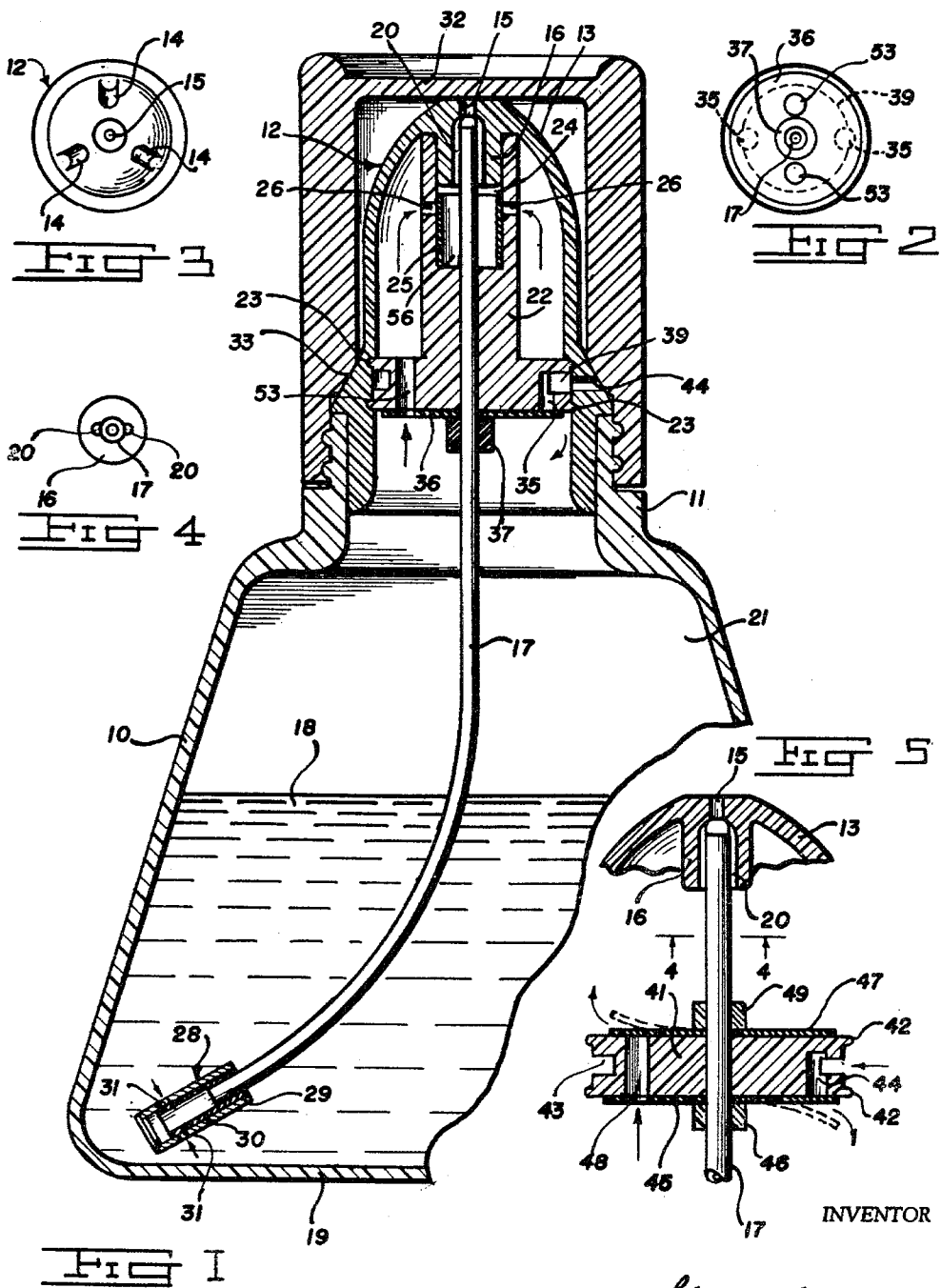


April 6, 1965

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FLUID DISPENSER

3,176,883

Filed April 15, 1963



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3,176,883

FLUID DISPENSER

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Filed Apr. 15, 1963, Ser. No. 273,055
5 Claims. (Cl. 222-193)

This invention relates generally to medication dispensers of the squeeze bottle type wherein, with previous devices, as the resilient walls of the dispenser are compressed, a mixture of air and medication is directed from the nozzle portion of the device in the form of an atomized spray and upon release of the dispenser air is drawn back into the dispenser through the discharge nozzle.

With nozzle sprays of this type wherein the dispenser nozzle is inserted within the nasal passage of a person being treated, it has been found that not unfrequently pressure is released upon the dispenser walls before the nozzle has been completely removed from the nasal passage, whereupon, infectious mucous from the nasal passage is drawn back into the dispenser with the returning air. Furthermore, it has been found that even after nozzle removal from the nasal passage, a portion of the contaminated film of mucous and medication generally covering the nozzle surface will, upon pressure release, be drawn back into the dispenser to result in a condition equally as objectionable as the first.

