Sept. 28, 1954 D F. BACHELLER 2,690,278

DISPENSING PUMP FOR SMALL CONTAINERS

Filed May 24, 1952

Fig. 1.

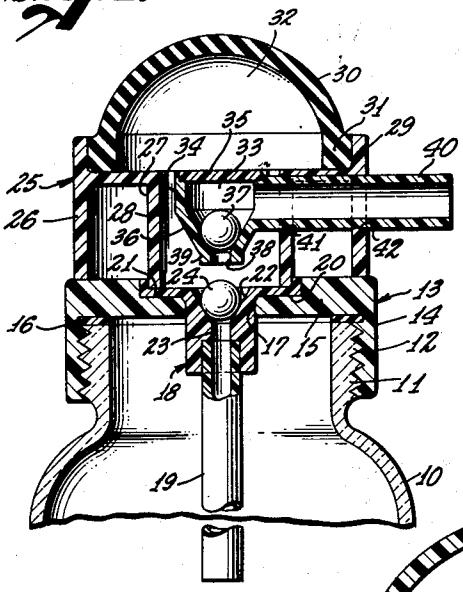


Fig. 2.

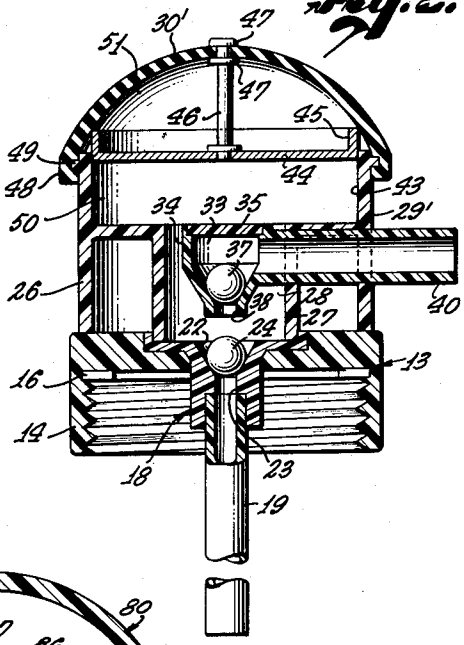


Fig. 4.

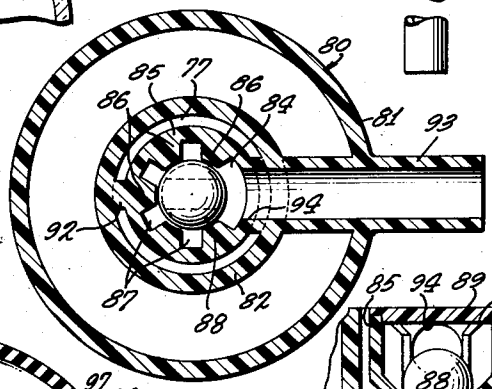


Fig. 3.

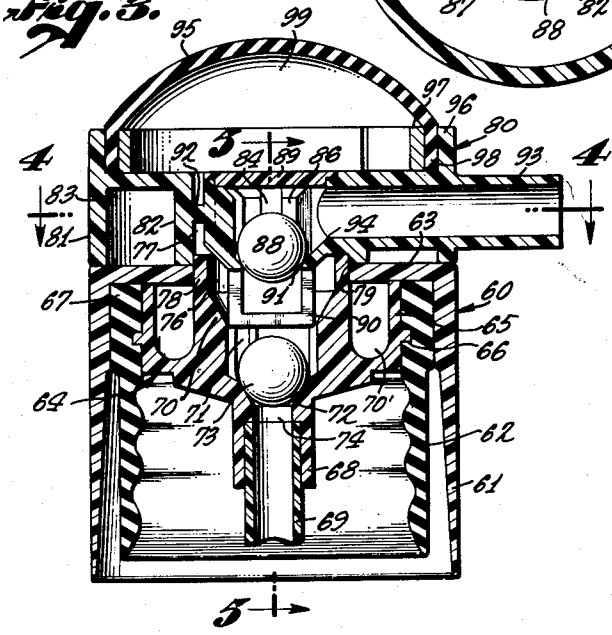
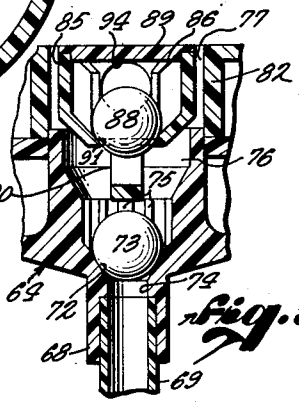


