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(54) **Improved liquid dispenser with anti-retraction feature**

(57) An improved nozzle assembly with an anti-retraction feature which is useful in conjunction with a container, such as a bottle, for the dispensing of a liquid, and particularly for the targeted delivery of a thickened liquid. The nozzle assembly is advantageously provided as an element of a combination package and delivery article useful for both storing and dispensing a liquid treatment composition which package and delivery article comprises the improved nozzle assembly. The improved nozzle assembly, especially when part of a combination package and delivery article is especially useful for the targeted delivery of a drain treatment composition used to treat slow running but especially clogged drains.

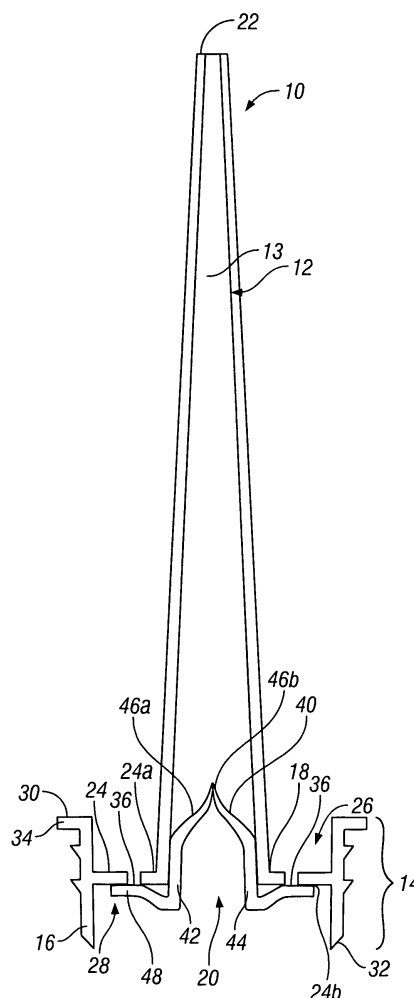


FIG. 1

Description

[0001] The present invention relates to an improved liquid dispenser for the delivery of a liquid composition from a bottle to a specific locus. More particularly, the present invention relates to an improved liquid dispenser for the delivery of a liquid composition, preferably a thickened composition, which liquid dispenser comprises an anti-retraction feature.

[0002] The prior art is replete with containers and devices which are useful for the storage of, and for the later dispensing of liquids therefrom. Such include those for the storage of a liquid, such as a thickened liquid, and for the delivery from such liquids, e.g., compressible vessels such as squeezable bottles. Where the end of the bottle is not merely an open end, a nozzle can be used to meter the amount of liquid being dispensed, and/or alternately direct the dispensed liquid exiting the bottle in a particular direction. Such nozzles are typically single piece bottle inserts which provide for a short, restricted passage of the liquid to pass therethrough from within the interior of the bottle. Although such combinations of a bottles and nozzles are widely known, there nonetheless exists a real and pressing need in the relevant art for still further improvements to bottle and nozzle assemblies, and in particular nozzles and nozzle assemblies which can be used to control and dispense specific types of liquids, and in particular thickened liquids through a medium such as standing water. Accordingly, it is to such an object that the present invention is directed.

[0003] According to one aspect of the invention there is provided an improved nozzle assembly with an anti-retraction feature which is useful in conjunction with a container, such as a bottle, for the dispensing of a liquid, and particularly for the targeted delivery of a thickened liquid.

[0004] According to a further aspect of the invention there is provided a process for the dispensing of a liquid from a bottle having an improved nozzle assembly as described herein.

[0005] According to a still further aspect of the invention there is provided an improved liquid dispenser which comprises an improved nozzle assembly with an anti-retraction feature as described herein.

[0006] According to a yet further aspect of the invention there is provided a combination package and delivery article useful for both storing and dispensing a liquid treatment composition which package and delivery article comprises an improved nozzle assembly with an anti-retraction feature as described herein.

[0007] In a further aspect of the invention there is provided an improved nozzle assembly as described herein which is advantageously used for the targeted delivery of a drain treatment composition used to treat slow running but especially clogged drains.

[0008] These and other aspects of the invention will become more apparent from the reading of the following specification.

[0009] The features of the invention will become more apparent from the following description which is to be read in conjunction with the accompanying drawings.

