

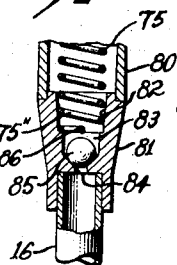
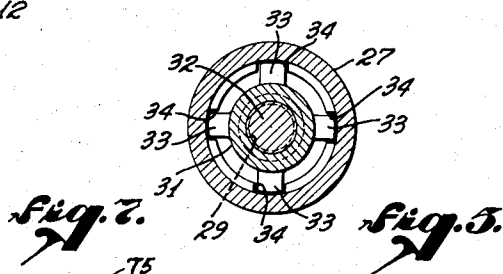
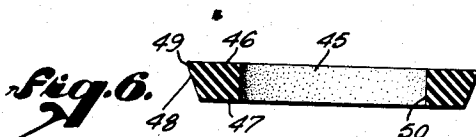
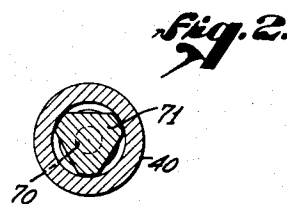
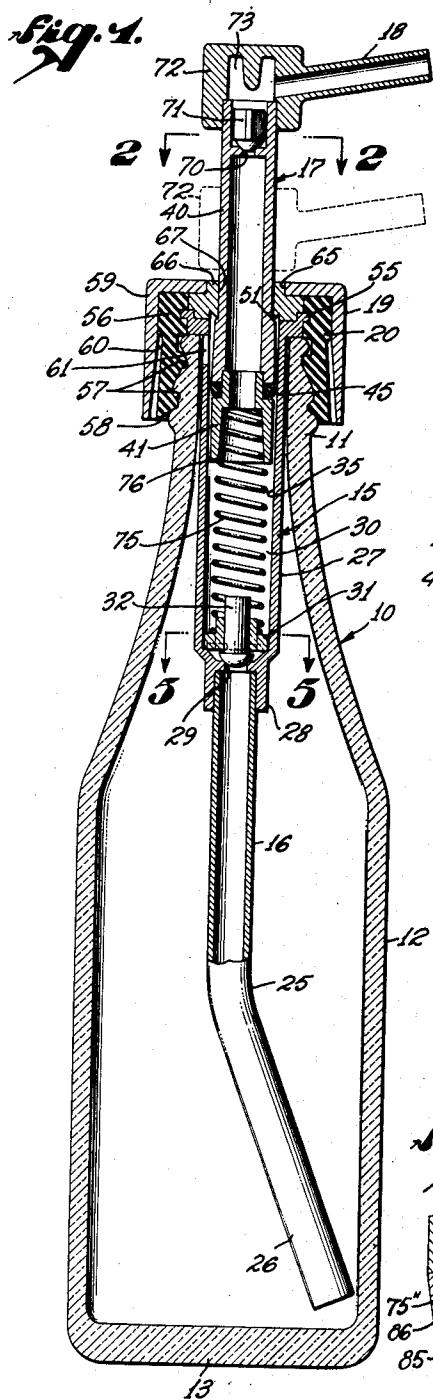
Nov. 3, 1953

"D" F. BACHELLER

2,657,834

HAND ACTUATED DISPENSER PUMP

Filed Oct. 12, 1948



"D" FLAVIUS BACHELLER,  
INVENTOR.

HUEBNER, BEEHLER, WORREL,  
HERZIG & CALDWELL,  
ATTORNEYS.

By *Vernon A. Beehler*

## UNITED STATES PATENT OFFICE

2,657,834

## HAND ACTUATED DISPENSER PUMP

"D" Flavius Bacheller, Glendale, Calif., assignor  
to "Pump-It" Incorporated, a corporation of  
California

Application October 12, 1948, Serial No. 54,084

7 Claims. (Cl. 222—321)

1

2

The application refers to dispenser pumps and particularly hand-actuated pumps which are found to be especially suitable for pumping thick liquids from containers in the nature of bottles. The device has had considerable acceptance in the dispensing of tomato catsup of the customary heavy consistency from conventional catsup bottles.

In the handling of material of the nature of tomato catsup in order that it may be successfully dispensed from the original bottles in which it is sold the dispensing device must be one not only capable of handling a heavy liquid of this type but also one which will not readily become clogged after remaining unused for a period of time. The device must be further one which will operate freely under all circumstances without sticking.

