

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 August 2001 (30.08.2001)

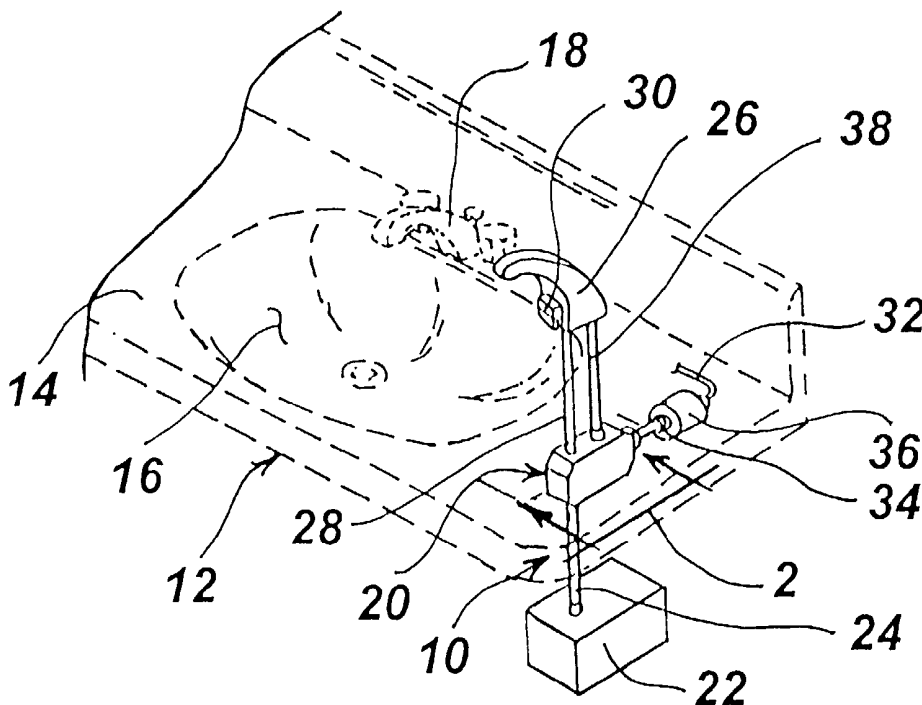
PCT

(10) International Publication Number  
WO 01/62661 A1

- (51) International Patent Classification<sup>7</sup>: **B67D 5/18** **John, J.** [US/US]; 4700 N Kolb Road, Suite 6211, Tucson, AZ 85750 (US).
- (21) International Application Number: PCT/US01/05607
- (22) International Filing Date: 22 February 2001 (22.02.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
09/513,903 25 February 2000 (25.02.2000) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:  
US 09/513,903 (CON)  
Filed on 25 February 2000 (25.02.2000)
- (71) Applicants and  
(72) Inventors: **TERRELL, Brian, C.** [US/US]; 1265 S Remington Circle, Chandler, AZ 85249 (US). **SPILOTRO,**
- (74) Agent: **PARSONS, Robert, A.**; Suite 260, 340 E Palm Lane, Phoenix, AZ 85004 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: AUTOMATED FLUID DISPENSER



(57) Abstract: An automatic fluid dispenser (10) including a pump mechanism (20) actuated by a piston (60) movable between a first position, and a second position in which a fluid is dispensed. A conduit (32) is coupled to the pump mechanism and coupleable to a pressurized fluid source. A valve (34) is carried by the conduit and is movable between an open position in which a pressurized fluid from the pressurized fluid source moves the piston to the second position, and a closed position stopping the pressurized fluid.



WO 01/62661 A1



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## AUTOMATED FLUID DISPENSER

## TECHNICAL FIELD

5 This invention relates to devices for dispensing fluids.

More particularly, the present invention relates to automated dispensing devices.

10 In a further and more specific aspect, the instant invention concerns automatically dispensing liquid soap.

## BACKGROUND ART

15 Devices for dispensing fluids are well known and have been used to dispense liquid soaps, cleaning fluids, and condiments for many years. While capable of dispensing any fluid, the present invention is primarily concerned with dispensing liquid soap which will be the primary area of discussion.

