Sept. 24, 1946. T. L. TITUS 2,408,009

FOUNTAIN PUMP

Filed Sept. 24, 1945 2 Sheets-Sheet 1

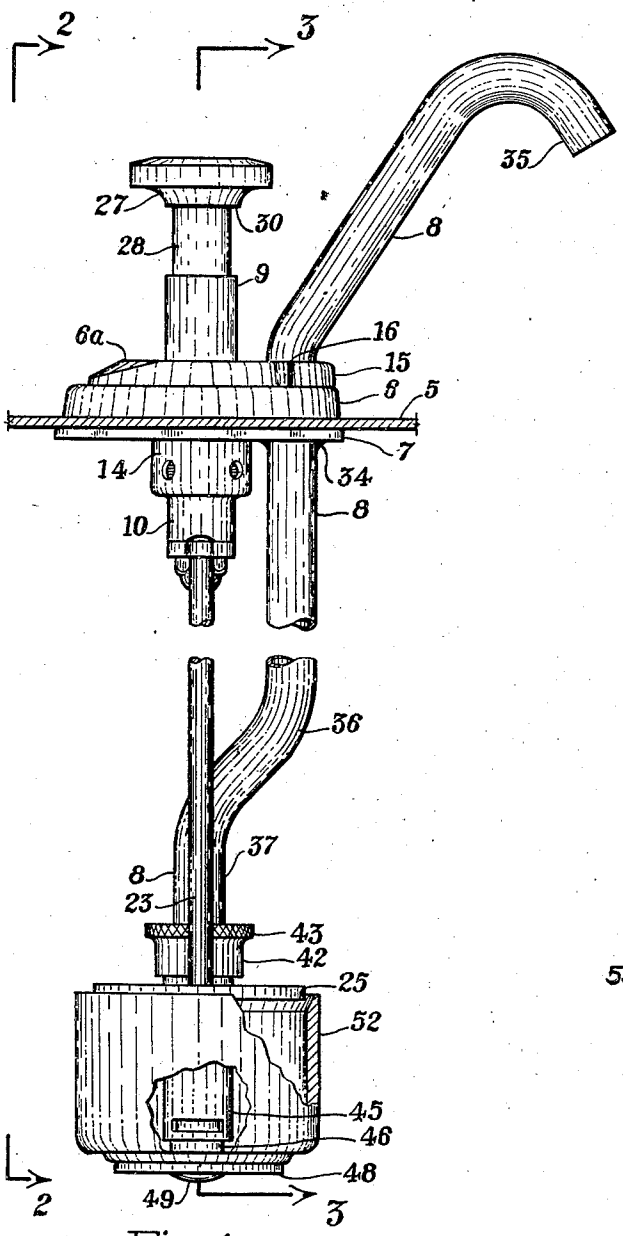


Fig. 1

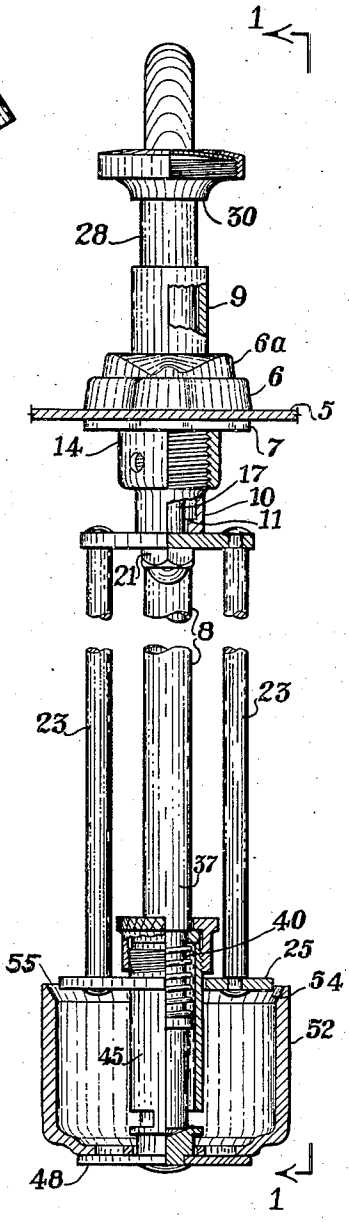


Fig. 2

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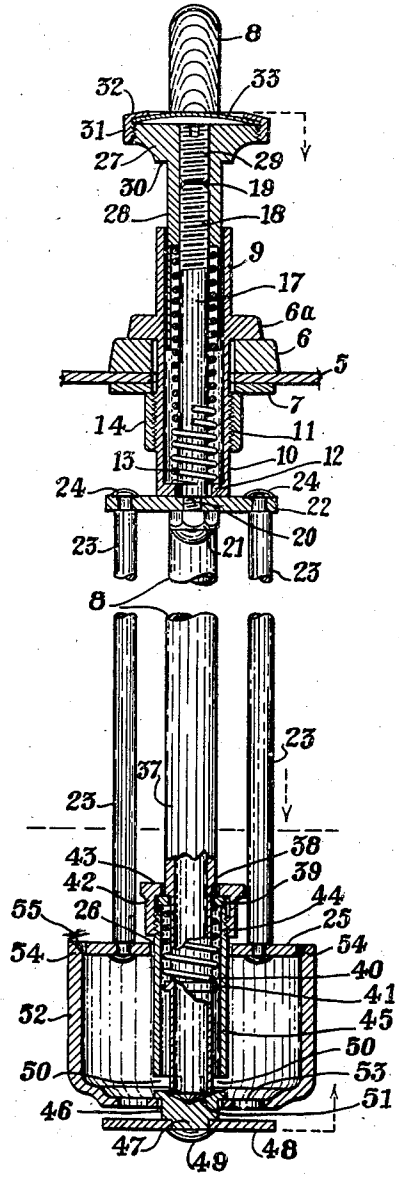


Fig. 3

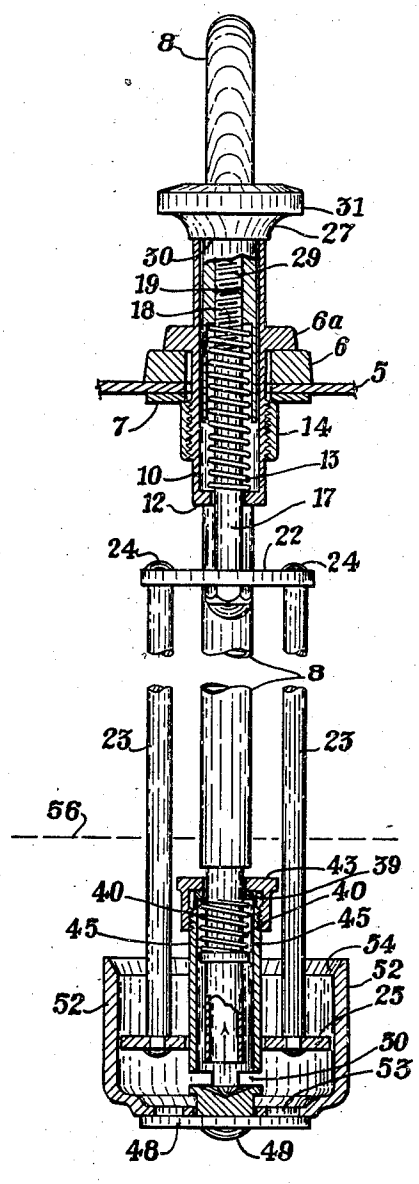


Fig. 4

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FOUNTAIN PUMP

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Application September 24, 1945, Serial No. 618,229

7 Claims. (Cl. 103—163)

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This invention relates to improvements in pumps for dispensing syrups at soda fountains and for analogous uses.

It is an object of this invention to produce a syrup dispensing pump of an improved construction which can be manufactured so as to have no joints or check valves in the dispensing tube.