It is an object of the present invention to provide a medication dispenser of the squeeze bottle type wherein a mixture of air and medication is directed from the discharge nozzle thereof as external pressure is applied to the resilient walls of the dispenser and wherein, upon release of the pressure, an arrangement of flow-controlling valves within the device operate to prevent the return of air or liquid through the dispensing nozzle by providing that the air return to the receptacle by way of a separate port located in spaced relation to the discharge port.

A further object of this device is to provide a dispenser of the resilient wall type wherein the entire multiple valve system thereof forms a part of the nozzling portion of the apparatus thusly permitting the nozzle assembly to be readily used with various sizes and shapes of resilient walled receptacles without alteration or modification of the latter.

A still further object is to provide a dispenser of the type disclosed wherein only a minimum quantity of fluid may be trapped between the air discharge control valve and the discharge nozzle should pressure be inadvertently applied to the device when the nozzle is in an inverted position.

An additional object is to provide a dispenser of the type herein shown wherein the closing cap therefor operates to simultaneously close both the discharge and air return ports of the device as the cap is threaded into place.

Other features and advantages of the present invention will become more apparent upon reading the following description while referring to the accompanying drawings wherein:

FIGURE 1 is a cross sectional view of the device partly in elevation and partly cut-away and showing the air return passage through the housing rotated 45 degrees for the purpose of description and clarity.

FIGURE 2 is a view in elevation of the valve disk as arranged over the base of the valve housing.

FIGURE 3 is a view in elevation looking down upon the dispenser nozzle and showing to advantage the vertical grooves therein.

FIGURE 4 is a view partly in elevation and partly cut-away as taken along plane 4-4.

FIGURE 5 is a view in section partly cut-away of an alternate form of the nozzle assembly and showing the

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air return valve rotated 45 degrees for the purpose of description and clarity.

Referring now to the drawings and more specifically to FIGURE 1 thereof, the receptacle member 10 of the present device is preferably formed of resilient material such as polyethylene plastic and may be of any size or shape suitable for the purpose. The receptacle includes an upward extending neck 11 wherein is press-fit a plastic nozzle assembly generally designated 12. The nozzle includes an oval-ended hollow shell-like member 13 wherein is provided an arrangement of vertical grooves 14 shown to advantage in FIGURE 3. Centrally located within the closed end of the shell is an exhaust port 15 through which a mixture of medication and air is dispensed from the device during its operation as will hereafter be more fully described. Beneath the exhaust port 15 is a depending member 16 wherein is press-fit a flexible tube 17. The free end of the tube extends down through the medication 18 and into close proximity with the receptacle bottom 19. Vertical grooves 20 formed in the member 16 to the sides of the tube 17 provide means whereby air is passed from volume 21 to the exhaust port 15 concurrently with fluid from volume 18 as internal pressure is put upon the system.

Tightly sleeved in sealing relation over the tube 17 and member 16 is a valve housing 22 wherein is arranged two of the three valve assemblies of the device. Annular flanges 23 formed about the extending edge of the housing, serve to mate with associate grooves provided therefor in the shell whereby in addition to forming a pressure seal therebetween further serves to maintain the housing securely in place within the shell following assembly thereof.

A recess 56 formed in the upper end of the housing and wherein is received member 16, encloses a thin closely fitting tubular sleeve 25 of resilient material such as rubber. This sleeve normally closes openings 26 and serve therewith to provide the air discharge valve of the system. This valve assembly supplies air to the discharge port 15 from volume 21 during operation of the device. Medication from 18 passes through tube 17 normally closed at its lower end by valve assembly 28. The valve 28 is comprised of a rigid cap member 29 wherein is enclosed a closely fitting resilient tubular sleeve 30. The arrangement of the sleeve 30 is such as to normally close fluid entrance ports 31 but operative upon a slight increase in pressure within the receptacle to move from the ports to allow fluid from volume 18 to pass through tube 17 and on to the discharge port 15.

The air return ports 35 in the housing are normally closed by the resilient disk member 36 held firmly in place against the base of the housing by sleeve 37. In order that ports 35 will readily intersect the air return ports 44 extending through the shell as shown, an annular groove is provided about the housing as at 39 to intersect the ports 44 as the housing is pressed into position within the shell. As previously described, flanges 23 provide a pressure seal on either side of the groove 39 once the housing 22 is in place.

