing fluid into the body 4 on actuation of the handle 8 via the dip tube 14 which extends into the container (not shown).

The plunger is an elongate tubular structure, and in the embodiment shown is longer than a conventional plunger to allow the spray head to be supported thereby during manufacture thereof, rather than the flimsier dip tube. The overall length of the plunger is around 95mm. The dip tube can then be applied at the filling point by insertion into the end of the plunger as shown.

The dip tube is prevented from being inserted to far into the plunger by a moulded internal shoulder 16. In addition, the plunger is provided with a moulded internal bead 18 to retain the dip tube therein.

Figures 2a-f illustrate a similar embodiment to that shown in Figures 1a-d, and similar reference numerals are used where applicable. However, in this embodiment the dip tube 122 is fitted externally over the plunger 120. The plunger is provided with an external shoulder 128 to prevent over insertion into the dip tube, and a circumferential barb 126 to retain the dip tube on narrower portion 124 of the plunger 120.

Figures 3a-4c and 5a-6c illustrate further details of one-part and two-part plungers respectively. The one part plunger is made entirely from low density polyethylene (LDPE) and is suitable for many applications. The glass ball 55 may be retained in the plunger 12 by a rubber ball retainer 57.

[0040] However, for certain conditions or chemicals it is desirable to use a two-part plunger, where the upper part 59 is made of LDPE and the lower part 54 is made from polypropylene (PP). A two-click seal 61 is provided in the form of a number of protrusions and corresponding recesses to ensure the lower part is sealed to the upper part.

[0041] It is known that different materials exhibit different expansion properties in respect of temperature. Thus when the products are being shipped from overseas and there arc large temperature variations during shipping, the provision of an external barb allows the dip tube to expand without cracking the plunger. Where the two part plunger is provided with different materials the wall thickness is thicker to prevent such cracking due to differential expansion.

[0042] Figures 7a-g illustrate further details of the nozzle 6 which is rotatably mounted on the spray head body 4, and moveable between on and off positions situated at 90 dcgtees to each other.

[0043] The nozzle 6 is typically square, provided with four faces 98, each of which may be marked with symbols or indications to signify the on or off position to the user. The nozzle 6' may also be more rectangular in shape which further illustrates to the user which position the nozzle is in due to the asymmetric appearance.

[0044] Locking means are provided in this example in the form of four recesses 90 on the rear of the nozzle, two of which are correspondingly engaged by two protrusions 92 disposed on the spray head body when

locked in an on or off position.

[0045] Thus as the locking means retains the nozzle in the off position during production and transportation thereof, with sufficient force to withstand knocks that would otherwise potentially move the nozzle to the on position. However, the user can overcome this frictional force to move the nozzle to the on position when required for use. Grooves 94 on the nozzle help the user to grip the nozzle to rotate the same, as do the on/off indications 96 which are impressed so as to allow the user to be able to increase the gripping force exertable on the nozzle.

[0046] Figures 8a-11c illustrate a closure mechanism including an outer closure part 70 and an inner closure part 72. The inner closure 72 is provided with a plurality of lugs 74 which arc designed to ride over and then grip under a ridge 82 provided on a container neck 84, to retain the spray head on the container.

[0047] In the unassembled position, a first plurality of protrusions 78 maintain the inner closure in position so that it is ready to be assembled.

[0048] The lugs are angled outwardly in their rest position, as shown in Figure 8a, but when the outer closure is pushed down over the inner closure during assembly and over the ridge 82 of the neck 84, the lugs are forced inwardly by the inner wall of the outer closure 70 as shown in Figure 8b, thereby gripping the neck 84 underneath the ridge 82. In addition, bore seals 80 may be provided to improve retention of the components to each other.

[0049] To maintain the outer closure in the assembled position so as to prevent the inner closure from moving and releasing the lugs, the outer closure is provided with a second plurality of protrusions 76 which engage the lower edge of the inner closure to prevent relative movement of the outer closure 70.

[0050] The neck 84 and lugs 74 are provided with engagement means in the form of, in this example, protrusions 86 on the lugs which engage recesses 88 on the neck. When the spray head is fitted to the container the protrusions engage the recesses to maintain the spray head in a particular orientation. However, as these components are typically made of plastic, the engagement is relatively weak, such that a user can overcome the engagement force and rotate the spray head to a different orientation relative to the container. The spray head can therefore be clicked into a new position via means similar to a ratchet mechanism.

[0051] Thus the closure mechanism provides a means for connecting spray heads to containers while ensuring correctable relative orientation thereof.

[0052] The outer closure 70 may be provided with a weakened section and releasing means in the form of tab 89. The user can pull the tab, once the closure is in the assembled position, to break the wall of the outer closure vertically along the weakened section, thereby releasing the spray head from the container.

[0053] Advantageously the broken outer closure provides evidence of tampering to the user, as is cannot be refitted to the container.

[0054] It will be appreciated by persons skilled in the art that the present invention may also include further additional modifications made to the device which does not affect the overall

Claims

1. A method of manufacturing a trigger sprayer product including the steps of:

   providing a spray head with a plunger;
   moving the spray head to a filling point;
   inserting a dip tube into the spray head;
   associating the spray head with the container;
   characterised in that the spray head is supported by the plunger during said moving thereof.

