Aug. 16, 1932. C. L. BOND 1,871,655

NONDRIP LIQUID DISPENSER

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Fig. 1

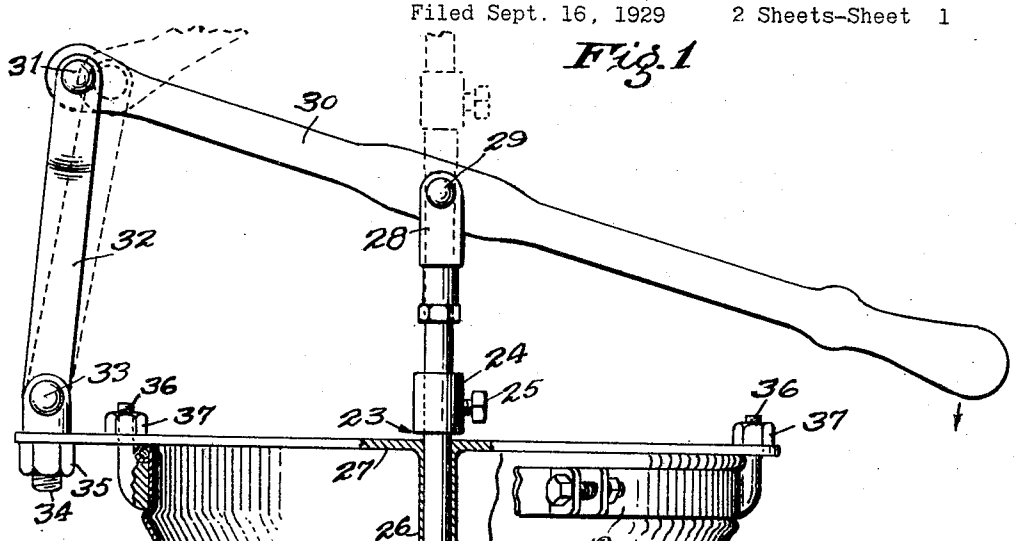


Fig. 2

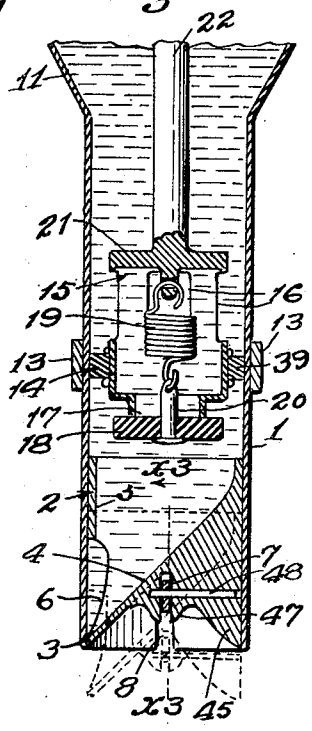


Fig. 3

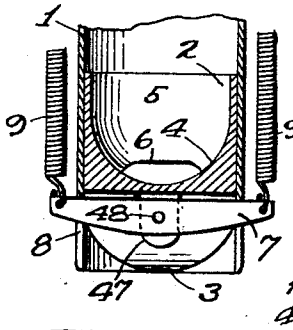
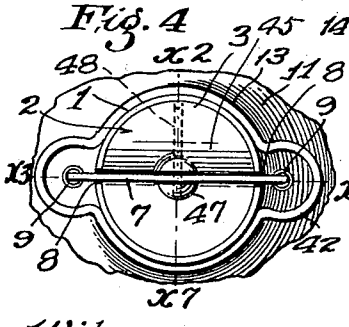
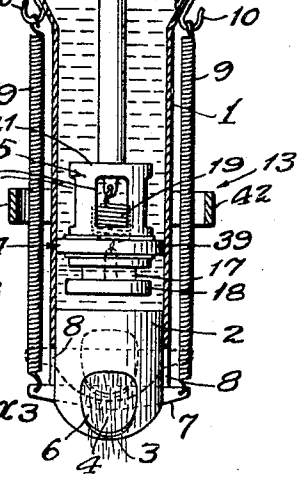


