MICROCOPY RESOLUTION TEST CHART
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COMMONWEALTH OF AUSTRALIA

Patents Act

APPLICATION FOR A PATENT

For We (a) THE AFA CORPORATION

14201 N. W. 60th Avenue
Miami Lakes, Florida 33014
United States of America.

hereby apply for the grant of a Patent for an invention entitled

"MANUALLY OPERATED LIQUID DISPENSERS"

Case No. 7502-U02

which is described in the accompanying (a) complete specification.

(Note: The following paragraph applies only to Convention applications)

This application is a Convention application and is based on the basic application(s)
for a patent or similar protection identified by number, country, and filing date as follows:

Serial No. 626,819 United States of America October 29, 1975

Address for Service: PHILLIPS, ORMONDE AND FITZPATRICK
Patent and Trade Mark Attorneys
37-41 Queen Street,
Melbourne, Australia

Dated (a) 1 APRIL 1976

[Signature]

Bruce Key
Secretary
THE AFA CORPORATION
INSTRUCTIONS
(a) Insert "Convention" if applicable
(b) Insert FULL name(s) of applicant(s)
(c) Insert "of addition" if applicable
(d) Insert TITLE of invention
(e) Insert FULL name(s) AND address(es) of declarant(s) (See headnote)
(f) Insert new application(s) AND address(es) of actual inventor(s)
(g) Insert country, filing date, and basic applicant(s)
(h) Insert PLACE of signing
(i) Insert DATE of signing
(j) Signatures of declarant(s)

NOTE: Paragraphs 3 and 4 apply only to Convention applications.

1. I/we, /we are the applicant(s).
   (or, in the case of an application by a body corporate)

2. I/we, /we are the actual inventor(s) of the invention.
   (or, where the applicant(s) is/are not the actual inventor(s))

3. The basic application(s) for patent or similar protection on which the application is based
   is/are identified by country, filing date, and basic applicant(s) as follows:

4. The basic application(s) referred to in paragraph 3 hereof was/were the first application(s)
   made in a Convention country in respect of the invention the subject of the application.

To: The Commissioner of Patents

PHILLIPS ORMONDE & FITZPATRICK
CLAIM 1. A manually operated liquid dispenser comprising
a. a component retaining body
b. a cavity located within the component retaining body
c. a variable volume bellows pump secured within the cavity
d. inlet and outlet conduit means disposed within the component retaining body for delivering liquid into and out of the bellows pump
e. operating means, including a trigger secured to the component retaining body for compressing of the bellows pump from an expanded condition of normal volume to a compressed condition of reduced volume, and
f. discharge means including a nozzle communicating with the outlet conduit means, for dispensing liquid pumped by the bellows pump.
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COMPLETE SPECIFICATION
(ORIGINAL)

17090/76

Class
Int. Class

Application Number:
Lodged:

Complete Specification Lodged:
Accepted:
Published:

Priority:

Related Art:

APPLICANT'S REF.: Case 7502-U02

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Complete Specification for the invention entitled:

MANUALLY OPERATED LIQUID DISPENSERS

The following statement is a full description of this invention, including the best method of performing it known to applicant(s):
BACKGROUND OF THE INVENTION

Manually operated, trigger actuated dispensing pumps for liquid containers have been proposed in the past, a particular one having wide commercial acceptance and application being disclosed in U.S. Patent 3,061,202 granted October 30, 1962, to Tracy B. Tyler. However, this type of pump is, in general, complex having many parts and is relatively costly to manufacture and/or assemble. In addition, some of the individual parts are also complex and costly to manufacture and/or assemble.