2. A method according to claim 1 wherein the dip tube is applied at the filling point.

3. A method according to claim 1 or 2, wherein the length of the plunger is range-taking.

4. A method according to any previous claim wherein the length of the plunger ranges from around 20mm to around 100mm.

5. A method according to any previous claim wherein the diameter of the plunger is substantially constant along the portion thereof which is variable in length.

6. A method according to any previous claim wherein at least a part of the plunger and/or the dip tube is made from low density polyethylene.

7. A method according to any previous claim wherein at least a part of the plunger is made from polypropylene.

8. A trigger sprayer product made in accordance with the method of any previous claim.

9. A trigger sprayer product according to claim 8 wherein the plunger is provided with an internal barb for retaining the dip tube therein.

10. A trigger sprayer product according to claim 8 or 9 wherein the dip tube is provided with an external barb to allow the dip tube to be retained externally on the plunger.

11. A trigger sprayer product according to any of claims 8-10 wherein the spray head is provided with a nozzle having locking means, said locking means including one or more protrusions and/or recesses on the nozzle for engaging one or more protrusions and/or

recesses on the body of the spray head, the nozzle being frictionally locked in position when the protrusions on one of the nozzle or body are engaged with corresponding recesses on the other, and the nozzle being unlocked by overcoming the frictional forces holding the nozzle in position.

12. A trigger sprayer product including a spray head fitted to a container via a closure mechanism,
said closure mechanism comprising an outer closure part and an inner closure part,
said inner closure part being provided with a plurality of moveable lugs,
said lugs being resiliently biased outwardly, and capable of being forced inwardly by the outer closure when the outer closure is forced thereover on connecting the spray head to the container,
the outer closure being provided with a first plurality of protrusions for retaining the inner closure in an unassembled configuration, and a second plurality of protrusions for retaining the inner closure in an assembled configuration,
characterised in that the lugs retain the spray head on the container.

13. A trigger sprayer product according to claim 12 wherein the container is provided with a neck onto which the spray head is fitted, and the neck is provided with a ridge under which the lugs are forced to retain the spray head to the container.

14. A trigger sprayer product according to claim 12 or 13 wherein the lugs and the neck are provided with engagement means for maintaining the spray head in a particular orientation.

15. A trigger sprayer product according to any of claims 12-14 wherein the spray head is releasable from the container, either by overcoming the retaining force of the second plurality of protrusions retaining the inner closure in an assembled configuration, or by providing the head with a weakened section and releasing means to enable the user to actuate the same to break the outer closure.