[0010] Figure 1 depicts in a cross-sectional view an improved nozzle assembly 10 according to one aspect of the invention. The improved nozzle assembly 10 includes a spout portion 12 from which depends a skirt portion 14. The square portion includes an outer wall 16 having a geometry which is adapted to be inserted into the opening of a bottle or other container (not shown) and to form a liquid-tight seal therewith. The outer wall 16 is connected to the base end 18 of the spout portion 12, which base end 18 includes a central opening 20 which in fluid communication with the open tip end 22 of the spout portion 12. As is visible from the drawing, the interior of the spout portion 12 is hollow and defines a continuous annular space between the base and 18 and that the tip and 22. Advantageously, the spout portion 12 is also tapered such that it converges as it extends upward from the base end 18 to the open tip end 22 of the spout portion 12. Depending radially outwardly from the base end 18 is a lateral plate 24 which provides an inter-connection between, and a support for the outer wall 16. As is visible in the figure, the position of the lateral plate 24 also acts to divide the interior space between the outer wall 16 into an outward section 26 and an inward section 28, which are respectively bounded by the upper surface 24a of the lateral plate 24 and the outer wall 16 to its upper margin 30, and the lower surface 24b of the lateral plate 24 and the outer wall 16 to its lower margin 32. Optionally but preferably the upper margin 30 of the outer wall 16 includes a flange 34 which extends outwardly radially therefrom which is useful in affixing or attaching to the improved nozzle assembly 10 to the opening of a bottle or other container. It is further to be noted that a least one, but preferably a plurality of air passages 36 are present and extend transversely through the lateral plate 24 and provide for a fluid conduit between the outward section 26 and the inward section 28. The improved nozzle assembly 10 also includes a flow check means which provides an anti-retraction feature. The flow check means in the embodiment according to figure 1 is provided as a flexible valve 40 which is present as part of the improved nozzle assembly 10. The flexible valve 40 includes a hollow barrel portion 42 which is continuously open at one end 44 and at the other end is provided a check-valve, here provided as a matched pair of flaps 46a, 46b which, when the flexible valve 40 is unstressed, are biased into a sealing position as is illustrated. Extending radially outwardly from the hollow barrel portion 42 is a circumferential flap 48 which functions as a second check-valve, which when the flexible valve 40 is unstressed, are biased into a further sealing position as is illustrated abutting against lateral plate 24 and sealing one or more air passages 36. In the embodiment depicted, the flexible valve 40 is retained within the interior of the base end 18 of the spout portion 12 by means of a friction fit between the base and 18 and at least part of

the barrel portion 42, which also provides for liquid-tight seal therebetween.

[0011] Figure 2 illustrates a top plan view of the improved nozzle assembly 10 disclosed on Figure 1. In this figure is more readily seen the open tip ends 22 which, as can be seen when viewing down through its hollow interior or visible parts of the matched pair of flaps 46a, 46b. For the visible is the spout portion 12, the lateral plate 24 including a series of air passages 36 as well as the flange 34. As can be seen, the air passages 36 are within the outward section 26 and are understood to be visible from the exterior of an improved nozzle assembly 10 when mounted on a bottle or other container (not shown). Conversely, while not shown but to be understood, the inward section 28 faces the interior of the bottle or other container when the improved nozzle assembly 10 is mounted thereon.

[0012] The operating characteristics of the improved nozzle assembly 10 will be described with further particularity on following Figures 3A and 3B.

[0013] Turning first to Fig. 3A, it is understood that the arrangement depicted is intended to be a partial view of the embodiment according to Fig. 1. Fig. 3A illustrates the condition of the elements from figure 1 wherein the pressure at the inward section 28 is greater than the pressure at the outward section 26, such as for example wherein a flexible bottle or other container is compressed such as by the manual squeezing of the same by a user, and/or by the generation of an internal pressures such as by the generation of a gas which may occur depending upon the nature of a composition contained within the bottle or other container. As is seen in the figure, the fluid (which may be a gas, liquid, gel, or other fluid) simultaneously causes the matched pair of flaps 46a, 46b to open which provides for the fluid to pass thereby (as indicated by the arrow "F") and into the hollow interior 13 of the spout portion 12 and ultimately (though not shown) out through the open tip end 22 of the spout portion 12, while the same fluid urges the circumferential flap 48 of the flexible valve 40 against the lateral plate 24 which functions to seal the plurality of air passages 36 and thereby denying the passage of the fluid to exit via these air passages 36.

[0014] Turning now to Fig. 3B, this figure illustrates the converse condition namely wherein the pressure at the inward section 28 is less than the pressure at the outward section 26 of the improved nozzle assembly 10. Such may occur for example when a compressed flexible bottle or other container it is released and is allowed to expand to an unstressed condition which causes a pressure drop within the interior of the bottle or other container with respect to the pressure at the exterior of the bottle or other container. As is seen in the figure, the matched pair of flaps 46a, 46b of the flexible valve 40 are forced together and to form a seal therebetween which denies for the passage of any fluid "F" which may be present within the hollow interior 13 of the spout portion 12, but simultaneously, the circumferential flap 48 of the flexible valve 40