Tomato catsup when packed in narrow-necked bottles has a tendency to cake at the neck of the bottle to such an extent that if the dispenser is to operate successfully the thick liquid should be drawn from the lower level of the bottle. It is also highly advantageous to have the structure one in which the use of metal is dispensed with as much as possible so as to avoid any deteriorating effect of seasonings or other ingredients of catsup upon the dispenser parts. A number of dispensing pumps have been attempted for handling liquid of this general variety, but these have not been without a number of objections. Although operating successfully at certain times, the prior pumps have experienced a tendency to stick or to lose the necessary vacuum in operation under certain conditions sufficient to render them too undependable for general acceptance.

It is therefore among the objects of the invention to provide a new and improved dispenser pump which is particularly smooth and easy in operation and wherein binding and sticking of the moving parts of the pump has been reduced to a minimum.

Another object of the invention is to provide a new and improved dispenser pump which is certain in its operation under all circumstances, wherein the moving parts, while permitting unrestricted freedom of movement, nevertheless maintain a sufficiently smooth contact so that a proper amount of vacuum is always present to operate the pump and wherein there is eliminated any tendency to score the walls of the pump interior even though they may be made of relatively soft material.

A further object of the invention is to provide a new and improved manually operated dispenser

pump for containers in the nature of tall bottles wherein an inlet tilted to the bottom corner of the bottle is readily maintained in proper alignment with a spout through which the contents of the bottle are dispensed.

Still further among the objects of the invention is to provide a manually actuated dispenser pump for narrow-necked bottles, parts of which are maintained at a substantial minimum number and so designed that the fabrication and assembly is productive of a device relatively inexpensive in construction without there being experienced any impairment in the efficiency of operation of the device though interrupted by relatively long periods of disuse.

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.

In the drawings:

Figure 1 is a vertical sectional view of the dispenser pump shown in a position ready for operation in a bottle.

Figure 2 is a cross-sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary longitudinal sectional view showing the washer portion of the piston in the position assumed during a downward stroke.

Figure 4 is a fragmentary longitudinally sectional view showing the position of a washer on the piston during an upward stroke.

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a cross-sectional view of a washer used in the pump.

Figure 7 is a fragmentary longitudinal sectional view of a modified type of structure for the pump cylinder.

This application is an improvement on my application Serial No. 754,091, filed June 12, 1947, now Patent No. 2,547,109, dated April 3, 1951.

The production and sale of hand-actuated dispensers suitable for use in dispensing foods in the nature of tomato catsup requires that the device be one of such simple construction and operation that it can be produced at a relatively low cost. Moreover, because of the limited area of the neck of the average bottle the dimensions of the pump need be restricted sufficiently to operate in the neck of the container without impairment of any smoothness or efficiency of oper-

3

ation. The dispenser pump must not only be successful as a means of dispensing all of the contents of the container down to the last ounce, but must also include structure which serves to properly mount the dispenser on the bottle, and, at the same time, seal the contents within the bottle without disturbing operation of the dispenser.

In the embodiment chosen to illustrate the invention, there is pictured a conventional style vessel or container 10 herein taking the form of the average bottle used for packing tomato catsup. The bottle customarily has a relatively narrow neck 11, a body portion 12 relatively high in proportion to the diameter and a bottom 13. The neck ordinarily is provided with ridges upon which a cap may be pressed, although on some occasions, threads are substituted for annular ridges.

The dispenser herein taking the form of a manually-actuated pump includes a pump cylinder 15, an inlet tube 16, a pump piston 17 and a spout 18. A cap 19 having therein a rubber-like ring 20 is used for mounting the pump on the top of the bottle and for sealing the contents in the bottle whenever the pump is in place.

The inlet tube in the embodiment illustrated is bent at 25 so that an off-set end 26 is adapted to reach into the corner of the bottle or other container formed at the junction of the bottom 13 with the side wall 12.

The pump cylinder includes an upper barrel portion 27 and a lower barrel portion 28. The inlet spout is normally fixed in its position in the lower barrel portion 28. Also in the lower barrel portion is an inlet passage 29 communicating with a pump chamber 30. At the bottom of the pump chamber 30 is a valve retainer 31 which has a fixed position in the bottom of the chamber and which is designed to hold in operative position a gravity-responsive check valve element 32. When the valve retainer is in position there is provided a limited movement for the valve element between a valve closing position and a valve opening position.

