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DISPENSING PUMP

Filed Aug. 15, 1961

FIG. 1.

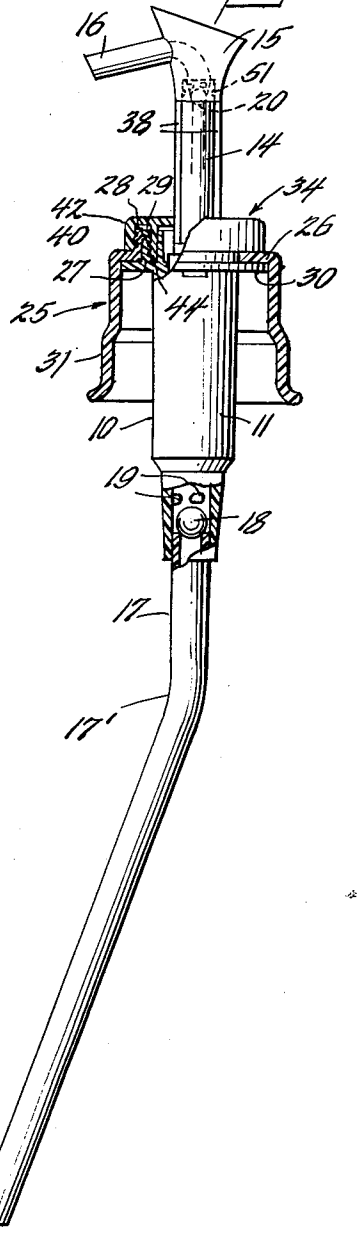


FIG. 2.

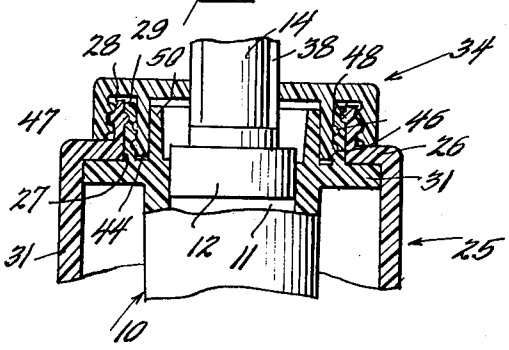


FIG. 3.

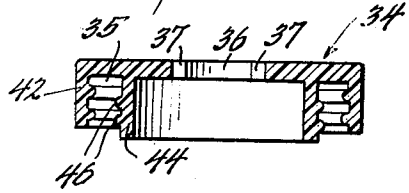
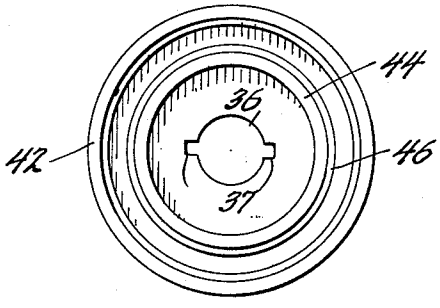


FIG. 4.



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DISPENSING PUMP

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This invention relates to improvements in a dispensing device, more particularly a dispensing pump of the class in which the pump of the reciprocating finger pressed type is supported for operation in the liquid container, by means of the container cap or closure.

It is a primary object of the present invention to provide a novel assembly of the various pump parts with each other and with the cap such as will facilitate and expedite the efficient assembly of these parts as well as to permit their easy disassembling, cleaning and subsequent reassembly, without the need for any tools or specialized knowledge.

It is a further important object to provide such an assembly which is particularly adapted for use with a resiliently stretchable and flexible cap adapted for interchangeable use with containers of various sizes and types in which the apertured upper end through which the pump barrel is disposed and supported is restrained from such stretching as would tend to enlarge its aperture and disengage it from sealing operative engagement with the pump structure.

It is a further more specific object to provide a novel assemblage and interconnection between the parts, in which the resiliently stretchable cap is provided with an axially upstanding annular rim around its aperture or opening, which rim is concentrically disposed around the annular coaxial extension of the pump barrel above its flange, and in which both said rim and extension are snugly fitted into and received in an annular downwardly opening groove of a collar which thus serves to maintain these parts in their assembled relation and in addition functions as a guide bearing in snug wiping engagement with the plunger stem.

