

Oct. 16, 1928.

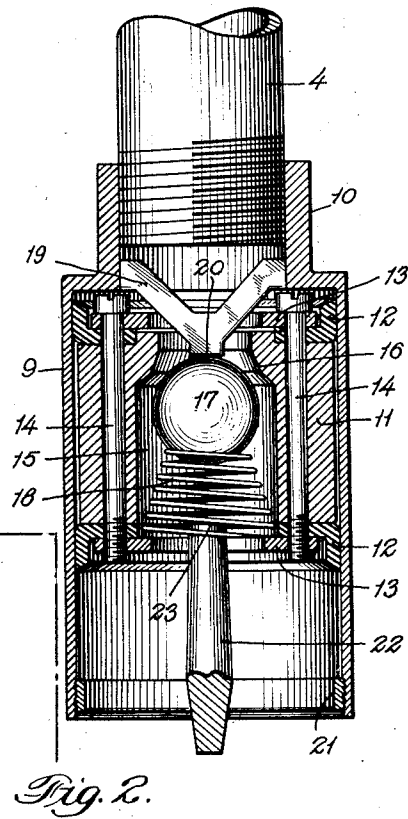
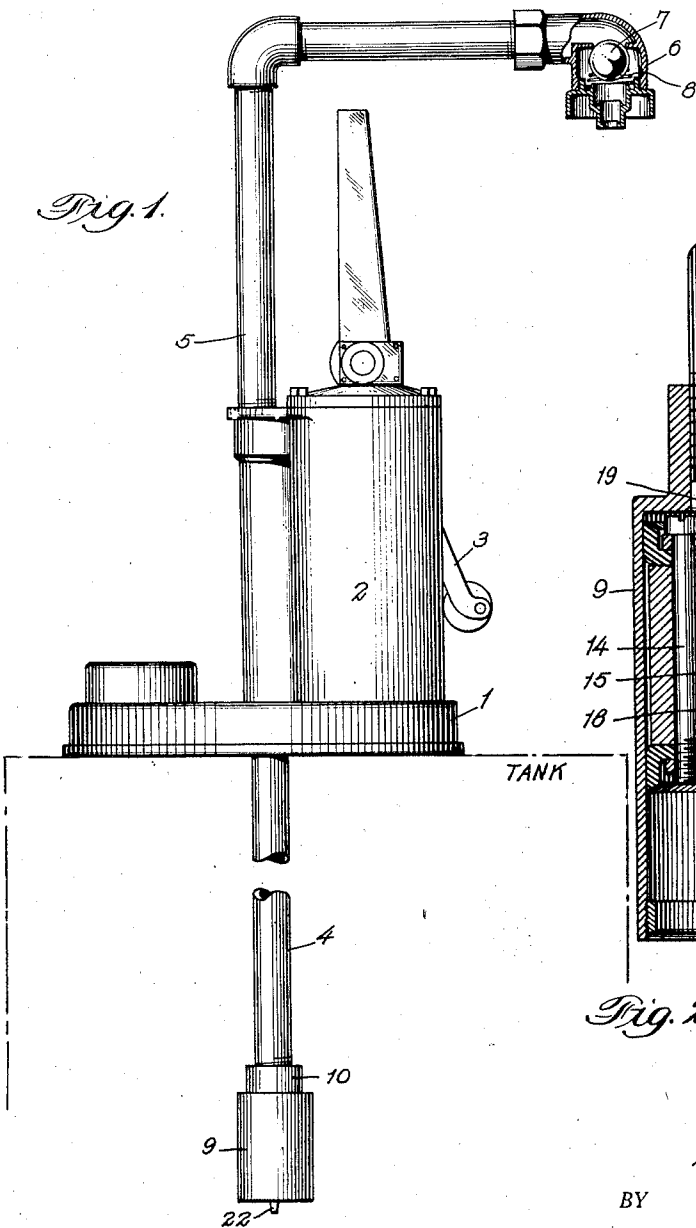
1,688,237

A. JONCHA

TANK PUMP

Filed Jan. 18, 1928

2 Sheets-Sheet 1



INVENTOR.

ANTON JONCHA

BY

Jack A. Richmond

ATTORNEY

Oct. 16, 1928.

1,688,237

A. JONCHA

TANK PUMP

Filed Jan. 18, 1928

2 Sheets-Sheet 2

Fig. 3.

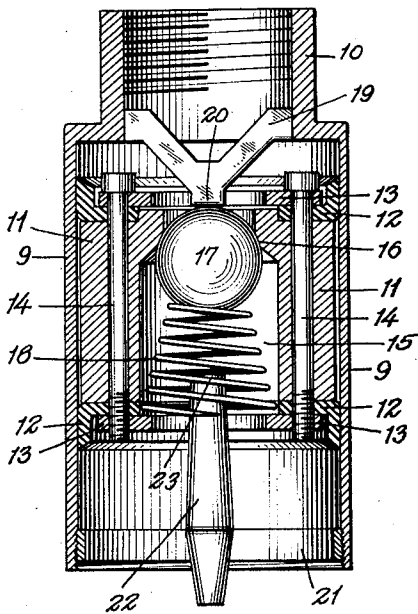


Fig. 4.