Other prior art patents have been granted which are directed toward overcoming the problem of costly manufacture inherent in the above mentioned U.S. Patent 3,661,202, a particular one being U.S. Patent 3,749,290, granted on July 31, 1973 to Lewis A. Micallef et al. This patent discloses a trigger sprayer having a deformable, tubular, internally supported member which is compressively stressed on a sidewall thereof by a trigger mechanism to reduce its volume and discharge liquid drawn thereinto from a container. The hollow tubular member incorporates an in-line, open bottom intake port and an open upper outlet port together with inlet and outlet valving, the former being in the open bottom and the latter being a concentric rim on the member engaging part of the sprayer body internal surface which cooperate to form the valve means. The Micallef et al. device utilizes a trigger means to flex a sidewall of the tubular member which causes the inlet valve to close and the outlet valve to open to discharge liquid. The amount of liquid discharged in a single actuation of the trigger is in large part determined by the
degree of sidewall flexibility consistent with the space available for displacement thereof. The Michallef device is an example of a low cost, relatively uncomplex, manually operated dispenser.

In another prior art liquid ejection device, U.S. Patent 3,575,318, granted on April 20, 1971 to O. Kunz, a toy water pistol is disclosed. In this patent a removable, liquid containing, collapsible cartridge is inserted in the body of the pistol in contact with a trigger operated plunger. When the trigger is actuated the plunger collapses the cartridge ejecting liquid contained through a restricted nozzle on the cartridge end opposite the plunger. When all of the liquid is ejected, the cartridge is removed and reloaded with liquid from a water tap and reinstalled in the pistol.

Still another prior art patent, U.S. Patent 3,022,779, granted on February 27, 1962 to E. Benkoe, discloses a multiple "shot" water gun comprising a water containing, collapsible container which is inserted into a breech chamber of the gun. Liquid in the container is ejected by a trigger assembly which acts against the container collapsing it and ejecting liquid through a nozzle. Also disclosed is a device wherein missile ammunition in the nozzle is "shot" from the gun by the pressure of the liquid in the collapsed container. In both arrangements as disclosed in this patent, the container is pre-filled, from a source of supply and thereafter inserted into the gun prior to operation. A return spring is added to return the trigger assembly to its operating position after liquid ejection and insertion of the refilled cartridge or
Other types of sprayers are well known to the art and come to mind when it is desired to spray liquid from a container. For example, the well-known finger actuated, plunger type sprayers and the like are well-known and widely used. The art is well developed with many manually operated dispensing devices proposed and manufactured.

This invention has a principal object, the construction and assembly of an extremely inexpensive, dispenser having relatively few parts, each individually simple and inexpensive to manufacture and assemble, and fabricated from readily available materials.

According to one aspect of the present invention, there is provided a manually operated liquid dispenser comprising:

a. component retaining body means

b. a cavity located within the component retaining body means

c. a variable volum bellows pump comprising a closed end and an open end secured within the cavity

d. inlet and outlet means disposed within the component retaining body means for delivering liquid into and out of the bellows pump

e. operating means, including a trigger secured to the component retaining body means for shifting the bellows pump from a normal, non-pumping position to a pumping position

f. discharge means, communicating with the outlet means, for dispensing liquid pumped by the bellows pump.
According to one aspect of the present invention, there is provided a manually operated liquid dispenser comprising:

a. component retaining body
b. a cavity located within the component retaining body
c. a variable volume bellows pump secured within the cavity
d. inlet and outlet conduit means disposed within the component retaining body for delivering liquid into and out of the bellows pump
e. operating means, including a trigger secured to the component retaining body for compressing of the bellows pump from an expanded condition of normal volume to a compressed condition of reduced volume, and
f. discharge means including a nozzle communicating with the outlet conduit means, for dispensing liquid pumped by the bellows pump.

According to a further aspect of the present invention there is provided a manually operated liquid dispenser comprising:

a. component retaining body
b. inlet conduit means within said body for admitting liquid thereinto
c. outlet conduit means including a discharge orifice located at one end of said body remote from said inlet conduit means to dispense liquid therefrom
d. check valve means disposed within said body to regulate the fluid flow from said inlet conduit means to said outlet conduit means
e. a cavity defined within the interior of said body intermediate said inlet and outlet conduit means and in communication therewith
f. a variable volume bellows pump secured within said cavity
g. a plunger engaging said bellows pump and shiftable within said cavity to compress said bellows pump, and
h. a trigger secured to said body for shifting said plunger within said cavity between a normal, non-pumping position in which said bellows pump is expanded to its normal volume and a pumping position in which said bellows pump is compressed to reduce its volume.