Fig. 4





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Fig. 5

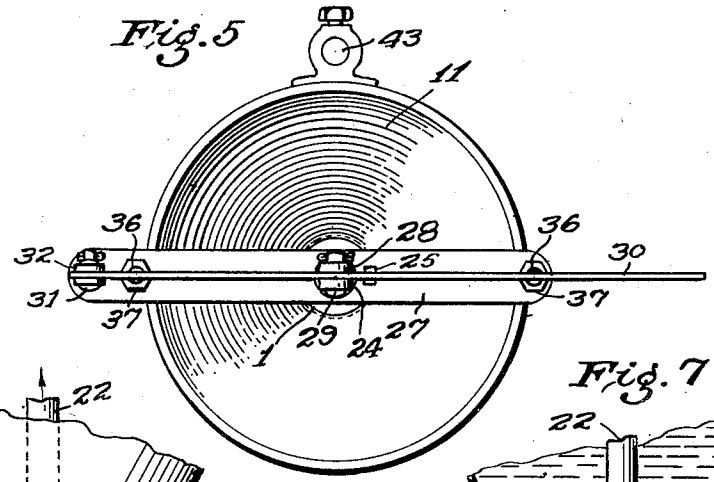


Fig. 6

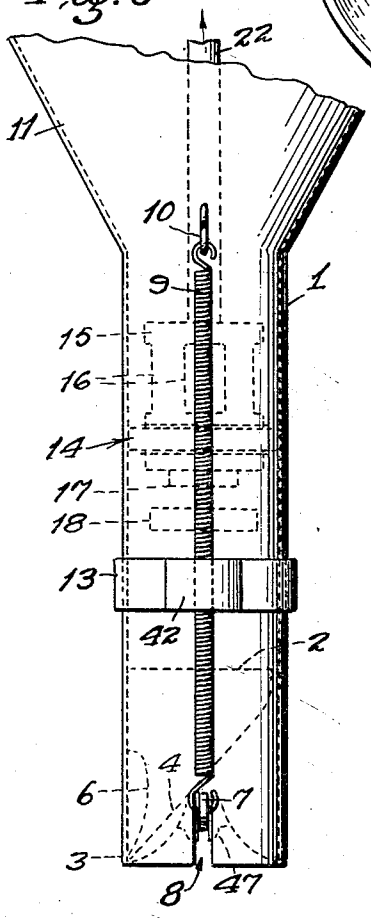
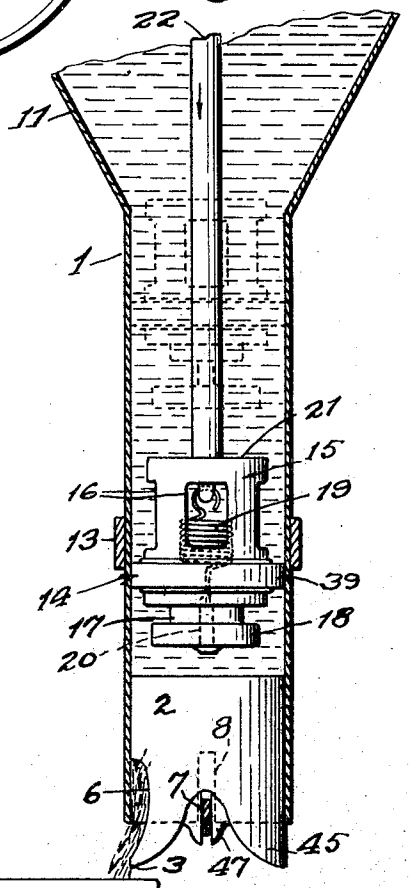
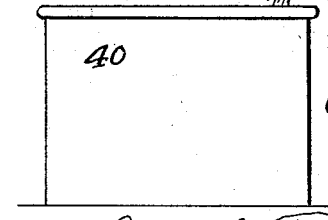


Fig. 7





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UNITED STATES PATENT OFFICE

CHARLES L. BOND, OF LOS ANGELES, CALIFORNIA

NONDRIP LIQUID DISPENSER

Application filed September 16, 1929. Serial No. 393,067.

This invention relates to means for dispensing liquids for filling containers or for other purposes, and an object of the invention is to provide a liquid dispenser by means of which the stream of liquid flowing from the dispenser will not contact with any surface that will hold it in position to be exposed to the air at any time after closing, and before reopening, of the valve, and by which means the flowing stream will be sharply cut off at the close of the dispensing operation without any dripping or the formation of any drop at the outlet of the dispenser.

This invention is applicable to the dispensing of all forms of liquids but is more particularly desirable for those forms of liquid having a high coefficient of cohesion and adhesion and commonly known as semi-liquids, such as paint, paste, mayonnaise dressing, molasses, heavy oils and the like.