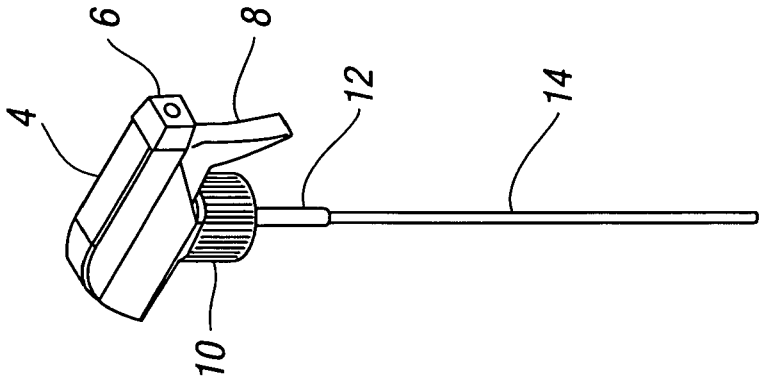


FIG. 1d

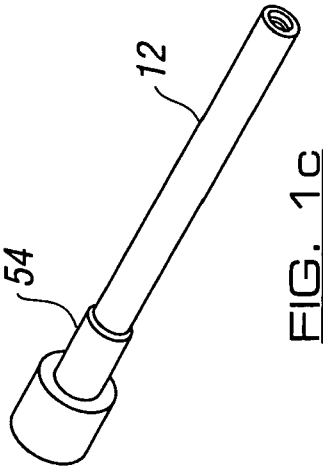


FIG. 1c

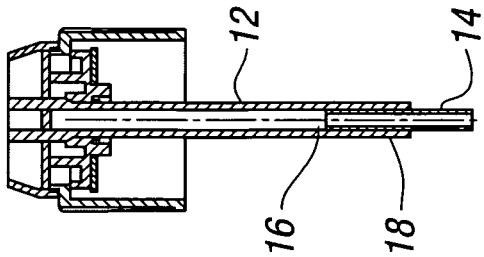


FIG. 1b

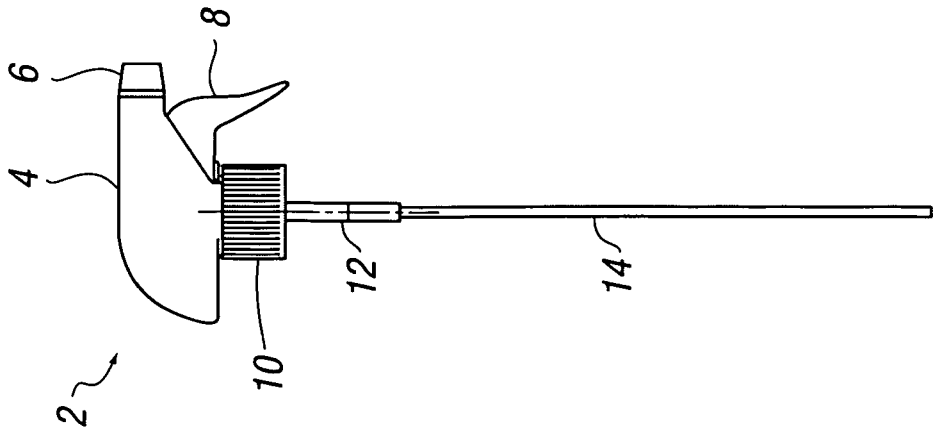


FIG. 1a

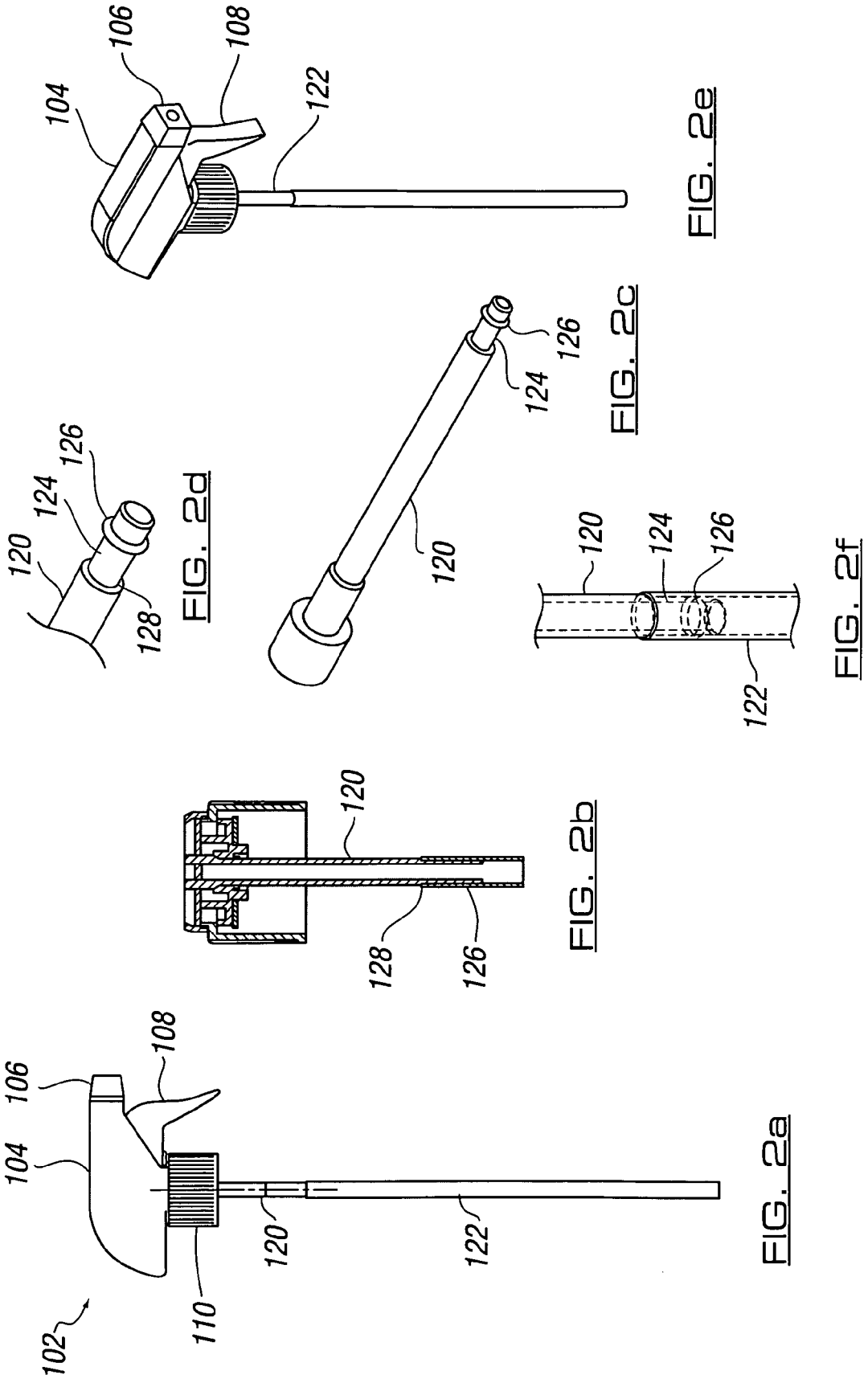


FIG. 2a

FIG. 2b

FIG. 2c

FIG. 2d

FIG. 2e

FIG. 2f

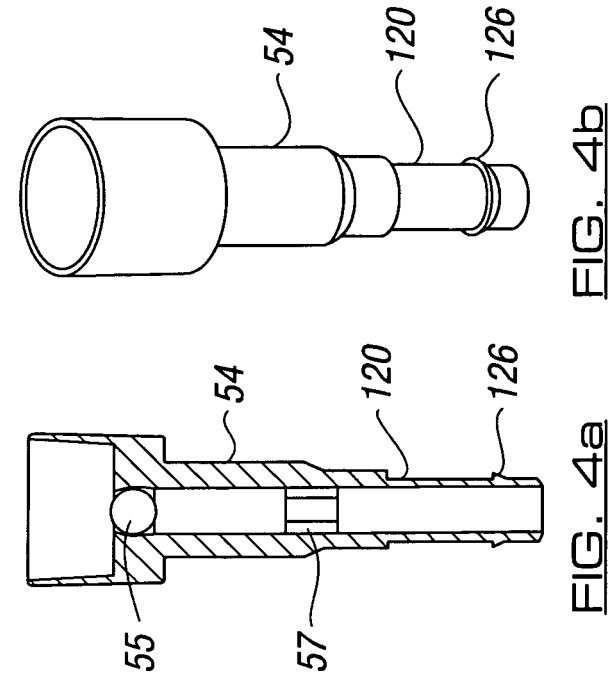