The following description refers in more detail to these essential features and further optional features of the invention. To facilitate an understanding of the invention, reference is made to the accompanying drawings where these features are illustrated in preferred form. It is to be understood however, that the essential and optional features of the invention are not limited to the specific forms of these features as shown in the drawings.

In the drawings:
single part possesses multiple capabilities, combining to perform the functions of a piston, a fluid chamber, a return spring and a valve.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a vertical, transverse sectional view of the dispensing device of the invention before actuation;

Figure 2 is a view similar to Figure 1 after a compressive stress has been applied to the pump container of the invention;

Figure 3 is a sectional view, on a magnified scale, of the associated valves of the invention of Figures 1 and 2; and

Figure 4 is a vertical, transverse sectional view of another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Describing now the structure of the presently illustrated preferred embodiment of the invention, and with particular reference to Figures 1 through 3, the invention comprises a dispenser 10 threadably secured to a container 11 by a closure cap 12 on the neck of container 11.

Dispenser 10 comprises a component retaining body 13, an operating member or trigger 14 having an extension 16 connected thereto by a plastic, actuating hinge 15. A cavity 19 in body 13 receives a hollow, resilient, collapsible pump container 20 of unitary, blow molded construction, a preferred form being the elastomeric compressible bellows shown. Container pump 20 has flexible walls or corrugations 21 enclosing a variable volume pump chamber 22, and is supported on extension 16 in a recessed
platform or plunger 23 thereof. Chamber 22 has a closed bottom end 22-a and an open top end 22-b in a radially extending flared end 29 of container 20.

Pump or bellows container 20, flared end portion 29, which includes open top 22-b, receives in sealing relation an inwardly tapering projection 24 of body 13, on a sealing surface or valve seat 25-a of an outlet valve 25. Flared end 29 has an integral rib or lip comprising a movable valve member 26, which operatively combines with valve seat 25-a to form outlet valve 25. In Figure 3, outlet valve 25 is shown in the open or liquid discharging position and, as indicated by the arrows, liquid is flowing therethrough, pump container 20 having been compressed and collapsed by the folding of its flexible wall corrugations 21 which causes flared end 29 to move forwardly a slight distance separating valve member 26 from seat 25-a to opening outlet valve 25.

Tapered body projection 24 has a central passage formed therein terminating in an intake port 27 in open top 22-b of chamber 22. Upstreamwardly of intake port 27, retained therein by an annular, radially extending rib or raised 27-a in intake port 27, is an inlet valve 28 comprising a ball check 28-a, and an inlet valve seat 28-b. An angled inlet conduit 17 connects chamber 22 through valve 28 to a liquid suction or dip tube 18 which is retained in a body or base insert 38, depending therefrom into container 11.

Collapsible container pump or compressible bellows 20 is retained in body 13 in a circumferential groove or recess 29-a by means of a press fitted, cylindrical retaining clip 30 in cavity 19 which engages an
integral annular collar or clamping ring 31 on pump container or bellows 20.

A discharge conduit 32 is connected to open top 22-b through outlet valve 25, receives liquid being pumped from chamber 20 and conducts the same to a discharge nozzle 33 where the liquid is ejected or dispensed, in a spray if desired.