20 Liquid soap is typically dispensed by the reciprocal translation of a plunger which pumps liquid soap from a source and ejects it from an aperture. These dispensers require manual manipulation of the plunger. Such manipulation serves as a vehicle for transmission of bacterial and viral contaminants to subsequent users.

25 There also exists pneumatically actuated and mechanically (motor/pump) actuated mechanisms for dispensing soap in response to a trigger signal. These devices require a relatively substantial amount of power, usually in the form of electrical power, to maintain the air or gas pressure necessary to operate the pneumatic dispenser or to operate a motor in a mechanical dispenser.  
30 Conventional electric power (120 volts AC) creates an electrical hazard in proximity to a wash basin, or the like, reducing the desirability of devices requiring large quantities of power.

It would be highly advantageous, therefore, to remedy the foregoing and other deficiencies inherent in the prior art.

Accordingly, it is an object of the present invention to provide a new and improved automatic fluid dispenser.

Another object of the invention is to provide an automatic soap dispenser which requires very little electrical power.

And another object of the invention is to provide an automatic soap dispenser which is self cleaning.

Still another object of the present invention is to provide an automatic soap dispenser which is adjustable to dispense a pre-determined quantity.

15

#### DISCLOSURE OF THE INVENTION

Briefly, to achieve the desired objects of the instant invention in accordance with a preferred embodiment thereof, provided is an automatic fluid dispenser including a pump mechanism actuated by a piston movable between a first position, and a second position in which a fluid is dispensed. A conduit is coupled to the pump mechanism and couplable to a pressurized fluid source. A valve is carried by the conduit and is movable between an open position in which a pressurized fluid from the pressurized fluid source moves the piston to the second position, and a closed position stopping the pressurized fluid.

In a more specific aspect of the present invention, provided is an automatic fluid dispenser including a liquid soap reservoir, a soap dispensing fixture and a pump mechanism. The pump mechanism includes a housing defining a pump chamber having an inlet coupled to the liquid soap reservoir and an outlet coupled to the soap

dispensing fixture. A first check valve is mounted in the inlet of the pump chamber for allowing liquid soap flow only into the pump chamber from the reservoir, and a second check valve is mounted in the outlet for allowing liquid soap flow only out of the pump chamber to the soap dispensing fixture. A piston is positioned within a bore in the housing for reciprocating motion between a first position in which the pump chamber has a volume and a second position in which the volume of the pump chamber is reduced. The pump mechanism further includes a biasing element biasing the piston into the first position. A conduit is coupled to the bore and coupled to a pressurized water source. The conduit directs pressurized water from the pressurized water source onto the piston. A valve is carried by the conduit and movable between an open position in which pressurized water from the pressurized water source moves the piston to the second position, and a closed position stopping the pressurized water. A water bleed is coupled to the bore between the piston and the valve. A sensor positioned proximate the fixture actuates a solenoid to move the valve to the open position. The valve is normally biased to the closed position.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and further and more specific objects and advantages of the instant invention will become readily apparent to those skilled in the art from the following detailed description of a preferred embodiment thereof taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of an automatic soap dispenser according to the present invention as it would appear installed on a sink;

4

FIG. 2 is a sectional perspective view of the pump mechanism taken along line 2-2 of FIG. 1;

FIG. 3 is a side schematic view of the automatic soap dispenser according to the present invention; and

5 FIG. 4 is a sectional side view of the dispensing fixture of the present invention.

#### BEST MODES FOR CARRYING OUT THE INVENTION

10 Turning now to the drawings in which like reference characters indicate corresponding elements throughout the several views, attention is first directed to FIGS. 1 and 3 which illustrates an automatic soap dispenser generally designated 10, carried by a sink assembly 12 displayed in phantom lines. Sink assembly 12 is of conventional  
15 design, and includes a counter top 14, a bowl 16 formed in counter top 14, and a faucet 18 positioned to overhang bowl 16.