It is a still further object to provide in conjunction with the assembly of parts above mentioned a dispensing head which is removably fitted onto the upper end of the plunger stem after the collar above mentioned has been operatively positioned therearound, all to the end that the various removably assembled parts may be readily disassembled for cleaning and reassembled by an unskilled person.

In order to facilitate the foregoing assembling and disassembling operations, it is further desirable to provide suitable means for retaining the usual ball check valves of the pump against displacement or loss and it is further desirable to provide suitable snap fastening means between the collar and both the pump barrel extension and the axially upstanding rim around the opening of the container cap.

The foregoing as well as other incidental objects and advantages which will appear hereinafter are obtainable by the preferred exemplification of the invention illustrated in the accompanying drawing in which:

FIGURE 1 is a side elevation partly in section of a reciprocating fluid pump structure and container cap assembled and interconnected in accordance with the invention in readiness for application, to, and use to dispense the contents of, a liquid container or bottle.

FIGURE 2 is an enlarged fragmentary axial section through the interconnected portions of the pump barrel.

FIGURE 3 is an axial section in the same plane as FIGURE 2 through the collar per se.

FIGURE 4 is a bottom plan view of the collar.

Referring now in detail to the accompanying drawing, the numeral 10 therein designates in its entirety the cylindrical pump barrel which defines the pump chamber 11 in which is reciprocably disposed a plunger comprising the piston 12 having a hollow tubular piston rod 14 projecting upwardly therefrom and through the open upper end of the barrel for snug but removable reception of its free upper end in the downwardly opening socket of a combined discharge head and actuator button 15 having a discharge spout 16 which communicates through the head 15, plunger rod 14 and piston 12 with the pump chamber 11. At its lower end the pump chamber 11 communicates with a suction tube 17 which, if desired, may be bent at 17' so that its lower end will project radially in offset relation from the axis of the pump for reception in the corner of the container with which the pump is employed.

In accordance with usual practice, both the pump barrel 10 and the plunger 12, 14 have their intercommunicating fluid passages controlled by check valves 18 and 20 respectively as shown in FIGURE 1 to prevent backflow of the fluid from the pump barrel into the container. In order that these ball valves 18 and 20 will not be inadvertently misplaced and lost during disassembly of the pump structure for cleaning, there may be provided suitable resiliently yieldable retainers such as the lugs 19 projecting radially inwardly from the barrel walls into the pump chamber 11 over the valve 18 so that the valve may be forced downwardly past these lugs in initially assembling the device but normally will be limited by them to an operative degree of retraction movement of the ball from its seat, or in other words the ball will be effectively confined between its seat and these lugs.

The upper ball valve or check valve 20 similarly has associated therewith a plurality of radially inwardly projecting lugs 21 confining it against escape and loss.

The bottle cap or closure 25, by means of which the pump is operatively positioned and supported on the bottle neck or container spout, has a circular or annular end wall 26 defining a circular and coaxial opening 27 around which is formed an axially upstanding annular rim 28. Depending from the end wall 26 is a skirt 30 which may be of usual configuration for snug reception of and retention on the bottle neck or container spout. With the construction herein employed, it has been found possible and practical to form the cap 25 of a resiliently stretchable and flexible material such as rubber, polyethylene or other plastics having these characteristics and in such event the cap, despite its flexible and stretchable characteristics, will be retained effectively against separation from the associated structure which is received and supported through its opening 27.

It will be seen that in the assembled relation of the cap with the pump barrel, the end wall 26 of the cap receives through its opening 27 an upward extension 29 of the pump barrel defining the open upper end of the latter, and the end wall itself rests upon and in axial abutment with the radially projecting annular flange 30 around the pump barrel in spaced relation from its open end. As thus arranged, the coaxial barrel extension 29 projects above the flange 30 and is received coaxially within the rim 28 of the cap with its radially outer wall in snug engagement with the encircling inner wall of the rim 28.