In this invention I provide a vertical dispensing tube having an open lower end; a sliding plug valve exactly fitting and wholly withdrawable into the tube, and slidable out and in through the open tube end and being provided with a channel in the upper end of the plug, which channel is reduced in width downwardly to a narrow arc at one side of the plug and one side of the bore of the tube just above the lower end of the tube when the plug is wholly within the tube, thereby entirely closing the lower tube end in readiness to be moved downward to open an outlet from the lower end of the tube underneath the tube end and below the level of the lower end of the plug, upon depression of the plug; a valved pump piston operable in the tube above the plug to force liquid down to lower the plug to bring the lower end of the channel below the bottom of the tube, and to project a stream of liquid outwardly and downwardly aslant beyond and free from the periphery of the plug; said pump piston being provided at its lower end with a thin walled tubular nipple having a square cut end, a valve plate having a flat face fitting against the square cut end of the nipple for instantaneous closing against the nipple by atmospheric pressure on cessation of downward pressure of the pump piston; a valve spring arranged to follow up the closing movement of the pump valve to hold such valve in the atmospherically closed position; and spring means connected to the valve plug to return such plug into the inside of the tube to close the outlet upon cessation of downward pressure on the pump valve, and to avoid exposure to the air of any surface upon which deposit of liquid is made during the dispensing operation.

The invention may be applied in various ways and the liquid may be fed to the tube from a supply of any desirable capacity, and the added or valve opening pressure may be applied in various ways; and for the purposes of this description, the tube will be shown provided with a funnel like charging device, and the means for applying pressure upon the pump valve will be shown as a valved plunger operable by a piston rod moved by a hand lever.

One of the advantages of this invention is the rapid dispensing of highly adhesive and cohesive liquids, as for instance, prepared paints, glues, syrups, pastes, mayonnaise dressing, etc. For example in filling paint cans from faucets as heretofore, the prepared paint will continue to flow or drip from, or adhere to, after the faucet has been closed, and considerable time must be consumed in waiting for the stream or drop to cease, to avoid mussing or smearing the cans or other receptacles being filled successively; so that the attendant finds it necessary to attempt quick changing from a filled to an empty can, with the result that the string of paint from the faucet dribbles over and smears both cans. In filling cream bottles in restaurants a like dripping occurs, thus delaying the work or causing the cream to be spread in an undesirable way. By the present device all this is avoided and the cut off is perfect and instantaneous, no liquid adheres to the outside of the dispenser, and the containers can be changed without any smearing or mussing.

A further advantage is that the attendant can accurately fill a container to exactly the depth required, as the cut off is complete at the moment the plunger ceases its descent.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detailed description and the appended claims.

The accompanying drawings illustrate the invention.

Figure 1 is a side elevation partly in section, of a dispensing apparatus charged with liquid to be dispensed and constructed in accordance with this invention; showing the parts, in solid lines as dispensing liquid while the handle and plunger are moving down, and just before the cut off is effected at the stopping of such down movement; the cutting off position of the dispensing valve being indicated in broken lines, and the fully elevated position of the plunger and lever being shown in dotted lines.

Fig. 2 is an enlarged view in vertical section on line *x*2—*x*7, Fig. 4, of the dispensing tube and the interior parts, at the moment after stopping the downward movement of the plunger which held the dispensing valve in the dispensing position indicated in broken lines in this view and in solid lines in Fig. 1; the dispensing valve being shown in solid lines as returned by the side springs to the cut off position indicated in broken lines in Fig. 1.

Fig. 3 is a section on line *x*3, Figs. 2 and 4.

Fig. 4 is a view looking from the bottom up toward the intake funnel, a fragment of which is shown.

Fig. 5 is a reduced plan view of the device shown in Fig. 1.

Fig. 6 is an outside view of the tube and retracting spring at right angles to Fig. 1, the dispenser being closed and the plunger shown rising in dotted lines.

Fig. 7 is a mid-section on line *x*2—*x*7, Fig. 4, showing the parts in position discharging the liquid into a container.

The dispensing tube 1 is shown vertical and may be of any appropriate cross-section and length and its lower end may be cut off square as clearly shown in Figs. 2, 3 and 6. The plug valve 2 is externally circular and has a discharge passage open above a terminal lip 3 at the lower end of the plug at the meeting of a slanting floor 4 and a semi-cylindrical wall 5 arranged opposite to the floor 4 and provided just above the lip 3 with an orifice 6 adapted to be closed by the tube 1 when the plug is entirely inside the tube, and which constitutes a lateral nozzle outlet below the end of the tube when the plug is projected below the end of the tube.

In the form shown, the floor 4 of the plug valve is aslant at an angle of about forty-five degrees to the opposite wall 5 and is shown as extending downwardly at different angles from a vertical to an angle divergent from the floor 4, thus to form a narrowing outlet through passage 6 to the nozzle outlet 3.

7 is a yoke extending under the dispensing valve plug 2 and through slots 8 below the floor 4 to outside the tube 1 on opposite sides thereof, and there connected to retracting springs 9 fastened at their lower ends to the yoke and at the upper ends to hooks 10 that are fixed to the stationary supplying device formed, in the instance shown, by the tube 1 and the funnel body 11 which is shown fixedly supported by the bands 12 and 13. The springs 9 normally hold the dispensing valve plug retracted within the dispensing tube 1, with the yoke 7 stopped by the upper ends of the slots 8.