Automatic soap dispenser 10 includes a pump assembly 20 coupled to a reservoir 22 by a conduit 24, and an  
20 outlet fixture 26 by a conduit 28. An actuating assembly controls the operation of pump assembly 20 by regulating a flow of pressurized water. Upon release of pressurized water to pump assembly 20 a quantity of soap is dispensed. The actuating assembly includes a sensor 30 mounted on or  
25 proximate fixture 26, a conduit 32 from a pressurized water source, and a valve 34 opened and closed by a solenoid 36 upon triggering of sensor 30. Additionally, a conduit 38 is coupled between pump mechanism 20 and an  
30 conduit 38 allows the elimination of water employed to operate pump mechanism 20. In the preferred embodiment, all of the elements described are mounted below counter top 14 except fixture 26 positioned to dispense soap over

5

bowl 16, and sensor 30 positioned on or proximate fixture 26.

Referring now to FIG. 2, pump assembly 20 includes a housing 40 having a water inlet 42, a soap inlet 44, a soap outlet 46 and a water outlet 48. A bore 50 extends between soap inlet 44 and soap outlet 46, intersecting a bore 52 extending from water inlet 42 and terminating at closed end 54. Check valves 56 and 58 are formed at soap inlet 44 and soap outlet 46, respectively, to prevent back flow of soap. It will be understood that check valves 56 and 58 can be positioned anywhere along conduits 24 and 28, respectively, to prevent backflow of material. A piston 60 is reciprocally movable within bore 52 between a forward stroke and a rearward stroke. A volume of a chamber 62, defined by bore 50 between check valves 56 and 58, and bore 52 at the intersection thereof, is reduced and increased by the movement of piston 60 between the forward stroke and the rearward stroke, respectively. As the volume is reduced, soap is expelled through check valve 58 into conduit 28. During the rearward stroke the volume is increase to a normal volume, creating a vacuum which draws soap past check valve 56 into chamber 62 from conduit 24. The quantity of soap dispensed is dependent upon the size of chamber 62 and the length of the stroke of piston.

The forward stroke of piston 60 is produced by the release of pressurized water from conduit 32 by valve 34. Valve 34 is biased closed and is opened for a brief period by solenoid 36 and automatically closed. The surge of pressurized water drives piston 60 in the forward stroke. The water is then bled away through water outlet 48 and conduit 38. The bled off water can be disposed of in many different manners. Conduit 38 can direct the water

6

directly to a drain pipe, mix the water with the dispensed soap, etc. In this embodiment, as can be seen in FIG. 4, the water is directed to an outlet 70 of fixture 26, which disposes of the water onto the side of bowl 16. This aids  
5 in washing any soap residue from bowl 16 after soap has been dispensed.

Still referring to FIG. 4, fixture 26 includes a dispense outlet 72 coupled to conduit 28 by a channel 74. In the preferred embodiment, channel 74 is inclined from  
10 conduit 28 to outlet 72. The incline prevents liquid soap from dripping into bowl 16. Once the soap is dispensed any residual soap is prevented from exiting outlet 72 by the incline of channel 74.

Referring back to FIG. 2, the force of the water acting upon piston 60 can be adjusted by positioning  
15 bushings 76 and 78 within water inlet 42 and/or water outlet 48. The amount of constriction produced by bushings 76 and 78 will increase the force of the water from conduit 32 and reduce the speed with which the water  
20 is bled away. By adjusting these factors, less water may be needed.

The rearward stroke is achieved by a biasing element 80 which forces piston 60 into the rearward stroke. The rearward movement of piston 60 displaces the water which  
25 moved piston 60 in the forward stroke, through water outlet 48. In this embodiment, biasing element 80 is a compression spring carried within bore 52 between end 54 and piston 60. Piston 60 includes an adjustable stop 82 for varying a distance between the first position and the  
30 second position whereby the reduction of the volume of the chamber is adjustable. Stop 82 is preferably threadably engaged to the end of piston 60. By adjusting stop 82 outward, the stroke of piston 60 is reduced thereby



reducing the amount of soap dispensed. Conversely, by adjusting stop 82 inward, the stroke of piston 60 is increased thereby increasing the amount of soap dispensed.

5 By employing a pressurized water source to power the dispensing of soap, large amounts of hazardous electrical power are not required. A small amount of power needs to be supplied to sensor 30 and solenoid 36, but battery power is sufficient for this requirement.

10 Various changes and modifications to the embodiments herein chosen for purposes of illustration will readily occur to those skilled in the art. For example, while the preferred embodiment of the present invention is driven by pressurized water to dispense liquid soap, one skilled in the art will understand that substantially any fluid can  
15 be dispensed and the device can be driven by other pressurized sources. To the extent that such modifications and variations do not depart from the spirit of the invention, they are intended to be included within the scope thereof which is assessed only by a fair  
20 interpretation of the following claims.