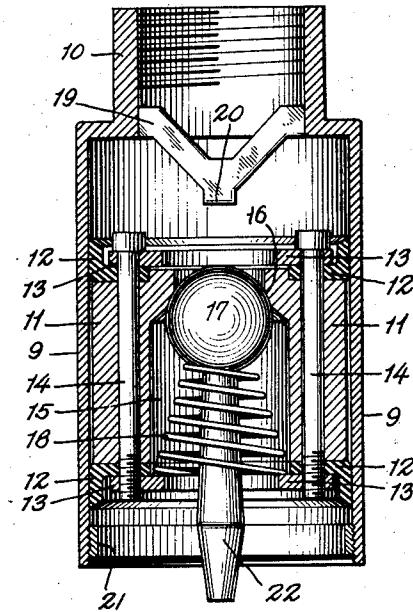


Fig. 5.

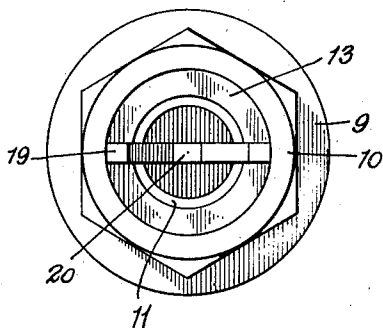
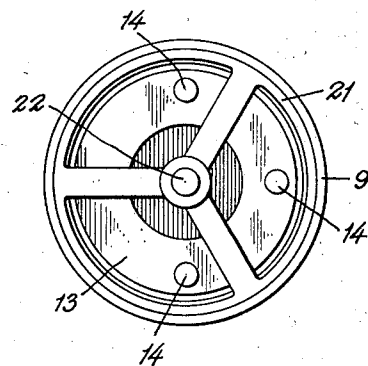


Fig. 6.



INVENTOR.

ANTON JONCHA

BY

Jack A. Richmond

ATTORNEY.

UNITED STATES PATENT OFFICE.

ANTON JONCHA, OF MAYWOOD, ILLINOIS, ASSIGNOR TO OIL PRODUCTS APPLIANCE CO.,
OF MAYWOOD, ILLINOIS, A CORPORATION OF ILLINOIS.

TANK PUMP.

Application filed January 18, 1928. Serial No. 247,643.

This invention relates to an oil expansion foot valve for liquid dispensing pumps where-in provision is made for automatically compensating for the expansion of the liquid column between the foot valve and nozzle valve under temperature changes to thereby prevent leakage and dripping at the nozzle.

In liquid dispensing pumps, the delivery pipe remains filled with the liquid following the delivery stroke of the pump, so that a column of liquid is held between the foot valve and nozzle valve while the pump is idle. Under temperature changes the volume of this column of liquid increases and as the foot valve, as ordinarily constructed, prevents return flow of the liquid to the tank, such increased volume of liquid displaces the outlet or nozzle valve with a consequent dripping or leakage of the liquid through the nozzle.

The main object of the present invention is the provision of a foot valve which, under expansion of the liquid column, will yield to compensate for such expansion and thereby prevent dripping or leakage at the nozzle.

A further object of the invention is the provision of a foot valve which is capable of yielding bodily without interruption of its valve function under the weight of the column of liquid between said foot valve and nozzle valve, thereby tending toward a reduction of pressure within the delivery pipe above the foot valve; that is to say, producing a vacuum pull on the liquid column between the foot valve and nozzle.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a view in elevation, partly in section, of a sufficient portion of a liquid dispensing pump to illustrate the application of the present invention.

Figure 2 is an enlarged vertical section of the foot valve with a portion of the delivery pipe connected thereto, the valve parts being shown in the positions occupied under the suction or lifting stroke of the pump.

Figure 3 is a vertical section of the foot valve, the parts being shown in the positions occupied when the pump is idle and under lifting pressure.

Figure 4 is a similar view of the foot valve with the pump parts in the positions occupied when the pump is under delivery pressure.

Figure 5 is a top plan view of the foot valve.

Figure 6 is a bottom plan view of the same.

The liquid dispensing pump in the detail illustrated includes a head 1 providing a removable cover for the tank on which is mounted a pump 2, the piston of which is adapted to be operated by a handle 3. A delivery pipe 4 carried by the head extends into the tank and is connected with the pump, extending above the latter, as at 5, and terminating in a delivery nozzle 6, preferably of the non-drip type, and including a nozzle valve 7 opening under delivery pressure from the pump and normally closed by a spring 8.