Also provided in dispenser 10 is a venting means for container 11 to ensure pressure equalization therein, comprising a resilient washer vent or ring seal 39 of generally frusto-conical shape, removably secured in cap 12 between the top of container 11 and the flange 37 of body or base insert 38. Vent washer 39, which can be fabricated of any resilient material such as natural or synthetic rubber, polyethylene, polypropylene, or any material capable of maintaining its general form and resiliency, has a central, slightly undersized aperture with respect to the outside of a tube holder or support member 36 of insert 38 with which it is associated as a check valve permitting air to flow into container 11 from above to equalize pressure therein by replacing the liquid which is dispensed while preventing liquid leakage from below. In operation, air passes through a slot 41 in the top of cap 12 and into a passage 40 above ring seal or washer vent 39 and into container 12, since vent 39 will yield by flexing away from the surface of support member 36 to permit outside air to enter container 11 replacing liquid which has been drawn therefrom. On the other hand, liquid in container 11 is prevented from leaking since liquid pressure on the container side of washer vent 39 causes it to close tighter around support
Referring now to Figure 4 there is shown therein another embodiment of the present invention wherein a dispenser 110 comprises a component retaining body 113, a trigger 114 having an extension 116 connected thereto by a plastic hinge 115. A cavity 119 in body 113 contains a unitary pump or bellows container 120 having flexible walls or corrugations 121 enclosing a pump chamber 122. Chamber 122 has a closed bottom 122-a and an open top 122-b and is supported on a platform 123.

Pump or bellows container 120 has a flared end 129 which includes open top 122-b and terminated in an expandable, flexible flange or collar 43. Flange 43 is engaged in a recess 44 in body 113 which is formed by a tapered projection 124 therein. Tapered projection 124 extends into flared end 129, and a portion of its outer peripheral surface 125-a provides a seal for a valve 125 when engaged by a valve member 126 on end 129.

Tapered portion 124 has a central passage terminating in an intake port 127 at the entrance to chamber 122. An inlet valve 128 is retained in the central passage of projection 124 between a rib or land 127-a in the entrance to chamber 122 and comprises a ball check 128-a and a valve seat 128-b. An angled inlet conduit 117 connects chamber 122 to a depending dip tube 118 and a container of liquid (not shown), as in the previously described embodiment of Figure 1.

Bellows 120 is retained in body 113 in a recess or groove 129-a in cavity 119 by a clip or snap ring 130 which engages a peripheral radially extending clamping ring.
A discharge conduit 132 for conducting liquid from chamber 122 extends from outlet valve 125 to a discharge nozzle (not shown).

**OPERATION OF THE PREFERRED EMBODIMENT**

In operation of the present invention, dispenser 10 is attached to container 11 by screwing closure cap 12 onto the neck of container 11. An operator of the invention holds assembled dispenser 10 in the hand, fingers grasping trigger 14 and closure cap 12 in the palm and container 11 extending below the hand. Trigger 14 is actuated by a squeezing action which forces trigger extension 16 and recessed platform 23 on hinge 15 against bottom 22-a of bellows pump 20 applying a compressive stress thereupon. Bellows pump 20 then collapses by folding of flexible wall corrugations 21 as shown in Figure 2. As bellows container pump 20 collapses, chamber 22 decreases in volume and pressure is generated. Initially, only air is present in chamber 22 and its pressure increase forces intake ball check valve 28-a against seat 28-b closing valve 28. Simultaneously outlet valve 25 opens since pump container 20, in being compressed, suffers a length reduction as both ends move longitudinally toward stationary clamping ring 31, flared end 29 flexing downwardly over projection 24 until valve member 26 and valve seat 25-a can no longer remain in contact. Air in chamber 22 then passes through open valve 25 into outlet conduit 32 and is ejected through nozzle 33. Upon release of trigger 14, the inherent "memory" of elastomeric flexible wall corrugations 21 of bellows 20 causes the latter to expand and elongate to its
original, uncollapsed configuration, at the same time returning trigger 14 to its original position shown in Figure 1, pivoting on a pin connector 21-a in body 13. This return action results in a partial vacuum being developed in chamber 22 closing outlet valve 25, opening inlet valve 28, and causing liquid to be drawn into chamber 22 from container 11 through dip tube 18, conduit 17, open valve 28 and intake port 27, filling chamber 22 with a charge of liquid to be dispensed.

