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FLUID DISPENSER WITH ADJUSTABLE STROKE PUMP PISTON

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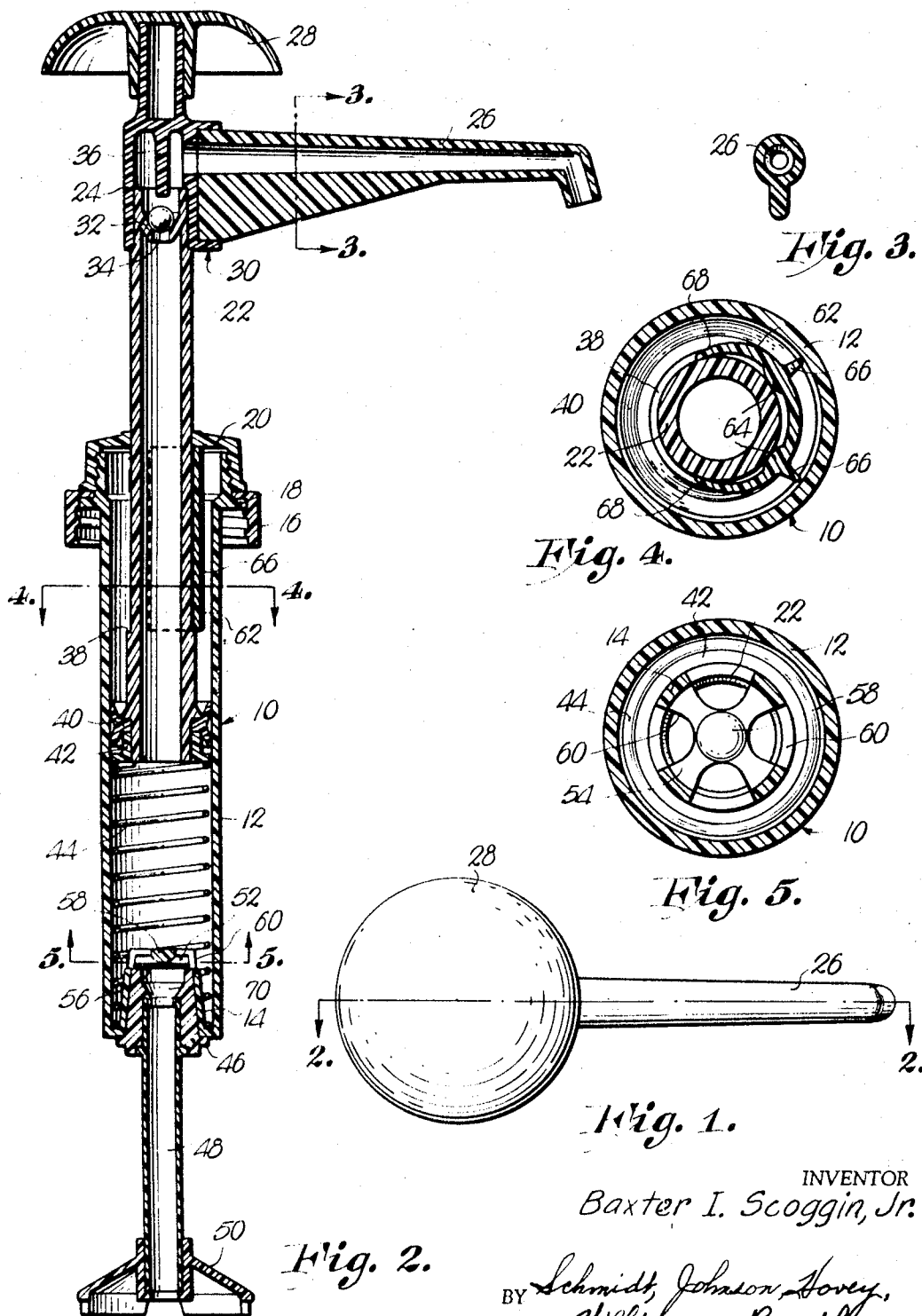


Fig. 1.

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4 Claims

ABSTRACT OF THE DISCLOSURE

A hand pump dispenser adapted to convert virtually any type of container to a portion-controlled fountain in that each stroke of a spring-loaded piston in its cylinder dispenses a preselected amount of liquid through a spout extending laterally from a tubular plunger that is reciprocably carried by a guide collar on one end of the cylinder and has the piston secured thereto. A truncated cone integral with the cylinder therewithin at its opposite end receives the spring in encircling relationship thereto when the spring is compressed. In cooperation with a plug fitted into the cone and provided with a liquid inlet port, there is presented a cage which receives a resilient, disc-type flapper valve, held at its center against the plug by a button on the top wall of the cone. A detachable clip cooperable with spaced stops may be used on the plunger interiorly or exteriorly of the cylinder to provide various amounts of measured liquid to be dispensed during each stroke.

An important object of the instant invention is the provision of a flapper valve for hand pumps that is quick-acting and highly responsive to liquid flow by virtue of being centrally held in place so that it deflects only at its periphery and then returns to its closed position without leakage and without losses due to flutter within its cage as would be true if the valve were permitted to rise and fall bodily within the cage.

Another important object of my present invention is to provide simple and accurate stroke determining means for the pump plunger, permitting pre-selection of measured quantities of liquid to be dispensed during each stroke, and taking the form of an inexpensive and easily manufactured clip which may be quickly attached to the plunger without difficulty.

In the drawing:

FIGURE 1 is a top plan view of a dispenser made according to the present invention;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1; and

FIGS. 3—5 are cross-sectional views taken on lines 3—3, 4—4 and 5—5 respectively of FIG. 2.