FIG. 4b

FIG. 4a

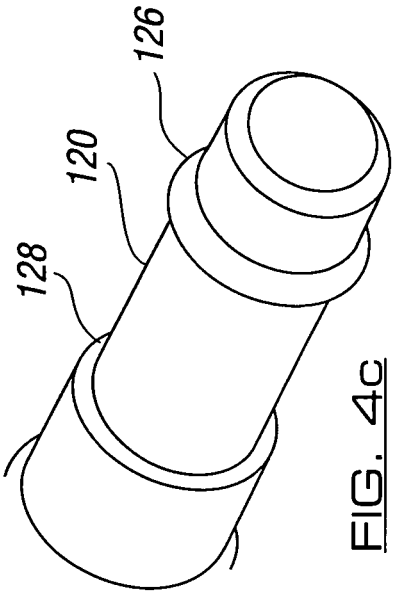


FIG. 4c

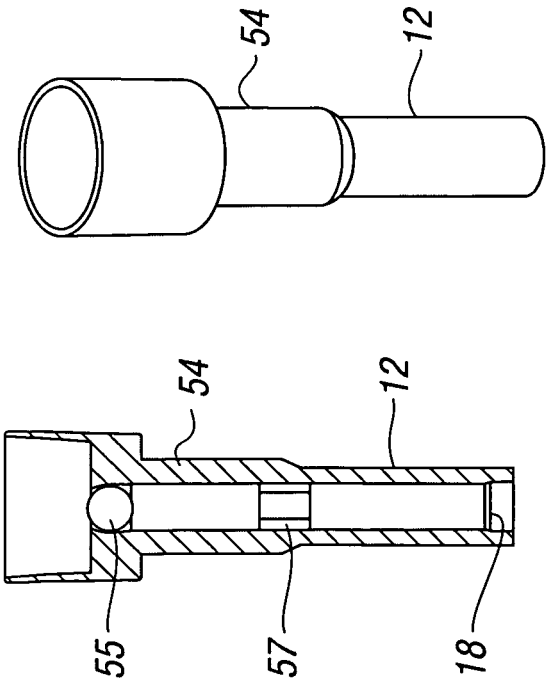


FIG. 3b

FIG. 3a

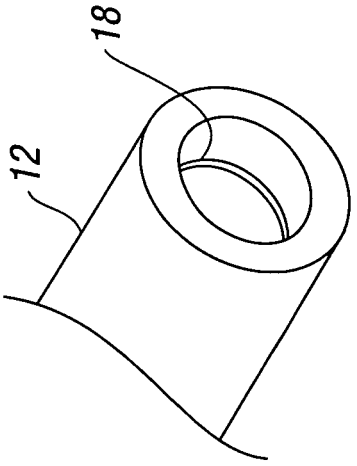


FIG. 3c

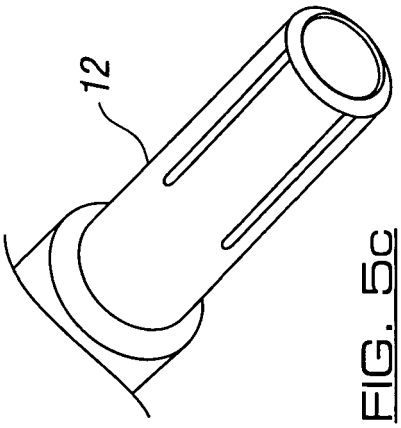


FIG. 5c

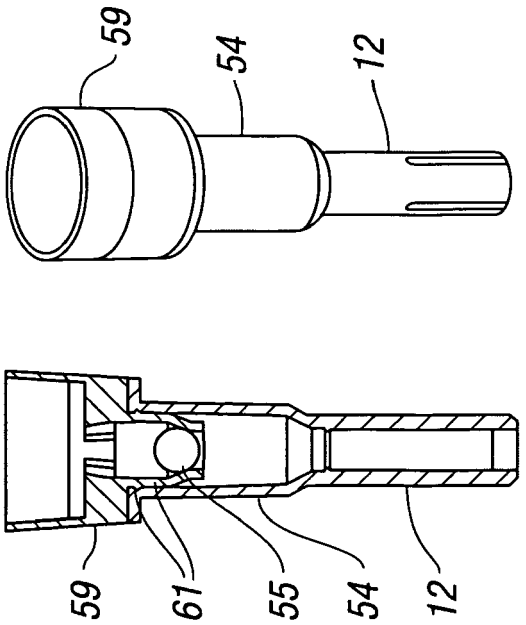


FIG. 5b

FIG. 5a