Both the rim 28 and the extension 29 are securely though removably retained in their assembled relation with respect to each other as well as against axial displacement of the cap from the flange 30 by means of the annular collar 34, illustrated in detail in FIGURES 3 and 4, which overlies and abuts axially against the cap to confine same between it and the flange 30 and is

connected to the barrel 10 against axial displacement by means of snug reception in its annular downwardly opening axial groove 35 of both the barrel extension 29 and the encircling marginal rim 28 of the cap. This same interconnection between the collar and the elements 28 and 29 also serves to effectually interconnect the cap and pump barrel in their operative relationships.

In addition to thus interconnecting the barrel and cap of the pump, the collar 34 is provided with a central opening 36 which slidably receives the plunger rod or stem 14 and is in guiding and wiping engagement therewith to assist both in maintaining the axial alignment of the plunger in the barrel 10 and also to prevent the loss of any appreciable amount of fluid between the collar and the plunger rod 14. At the same time, the portion of the collar immediately surrounding the opening 36 and overlying the plunger piston 12 may coact with said piston to limit the upward travel of the plunger structure. Moreover, if desired, the collar may be provided with one or more keyways 37 opening radially into its central aperture 36 for sliding reception of keys 38 on the plunger rod, whereby to maintain the radial plunger spout 16 in a predetermined position of orientation with respect to the pump barrel and more particularly to maintain it in the same radial plane of the pump as the offset lower end of the tube 17. By means of this particular orientation, tilting of the liquid container or bottle to discharge its contents through the spout 16 will also serve to move the contents by gravity into the lowermost corner of the bottle or container in which the end of the suction tube 17 will be disposed.

The snug interfit or holding relationship between the collar and the elements 28 and 29 may be merely a frictional one or one such as is caused by press fitting the collar onto these elements, though preferably a more positive holding action is obtained by means of a more or less conventional snap fastening means formed in the outer wall of the groove 35 for coaction with the radially outwardly presented face of the cap rim 28. Such means is exemplified in the present embodiment by the annular radially outwardly projecting rib 40 formed on the rim 28 for reception in the conformingly disposed annular groove 40 formed in the depending radially annular wall 42 of the coller which defines one side of the groove 35. The resilient snap fastening means between the barrel extension 29 and the radially inner depending annular wall 44 of the collar is defined in the present embodiment by a pair of relatively axially spaced parallel annular ribs 46 on the inner wall 44 arranged for reception between them of a rib or annular portion 47 of the barrel extension 29.

Also if desired the barrel extension 29 and the surrounding container cap rim 28 may be releasably interconnected against axial displacement by means of the annular rib and groove type snap connection 48, best shown in FIGURE 2.

Although the various parts and interconnections above mentioned will generally serve amply for the purpose of releasably interconnecting the various parts in their properly assembled relations, it may be desirable in some cases to provide an additional or auxiliary annular axial barrel extension 50 which is disposed concentrically within and engages the inner depending wall 44 of the collar to reinforce same against radial inward deflection.

In the assembly of the pump structure and cap in accordance with the invention, it will be readily apparent that both the cap and the assembled plunger structure, except for the discharge head 15, may be applied to the barrel in any desired order, the plunger being applied merely by inserting its piston 12 downwardly through the open upper end of the barrel after first inserting in the barrel such auxiliary parts as the usual plunger compression spring (not shown) as well as the plunger ball valve 18.

With the parts as thus far assembled, the collar 34 is applied downwardly concentrically about the plunger rod 14, which will be disposed through its opening 36 with the plunger keys 38 disposed in the keyways 37 of the collar. The collar 34 will then be moved axially downwardly onto the rim and plunger barrel extension 28 and 29 respectively. Following this the ball valve 20, if not already in place, may be inserted into the upper end of the plunger rod 14 and onto its seat past the resiliently yieldable retainer lugs 21. The downwardly opening socket within the dispensing or discharge head 51 for snug reception of the plunger rod (14) may, if desired, be formed with a snap connection or connecting means such as heretofore described and as exemplified by the annular radially inwardly projecting rib 51 in the discharge head socket for reception in a conformingly shaped and disposed annular groove around the upper end of the plunger rod 14.