Liquid pump or dispenser 10 has an elongated cylinder 12 provided with a hollow truncated cone 14 at one end thereof. An internally threaded container cap 16 is rotatable on cylinder 12 at its opposite end, and an external flange 18 on cylinder 12 is disposed within cap 16 to clamp a gasket (not shown) against the outer end of the screw threaded neck of a liquid container when the cap 16 is attached to such neck. A collar 20, threaded on cylinder 12, serves as a lock nut for cap 16 and as a guide for a reciprocable, tubular plunger 22 that extends into cylinder 12.

A mount 24 on the upper end of plunger 22 for a discharge spout 26 and a hand knob or head 28 presents a shoulder 30 exteriorly of cylinder 12. A perforated seat 32 for ball valve 34 is formed in plunger 22, and a stem 36 in mount 24 limits the extent of movement of valve 34 away from seat 32. Another shoulder 38 on plunger

22 internally of cylinder 12 faces oppositely to shoulder 30.

A soft, flexible, double action piston ring 40 in cylinder 12 is held on plunger 22 by a retainer 42 against which bears one end of a spring 44 in cylinder 12, the opposite end of spring 44 surrounding cone 14. A tubular plug 46 in cone 14 receives a dip tube 48 that is provided with a supporting pedestal 50 for dispenser 10, the pedestal resting on the bottom of the liquid container therewithin.

A cage 52 between plug 46 and top wall 54 of cone 14 receives a disc type, free-flowing flapper valve 56 of flexible material. A retainer in the nature of a button 58 integral with wall 54 bears against the valve 56 to hold it against plug 46. A plurality of spaced liquid passages 60 in cone 14, inwardly of plug 46 and valve 56, extend also into wall 54 radially thereof toward button 58.

One or more stroke limiting devices of various lengths for plunger 22 each take the form of an elongated, generally C-shaped clip 62 of resilient material adapted to be detachably secured to plunger 22 either internally of cylinder 12 as shown or exteriorly thereof. Clip 62 grips the plunger 22 in embracing relationship thereto and partially surrounds plunger 22. A pair of longitudinal ribs 64 inside clip 62 and a pair of opposed outer ribs 66 on clip 62 serve as reinforcements. Ribs 64 engage plunger 22 and hold clip 62 eccentric to plunger 22, thereby increasing the grip of wings 68 of clip 62 on plunger 22. If the clip 62 is used inside cylinder 12, the ribs 64 tend to keep clip 62 on plunger 22 when they engage the inner wall of cylinder 12.

OPERATION

Pump 10 may be used with cans, glass bottles, plastic jugs and other types of containers adapted to receive cylinder 12 therewithin and to attach cap 16 to the neck thereof, whereupon collar 20 is tightened against cap 16 to hold it against rotation. Where necessary to more adequately support pump 10, the pedestal 50 rests on the bottom of the container therewithin, the dip tube 48 being custom cut to fit the container. Virtually all types of liquid may be pumped, including those containing pulp and those that are otherwise heavily viscous.

When clip 62 is not used, each stroke of the plunger 22 dispenses, for example, one ounce, the stroke being determined by shoulders 30 and 38 striking collar 20. When clip 62 is inside cylinder 12, one-half ounce, for example, is dispensed, depending upon the length of clip 62, the stroke being limited by clip 62 between shoulder 38 and collar 20. The same amount of liquid is dispensed when clip 62 is outside cylinder 12, the stroke being limited by clip 62 between shoulder 30 and collar 20.

Upward movement of piston 40 by spring 44 causes liquid to be drawn up tube 48 past valve 56 and into cylinder 12. Valve 56 responds quickly as it deflects upwardly away from plug 46 throughout the periphery of valve 56, button 58 serving to hold the center of valve 56 against upward movement in cage 52.

When plunger 22 is depressed against the action of spring 44 by force applied to head 28, the valve 56 quickly and positively closes the port 70 of plug 46, dispensing the same amount of liquid during each stroke. The liquid rises in plunger 22, opens valve 34 and flows through the spout 26. Engagement of shoulder 30 with collar 20 prevents retainer 42 from striking wall 54, and spring 44 is compressed into encircling relationship to cone 14.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a liquid pump:

an elongated cylinder having a hollow, truncated cone in one end thereof;

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a reciprocable plunger extending into the opposite end of the cylinder and provided with a discharge spout exteriorly of the cylinder;

said plunger having a pair of shoulders, one internally of the cylinder and one exteriorly thereof, said cylinder having a plunger guide at said opposite end thereof;

a piston secured to the plunger within the cylinder;

a spring surrounding the cone within the cylinder and engaging the plunger to yieldably bias the latter outwardly;

a tubular plug in the cone;

a disc valve resting on the plug within the cone;

a retainer in the cone bearing against the valve at the center thereof for holding the latter against the plug;

said cone having passage means for flow of liquid from the plug to the cylinder when the valve is open around the retainer; and

a stroke limiting device for said plunger detachably secured thereto either exteriorly of the cylinder between the exterior shoulder and the guide or interiorly of the cylinder between the interior shoulder and the guide;

said device comprising an elongated, transversely C-shaped clip of resilient material adapted to grip the plunger in embracing relationship thereto and partially surrounding the plunger.

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2. In a liquid pump as claimed in claim 1, said cone having an end wall in said cylinder, said retainer comprising a button on said wall within the cone.

3. In a liquid pump as claimed in claim 1, said clip having a longitudinal rib engaging the plunger for holding the clip in eccentric relationship to the plunger.

4. In a liquid pump as claimed in claim 1, said clip having a longitudinal rib engageable with the cylinder when the clip is in the cylinder for holding the clip against displacement from the plunger.

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