moves away from the lateral plate 24 and permits for the entry of a fluid, preferably ambient air, through one or more of the plurality of air passages 36 (as indicated by arrows "A") from the outward section 26 and into the inward section 28. As the improved valve assembly 10 is advantageously mounted within an opening of a bottle or other container, such an operation provides an anti-retraction benefit in that it denies for the return of any liquid which had been previously expelled past the flexible valve 40 and into the hollow interior 13 of the spout portion 12, or alternately denies the entry of any liquid which may be present in the hollow interior 13 of the spout portion 12 which had entered via the open tip end 22 of the spout portion 12, past the flexible valve, into the inward section 28 and ultimately into the bottle or other container upon which the improved nozzle assembly 10 is mounted. This eliminates the likelihood of contamination of the composition contained within the interior of the bottle or other container. At the same time, the operation of the circumferential flap 48 of the flexible valve 40 permits sufficient passage of ambient air to allow a compressed bottle or other container to assume its unstressed and normal shape after the targeted delivery of the composition contained therein.

[0015] The foregoing features of the improved nozzle assembly 10 and the anti-retraction benefit provided thereby is particularly advantageous for the targeted delivery of a liquid composition through the spout portion 12 particularly when the spout portion 12 is downwardly directed, that is to say when a combination package and delivery article, which may be in its simplest form a bottle or other container having mounted thereon and improved nozzle assembly 10, is inferred it is such that the bottle or other container is directed vertically upwardly and above the improved nozzle assembly 10 and the open tip end 22 is directed downwardly with respect thereto. Such is particularly advantageous when the combination package and delivery article is used to provide for the targeted delivery of a composition through a second that liquid, such as standing water such as may be present in a sink or other base and having a drain at the bottom thereof

[0016] In use, the improved nozzle assemblies and the combination package and delivery article are a particularly advantageously employed in the delivery of a thickened liquid, e.g., a drain treatment composition, such as a thickened bleach containing liquid and/or alternately a thickened alkaline liquid, and/or alternately a thickened acidic liquid to a desired position or locus. Such a thickened liquid generally has a viscosity of at least about 50 cps, preferably at least about 100 cps, yet more preferably at least about 200 cps. Concurrently, such any thickened liquid has a viscosity of not more than about 1500 cps, preferably not more than about 700 cps, and still more preferably not more than about 500 cps. The foregoing viscosities can be easily measured by routine analytical methods at room temperature, such as by the use of Brookfield viscometer using an appropriate spindle

and rotational speed.

[0017] Advantageously, the improved nozzle assemblies are useful in providing for the targeted delivery of a thickened composition, e.g., drain treatment composition, especially a thickened bleach composition having and alkaline pH (a pH of greater than 7, preferably a pH of 10 or greater) to a specific location through a different standing liquid. For example, the improved nozzle assemblies are particularly useful in providing directly to a sink drain or a sink trap a liquid composition particularly a thickened alkaline compositions such as a thickened bleach composition which may provide a useful benefit in clearing a drain clog. Using the improved nozzle assemblies of the invention, a consumer can conveniently open up a container such as any compressible or squeezable thermoplastic bottle containing a quantity of a drain treatment composition, including but not limited to a thickened bleach composition, invert the bottle such that the tip is pointed downwardly and extends through standing water such as maybe found in a clogged kitchen or bathroom sink, insert the tip has far down in the drain or drain opening as possible, and then squeeze the bottle thereby forcing the composition contained therein down through the nozzle assembly and the directly in the proximity of the drain or drain opening. Such minimizes the dilution of the treatment composition and may accelerate the loosening of the blockage within the drain. When the compressed bottle is withdrawn from the standing liquid and released, the anti-retraction feature of the nozzle assembly ensures that none of the standing liquid enters into the interior of the container on which the nozzle assembly is mounted. The nozzle assembly also permits for the venting of the contents of the bottle in a safe manner by permitting for the exit of any gas which may be generated by the composition through the nozzle, while at the same time resisting the egress of the liquid composition. Such reduces the incidence of bloating and undesired expansion of the container when stored or between dispensing operations.

[0018] Although described primarily as providing a useful benefit in the targeted delivery of a drain treatment composition, it is clear that the present invention can be used for the targeted delivery of other compositions in a similar manner as that described above.