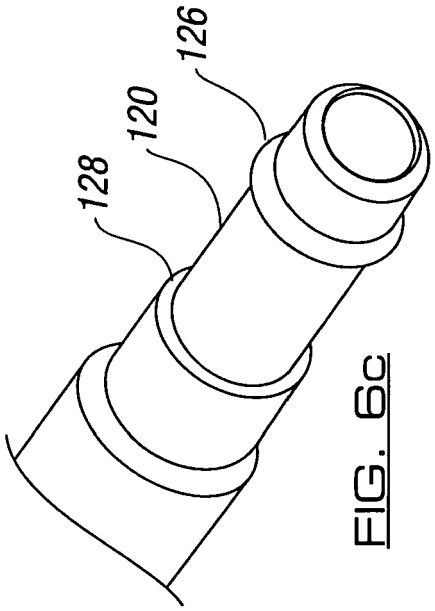


FIG. 6c

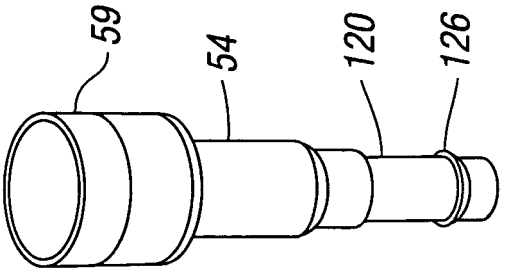


FIG. 6b

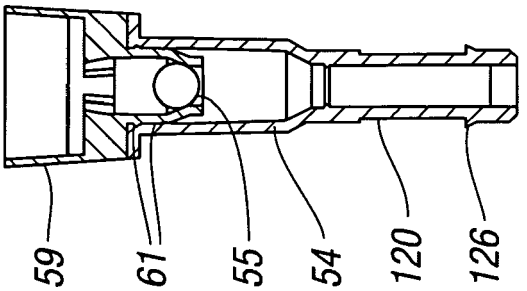


FIG. 6a

FIG. 7b

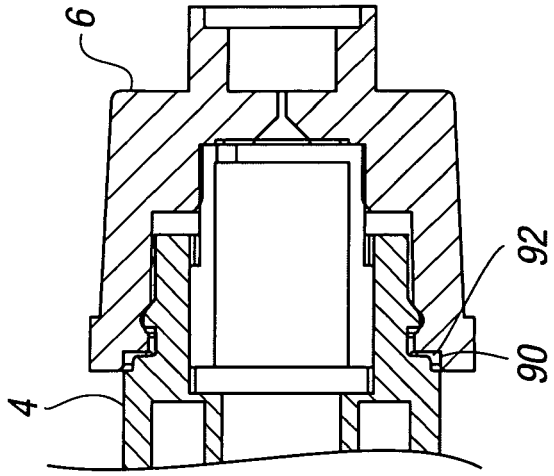


FIG. 7d

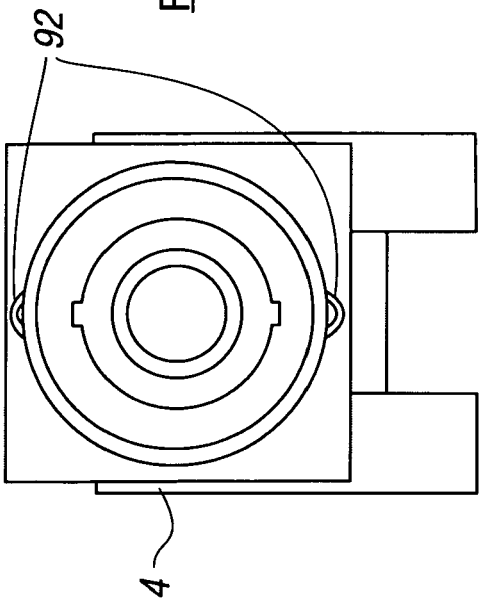


FIG. 7a

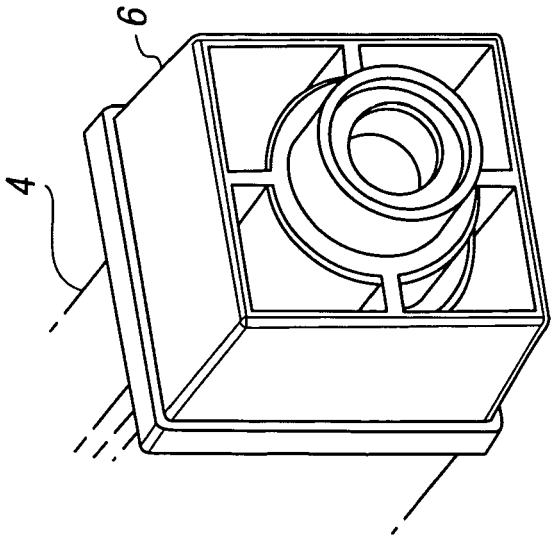
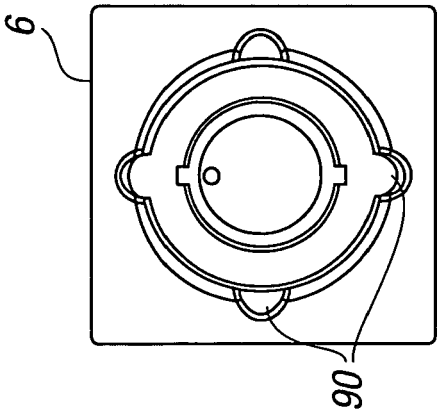