The present invention is particularly concerned with the foot valve removably secured at the lower end of the delivery pipe 4, which valve is designed, as usual, to permit the liquid in the tank to be drawn into the delivery tank on the suction stroke of the pump and to close against the return of this liquid to the tank in order that the delivery stroke of the pump may force the liquid in desired quantity past the nozzle valve and through the nozzle.

The foot valve includes a casing 9 open at the lower end and having a diametrically reduced neck 10 at the upper end which is interiorly threaded for removable connection with the delivery pipe. A piston 11 of somewhat elongated form is fitted within the valve casing 9, suitable packing in the form of cup leathers 12 held by plates 13 secured by rods 14 passing through the piston serving to maintain a non-leakage connection between the piston and casing. The piston is formed with a longitudinally extending centrally arranged bore or passage 15, the wall of which near the upper end of the piston is formed to provide a valve seat 16.

A ball valve 17 is positioned within the bore of the piston and rests upon a slightly conical coil spring 18, the lower end of which bears upon the lower packing holding plate 13, as shown. The ball valve 17 is designed to co-operate with the seat 16 to form a seal, the spring 18 serving to hold the valve against its seat in the direction of flow of the liquid from the tank to the delivery pipe. The diameter of the piston bore 15 is of course greater than that of the valve 17, so that when the valve is displaced from its seat there is a free liquid passage through the piston and around the valve.

The neck extension 10 of the valve casing is provided with what will be termed an upper valve stop 19 in the form of a V-shaped

bar integral with or secured to the interior portion of the neck extension, the lower end of which terminates in a square abutment 20 directly in the path of the valve 17 and disposed in such a plane that, when the piston is at its upper limit of movement in the casing 9, the abutment will have engaged and displaced the valve 17 relative to its seat 16.

Secured in the lower open end of the casing 9 is an annular ring 21 of spider form having a central upstanding stem 22 forming the lower valve stop. This stem terminates at its upper end in an abutment 23 arranged in the path of movement of the valve and on such a plane that, in the downward movement of the piston, this lower valve stop will engage the valve 17 and force the same tightly onto the seat 16, the stem, in this movement of the piston, passing through the coil spring 18.

Under the suction stroke of the pump, the piston 11 of the foot valve moves upwardly, during which movement the ball valve 17 contacts with and is arrested by the abutment 20 of the upper valve stop. Under the suction of the pump, the upward movement of the piston continues, unseating the valve against the tension of the spring 18 and providing a free passage for liquid around the valve and through the delivery pipe to the pump. The parts are then in the positions shown in Figure 2. At the end of the suction stroke of the pump, the suction on the piston is discontinued and the spring 18 acts to compel a downward movement of the piston to thereby cause the valve 17 to cooperate with its seat to close the communication between the tank and delivery pipe. On the delivery stroke of the pump, the pressure of the pump forces the piston with the contained valve and spring downwardly in the casing 9 until the ball valve is forced into contact with the lower valve stop 22. The abutment 23 of this stop acts to force the valve tightly against its seat, and, obviously, the greater the pressure of delivery, the more tightly the valve is seated. The parts are then in the positions shown in Figure 4. At the end of the delivery stroke, the handle of the pump is ordinarily reversed to relieve the liquid column in the delivery pipe from the pressure in the pump and under this pressure relief the foot valve parts move to the positions shown in Figure 3, that is, with the valve closed and the piston in an upper position, though in this instance the upper position of the piston is below the position occupied under the suction stroke of the pump.

While the pump is idle, there is of course a column of liquid standing in the delivery pipe 4 and 5 which substantially fills such delivery pipe between the foot valve and nozzle valve. The foot valve is held in the position shown in Figure 3 substantially by the friction of the packing leathers 12 and it is

apparent that such friction is opposed by the weight of the liquid in the delivery pipe. With this weight of liquid in the delivery pipe sufficient to overcome the friction of the packing leathers of the piston, it is apparent that, if free to move, the weight of the liquid column in the delivery pipe would force the piston downwardly. As the nozzle valve 7, however, is closed against ingress through the nozzle, any movement of the liquid column in a direction to displace the foot valve piston would create a vacuum or a material reduction in pressure in the delivery pipe above the liquid column. A downward movement of the piston of the foot valve and a consequent lowering of the liquid column in the delivery pipe is, therefore, prevented to any appreciable extent, but the tendency toward such movement tends to a downward movement of the liquid in the delivery pipe which, under the conditions described, is always present when the pump is idle and the pump pressure has been released. While the actual downward movement of the liquid column is prevented due to the tendency to produce a vacuum above the column, the influence of the liquid column in this direction renders the foot valve particularly sensitive to any influence tending to increase the volume of the liquid column. For example, it has been found that when the pump is idle and the liquid column in the delivery pipe subjected to material temperature changes, there is a natural tendency to increase the volume of the liquid in this column. As the tendency of the liquid column is to displace the foot valve piston in a downward direction, this increase in volume of the liquid column readily displaces the piston of the foot valve, causing the same to move downwardly in the casing while maintaining the valve 17 seated through the pressure of the spring 18. Experience has proven that, roughly speaking, there is expansion of approximately one per cent in lubricating oil, for example, under a temperature change of twenty-five degrees, and each particular valve is designed to permit a sufficient movement of the piston to take care of this expansion in the liquid column.