[0019] Turning now to Figure 4 there is depicted a further embodiment of an improved nozzle assembly 10 according to the present invention which is substantially similar to the embodiment depicted with reference to Figure 1 except that the embodiment according to Figure 4 further comprises a support washer 50 upon which a portion of the flexible valve 40 is mounted, and wherein the support washer 50 is positioned within the inward section 28 and between the circumferential flap 48 of the flexible valve 40, and the lateral plate 24. Such a support washer 50 may be utilized for example wherein the configuration of the flexible valve 40 is inconveniently or impossible to directly mount to a portion of the spout portion 12 in the manner described with reference to Figure 1. Further de-

tails of the flexible valve 40 ended the support washer 50 are described with reference to Figs. 5A, 5B and 5C. Fig. 5A illustrates in a cross-sectional view a flexible valve 40 mounted through the central bore 54 of a support washer 50 and also illustrates the respective positioning of air passage slots 52 with respect to the circumferential flap 48 of the flexible valve 40. In the illustration of Fig. 5A, a flexible valve 40 shown in an unstressed condition, that is to say when there is essentially an equilibrium of pressure between the interior part of a bottle or other container (not shown) and the inward section 28, and the ambient pressure on the exterior of the bottle or other container and the outward section 24 of an improved valve assembly 10 of which the flexible valve 40 forms a part. Fig. 5B illustrates a perspective view and embodiment of a support washer 50 illustrating the central bore 54 and a plurality of air passage slots 52. Fig. 5C illustrate aside plan view of the flexible valve 40, including a view of the circumferential flap 48 and flap 46a.

[0020] Fig. 6 illustrates a further embodiment of the present invention and in particular illustrates an alternative embodiment of a flexible valve 40 according to the present invention. In this embodiment the flexible valve 40 includes a hollow barrel portion 42 which is continuously open at one end 44 and at the other end is provided a check-valve, provided as a matched pair of flaps 46a, 46b which, when the flexible valve 40 is unstressed, are biased into a sealing position as is illustrated. Extending radially outwardly from the hollow barrel portion 42 is a circumferential base 56 which includes in an upper part thereof an annular trough 58 which is both in fluid communication with one or more of the air passages 36, and with an inverted check valve 60, and via a corresponding conduit 62. The inverted check valve 60 is a second check valve which is directed into the inward section 28 and works in a manner opposite to that of the first check valve provided by flaps 46a, 46b. More specifically, when the pressure present at the inward section 28 is greater than the pressure at the outward section 24, the flaps 46a, 46b are urged to open and allow for the passage of any fluid past flaps 46a, 46b while simultaneously, the second set of flaps 46a, 46b of the inverted check valve 60 arc urged to close in denying the passage of any of said fluid past them. Conversely, when the pressure present at the outward section 24 is greater than that of the inward section 28, such as when there is a relative vacuum within the interior of a bottle or other container upon which the improved nozzle assembly 10 is mounted, then the flaps 46a, 46b are urged against one another and are close denying the passage of any fluid past said flaps, while the second set of flaps 64a, 64b are urged to open such as to permit for the passage of ambient air to pass through the air passages 36 into the trough 58, via the conduit 62 and past the second set of flaps 64a, 64b to the inward section 28. Advantageously, this also permits for the passage of ambient air into the interior of a bottle or other container upon which the improved nozzle assembly 10 is mounted. Fig. 6 illustrates the arrange-

ment of the flexible valve 40 when there is a respective relative equilibrium between the inward section 28 and the outward section 24, corresponding respectively to a pressure equilibrium between the interior of a bottle or flask upon which the improved nozzle assembly 10 is mounted, and the ambient air or atmosphere surrounding the improved nozzle assembly 10.

[0021] Fig. 7 illustrates an embodiment of a process for the targeted delivery of a treatment composition, here a drain treatment composition from a combination package and delivery article useful for both storing and dispensing a liquid treatment composition, which package and delivery article comprises the improved nozzle assembly. As depicted a bottle 70, here a flexible bottle advantageously formed from a flexible polymer which is sufficiently stiff so to substantially return to its uncompressed configuration following release of any compressing pressures, is affixed via its opening to an improved nozzle assembly 10 in a liquid seal-tight relationship. The bottle 70 is inverted is such that the spout portion 12 extends downward lead through a volume of a liquid 71, here water standing in a sink 70 due to the presence of a clog (not shown) within a drainpipe 74 downstream of a drain 72. The open tip end 22 of the spout portion 12 it is positioned to be adjacent to, in the proximity of, but desirably within the drain 72. Advantageously, the skirt portion 14 is above the top surface 74 of the liquid 71 so that the air passages 36 (not visible) are in communication with the ambient air and not immersed within the liquid 71. In use, a user or consumer, following positioning of the combination package and delivery article 80 in the manner outlined above may dispense a quantity of a liquid treatment composition contained within the bottle 70 such that it passes downward lead through the spout portion 12, exits via the open tip and 22 and is directed into the drain 72. When the bottle 70 cannot be further compressed, it may be released which, due to the anti-retraction feature of the improved nozzle assembly 10 denies for the drawback of any liquid contained within the interior of the spout portion 12 to enter into the interior of the bottle 70, but which allows for the entry of ambient air via the improved nozzle assembly 10 into the interior of the bottle 70 so that it retains its prior unstressed shape and additionally now also contains a volume of air trapped within the interior of the bottle. Optionally, but often it necessarily, the consumer may then repeat the application process, and again compress the bottle 70 which forces a further quantity of a treatment composition downwardly from the bottle, through the spout portion and out from the open tip and 22 and into the drain 72. This sequence of steps may be repeated as many times as is thought necessary or desirable by the consumer. The utilization of the improved nozzle assembly 10 ensures that none of the liquid 71 enters into the interior of the bottle 70 to regardless of the number of dispensing applications providing a targeted delivery of the treatment composition as hereinbefore described.