Another object is to produce a syrup dispensing pump of such construction that the dispensing tube can be readily and thoroughly cleaned by means of a brush or other cleaning implement.

A further object is to produce a syrup dispensing pump of such construction that all of the parts can be made readily accessible for cleaning.

Another object is to produce a pump in which the dispensing tube will always remain full of liquid and which will not drip.

A further object of the invention is to produce a syrup pump that will dispense accurately any predetermined quantity of liquid.

Another object is to produce a pump of such construction that it can be readily adjusted to dispense any desired quantity of liquid.

A further object is to produce a syrup dispensing pump of a simple and substantial design and of a pleasing and ornamental appearance.

The above and any other objects that may become apparent as the description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail and for this purpose reference will be had to the accompanying drawings in which the invention has been illustrated in its preferred form, and in which:

Figure 1 is a side elevation of the pump looking through plane 1—1, Figure 2, portions having been broken away to better disclose the construction;

Figure 2 is a side elevation looking through plane 2—2, Figure 1, a portion of the device being shown in diametrical section and other portions broken away to more clearly disclose the construction;

Figure 3 is a vertical section taken on line 3—3, Figure 1, the parts being shown in normal inoperative position; and

Figure 4 is a section similar to that shown in Figure 3 but shows the parts in liquid dispensing position.

The pump that has been illustrated and which forms the subject of this invention is intended primarily for use in connection with soda fountains and similar places where different flavored syrups are dispensed for soft drinks. The syrup is contained in a jar having a cover which, in the

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drawings, has been designated by reference numeral 5, a fragment thereof being shown. Secured to the cover is the pump structure comprising a head 6, a stay plate 7 and a discharge tube 8. The head is made in two parts, the upper part having been designated by reference numeral 6a. The stay plate, the cover and the head 6 are all provided with aligned openings. That portion of the head which has been designated by reference numeral 6a has an upwardly extending tubular member 9 and a downwardly extending tubular member 10, the latter having a threaded section indicated by reference numeral 11. At the bottom of tubular member 11 there is an inwardly extending flange 12 which serves as an abutment for spring 13. A nut 14 cooperates with the threaded section 11 and clamps the head 6, the cover 5 and the stay plate 7 in assembled relation. The stay plate, the cover and the head 6 are all provided with aligned openings for the reception of the discharge tube 8.

It will be observed that head 6 has an upwardly projecting portion 15 that extends to line 16. The upwardly extending part 15, as well as the adjacent end of head portion 6a have semi-circular recesses that form a circular opening through which the discharge tube 8 passes. Extending through the opening in parts 9 and 10 is a round rod 17 whose upper end is threaded, as indicated at 18, and which terminates at point 19. The lower end of this rod has a section 20 of reduced diameter which is threaded for the reception of nut 21. A cross head 22 is secured to the threaded extension by means of nut 21, as shown in Figure 3. The ends of the cross head are provided with openings through which the upper reduced ends of bars 23 extend. These bars are riveted to the cross head as indicated at 24. Secured to the lower ends of bars 23 is a piston 25. This piston is annular in shape having a central opening designated by reference numeral 26. A head 27, that has a downwardly extending tubular cylindrical part 28, is attached to the threaded end 18 of rod 17 as shown in Figures 3 and 4. A set screw 29 serves to hold the head in adjusted position on rod 17. The lower end of tubular extension 28 abuts the upper end of spring 13 and spring 13 is under compression and therefore serves to hold the parts in the position shown in Figure 3 and to move them back to this position if displaced therefrom. Head 27 has a shoulder 30 that serves as a stop when it comes into engagement with the upper end of tubular member 9. The extent to which rod 17 can be moved is determined by

the distance between the upper end of tubular member 9 and shoulder 30. By turning the head 27 on rod 17, the extent of the vertical movement of the parts can be adjusted for a purpose which will hereinafter appear. Cap 31 is threadedly connected with head 27 and has an inwardly extending flange 32 that holds a disk of plastic or other material 33, in position. Disk 33 may have printed thereon the name of the flavor dispensed by that particular pump.