On the next and subsequent squeezing operations of trigger 14, the liquid in chamber 22 becomes pressurized by the compressively stressed, collapsing bellows pump 20 which forces inlet ball check 28-a against seat 28-b closing inlet valve 28, opening outlet valve 25 by the flexing displacement of bellows 20, above described, and permitting liquid to flow into discharge conduit 32 and be dispensed from nozzle 33.

During the above described pumping and dispensing operation of dispenser 10, the liquid level in container 11 is lowered as liquid is dispensed or sprayed. This causes a partial vacuum to develop in container 11 unless venting thereof is provided. In the present invention, venting is accomplished by means of flexible vent washer or ring seal 39. Atmospheric pressure acting on ring seal 39 causes it to flex downwardly away from support 36. Air passes into passage 40 around the threaded cap 12 and threaded container 11 top and into container 11 through the opening between support 36 and vent valve 39. If venting were not provided for, that is, if atmospheric pressure were not maintained in container 11, container 11 would have a tendency to collapse
and pumping efficiency would be impaired. However, by means of vent valve or washer 39 in cap 12, this eventuality is avoided. In addition, vent washer or ring seal 39 which flexes downwardly to permit air passage into container 11, also provides a tight seal against liquid leakage from container 11, since any liquid from container 11 acts on the underside of ring seal 59 and forces it against support 36, tightly sealing container 11 against leakage.

To operate dispenser 110 of Figure 4 trigger 114 is moved toward the tight and compressible bellows 120 is initially compressed closing valve 128 by forcing ball check 128-a against seat 128-b. Trapped air in chamber 122 increases in pressure and causes flange 43 to expand radially opening outlet valve 125 by causing valve member 126 to separate from seat or seal surface 125. When trigger 114 is released bellows 120 expands or elongates under its inherent memory to its original fully extended configuration. This elongation creates a suction or partial vacuum in chamber 122 which causes valve member 126 to reseat on surface 125-a closing outlet valve 125. Simultaneously, ball check 128-a is unseated, leaving seat 128-b, inlet valve 128 opens and liquid is drawn up into chamber 122 from container 11 through dip tube 118 and intake conduit 117. The next compressive stroke on bellows 120 by movement of trigger 114 closes valve 128 and expands flange 43 to open valve 125 and liquid in chamber 122 flows into exit conduit 132 to be dispensed from sprayer 110. Subsequent trigger 114 actuations result in alternate suctions and
pressure to occur in chamber 120 and liquid can be dispensed in a steady stream, as desired.

There has now been disclosed and described as improvements advancing the art of liquid dispensers, an integral, collapsible container pumping mechanism and with valving therefor, preferably in the form of a bellows pump. The dispenser, and in particular the pumping container is preferably fabricated of thermoplastic elastomeric materials and holding resins. The bellows comprises flexible walls or corrugations and can be repeatedly flexed and unflexed with little or no loss of elastic memory and which, in a single part, combines the operations of a piston, a fluid chamber, a return spring and a valve. The bellows container pump can be constructed and fabricated in the configurations described, of thermoplastic elastomeric materials by any known process, one particularly preferred one being the well-known blow molding process. It has been discovered that by so doing, such a bellows container can duplicate the tensile strength of a spring, allowing the same to collapse when compressively stressed from the closed bottom end and are thereafter, due to its inherent plastic memory, recovering its original shape when the stress is removed. Any of the well-known plastics can be used, a preferred one being polyolefin, in particular, polyethylene. Another suitable material is a member of a family of polyolefin thermoplastic rubbers available to the art and sold under the trademark Thi, registered in the United States Patent and Trademark Office. Still others include, but are not limited to, polypropylene, polyurethane, polyester elastomer, polyvinyl chloride and natural
and synthetic rubber. In some instances, it is believed the invention may be of metal or metal in combination with plastic, and such combinations of materials are contemplated for use herein. Other materials and combinations will occur to the skilled artisan in carrying out the invention.
The claims defining the invention are as follows:

1. A manually operated liquid dispenser comprising
   a. component retaining body
   b. a cavity located within the component retaining body
   c. a variable volume bellows pump secured within the cavity
   d. inlet and outlet conduit means disposed within the component retaining body for delivering liquid into and out of the bellows pump
   e. operating means, including a trigger secured to the component retaining body for compressing of the bellows pump from an expanded condition of normal volume to a compressed condition of reduced volume, and
   f. discharge means including a nozzle communicating with the outlet conduit means, for dispensing liquid pumped by the bellows pump.

2. A dispenser according to claim 1 in which the bellows pump has a sealed bottom end corrugated sidewalls and an open end.

3. A dispenser according to claim 1 in which the body engages the open end of the bellows.

4. A dispenser according to claim 1 in which a projection in the body extends a short distance into the cavity and the bellows pump engages said projection.

5. A dispenser according to claim 4 in which the bellows pump has a sealed bottom end, corrugated sidewalls and an open upper end that terminates in a flared portion and the projection in the body is tapered to accommodate the flared portion of the bellows pump.

6. A dispenser according to claim 5 in which an inwardly projecting lip is formed at the upper end of the
7. A dispenser according to claim 5 in which the flared portion of the upper end of the bellows pump normally engages the projection in the body to define a valve therebetween.

8. A dispenser according to claim 1 in which the inlet conduit means includes a check valve.

9. A dispenser according to claim 4 in which inlet conduit means, including a check valve is disposed within the projection in the body.

10. A dispenser according to claim 1 in which the operating means further includes a plunger engaging the bellows pump, the plunger being shiftable within the cavity to compress the bellows pump.

11. A dispenser according to claim 1 in which the bellows pump is secured in the cavity by an annular clamping ring located on the exterior of the bellows pump and a retaining clip inserted into said cavity engages the clamping ring and secures the bellows pump in fixed position within the cavity.

12. A manually operated liquid dispenser comprising

a. component retaining body

b. inlet conduit means within said body for admitting liquid thereinto

c. outlet conduit means including a discharge orifice located at one end of said body remote from said inlet conduit means to dispense liquid therefrom

d. check valve means disposed within said body to regulate the fluid flow from said inlet conduit means to said
outlet conduit means

e. a cavity defined within the interior of said body
   intermediate said inlet and outlet conduit means and in
   communication therewith

f. a variable volume bellows pump secured within said cavity

g. a plunger engaging said bellows pump and shiftable within
   said cavity to compress said bellows pump, and

h. a trigger secured to said body for shifting said plunger
   within said cavity between a normal, non-pumping position
   in which said bellows pump is expanded to its normal
   volume and a pumping position in which said bellows pump
   is compressed to reduce its volume.

13. A manually operated liquid dispenser as defined
    in claim 12 in which said body opens outwardly and a
    projection in said body extends a short distance into said
    cavity, and said bellows pump has a sealed bottom end,
    corrugated sidewalls and an open end, said open end being
    engaged upon said projection.

14. A manually operated liquid dispenser as defined in
    claim 13 in which the open end of the bellows pump terminates
    in a flared portion, and the projection in said body is
    tapered to accommodate the flared portion of the bellows
    pump.

15. A manually operated liquid dispenser as defined
    in claim 13 in which an inwardly projecting lip is formed
    at the open end of said bellows pump, said lip normally
    engaging the projection in said body to define a valve
    therebetween.

16. A manually operated liquid dispenser as defined
    in claim 13 in which a clamping ring is located on the exterior
of the bellows pump, said ring being engaged by a retaining 
clip inserted into said cavity for securing said bellows 
pump in fixed position within said cavity.

17. A manually operated liquid dispenser substantially 
as hereinbefore described with reference to the accompanying 
drawings.


PHILLIPS ORMONDE & FITZPATRICK
ATTOREYS FOR:

THE AFA CORPORATION.