Having fully described the invention in such clear and concise terms as to enable those skilled in the art to understand and practice the same, the invention claimed is:

8  
CLAIMS

1. An automatic fluid dispenser comprising:  
a pump mechanism actuated by a piston movable between a first position, and a second position in which a fluid is dispensed;  
a conduit coupled to the pump mechanism and couplable to a pressurized fluid source; and  
a valve carried by the conduit and movable between an open position in which a pressurized fluid from the pressurized fluid source moves the piston to the second position, and a closed position stopping the pressurized fluid.
2. An automatic fluid dispenser as claimed in claim 1 further including a fluid bleed coupled to the conduit between the pump mechanism and the valve.
3. An automatic fluid dispenser as claimed in claim 2 wherein the pump mechanism further includes a biasing element biasing the piston into the first position.
4. An automatic fluid dispenser as claimed in claim 3 wherein the pump mechanism includes a housing defining a pump chamber having an inlet and an outlet, a first check valve mounted in the inlet of the pump chamber for allowing fluid flow only into the pump chamber, and a second check valve mounted in the outlet for allowing fluid flow only out of the pump chamber.
5. An automatic fluid dispenser as claimed in claim 4 wherein the piston is positioned within a bore in the

housing for reciprocating motion between the first position in which the pump chamber has a volume and the second position in which the volume of the pump chamber is reduced.

6. An automatic fluid dispenser as claimed in claim 5 wherein the piston includes an adjustable stop for varying a distance between the first position and the second position whereby the reduction of the volume of the chamber is adjustable.

7. An automatic fluid dispenser as claimed in claim 5 wherein the conduit is coupled to the bore for directing the pressurized fluid onto the piston.

8. An automatic fluid dispenser as claimed in claim 4 further including a sensor for actuating a solenoid to move the valve to the open position, the valve being normally biased to the closed position.

9. An automatic fluid dispenser as claimed in claim 8 further including a reservoir of fluid to be dispensed coupled to the inlet of the pump chamber and a fixture to dispense the fluid to be dispensed, coupled to the outlet of the pump chamber, the sensor being positioned proximate the fixture.

10. An automatic fluid dispenser comprising:

a pump mechanism actuated by a piston movable between a first position, and a second position in which a fluid is dispensed, the pump mechanism including a biasing element biasing the piston into the first position;

a conduit coupled to the pump mechanism and couplable

10

to a pressurized fluid source, the conduit directing the pressurized fluid onto the piston; and

a fluid bleed coupled to the conduit between the pump mechanism and the valve;

a valve carried by the conduit and movable between an open position in which a pressurized fluid from the pressurized fluid source moves the piston to the second position, and a closed position stopping the pressurized fluid; and

a sensor for actuating a solenoid to move the valve to the open position, the valve being normally biased to the closed position.

11. An automatic fluid dispenser as claimed in claim 10 wherein the pump mechanism includes a housing defining a pump chamber having an inlet and an outlet, a first check valve mounted in the inlet of the pump chamber for allowing fluid flow only into the pump chamber, and a second check valve mounted in the outlet for allowing fluid flow only out of the pump chamber.

12. An automatic fluid dispenser as claimed in claim 11 wherein the piston is positioned within a bore in the housing for reciprocating motion between the first position in which the pump chamber has a volume and a second position in which the volume of the pump chamber is reduced.

13. An automatic fluid dispenser as claimed in claim 12 wherein the piston includes an adjustable stop for varying a distance between the first position and the second position whereby the reduction of the volume of the chamber is adjustable.

14. An automatic fluid dispenser as claimed in claim 12 wherein the conduit is coupled to the bore for directing the pressurized fluid onto the piston.

15. An automatic fluid dispenser as claimed in claim 14 further including a reservoir of fluid to be dispensed coupled to the inlet of the pump chamber and a fixture to dispense the fluid to be dispensed, coupled to the outlet of the pump chamber, the sensor being positioned proximate the fixture.