Fig. 5.



"D" FLAVIUS BACHELLER,
INVENTOR.

HUEBNER, BEEHLER,
WORREL & HERZIG,
ATTORNEYS.

BY Vernon D Beehler

Patented Sept. 28, 1954 2,690,278

UNITED STATES PATENT OFFICE

2,690,278

DISPENSING PUMP FOR SMALL CONTAINERS

D Flavius Bacheller, Glendale, Calif.

Application May 24, 1952, Serial No. 289,825

5 Claims. (Cl. 222—207)

1

The invention relates to small, compact manually operated pumps which are readily adapted to be used on bottles and small metal containers replacing the usual cover or top, the pump being one serving simultaneously as a closure and a dispensing pump to eject periodically small quantities of the contents of the container. More particularly the invention is one adapted to be operated by the thumb or perhaps the forefinger while the container as a whole is grasped in the same hand.

A variety of dispensing pumps have heretofore been employed for a similar or related purpose but these pumps for the most part have depended upon one variation or another of the conventional piston pump construction with their attendant complexities and defects. Other pumps of a comparable nature have been employed in some cases to provide a spray ejection or ejection under considerable force for some special purpose such as an atomizer. Devices of the general sort here in question which have been employed in the past have been to a large extent rather bulky requiring an unnecessarily large quantity of material in their construction and a relatively large number of working parts and attendant large number of assembly operations in their fabrication.

Among the objects of the present invention is to provide a new and improved closure and dispensing pump which is relatively inexpensive to manufacture, which is economical of material, and which at the same time is a versatile type of pump, the construction of which is suited to the dispensing of liquids of widely varying viscosity.

Another object of the invention is to provide a new and improved dispensing pump which can be readily fabricated of moldable material such as one or another of the commercially available plastics which contemplates fabrication of relatively few pieces to comprise the entire assembly with a corresponding relatively few assembly operations.

Still another object of the invention is to provide a new and improved compact manually or finger operated dispensing pump wherein the conventional piston is dispensed with in favor of a resilient movable wall of the pump chamber which is exposed to manual operation.

Still another object of the invention is to provide a new and improved manually operated

2

terior dimension of the neck of the bottle or other container to which it may be attached.

Another object of the invention is to provide a dispensing pump sufficiently compact to permit mounting all the operating parts on the neck or top of the container without the necessity of inserting such parts down into the container nor of extending them beyond the nominal exterior of the open end of the container.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

The present application is a continuation-in-part of my co-pending application Serial No. 778,059, filed October 6, 1947, now abandoned.

In the drawings:

Figure 1 is a longitudinal sectional view of one form of the invention showing the manually operated dispenser pump mounted upon the threaded upper end of a conventional container.

Figure 2 is a longitudinal sectional view of a manually operated dispensing pump modified to a slight extent with respect to Figure 1.

Figure 3 is a longitudinal sectional view of still another form of the dispensing pump showing a form of attachment useful in applying the device to containers which do not have a threaded exterior at the opening.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary longitudinal sectional view taken on the line 5—5 of Figure 3.

In the form of the device illustrated in Figure 1 a container 10 is shown having a neck 11 provided with a threaded exterior 12. The pump mechanism is shown mounted upon a container closure member 13 which is provided with a sleeve-like portion 14 threaded to engage the threads 12 on the neck of the container. A top 15 of the closure member forms essentially the closure for the container and may have provided therein a sealing washer 16 to effectively seal the closure member upon the container.