Though the cap 25 as well as its upstanding annular rib 23 are both of flexible and stretchable material, the barrel extension 29 will normally be comparatively more rigid and thus will serve as a rigid support or backing tending to resist radial inward deflection of the rib 28. The depending inner wall 44 of the collar may serve a similar added reinforcing function in conjunction with the extension 29. Of somewhat more importance, however, is the fact that these members 29 and 44 jointly provide a substantially rigid backing against which the flexible rim 28 is gripped and held by the depending outer wall 42 of the collar 34. At the same time the collar itself is of a comparatively more rigid construction than the rim 28 and thereby serves to confine the rim and the underlying portions of the cap ends 26 from radial expansion such as might otherwise serve to disconnect the cap from the collar incident to the application of the cap to a bottle neck of comparatively large external diameter.

In this application the foregoing description and the accompanying drawing are merely by way of exemplification and are not intended to limit the scope of the invention in any manner other than is specifically required by the appended claims.

The invention having been thus described, what is claimed as new is:

1. A dispensing pump for a container comprising: a container cap having an end wall formed with a circular opening therethrough and having an axially upstanding annular rim around said opening; a hollow pump barrel defining a pump chamber open at its upper end and having a radial flange therearound adjacent said end; an annular coaxial extension of said barrel projecting above said flange and being received coaxially within said rim; a plunger comprising a piston reciprocable in said pump chamber and a plunger stem projecting coaxially from the chamber through said open end; an annular collar around and in wiping engagement with said stem, said collar overlying and abutting axially against said cap to confine same between it and said flange, and being formed to define a downwardly opening annular groove for snug reception of both said extension and said rim, said groove being defined by a radially inner annular wall releasably engaging said extension, and by a radially outer annular wall releasably engaging said rim, said inner annular wall and said extension including interengaging resilient snap fastening means, and said outer annular wall and said annular rib also including interengaging resilient annular snap fastening means.

2. A dispensing pump as defined in claim 1 in which interengaging resilient snap fastening means are disposed on the radially opposite faces of said rim and said extension respectively.

3. A dispensing pump for a container comprising: a container cap having an end wall formed with a circular opening therethrough; a hollow pump barrel defining a pump chamber open at its upper end and having a radial flange therearound adjacent said end; an annular coaxial

extension of said barrel projecting above said flange and through said opening; a plunger comprising a piston reciprocable in said pump chamber and a plunger stem projecting coaxially from the chamber through said open end; and an annular collar around and in wiping engagement with said stem, said cap being axially confined between said collar and flange, said collar having an annular depending wall snugly concentrically disposed within said barrel extension, and snap interlocking means on the relatively adjacent faces of said wall and said extension; in combination with an annular element encircling and radially confining the said extension to increase the holding power of said interlocking means by resisting outward deflection of said extension.

4. A dispensing pump for a container comprising: a container cap having an end wall formed with a circular opening therethrough and having an axially upstanding annular rim around said opening; a hollow pump barrel defining a pump chamber open at its upper end and having a radial flange therearound adjacent said end; an annular coaxial extension of said barrel projecting above said flange and being received coaxially within said rim; a plunger comprising a piston reciprocable in said pump chamber and a plunger stem projecting coaxially from the chamber through said open end; an annular collar around and in wiping engagement with said stem, said collar overlying and abutting axially against said cap to confine same between it and said flange, and being formed to define a downwardly opening annular groove for snug reception of both said extension and said rim; said cap and said rim being formed of a flexible and stretchable

material, and both said collar and said extension being of a comparatively more rigid construction than the rim, and concentrically disposed on opposite radial sides of and in engagement with the rim to resist radial distortion thereof; said groove in the collar being defined by radially inner and outer axially depending walls of the collar in concentric radially spaced relation; and further including an auxiliary annular axial extension of said barrel disposed concentrically within and engaging said inner depending wall to reinforce same against radial inward deflection.

5. A dispensing pump for a container comprising: a container cap having an end wall formed with a circular opening therethrough; a hollow pump barrel defining a pump chamber open at its upper end and having a radial flange therearound adjacent said end; an annular coaxial extension of said barrel projecting above said flange and through said opening; a plunger comprising a piston reciprocable in said pump chamber and a plunger stem projecting coaxially from the chamber through said open end; and an annular collar around and in wiping engagement with said stem, said cap being axially confined between said collar and flange, said collar having an annular depending wall snugly concentrically disposed within said barrel extension; and snap interlocking means on the relatively adjacent faces of said wall and said extension.

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