16. An automatic fluid dispenser comprising:

a liquid soap reservoir;

a soap dispensing fixture;

a pump mechanism including a housing defining a pump chamber having an inlet coupled to the liquid soap reservoir and an outlet coupled to the soap dispensing fixture, a first check valve mounted in the inlet of the pump chamber for allowing liquid soap flow only into the pump chamber from the reservoir, and a second check valve mounted in the outlet for allowing liquid soap flow only out of the pump chamber to the soap dispensing fixture, a piston positioned within a bore in the housing for reciprocating motion between a first position in which the pump chamber has a volume and a second position in which the volume of the pump chamber is reduced, the pump mechanism including a biasing element biasing the piston into the first position;

a conduit coupled to the bore and coupled to a pressurized water source, the conduit directing pressurized water from the pressurized water source onto the piston;

12

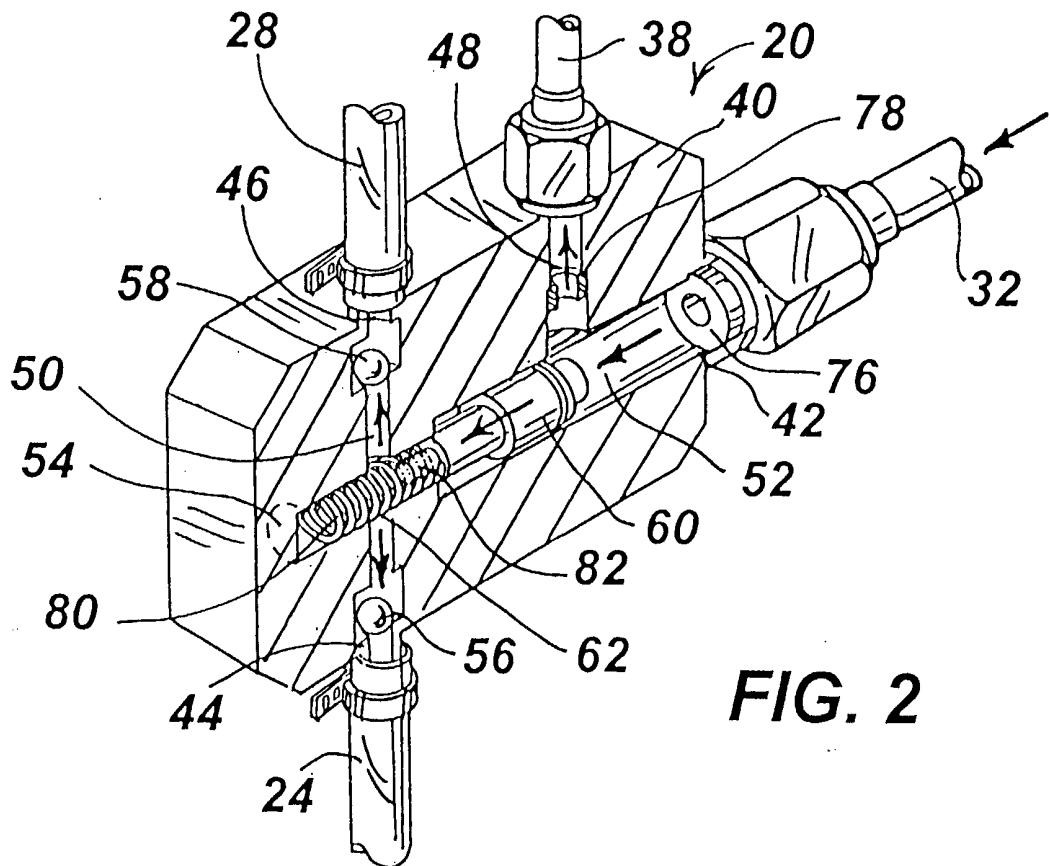
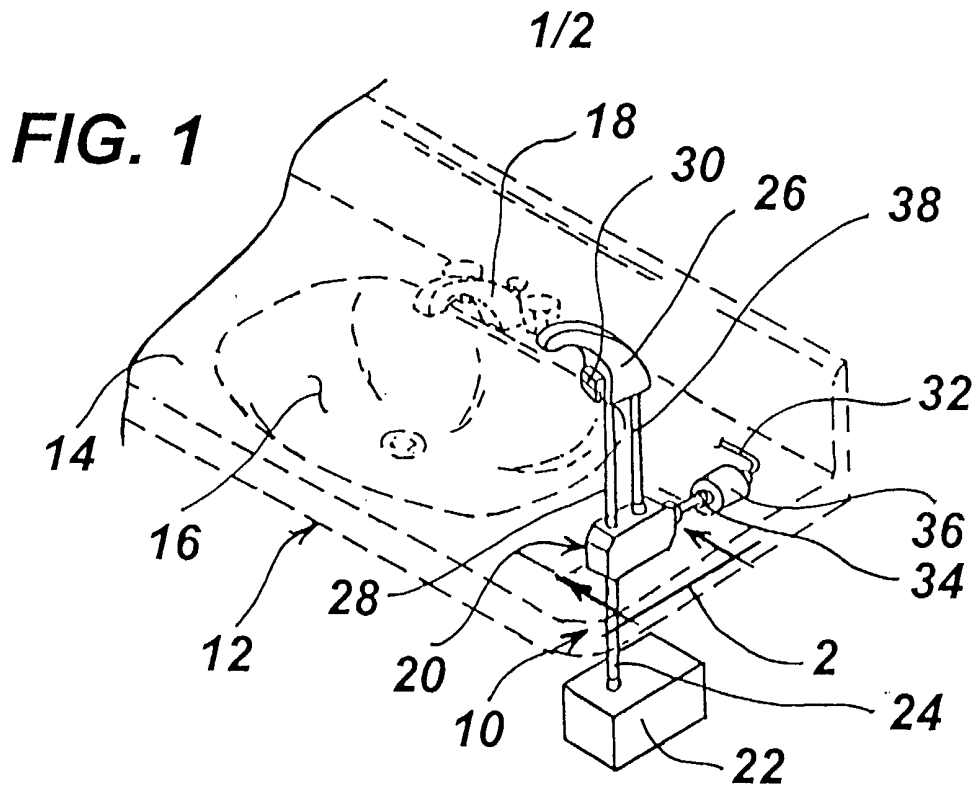
a valve carried by the conduit and movable between an open position in which pressurized water from the pressurized water source moves the piston to the second position, and a closed position stopping the pressurized water;