At the center of the top is an opening 17 in which is mounted an insert 18 having a pipe 19 extending downwardly therefrom to the interior of the container. The insert 18 has a disc-like portion 20 overlying the top within a recess 21.

ball check 24 is received in the depression 22 seating in this instance on the wall of the depression.

A body 25 of the pump is herein shown as comprising a double wall having an outer portion 26 and an inner portion 27, the inner portion 27 of which forms essentially the outer wall of a pump chamber 28. In this instance the lower edges of the double wall are shown fastened to the closure member 13, the outer portion being mounted directly on the top face of the closure member and the inner portion being received within a rim around the disc-like element 20 of the insert.

Around the upper or outer edge of the double wall and particularly the outer portion thereof is an upstanding rim 29 within which is positioned a resilient dome 30 preferably constructed of rubber or one of the acceptable synthetic materials such as neoprene or perhaps a suitable resilient plastic material. At the lower edge of the dome is a thickened portion 31 which expands resiliently outwardly into engagement with the interior side of the rim 29 forming an air-tight seal. An interior space 32 within the dome forms a portion of the pump chamber 28, the dome itself comprising a resilient wall of the pump chamber.

Centrally disposed within the pump chamber 28 is a discharge chamber 33 formed by an inner annular wall 34 having a cap 35 closing the top of the discharge chamber. At the lower end of the inner wall is a frusto-conical wall 36, the interior of which forms a seat for a ball check 37. At the bottom of the frusto-conical wall is an inlet port 38 which provides an inlet into the discharge chamber 33. A short cylindrical portion 39 surrounding the inlet port extends downwardly in axial alignment with the suction port 23 and forms in effect a stop or limit with respect to the ball check 24 so that the ball check 24 may be retained in proper position for seating upon its seat.

To discharge the contents of the discharge chamber 33 there is provided a spout 40 communicating with the discharge chamber through the inner annular wall 34, the spout extending through a suitable opening 41 in the inner portion 24 and a similar opening 42 in the outer portion 26. Thus mounted the spout also provides a means for supporting the inner annular wall 34 in proper position within the pump chamber.

In operation the pump is mounted as shown upon a container such as the container 10 with the pipe 19 extending to a position only slightly elevated above the bottom of the container (not shown). To eject the contents of the container the pump is manipulated by depressing the dome 30 down and up in alternate strokes. On the downward stroke the volume within the pump chamber is reduced and initial air therein ejected through the inlet port 38 to the discharge chamber and thence out through the spout 40. When the dome is released, the inherent resiliency of the dome raises it to its initial position as shown in Figure 1. The ball check 37 seats closing off air which might otherwise be drawn back through the spout and thereupon the contents of the container 10 are drawn up through the pipe 19 past the ball check 24 which is unseated by this flow, the contents being emptied into the pump chamber 28. Two or three initial operations of the dome may be necessary in order to fill the pump chamber to a suitable degree.

contents of the pump chamber through the inlet port 28 into the discharge chamber 33 unseating the ball check 37 during this passage. Meanwhile the ball check 24 as a result of the force of gravity on the ball check 24 coupled with pressure exerted in the pump chamber will seat upon its seat preventing flow of the contents downwardly through the pipe 19. The force exerted in the pump chamber will seat upon its seat preventing flow of the contents downwardly through the pipe 19. The force exerted upon the dome 30 by the finger will drive a substantial portion of the contents of the discharge chamber 33 outwardly through the spout 40.

In the modified form of the device illustrated in Figure 2 the overall construction and mode of operation is substantially similar to that of Figure 1 except that in this form of the device the arrangement is such that the liquid contents of the container are prevented from coming into direct contact with the material of the resilient dome. This is found desirable under certain circumstances where the character of the liquid in the container might be such that it would be detrimental to have it come into contact with a resilient type of material of which the dome must be constructed.