FIG. 7c



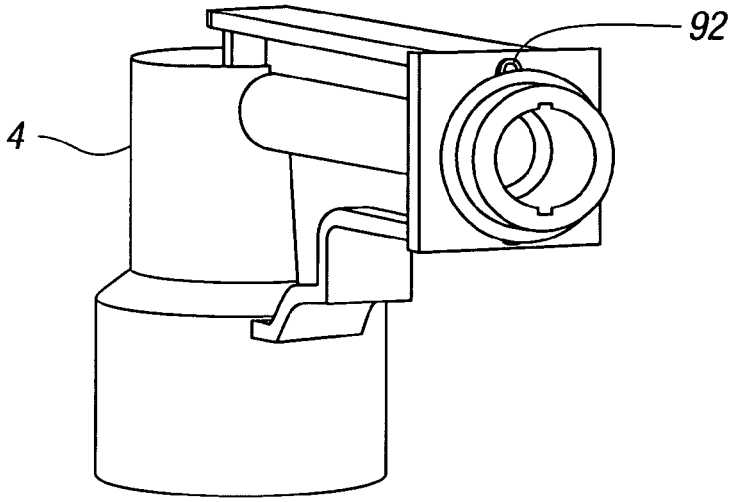


FIG. 7e

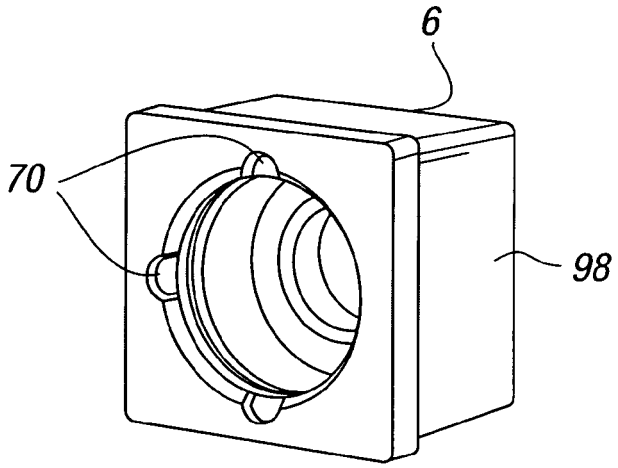


FIG. 7f

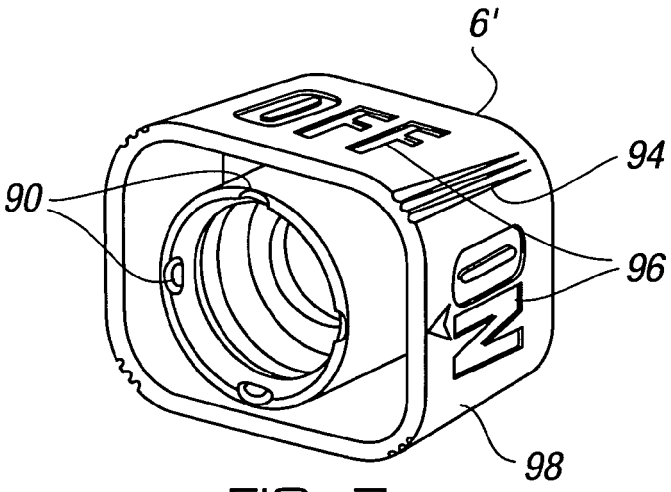


FIG. 7g

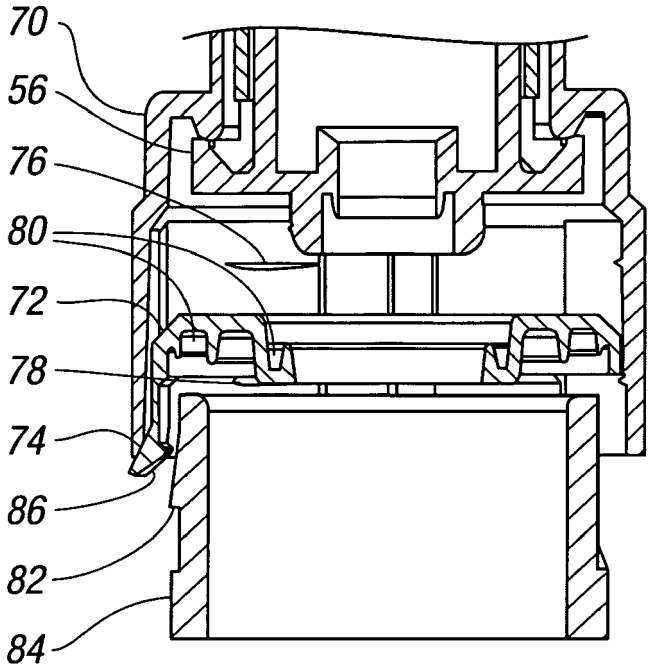


FIG. 8a