To further satisfy one of the purposes of the invention the valve retainer is formed with projections 33 extending therefrom and adapted to fit into recesses 34 formed at the junction of the upper barrel portion and the lower barrel portion. The design is such that the barrel in its entirety may be cast from some one of the common commercial plastics. During the casting the recesses 34 may be formed and a wall 35 of the chamber given a somewhat tapered form tapering inwardly from the outer end of the chamber toward the inner end.

The pump piston 17 is preferably tubular in form and comprises an outer part 40 and an inner part 41. An examination of Figures 3 and 4 will reveal that the outer part 40 has an annular recess 42 at the inner end of fixed breadth and depth and that the part 41 has a recess 43 at the upper end on the outer circumference also of fixed depth and breadth. The relationship of the recesses in the parts is such that the parts fit telescopically together as illustrated in Figures 1, 3 and 4 and in fitted position provide an open annular recess 44 of fixed breadth and depth. In the open annular recess 44 there is positioned a pump washer 45 of special size and form. As best illustrated in Figure 6, the pump washer may have an upper flat face 46 and a lower parallel flat face 47. An outer surface or wall 48 of the washer is pitched substantially

4

at an angle so that a relatively sharp or feather edge 49 may be formed at the junction of the wall 48 with the flat face 46.

It can be noted that, by reference to Figures 3 and 4, the thickness of the washer is substantially less than the breadth of the open annular recess 44. Moreover the diameter of an aperture 50 in the washer is appreciably greater than the diameter of the bottom of the open annular recess 44. Also the diameter of a line tracing the circumference of the sharp edge 49 is greater than the internal diameter of the chamber 35 at all positions throughout the range of operation of the piston. As previously noted the wall 35 of the chamber 30 is tapered, said taper being shown in exaggerated form in Figures 3 and 4. The taper, however, necessitates making certain that the diameter of the sharp edges is sufficient to contact the wall of the chamber in every position of piston operation. Because of the taper the feather edge on the washer is particularly well adapted to insure free movement of the piston at the lowermost position of piston operation where the wall 35 is most closely contracted as well as to insure a complete contact where the wall of the chamber is greatest in diameter, namely, at the upper end of the piston stroke.

To insure a perfect contact at all times the washer 45 is free to float in a lateral direction so that the feather edge is in complete contact with the wall 35 at all times. The feather edge permits constriction of the edge alone at the bottom of the stroke without undue sticking or any undue increase in friction.

It is also significant to note that because the breadth of the washer between the flat faces 46 and 47 is less than the breadth of the open annular recess 44, the washer is free to shift longitudinally in the recess. The different positions of the washer with respect to the recess are illustrated in Figures 3 and 4. In both positions there will be a sufficient seal between the respective face of the washer and the corresponding wall of the open recess 44. These factors contribute materially to the freedom of movement of the pump piston in the chamber. A shoulder 51 on the exterior of the upper part 40 of the piston is adapted to limit movement of the piston in an outward direction.

For mounting the pump cylinder and piston upon the bottle the cylinder is provided with a projection 55 adapted to fit into a suitable recess in a resilient cap washer 56. The washer in turn may be provided with ridges 57 adapted to accommodate the washer to corresponding depressions on the neck of the bottle. An outwardly flared portion 58 on the cap washer permits it to be readily applied over the necks of bottles of varying sizes. Outside of the cap washer is a hollow cap 59 which fits smoothly around the upper portion of the cap washer but around the lower portion provides a space 60 within which the cap washer may expand when the neck of the bottle is larger than usual.

An air intake 61 is provided in the upper wall of the cylinder so as to eliminate any tendency of a vacuum to form as the pump cylinder moves in and out.

On the upper face of the cap 59 is an aperture 65 in which is sealed an annular ring 66. This ring may also have a sealed junction with the flange 55 on the top of the cylinder. The ring has a smooth inner surface 67 providing a smooth sliding fit for the upper part of the piston.

At the top of the piston there is provided a re-

stricted passage 70 at the upper end of which is mounted a gravity-responsive check valve element 71. The spout 18 includes a bushing 72 having a hollow chamber 73 through which liquid is adapted to pass on its way to the spout 18 after passing the check valve 71.

In order to maintain the spout 18 in alignment with the off-set end 26 of the inlet tube there is provided a spring connection between the piston 17 and the valve retainer 31. As has been previously noted, the valve retainer is constructed with projections 33 interfitting with recesses 34 at the bottom of the pump cylinder. By operation of these devices the valve retainer is non-rotatably associated with the pump cylinder. A spring 75 is coiled to such a size that the lower end has a snug frictional engagement with the valve retainer.