Essentially the form of the invention in Figure 2, in addition to those parts already described in connection with Figure 1, features an upstanding rim 29′ relatively higher than the rim 29 sufficient to form at its interior a wall 43 of a piston chamber. Reciprocally mounted within the wall is a piston 44 having a piston wall 45 in smooth sliding engagement with the wall 43. The piston has a piston rod 46 anchored and sealed at its mid-portion, the piston rod 46 extending upwardly into engagement with a central portion of a dome 30′ where it is held or anchored by means of suitable washers 47, the washers being effective in sealing the piston rod 46 in the dome 30′. In this instance an edge portion 48 of the dome 30′ extends over the exterior of the rim 29′ where it is anchored by means of a flange 49 useful in securing as well as sealing the dome in proper position.

In the operation of this form of the device the flow of the liquid contents of the container follows the same path as heretofore described in connection with Figure 1. In this instance, however, the liquid contents do not pass beyond a chamber 50 formed by the wall 43, being prevented from coming into contact with the interior of the dome 30′ by the piston 44. A space 51 between the dome 30′ and the piston 44 remains filled with air and also retains its initial shape. Depression of the dome 30′ will push the piston 44 into the chamber 50, thereby forcing a discharge of the contents of the pump chamber through the discharge chamber 33 on the downstroke. When the finger is released from the downstroke, the inherent resilience in the dome 30′ will raise the dome and also raise the piston 44 through its connection thereto by means of the piston rod 46. Pumping action may thereafter be continued as will be obvious by pumping the dome 30′ up and down.

The form of the device illustrated in Figure 3 exemplifies a dispensing pump which is particularly well adapted to application to the neck of a bottle which is not provided with threads or other special means by virtue of which the pump might be attached. In this form of the device a

around the exterior of the neck of a bottle or similar container and which is prevented from excessive expansion by the skirt 61 adapted to confine the inner skirt between itself and the exterior of the bottle neck. The closure member has a top 63 adapted to extend horizontally across the top of the closure member and provide a means of mounting parts of the pump mechanism.

Mounted centrally within the closure member is a part or element which may for convenience be described as an insert element 64. This element is constructed with an outside wall 65 on the exterior of which is a flange 66 adapted to extend into a thickened portion 67 of the resilient sleeve 62 in order to confine the upper thickened portion of the sleeve between itself and the adjacent part of the closure member, there to anchor it in place.

The insert has a depending neck 68 in which is positioned a tube 69 which is adapted to extend down into the interior of the bottle or container upon which the pump may be mounted.

On the upper side of the insert element 64 is a boss 70 surrounded by a space 70', the space being provided primarily to lighten the weight of the insert member. Centrally disposed in the boss is a depression 71. At its lower end the depression terminates in a frusto-conical valve seat 72 in which a ball check 73 seats, the ball check being one controlling a suction port 74. Surrounding the depression 71 at its interior wall there may be provided, if desired, a series of flutes 75 for the purpose of guiding the ball check 73 during its movement up and down and also for providing between the flutes sufficient space to permit easy flow therethrough of relatively viscous fluids.

Adjacent the upper end of the depression 71 is a widened space 76 into which liquid may flow from the depression 71 and which for descriptive purposes may be considered as a part of a pump chamber 77. A wall 78 of the insert is maintained within a suitable aperture 79 in the top 63 where it may be cemented in place.

A housing 80 is adapted to contain the upper portions of the pump mechanism, the housing herein being shown constructed of an outer portion or annular wall 81 and an inner portion or annular wall 82 forming a space 83 therebetween, which space is chiefly provided in order to lighten the weight of the section. The lower ends of the outer and inner portions 81 and 82 are shown cemented or otherwise fastened to the top 63 of the closure member 60, the inner portion being further centered around the exterior of the wall 78, thereby assuring proper location of the mechanisms of the pump.