As the expansion of the liquid column in the delivery pipe under temperature changes is thus completely taken care of and automatically compensated for by the foot valve, it is of course apparent that there is no tendency of such liquid to displace the nozzle valve 7 and hence, under these conditions, there will be no leakage or dripping from the nozzle.

The improved foot valve is constructed as a unit and may be readily applied to any liquid dispensing pump without necessitating any change whatever in the latter and will serve, when applied to prevent the objectionable dripping and leakage from the nozzle

under any expansion of the liquid column in the delivery pipe while the pump is idle.

What is claimed to be new is:

1. In a liquid dispensing pump, a foot valve constructed to compensate for increase in liquid volume above the valve without releasing the liquid, to thereby prevent nozzle leakage.

2. In a liquid dispensing pump, a foot valve movable without valve release under the weight of the liquid column above it, to thereby create a vacuum pull on such liquid.

3. In a liquid dispensing pump, including a tank, a pump, and a delivery pipe, and means for preventing return flow from said pipe to the tank, said means automatically compensating for any volume increase in the liquid column in the delivery pipe while the pump is idle.

4. In a liquid dispensing pump, including a tank, a pump, and a delivery pipe, means for preventing return flow from said pipe to the tank, said means automatically compensating for any volume increase in the liquid column in the delivery pipe while the pump is idle and being influenced for such compensation by the weight of such liquid column.

5. In a liquid dispensing apparatus wherein a column of liquid is held ready for delivery while the apparatus is idle, means yielding under any increase in volume of such column without releasing the liquid to prevent escape of such liquid under said volume increase.

6. A foot valve for liquid dispensing pumps yieldable under volume increase of the liquid column above it when the pump is idle to prevent escape of such liquid.

7. A foot valve for liquid dispensing pumps operating to maintain a vacuum pull on the liquid column above it while the pump is idle.

8. A foot valve for liquid dispensing pumps, including a valve proper, and means to support the valve for bodily movement without valve release under increase of volume in the liquid column above the valve when the pump is idle.

9. A foot valve for liquid dispensing pumps, including a valve proper, and a piston carrying such valve, said piston being movable without valve release to compensate for increase in the volume of the liquid column above it when the pump is idle.

10. A foot valve for liquid dispensing pumps, including a valve casing, a piston slidable therein, a valve operating in the piston, and means for displacing the valve relative to the piston in the movement of the piston un-

der the suction stroke of the pump to thereby open the valve.

11. A foot valve for liquid dispensing pumps, including a casing, a piston therein formed with a liquid passage, a valve normally closing said passage, and means for limiting the movement of the valve without interrupting the piston movement under the suction stroke of the pump to thereby open the valve.

12. A foot valve for liquid dispensing pumps, including a casing, a piston movable therein and having a liquid passage formed to provide a valve seat, a valve cooperating with said seat, a spring for holding the valve on its seat, and means for displacing said valve from its seat in the movement of the piston under the suction stroke of the pump.

13. A foot valve for liquid dispensing pumps, including a casing, a plunger therein having a liquid passage, a valve for closing said passage, a spring for holding the valve to its seat, an upper valve stop for displacing the valve relative to its seat in the movement of the piston under the suction stroke of the pump, and a lower valve stop for maintaining the valve on its seat during the delivery stroke of the pump.

14. A foot valve for liquid dispensing pumps, including a casing, a plunger therein having a liquid passage, a valve for closing said passage, a spring for holding the valve to its seat, an upper valve stop for displacing the valve relative to its seat in the movement of the piston under the suction stroke of the pump, and a lower valve stop for maintaining the valve on its seat during the delivery stroke of the pump, said piston having a limited movement between the upper and lower valve stops during which the valve is held on its seat by said spring.

15. A foot valve for liquid dispensing pumps, including a casing, a plunger therein having a liquid passage, a valve for closing said passage, a spring for holding the valve to its seat, an upper valve stop for displacing the valve relative to its seat in the movement of the piston under the suction stroke of the pump, and a lower valve stop for maintaining the valve on its seat during the delivery stroke of the pump, said piston being open to the influence of the liquid column above it when the pump is idle, and movable under such influence with the valve held closed by the spring.

In testimony whereof I affix my signature.

ANTON JONCHA.