Under ordinary circumstances the piston is not only free to reciprocate endwise but also is entirely free to rotate with respect to the pump cylinder. Under such circumstances the spout 18 would be continually getting out of alignment with the off-set end of the inlet tube. Such being the case the off-set end would not dip into the corner of the bottle during pumping at a near empty condition of the bottle. The spring connection therefore between the spout and piston combination and the assembly comprising the inlet tube and the pump cylinder is adapted to maintain such an effective alignment.

To connect the spring 75 to the piston the piston part 41 is provided with a gently tapered recess 76 at the bottom slightly smaller in interior diameter than the exterior diameter of the spring. The upper end of the spring can therefore be forced into the recess and because the spring can be forced rotatably against the frictional effect the direction of the spout permits proper alignment with respect to the projection 33. Then when the piston, the spring, and the valve retainer are assembled with the pump cylinder the spout will be in alignment with the off-set end 26 of the inlet spout. If there should be some slight misalignment the alignment can be restored by holding the inlet tube and then by forcing the inlet spout rotatably a distance sufficient to reestablish the alignment.

A slightly modified type of structure for the pump chamber is illustrated in Figure 7. As there shown there is provided a pump cylinder wherein a barrel 80 is provided with a fitting 81 at the bottom to which is attached the inlet tube 18. The fitting is provided with a recess 82 terminating in a recess 83 of smaller bore which is connected by means of a passage 84 to the inlet tube. The bottom of the recess 83 provides a valve set for a ball check 85.

In this form a coiled spring 75 is normally of an outside diameter less than the inside diameter of the upper end of the recess 82 but of greater diameter than the lower end of the recess. The spring 75 can therefore be forced into the recess and lower coils 75' reduced slightly in diameter to provide a friction fit between the spring and the fitting 81. It is contemplated that a similar relationship may be employed at the upper end of the spring instead of the relationship shown in Figure 1 at the top.

To prevent the ball check from falling out of position a lowermost coil 86 of the spring is bent over the location of the ball.

In this form of the device the spring 75 is frictionally engaged in a recess not only at the top

but also at the bottom. The frictional engagement of the spring with the pump cylinder at the bottom and with the plunger or piston at the top connects these two parts together substantially non-rotatably so that the spout 18 may be maintained in alignment with the off-set portion 26 of the inlet tube. Inasmuch as the connection between the spring and the pump parts is not rigid the pump parts may be forcibly rotated one with respect to the other until the spout and the inlet tube are in proper alignment, should they become misaligned at any time.

It will be clear from the foregoing description that there has been provided a compact inexpensive manually operated pump which can be readily applied to and removed from containers such as narrow-necked bottles. The parts are so designed moreover that virtually all of the parts can be cast from some one of the accepted commercial types of plastic by conventional molding methods. Once the proper relationship is established all parts will operate effectively and consistently without the necessity of holding extremely close tolerances.

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.

The invention having been herein described, what we claim as new and desire to secure by Letters Patent is:

1. A pump comprising a pump cylinder having a bore tapered inwardly from the outer toward the inner end, an inlet to said bore having a valve therein, and a piston reciprocably mounted in said inwardly tapered bore comprising a tube having an outlet at the outer end thereof and a valve adjacent the outlet, said piston having an annular recess in the outer surface of fixed breadth and depth comprising a bottom wall and side walls, and an annular pump washer in said annular recess of resilient material having an internal diameter greater than the diameter of all portions of the bottom wall of the recess, a breadth less than the breadth of the recess at all portions of the side walls and a relatively sharp annular edge greater in external diameter than the internal diameter of the largest section of said bore within the range of piston operation, the external surfaces of said washer having a progressively varying area of contact with the bore throughout the inwardly tapered portion during reciprocation of the piston.

2. A pump cylinder having a bore tapered inwardly from the outer toward the inner end, an inlet to said bore having a valve therein and a piston reciprocably mounted in said bore, said piston comprising a tube having an outlet at the outer end thereof, a valve adjacent the outlet and an annular recess in the outer surface of the tube of fixed breadth and depth having parallel walls and a cylindrical bottom, and an annular flat faced floating pump washer of resilient material in said annular recess, said pump washer having an interior cylindrical concentric wall having a diameter greater than the diameter at the bottom of the recess, a breadth between the flat faces less than the breadth of the recess and an oblique outer face pitched to form a relatively sharp edge adjacent one flat face, the diameter of said sharp edge being greater than

the internal diameter of the largest section of said bore within the range of piston operation.