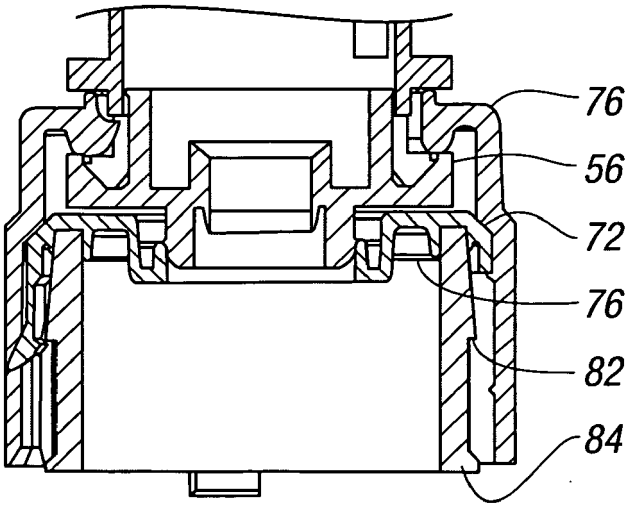


FIG. 8b

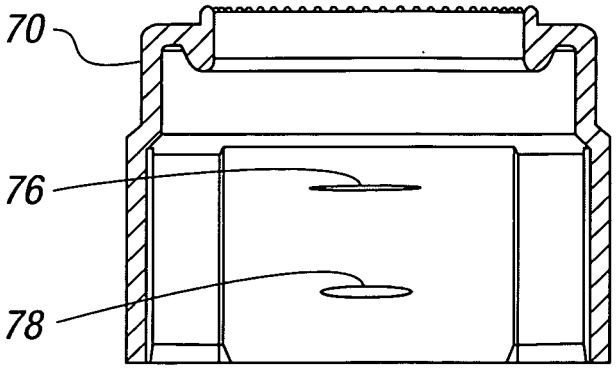


FIG. 9a

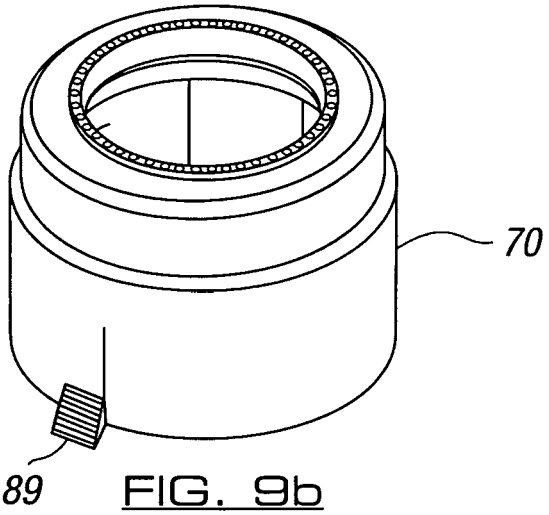


FIG. 9b

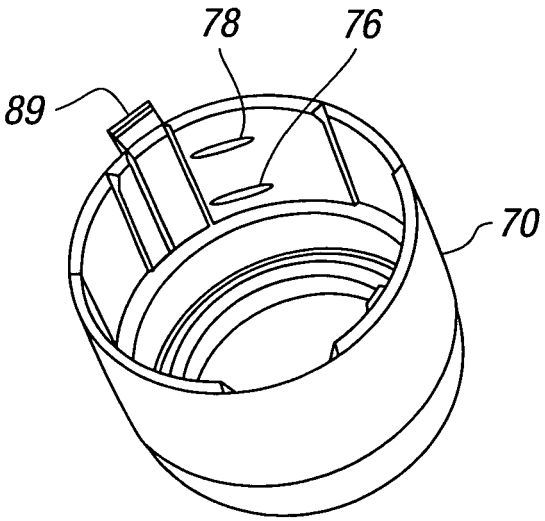


FIG. 9c

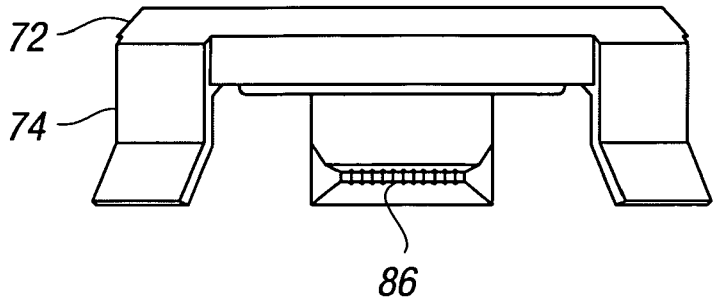