Discharge tube 8 is welded to the stay plate 7 as indicated at 34 and therefore remains in a fixed relation with respect to this plate. The upper end of the discharge tube is downwardly inclined as indicated at 35. Tube 8 is curved, as indicated at 36, so that the lower portion 37 is in axial alignment with rod 17 as shown most clearly in Figure 1.

The lower end of tube 8 is of slightly reduced diameter and is formed with a shoulder 38 that serves as a stop for the abutment ring 39. A helical compression spring 40 surrounds the lower end of tube 8 below the shoulder 38 and has its lower end in abutting relation to a collar 41 that is soldered or welded to the tube. A nut 42 has an inwardly extending flange 43 that overlaps the ring 39. The inner surface of the downwardly extending tubular portion of nut 43 is threaded as shown at 44 and is in threaded engagement with the upper end of the tubular valve member. Instead of threads, the nut and the tubular valve member may be interconnected by a bayonet joint or other equivalent means. Valve member 45 terminates in a solid end portion 46 that in turn terminates in a cylindrical portion 47 to which the pump seal 48 is secured. The pump seal is held in position by having the end 47 riveted as shown at 49. The side wall of valve member 45 is provided with one or more slots 50 positioned above the solid end portion 46. The upper surface of the latter has a conical depression 51 that serves as a valve seat for the lower end of tube 8, as shown most clearly in Figure 3. A cup-shaped pump cylinder 52 has its bottom provided with a central opening that receives the solid end portion 46. The bottom of the cylinder is also provided with other openings that have been designated by reference numeral 53. The upper surface of the pump seal 48 and the lower surface of the cylinder 52 form a tight seal when they are in engagement as shown in Figure 4.

Attention is also called to the fact that the central opening in the bottom of cylinder 52 is somewhat larger than the diameter of part 46 and that the cylinder can rock slightly and therefore it will always form a good seal between itself and the cylinder seal.

It will be observed that the inner upper edge of the pump cylinder has an upwardly flaring surface 54 and that when the parts are in the position shown in Figure 3, piston 25 is positioned above the lower edge of this surface so as to form an opening like that indicated at 55 in Figure 2. The diameter of the piston is slightly smaller than the inside diameter of the cylinder 52 so that when the parts are in the position shown in Figure 4, there is very little leakage between the piston and the cylinder and practically no friction.

Let us now assume that the pump that has been described is positioned in a flavoring syrup or other liquid whose upper level has been indicated by reference numeral 56 (Figures 3 and 4). For reasons that will hereinafter appear, the cylinder 52 is full of liquid when the parts are in the position shown in Figure 3 because the parts are then wholly submerged in the liquid.

Let us now assume that a quantity of syrup is to be dispensed, the operator exerts a downward pressure on head 27 moving the parts downwardly until shoulder 30 comes into engagement with the upper end of tubular member 9. As soon as this downward movement begins, bars 23 to which the piston 25 is connected, move downwardly with respect to the cylinder. As soon as the piston gets down below the inclined surface 54, the liquid confined in the cylinder will be put under considerable pressure and will move the cylinder seal and tubular member 45 downwardly compressing spring 40. As soon as spring 40 begins to be compressed, the conical valve surface 51 moves away from the lower end of tube 8 to the position shown in Figure 4, whereupon any liquid below the piston will move upwardly into the discharge tube. As soon as pressure is released on the head 27, the pressure of the liquid below the piston will be quickly reduced to that equal to the head of the liquid in tube 8 and spring 40 will immediately move the parts to the position shown in Figure 3 with the conical surface 51 in contact with the lower end of tube 8, whereupon any liquid in the discharge tube will be trapped therein. As a result of this, the discharge tube will always be full of liquid because it cannot return into the container. The amount of liquid dispensed will depend upon the relative movement between the piston 25 and the cylinder 52 and this can be controlled by moving the head 27 relative to rod 17. The parts are adjusted to get the desired quantity of liquid dispensed at each stroke. As soon as pressure is released from head 27, the latter will move in response to the action of spring 13 and during this upward movement cylinder 52 will be held in spaced relation with respect to the pump seal 48 and liquid will therefore flow into the cylinder due to the suction produced by the upward movement of the piston. As soon as the piston comes to a point above the lower edge of the inclined surface 54 (see Figure 3), the cylinder will drop in response to the action of gravity, to the position shown in Figures 1 and 2, whereupon liquid can enter from above permitting the cylinder to drop freely in response to the action of gravity until it rests on the pump seal as shown in Figure 1. When pressure is again exerted on head 27, the cylinder and attached parts will move downwardly, relative to the discharge tube, opening a passage to the interior of the discharge tube permitting liquid to be dispensed in the quantity desired.