3. A pump comprising a pump cylinder having a bore tapered inwardly from the outer toward the inner end, an inlet to said bore having a valve therein and a piston reciprocably mounted in said bore, said piston comprising a tube having one part including an outlet at the outer end thereof and a valve adjacent the outlet and another part at the end of the piston remote from the outlet, one of said parts having a recess in the outer wall and the other of said parts having a recess in the inner wall shorter in length than said recess in the outer wall, said parts having a telescoped engagement providing an open annular exterior recess of fixed breadth and depth, and an annular floating pump washer in said annular recess of resilient material having an inner diameter greater than the diameter at the bottom of the open recess, a breadth less than the breadth of the open recess and a relatively sharp annular edge at the outermost perimeter of the washer greater in diameter than the internal diameter of the largest section of said bore within the range of piston operation.

4. A hand actuated dispenser pump comprising a support adapted to engage the open end of a liquid container, a pump cylinder engaging said support having a bore tapered inwardly from the outer toward the inner end, an inlet to said bore having a gravity responsive check valve therein and a piston reciprocably mounted in said bore comprising a tube, a delivery spout on the tube having a discharge passage therein communicating with the bore and a gravity responsive valve between the tube and the delivery spout, said tube having an annular recess adjacent the inner end of fixed breadth and depth, and an annular floating pump washer in said annular recess of resilient material having parallel flat faces on the inner and outer sides, an internal diameter greater than the diameter of the tube at the bottom of the recess, a thickness between said faces less than the breadth of the recess and an oblique outer face on the portion only of said washer located outside the recess pitched to form a relatively sharp edge at the flat face at one side only greater in external diameter than the internal diameter of the largest section of said bore within the range of piston operation.

5. A dispenser pump for open ended containers comprising a pump cylinder, an off-set intake tube in communication with the cylinder and extending endwise therefrom, a piston freely rotatable with respect to and reciprocably mounted in the cylinder, a transversely disposed spout on the piston, means for mounting said cylinder on the open end of the container, a retainer at the bottom of the pump cylinder comprising at least one pair of interfitting elements respectively on the retainer and the cylinder, a coiled spring frictionally engaged at one end with said retainer, said spring having at the other end a frictional grip on the piston forming thereby a connection between the piston and the pump cylinder whereby the spout and the intake tube are maintained in alignment.

tional grip on the piston forming thereby a connection between the piston and the pump cylinder whereby the spout and the intake tube are maintained in alignment.

6. A hand actuated dispenser pump for open ended containers comprising a pump cylinder, an offset intake tube in communication with the cylinder and extending endwise therefrom for reaching a bottom corner of the container, a piston freely rotatable with respect to and reciprocably mounted in the cylinder, a transversely disposed spout on the piston and means for mounting said cylinder on the open end of the container, said cylinder having a bottom piece fitted thereto, a valve retainer adjacent the bottom piece having a check valve element therein, at least one pair of interfitting slots and projections between the bottom piece and the retainer, and a coiled spring frictionally engaging the retainer and the piston forming thereby a rotation resistant connection between the piston and the pump cylinder whereby the spout and the offset intake tube are maintained in alignment.

7. A hand actuated dispenser pump for open ended containers comprising a pump cylinder, an intake tube in communication with the cylinder and extending endwise therefrom, said tube having an offset intake end for reaching a bottom corner of the container, a piston freely rotatable with respect to and reciprocably mounted in the cylinder, a transversely extending spout fixed on the piston having a gravity responsive check valve therein and sealing means for mounting said cylinder on the open end of the container, a valve retainer at the bottom of the pump cylinder having a gravity responsive check valve element therein, interfitting slots and projections between the retainer and the cylinder, a coiled spring in frictional engagement at one end with said retainer and a tapered recess in the piston providing a frictional grip on the other end of the spring forming thereby a resilient connection between the piston and the pump cylinder whereby the spout and the offset end of the intake tube are maintained in mutual alignment.

"D" FLAVIUS BACHELLER.

#### References Cited in the file of this patent UNITED STATES PATENTS

Number	Name	Date
1,489,172	Symons	Apr. 1, 1924
2,038,778	Williams	Apr. 28, 1936
2,136,263	Holmes	Nov. 8, 1938
2,208,620	Balsch	July 23, 1940
2,362,080	Martin	Nov. 7, 1944
2,435,527	Arpin	Feb. 3, 1948
2,444,119	Thorn	June 29, 1948

#### FOREIGN PATENTS

Number	Country	Date
276,192	Great Britain	Aug. 25, 1927