[0022] While the nozzle assembly of the invention may

be formed of any of a variety of materials, advantageously the use of a synthetic polymers including thermosettable or thermo formable synthetic polymers such as are widely used in casting or injection molding. Exemplary synthetic polymers such as polyamides, polyolefins (e.g., polypropylene, polyethylene) as well as polyalkyleneterephthalates (i.e., polyethylene terephthalate, polybutylene terephthalate), polystyrenes, polysulfones, polycarbonates as well as copolymers formed from monomers of one or more of the foregoing being several nonlimiting examples of useful synthetic polymers. Desirably the material or materials of construction of the nozzle assembly is selected also as to not be deleteriously affected by the contents of the container which are to be used with the nozzle assembly. In the case where such contents are chemical compositions, e.g., aqueous or non-aqueous liquid compositions which comprise one or more surfactants, solvents, etc., the use of a synthetic polymer which is essentially chemically inert to such compositions is preferably used. In certain preferred embodiments all of the elements of the nozzle are formed from non-porous materials, preferably non-porous thermoplastic synthetic polymers such as synthetic polymers based on one or more polyolefins.

[0023] The flexible valve of the nozzle assembly of the invention maybe formed of any flexible or elastomer material in his most desirably formed of a material which has a "shape memory" and which will return to an unstressed configuration upon the release or removal of any stresses or other pressures causing deformation of the same. Many synthetic elastomer scum as well as naturally occurring may be used including without limitation natural and synthetic rubbers, neoprene, polyisoprene, silicone based materials and the like. Preferably, the material of construction for the flexible valve is one which also exhibits an acceptable degree of chemical resistance to any composition which may be dispensed via an improved nozzle assembly as described herein. Where such a composition as a liquid, which can be alkaline or alternately maybe acidic, silicone based materials are advantageously used as a being relatively simple to form, such as by molding into a desired configuration of the flexible valve means, provide a good degree of chemical resistance and at the same time exhibit a good "shape memory".

[0024] Although the invention has been shown and described with respect to the detailed embodiments thereof, it will be understood by those of skill in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof Therefore, it is intended that the invention not be limited to the particular embodiments disclosed in the above detailed description, but that the invention will include all embodiments falling within the scope of the appended claims.

Claims

1. An improved nozzle assembly with an anti-retraction feature which is useful in conjunction with a container, such as a bottle, for the dispensing of a liquid therefrom, the nozzle assembly which includes as the anti-retraction feature a flexible valve 40 which includes a hollow barrel portion 42 which is continuously open at one end 44 and at the other end is provided as a check-valve a matched pair of flaps 46a, 46b which, when the flexible valve 40 is unstressed, are biased into a sealing position, and further wherein the flexible valve 40 also comprises extending radially outwardly from the hollow barrel portion 42 a circumferential flap 48 which functions as a second check-valve, which when the flexible valve 40 is unstressed, are biased into a further sealing position abutting against lateral plate 24 and sealing one or more air passages 36.

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2. A combination package and delivery article useful for both storing and dispensing a liquid treatment composition which package and delivery article comprises an improved nozzle assembly with an anti-retraction feature as described in claim 1.

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3. A combination package and delivery article according to claim 2, which contains a thickened liquid having a viscosity of at least 50 cps.

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4. A combination package and delivery article according to claim 3, which contains a thickened liquid having a viscosity of at least 100 cps.

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5. A combination package and delivery article according to any of claims 2, 3 or 4 which contains a thickened alkaline liquid.

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6. A combination package and delivery article according to any of claims 2, 3 or 4 which contains a thickened acidic liquid.

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7. A combination package and delivery article according to any of claims 2, 3 or 4 which contains a thickened bleach containing liquid.

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8. A combination package and delivery article according to any of claims 2, 3 or 4 which contains a drain treatment composition.