FIG. 10a

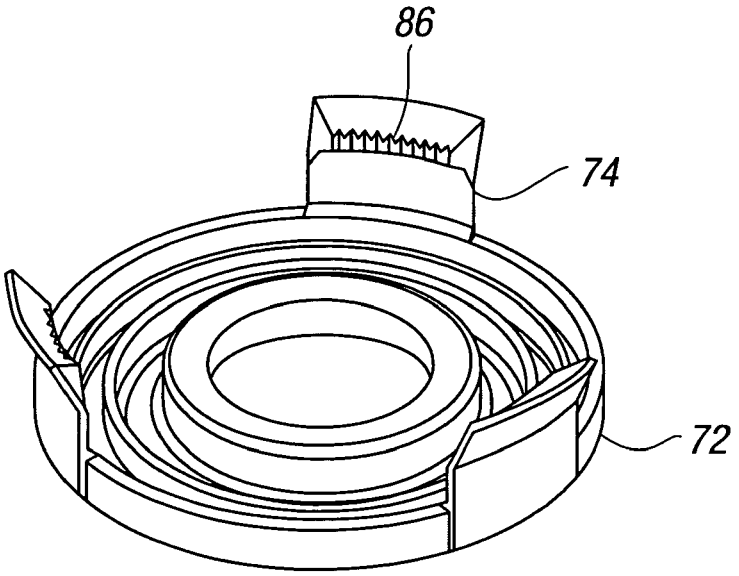


FIG. 10b

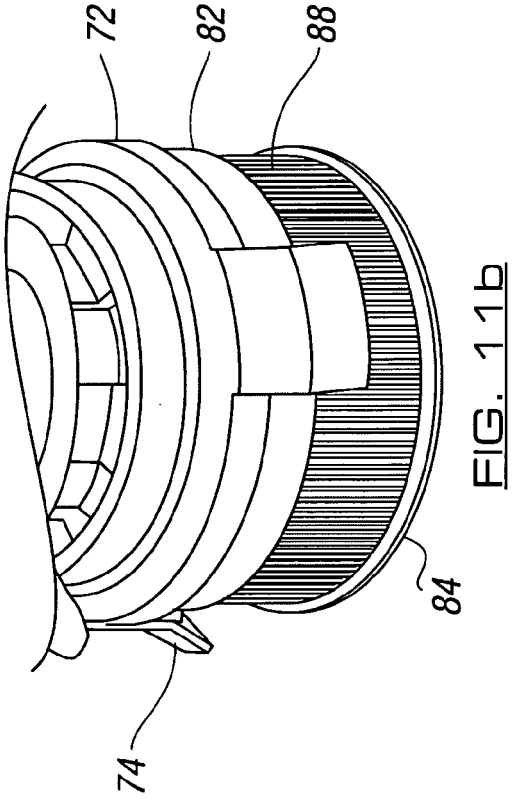


FIG. 11b

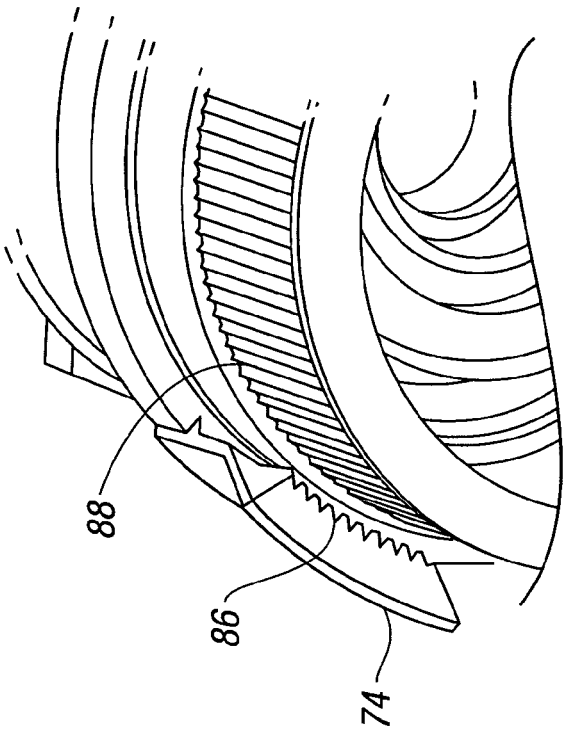


FIG. 11c

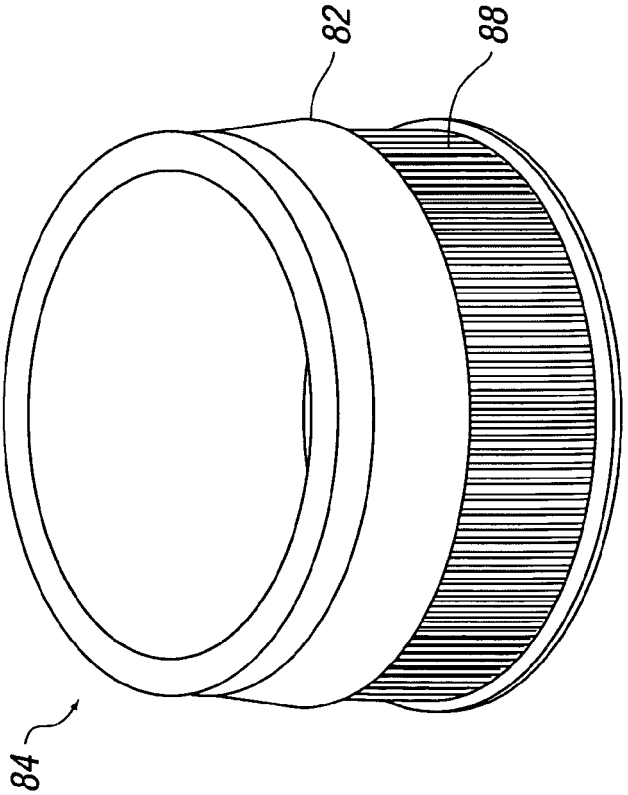


FIG. 11a