A discharge chamber 84 is formed by an inner wall 85, essentially annular and cylindrical, on the inside face of which is provided a series of flutes 86 separated by a series of spaces 87. Between the inside faces of the flutes 86 and a ball check 88 is a clearance in order to permit the ball to raise and lower freely within the fluted area guided by the flutes.

Providing a cover or top closure for the discharge chamber is a plate 89. Extending below the discharge chamber is an extension 90 which may be described as being laterally recessed on opposite sides in order to permit the free flow of liquid through the recess portions of the extension and upwardly through an inlet port 91 leading into the discharge chamber. The extension

to keep it within the confines of the depression 71. The inner wall 85 may be retained in its proper position wherein the port 91 is in axial alignment with the port 72 by a section 92 of the material forming the inner wall and also on the opposite side thereof by means of a spout 93. The spout has a discharge opening 94 at its inside end where it pierces the adjacent side of the inner wall 85. The spout 93 continues piercing the inner portion 82 of the housing continuing therethrough and through the outer portion 81 to the exterior.

The upper wall of the pump chamber 77 is provided with a resilient dome 95 which is retained within an upstanding rim 96 of the housing 80 by means of a snap ring 97. In assembly the snap ring can be depressed sufficient to slide a lower edge 98 of the dome 95 into position within the rim 96 and once in position the snap ring is permitted to expand outwardly to hold the lower edge of the dome in place.

The operation of the form of the device of Figures 3, 4 and 5 is substantially the same as that described in connection with Figure 1. The dome 95 is pressed down and released in alternate strokes which in turn respectively draw liquid through the tube 69 into the pump chamber 76 and then on the next stroke, which is a depression stroke for the dome 95, the liquid is forced upwardly through the inlet port 91 into the discharge chamber 84 and from there discharged outwardly through the spout 93. Meanwhile the ball check 73 will be seated upon its seat 72.

By reason of providing the flutes 86 particularly around the ball check 88, that ball check is prevented from falling into a position closing the discharge opening 94 of the spout 93. The flutes 86 on the right-hand side, as viewed in Figure 4, will prevent the ball from falling into position within the discharge opening even though the container with the pump mechanism mounted on it may be tilted far over on its side with the spout 93 pointing down. This is particularly useful when pumping heavy viscous liquids of the nature of tomato catsup and similar types of liquids.

The flutes 75 are also guides to maintain the ball check 73 in center position. In that position when suction is applied to lift a heavy liquid through the tube 69, the liquid will flow evenly on all sides of the ball check, thereby promoting a more efficient flow. It is also helpful in preventing another common phenomena in the pumping of heavy liquids, namely, that of having the ball check, for example, lean toward one side of the port which it is designed to close, permitting a greater accumulation of the heavy liquid on the opposite side of the port which in turn admits air past the ball check through the viscous liquid, the air traveling close to the metallic portion of the ball check or the face of the valve seat. Before the ball check again closes admission of air past the ball check diminishes to a considerable degree the effect of the pumping operation. When the ball is held in a center position so that there is an equal mass of heavy liquid on all sides, the tendency of air bubbles to form is substantially minimized by this forcible centering of the ball check. Even distribution of the liquid and air about the ball check greatly facilitates seating of the ball check.

stroke. The flutes serve to steer the ball check 88 rapidly to its seat, thereby promoting the full effect of the vacuum stroke, utilizing it for sucking liquid into the pump chamber from the container. The stop provided by the extension 90, being laterally recessed, admits free flow of the liquid in all directions and particularly upwardly past the exterior of the inner wall 82 so that it may partially fill a dome chamber 99 within the dome 95, this dome chamber being in fact a part of the pump chamber.

The structure described is particularly compact sufficient to permit it to be mounted in the neck of a container wherein the neck might be of relatively small diameter. The structural arrangement, moreover, permits all of the pump mechanism to be located near the open end of the container, it being necessary to have only the tube 69 extend downwardly into the container. Under circumstances where the neck of the container might be expressly small in diameter, the pump mechanism could be so constructed as to be mounted entirely above the upper rim or edge of the opening at the neck of the container without in any way impairing the efficiency of operation of the device.