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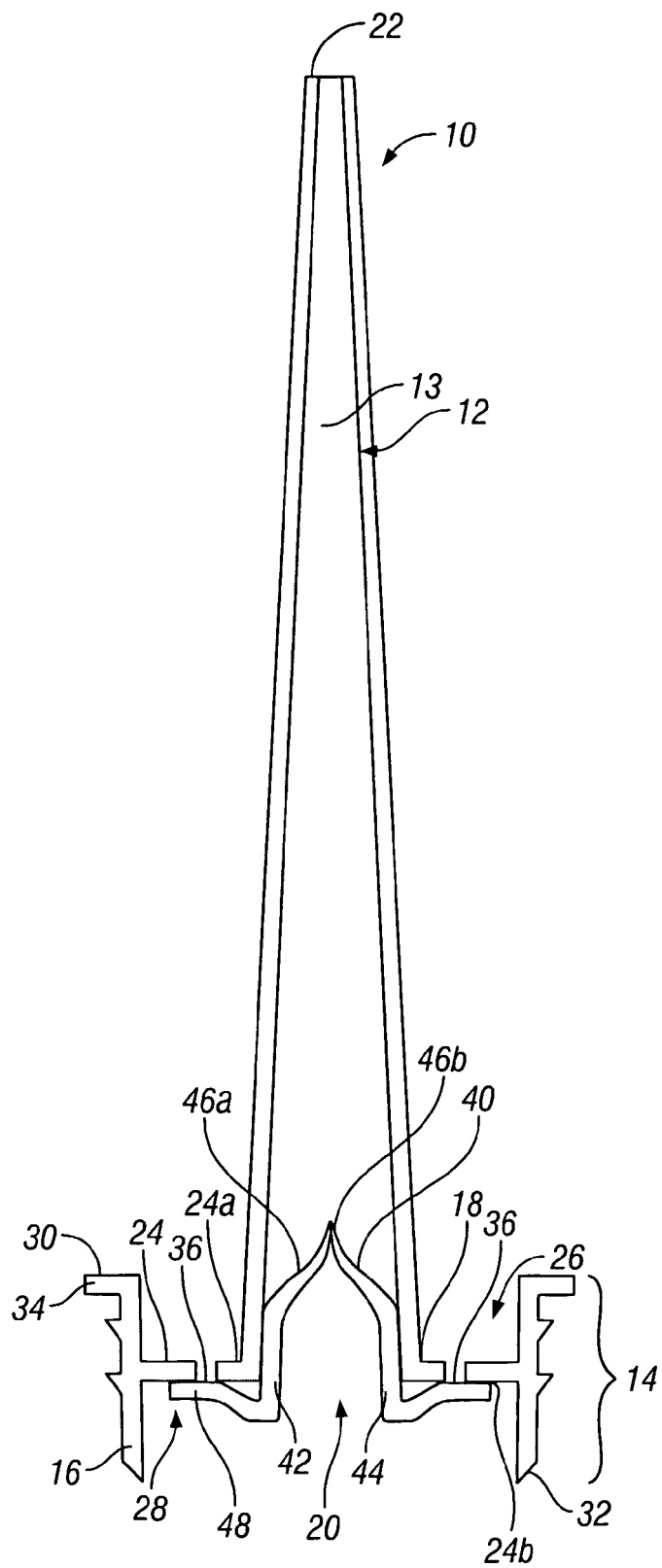