a water bleed coupled to the bore between the piston and the valve; and

a sensor for actuating a solenoid to move the valve to the open position, the valve being normally biased to the closed position, the sensor being positioned proximate the fixture.

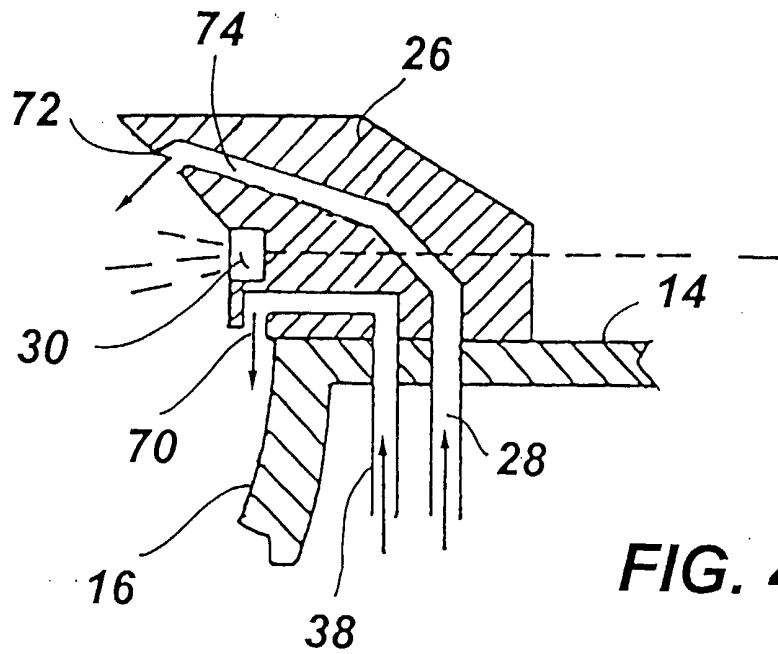
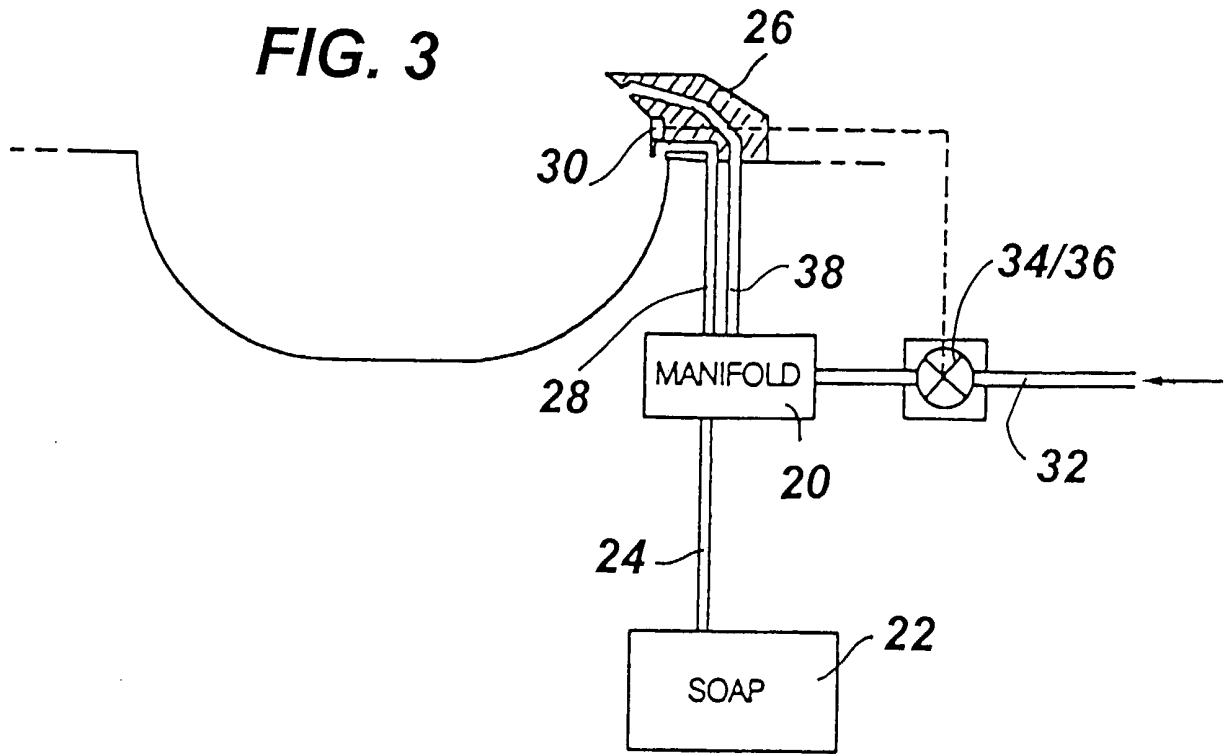
17. An automatic fluid dispenser as claimed in claim 16 wherein the biasing element includes a compression spring carried between the piston and an end of the bore.

18. An automatic fluid dispenser as claimed in claim 16 wherein the piston includes an adjustable stop for varying a distance between the first position and the second position whereby the reduction of the volume of the chamber is adjustable.



2/2

**FIG. 3**



**FIG. 4**



**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US01/05607

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(7) : B67D 5/18 US CL : 222/061		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 222/061,063,309,334,129.2		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3,940,019 A(KROSS et al.) 24 February 1976 (24.02.1976), Fig. 13, column 9, lines 26-60).	1-3
---		-----
Y		4-15
Y	US 3,830,405 A (JAEGER) 20 August 1974 (20.08.1974), Fig. 4, column 5 line 58 to column 6, line 15.	4-5, 7-9
Y	US 3,981,414 A (GUST et al.) 21 September 1976 (21.09.1976), Fig. 10, column 3, lines 47-63.	4-9, 11-15
Y	US 4,938,384 A (PILOLLA et al.) 03 July 1990 (03.07.1990), Fig. 1, column 4, lines 58-68.	10-15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search	Date of mailing of the international search report	
26 March 2001 (26.03.2001)	26 APR 2001	
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer <i>F. Hurley for</i> Kenneth Bomberg Telephone No. 703-308-0861	