The device in question is one particularly well adapted to fabrication of any one of a number of the commercially available plastics. Some portions of the device may, if desired, be made of transparent plastics and others of dyed or colored plastics in order to bring out a variety of effects. Employment of transparent plastics permits the passage of liquid through the device to be readily viewed. Another particular advantage of the structure herein above described is that it permits of easy, partial disassembly sufficient to permit the device to be cleaned in the event that liquid substance may dry or solidify in the interior passages. By provision of the passages and chambers described, together with ball checks carefully guided to proper seating position, there has been produced a simple, effective manually operable pump which is readily adapted without substantial change to the pumping of liquids of a great variety of viscosity.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A dispensing closure pump for a container comprising a cylindrical outer wall forming a pump chamber, a concentric inner wall forming a substantially cylindrical discharge chamber and joined to the outer wall at spaced intervals leaving a passage therebetween, a discharge spout extending from the discharge chamber through the outer wall to the exterior, said discharge chamber having an inlet port directed toward the container, a valve seat around the port and ball check therefor, a dome of resilient material comprising an outer movable wall of the pump chamber, a container closure secured to said outer wall and forming an end wall for the pump chamber opposite from the dome, said closure having a suction port in axial alignment with the inlet [illegible] and extending toward said suction port comprising a limiting stop for the ball check in said suction port.

2. A dispensing closure pump for a container comprising an annular outer wall forming a pump chamber, a concentric annular inner wall forming a discharge chamber and joined to the outer wall at separated intervals leaving a passage therebetween, a discharge spout extending from the discharge chamber through the outer wall to the exterior, said discharge chamber having an inlet port directed away from said discharge spout, a free moving gravity seating ball check therefor and circumferentially disposed flutes on the wall of the discharge chamber spaced around a circle having a diameter greater than the diameter of the ball check and comprising a guide for the ball check, and a sheet of resilient material sealed to outwardly exposed portions of the outer wall comprising an outer variable pumping wall for the pump chamber, a container closure member secured to the outer wall on the side opposite said variable pumping wall having means adapted to fit in sealed position over an open end of the container, said closure member having a depression forming part of the pump chamber and a suction port in the depression, and a gravity seating ball check adapted to close said suction port, said inner wall having a laterally recessed portion extending toward said last identified ball check adapted to limit inward movement of said last identified ball check.

3. A dispensing closure pump for a container comprising an annular outer wall forming a pump chamber, a concentric annular inner wall forming a discharge chamber and joined to the outer wall at separated intervals leaving a passage therebetween, a discharge spout extending from the discharge chamber through the outer wall to the exterior, said discharge chamber having an inlet port directed away from said discharge spout, a gravity seating ball check therefor and circumferentially disposed flutes on the wall of the discharge chamber spaced around a circle having a diameter greater than the diameter of the ball check and comprising a guide for the ball check, and a dome of resilient material sealed to outwardly exposed portions of the outer wall comprising an outer variable pumping wall for the pump chamber, a container closure member secured to the outer wall on the side opposite said dome having means adapted to fit in sealed position over an open end of the container, said closure member having a central depression forming part of the pump chamber and a suction port in axial alignment with said inlet port, a ball check adapted to close said suction port, said inner wall having a laterally recessed portion extending toward said last identified ball check adapted to limit inward movement of said last identified ball check.

4. A dispensing closure pump for a container comprising a cylindrical double outer wall, the inner portion of said double outer wall forming a pump chamber, a concentric inner wall forming a substantially cylindrical discharge chamber and joined to the outer wall at separated intervals leaving a passage therebetween, a discharge spout extending from the discharge chamber through the double outer wall to the exterior, said discharge chamber having an inlet port directed [illegible]

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.