FIG. 1

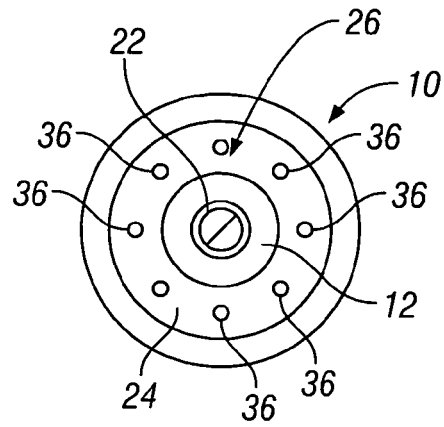


FIG. 2

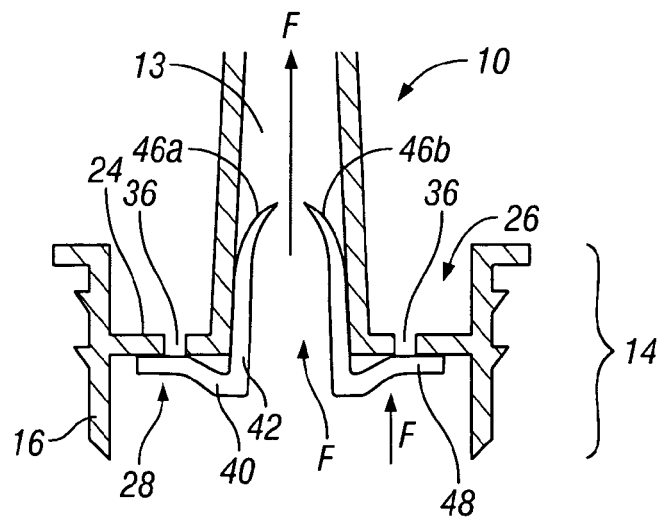


FIG. 3A

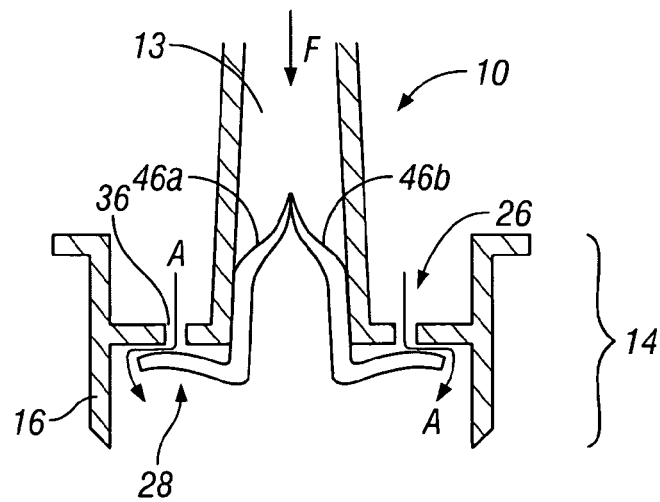


FIG. 3B

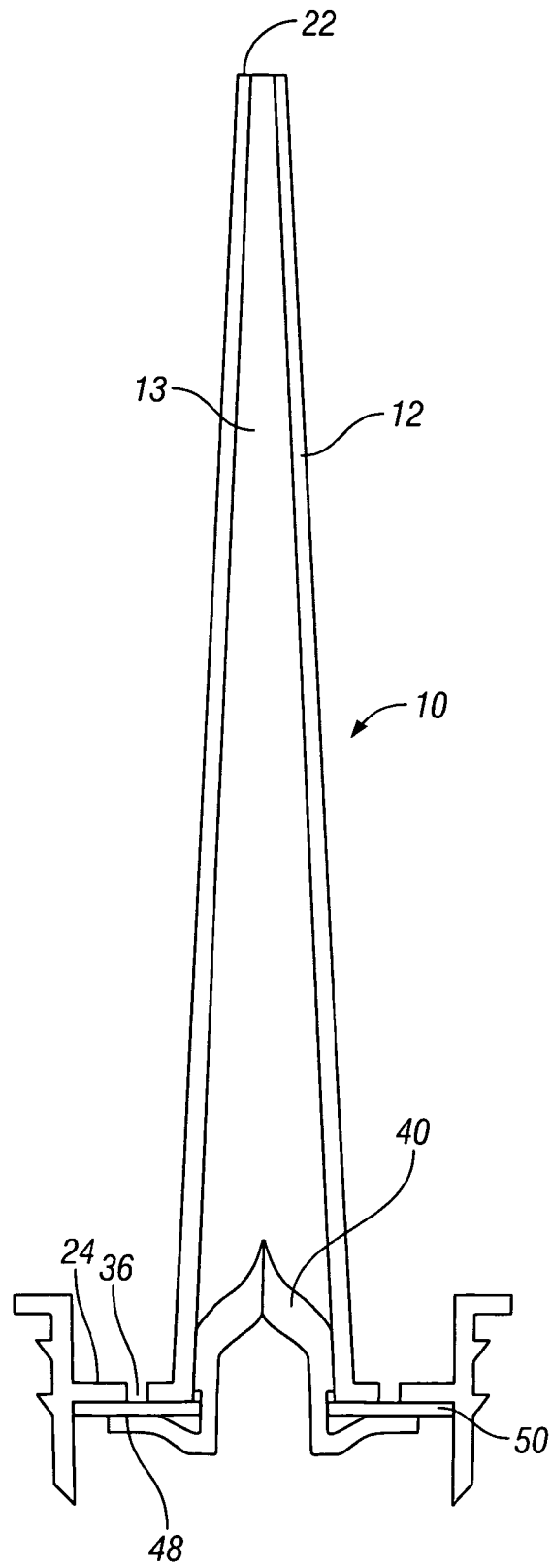


FIG. 4

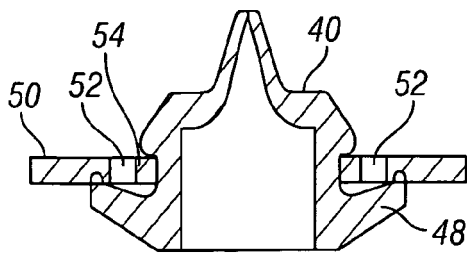


FIG. 5A

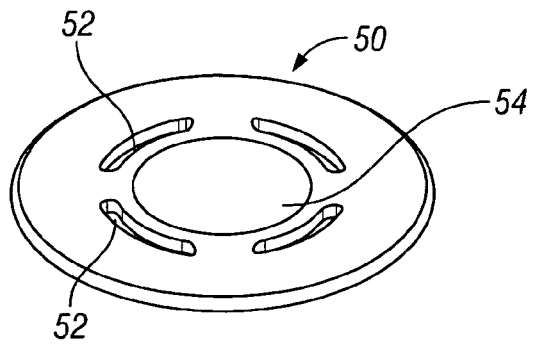


FIG. 5B

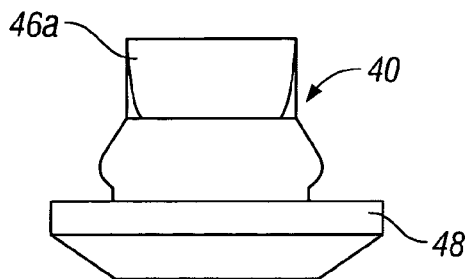


FIG. 5C