By unscrewing nut 43 from tube 45, the assembly comprising the pump seal, the cylinder and tube 45 can be separated for the purpose of cleaning and sterilizing. Spring 40 will, of course, remain on the lower end of pipe 8, due to the presence of flange 41 and ring 39.

When the cylinder and attached parts are separated, the discharge tube can be readily cleaned by threading a wire through the same, to which a suitable cleaning rag is attached and pulling the rag through the entire length of the tube, or a suitable flexible brush can be employed for cleaning the inside of this tube. The cylinder and attached parts can be readily cleaned in any usual manner. Since the parts that are attached to the stay plate do not come into contact with the liquid, they do not have to be cleaned as frequently

as the other parts, but, if, for any reason, it is desired to remove them for cleaning, nut 21 can be unscrewed, thereby permitting rod 17 and spring 13 to be removed, or, instead of removing nut 21, head 27 can be unscrewed from the upper end of rod 17, permitting the latter to be pulled downwardly. The spring can then be removed from the top of the tubular members in which it is positioned.

It will be seen form the above description taken with the drawings that the pump is of a simple and substantial construction; that it can be adjusted to dispense liquid in any predetermined quantities within the limits of the adjustment provided and that the discharge tube is always full of liquid.

The convenience with which the pump parts can be disassembled and cleaned is an important consideration. The valve must be positioned in an upwardly ranging position and therefore when the words "top" or "bottom" are used, they refer to the arrangement shown.

Particular attention is called to the fact that with the construction described and shown, liquid is dispensed at a point above the liquid level in the retainer. The piston and cylinder move vertically and their movements are so limited that when both are in their uppermost position, liquid may freely enter the cylinder. The upwardly flaring surface 54 is, in effect, a guide which directs the piston into the cylinder and may not be continuous although that is the preferable construction.

Having described the invention what is claimed as new is:

1. A liquid dispensing pump, in combination, a stay plate having an opening, an upwardly ranging discharge tube passing through the stay plate and rigidly attached thereto, a cupped cylinder connected with the lower end of the discharge tube for a limited free longitudinal and tilting movement, the bottom of the cylinder having an opening for the entrance of liquid, a cylinder seal plate for periodically closing the opening in the cylinder, connected with the lower end of the discharge tube for a limited longitudinal movement relative thereto, the seal plate having a member rigidly connected therewith provided with an upwardly facing valve surface, resilient means urging the valve surface against the lower end of the discharge tube to seal the entrance thereto, a piston, means comprising a member slidably connected with the stay plate for limited vertical movement, for reciprocating the piston within the cylinder, resilient means for normally holding the piston in elevated position adjacent the top of the cylinder, in unsealing relation thereto, and means for adjusting the extent of downward movement of the piston in the cylinder.