FIGURE 5 is a variation of the invention wherein the valve housing 41 is in the form of an annular disk held in place within the shell by flanges 42 as previously described. The annular groove 43 admits air to ports 44 normally closed by resilient valve disk 45 held in place by sleeve 46. A similar valve disk 47 closes the air discharge port 48 and is held in place over the housing by the sleeve 49. Air leaves the receptacle by passing through 48 and by the valve disk 47 before entering grooves 20 and from the dispenser by way of the discharge opening 15 along with fluid from tube 17.

Now to described briefly the operation of the device thus far disclosed, the receptacle 10 is filled to substan-

tially the height indicated with the medication desired. As the nozzle assembly 12 is pressed into place closing the receptacle, the fluid valve assembly 28 will rest upon or near the base of the receptacle to be covered by the liquid of 18. At this point all valves of the device are closed. As pressure is applied to the resilient side walls of the receptacle to increase the pressure therein, fluid from volume 18 forces open valve 28 to pass through tube 17 to the discharge nozzle 15. Concurrently therewith, air from volume 21 passes through opening 53 in the housing to open the air discharge valve sleeve 25 and by way of grooves 20 to pass from the discharge nozzle 15 with the liquid from volume 18 as an atomized spray.

During the foregoing operation the air return valve disk 36 remains closed. As pressure is released upon the walls of the receptacle, valve members 25 and 30 instantly close to prevent air or liquid entering the discharge nozzle while the air return valve disk 36 opens to pass air from 44 and 35 back into the system. This operating cycle is repeated each time the walls of the receptacle are compressed and released.

One of the primary advantages of the present arrangement is the smallness of the volume 56 which, as constructed, can hold only a drop or two of liquid. The purpose of this small volume is that should the receptacle be compressed when in a base up position and with the cap 32 in place, liquid from 18 will be trapped between the discharge port 15 and valve member 25. Should this occur, the next normal operation of the device will result in the liquid being discharged from the port 15 in the form of a stream rather than as an atomized spray as intended. The present arrangement provides for an almost instantaneous clearing of the nozzle should this occur.

The cap is so designed at 33 as to close both discharge port 15 and air return ports 44 as the cap is threaded into place upon the receptacle neck 11.

The pressure response of the valve members 25 and 30 may be varied in several ways as by the wall thickness or by providing a small notch or cut along the sides thereof 90 degrees from the valve openings.

While herein has been illustrated and described certain preferred embodiments of the device, it will be readily understood that various changes in the construction, operation and characteristics of the parts may be resorted to without departing from either the spirit or scope of the invention as now claimed.

I claim:

1. An atomizing dispenser of the type disclosed including in combination a resilient walled receptacle, means forming a discharge port in said receptacle, means forming a plurality of mutually separate fluid communication passages respectively for air flow and for liquid flow from within said receptacle to said discharge port, valve means normally closing said fluid communication

passages and operative upon an increase in pressure within said receptacle to open to pass fluid to said discharge port to atomize the liquid flow therethrough, means forming an air return passage into said receptacle, valve means normally closing said air return passage and operative to open said return passage upon a decrease in pressure within said receptacle.

2. A dispenser of the type disclosed including in combination a resilient walled receptacle, an atomizing discharge nozzle assembly disposed in a wall of said receptacle, means forming a discharge port in said nozzle, a liquid communication passage extending from within said receptacle to said discharge port, means forming an air passage for air communication to said discharge port, valve means normally closing said liquid communication passage and said air passage and operative upon an increase in pressure within said receptacle to open and pass air and liquid to said discharge port, means forming an air return passage into said receptacle and located in space relation to said discharge port, valve means normally closing said air return passage and operative upon a decrease in pressure within said receptacle to open to effect air return to said receptacle.

3. A dispenser as claimed in claim 2 wherein the flow controlling valve means thereof forms a part of said nozzle assembly.

4. A dispenser of the resilient wall type including in combination a resilient receptacle, means forming a filling mouth in said receptacle, a nozzle assembly closing said filling mouth, means forming a discharge port in said nozzle assembly, a liquid supply tube forming a part of said nozzle assembly and extending from within said receptacle to within operative relation with said discharge port, means forming in said nozzle assembly an air discharge passage from within said receptacle to said discharge port, valve means respectively closing said liquid supply tube and said air discharge passage, said valve means being operative upon a predetermined increase in pressure within said receptacle to open to allow the passage of liquid and air to said discharge port, means forming in said nozzle assembly an air return passage into said receptacle, valve means normally closing said air return passage, said last named valve means being operative upon a decrease in pressure within said receptacle to admit external air to said receptacle.

5. A dispenser as claimed in claim 4 wherein the nozzle assembly includes the valves of the assembly.

References Cited by the Examiner

UNITED STATES PATENTS

2,715,980	8/55	Frick	222—212	X
2,761,833	9/56	Ward	222—212	X
2,796,294	6/57	McKinnon	239—327	
2,876,935	3/59	Lindberg	222—212	X

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