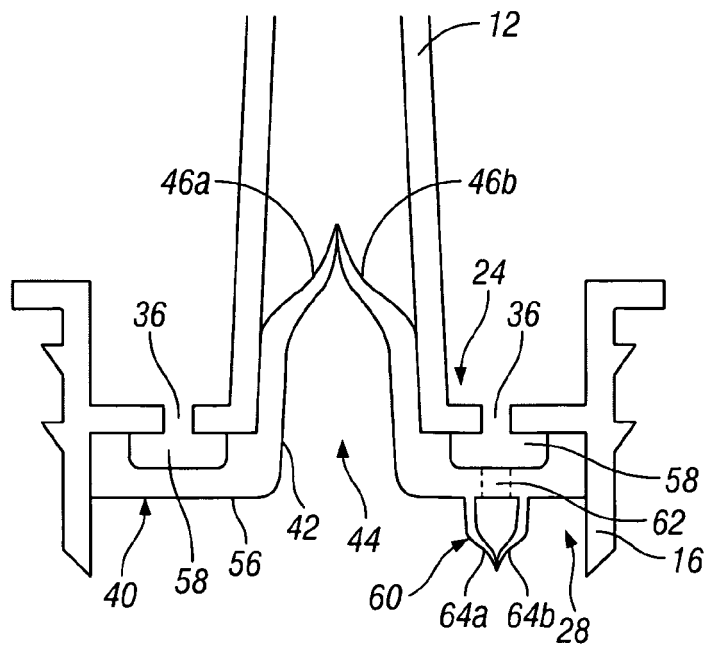


FIG. 6

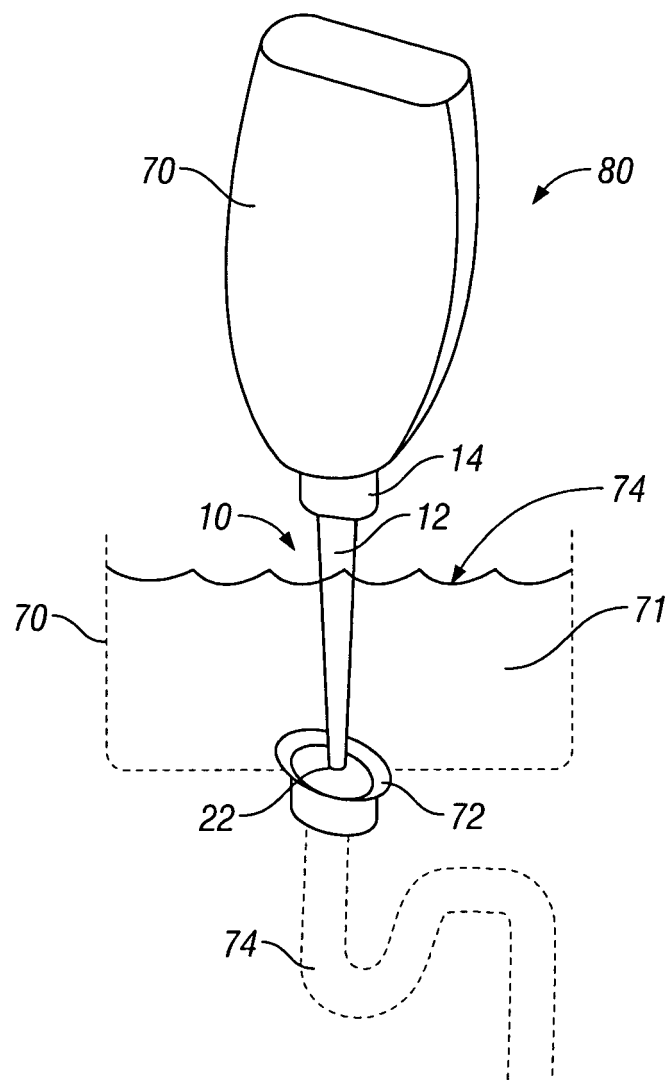


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 09 00 7274

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 September 2009	Examiner Roldán Abalos, Jaime
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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