2. A liquid dispensing pump for elevating liquid from a container in predetermined quantities comprising, in combination, a stay plate positioned above the liquid level in the container, a discharge tube secured to the stay plate and projecting over and below the same, means comprising a spring pressed valve normally closing the lower end of the discharge tube, a cup-shaped cylinder encircling the lower end of the discharge tube and the valve, mounted for limited longitudinal and rocking movement relative to the discharge tube, the bottom of the cylinder having openings for the admission of a liquid, a cylinder seal plate secured to the lower end of the spring pressed valve mechanism, below the cylinder for supporting the cylinder and sealing the opening

in the bottom thereof, a piston encircling the lower end of the discharge tube and the spring pressed valve mechanism, the diameter of the piston being slightly less than the inside diameter of the cylinder, and means accessible from the top of the stay plate for reciprocating the piston to discharge liquid from the discharge tube.

3. A liquid dispensing pump for elevating liquid in measured quantities, comprising a stay plate, a discharge tube extending therethrough and rigidly connected therewith, a tubular valve member surrounding the lower end of the discharge tube, the lower end of the tubular valve member being closed, the upper surface of the closed end forming a valve seat, means comprising a spring for normally holding the valve seat in sealing engagement with the lower end of the discharge tube, a cup-shaped cylinder secured to the tubular valve member below the valve seat, for limited longitudinal and rocking movement, the bottom of the cylinder having at least one opening for the admission of liquid, the wall of the tubular valve member having an opening above the valve seat, a cylinder seal plate secured to the end of the tubular valve below the cylinder, forming a seal for the liquid entrance opening when the cylinder rests thereon, a piston having an opening for the reception of the tubular valve member and an outside diameter slightly smaller than the inside diameter of the cylinder, the inner surface of the cylinder having an outwardly flaring zone at its upper end, means operable from above the upper surface of the stay plate for moving the piston downwardly within the cylinder, means comprising a spring for moving the piston upwardly, a stop for limiting the upward movement of the piston to a point where the lower surface thereof is above the lower edge of the flared zone, and an adjustable stop for limiting the downward movement of the piston relative to the cylinder.

4. A device for dispensing liquids in predetermined quantities, comprising, a stay plate, a discharge tube passing through an opening therein, a nut slidable on the discharge tube, a compression spring encircling the tube between the nut and the lower end thereof, a collar on the tube between the end thereof and the spring, forming an abutment for the spring, a tubular valve member, encircling the lower end of the discharge tube, the lower end being closed forming a valve seat, the upper end and the tubular valve being threadedly connected with the nut, the parts being so proportioned that the spring will normally hold the valve seat in sealing engagement with the lower end of the discharge tube, the wall of the tubular valve having an opening above the valve seat, a rod passing through the stay plate, means comprising a spring, urging the rod upwardly, means limiting the upward movement of the rod, adjustable means limiting the downward movement of the rod, an annular piston encircling the tubular valve, said piston being connected with the spring pressed rod, a cylinder seal attached to the lower end of the tubular valve, a cylinder of greater diameter than the cylinder seal positioned above the latter, means comprising a lost motion connection for guiding the cylinder and limiting its movement relative to the tubular valve, the bottom of the cylinder having openings for the entrance of a liquid, the interior diameter of the cylinder being slightly greater than the diameter of the piston, the upper edge of the inner surface of the cylinder terminating in an upwardly flar-

ing frusto conical surface, means comprising the spring pressed rod for moving the piston into and out of the cylinder, the lower surface of the piston being normally above the lower edge of the conical surface to permit the free entry of liquid, the wall of the tubular valve having an opening positioned above the valve seat for the entrance of liquid thereinto, and a knob at the upper end of the piston operating rod for receiving a downwardly acting force.

5. A device for dispensing liquids in predetermined quantities, comprising, a stay plate, a discharge tube passing through an opening therein, a nut slidable on the discharge tube, a compression spring encircling the tube between the nut and the lower end thereof, a collar on the tube between the end thereof and the spring, forming an abutment for the spring, a tubular valve member, encircling the lower end of the discharge tube, the lower end being closed forming a valve seat, the upper end of the tubular valve being threadedly connected with the nut, the parts being so proportioned that the spring will normally hold the valve seat in sealing engagement with the lower end of the discharge tube, the wall of the tubular valve having an opening above the valve seat, a rod passing through the stay plate, means comprising a spring, urging the rod upwardly, means limiting the upward movement of the rod, adjustable means limiting the downward movement of the rod, an annular piston encircling the tubular valve, said piston being connected with the spring pressed rod, a cylinder seal attached to the lower end of the tubular valve, a cylinder of greater diameter than the cylinder seal positioned above the latter, means comprising a lost motion connection for guiding the cylinder and limiting its movement relative to the tubular valve, the bottom of the cylinder having openings for the entrance of a liquid, the interior diameter of the cylinder being slightly greater than the diameter of the piston, the spring pressed rod forming means for moving the piston relative to the cylinder, the relative vertical movements of the piston and the cylinder being such that when both are in their uppermost position, an opening is formed through which liquid may freely enter the cylinder from above, whereby the cylinder will move downwardly in response to the action of gravity until it rests on the cylinder seal.

6. A liquid dispensing pump in combination, a stay plate, a discharge tube extending through an opening therein, a helical compression spring encircling the discharge tube adjacent its lower end, the tube having a flange between the lower end of the spring and the lower end of the discharge tube, a nut slidably connected with the discharge tube, above the spring, the nut having an inwardly directed flange for engagement with the upper end of the spring, a tubular valve member extending upwardly over the lower end of the discharge tube and over the spring, the upper end of the tubular valve member having threads for engaging with threads on the nut, the lower end of the tubular valve member being closed, the upper surface of the closure forming a valve seat for engaging with the lower end of the discharge tube, the wall of the tubular valve having an opening above the valve seat, the helical spring serving to normally hold the valve seat in sealing engagement with the lower end of the discharge tube, a cup-shaped cylinder having its bottom provided with an opening for the reception of a reduced portion the tubular valve member and with at least one other opening for the admission of liquid, a cylinder seal secured to the tubular valve member below the bottom of the cylinder, the cylinder having a limited longitudinal and rocking movement relative to the tubular valve, the inner surface of the cylinder terminating in a narrow outwardly flaring zone, a piston having a central opening encircling the tubular valve member, the outside diameter of the piston being slightly less than the inside diameter of the cylinder, means for reciprocating the piston in the cylinder comprising a rod having its lower end attached to the piston and its upper end passing through an opening in the stay plate, and means comprising a spring for normally holding the piston with its lower surface above the lower edge of the outwardly flaring zone of the inner surface.

7. A liquid dispensing pump in combination, a stay plate, a discharge tube extending through an opening therein, a helical compression spring encircling the discharge tube adjacent its lower end, the tube having a flange between the lower end of the spring and the lower end of the discharge tube, a nut slidably connected with the discharge tube, above the spring, the nut having an inwardly directed flange for engagement with the upper end of the spring, a tubular valve member extending upwardly over the lower end of the discharge tube and over the spring, the upper end of the tubular valve member having threads for engaging with threads on the nut, the lower end of the tubular valve member being closed, the upper surface of the closure forming a valve seat for engagement with the lower end of the discharge tube, the wall of the tubular valve having an opening above the valve seat, the helical spring serving to normally hold the valve seat in sealing engagement with the lower end of the discharge tube, a cup-shaped cylinder having its bottom provided with an opening for the reception of a reduced portion the tubular valve member and with at least one other opening for the admission of liquid, a cylinder seal secured to the tubular valve member below the bottom of the cylinder, the cylinder having a limited longitudinal and rocking movement relative to the tubular valve, a piston having a central opening encircling the tubular valve member, the outside diameter of the piston being slightly less than the inside diameter of the cylinder, means for reciprocating the piston in the cylinder comprising a rod having its lower end attached to the piston and its upper end passing through an opening in the stay plate, and means comprising a spring for normally holding the piston with its lower surface above the lower edge of the cylindrical inner surface providing an opening for the admission of liquid, whereby the cylinder will be free to drop onto the cylinder seal in response to the force of gravity.

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