The liquid thrusting and valve retracting plunger 14 comprises a cage 15 of less diameter than the tube, provided with side openings 16 and with a bottom outlet formed by a thin square cut tubular nipple 17 adapted to be normally closed by a poppet valve 18 yieldingly held in closed position by a spring 19 connecting a central stem 20 of the valve to the top 21 of the cage which is fixed to the piston rod 22 that may have a limited downward movement determined by a stop 23 formed of collar 24 adjustably fixed on the rod by set screw 25. Said rod extends through a guide 26 supported by a cross bar 27 against which the sleeve 24 will contact at the lower limit of the plunger rod movement, the valve 18 being free from contact with the dispensing valve plug 2.

In Fig. 1 the piston rod is shown provided with a fork 28 to support a fulcrum 29 of the operating lever 30 which is pivoted at 31 to a link 32 that is pivoted at 33 to a stationary support fixed by the bolt 34 and nut 35 to the cross bar 27 which is fixed by the studs 36 and nuts 37 and a band 12, to the funnel.

In practical operation with the embodiment shown, the liquid will be supplied to the tube 1 through the funnel body 11, and will flow to the dispensing valve 2 when the plunger and dispensing valve are in the position they are brought to by fully raising the handle of the lever 30.

The plunger 14 is provided with an annular gasket 39 surrounding and immovably fixed to the cage and fitted liquid tight in and slidable freely along inside the tube so that when the plunger 14 is retracted, it produces suction in the space above the dispensing valve, thus tending to produce a vacuum which will be supplied from above, through displacement of the poppet valve 18, so that if there is liquid in the tube above the level of the gasket 39, such liquid will flow down through the plunger and will fill the nozzle and the cavity of the dispensing valve 2, and the tube below the plunger; and if there is liquid in the funnel and the plunger is entirely withdrawn from the tube, the liquid will flow freely from the funnel into the tube so that upon the down thrust of the plunger on the liquid, the valve 2 will be

subjected to hydraulic pressure to force the dispensing valve down until the mouth of its nozzle passes the lower end of the tube, thus allowing the liquid to flow out at one side of the lower end of the tube and into the container 40.

The tube is held against vibration by a collar 13 which is shown provided with loops 42 to accommodate the springs 9, and is fastened to a support as a standard 43 to which band 12 is connected.

After the retracting movement, the poppet valve is held initially closed by the spring 19 which is stronger than the retracting springs 9 so that irrespective of any retracting movement of the handle, the springs 9 will retract the dispensing valve; and when the lever is raised, the vacuum caused by the poppet valve and resisted by the spring 19 will allow the external air pressure to snap the valve plug shut.

The springs 9 are strong enough to support the valve plug and the static pressure of the liquid in the tube, but upon the down movement of the plunger the force of the springs 9 is overcome and a resulting downward movement of the dispensing valve plug allows the liquid to be dispensed through the nozzle as above described.

It is thus seen that at the upward movement of the plunger the dispensing valve plug is closed and remains closed until the plunger is again returned to and is moved downward in the tube 1 to create a pressure upon the tube content to open the valve.

The square cut outlet end of the tube is shown provided with guide notches 8 to accommodate the ends of the yoke that carries the valve plug which is fixed to the yoke half way up the slanting bottom of the said valve plug from the outlet side of the valve plug; the other side of which extends downward below the slanting bottom floor as at 45, thus forming a guide extension corresponding to the valve lip or tip 3 of the valve plug, to avoid any canting or cramping of the valve plug.

The tube forms stop means for the yoke, to prevent the valve plug from being drawn up too far by suction of the plunger; and when the valve plug is stopped from its upward movement the poppet valve instantly relieves the vacuum above the valve plug.

The piston valve is provided on its under side with a slotted extension 47 in which the yoke is fulcrumed by a pin 48 so that the yoke may rock sufficiently to act as an equalizer between the side springs and the valve plug, thus further to avoid any likelihood of cramping, and furthermore to act as a stop.

I claim:

1. In combination with a tube having a square cut end portion and a way for a yoke extending above said square cut portion; a piston valve; a yoke fulcrumed to the piston valve and projecting beyond the walls of the tube and side springs connected to the ends of the yoke and to a support to retract the piston valve.

2. The combination with a tube; of a valve slidable in the tube and having at one side and at its lower end an outlet, and fitting the tube so that when the valve is retracted the outlet is cut off by the lower edge of the tube; an equalizing yoke pivoted to the valve; and springs connecting the ends of the yoke with the tube to yieldingly hold the valve retracted in the tube.

3. A liquid lispenser comprising in combination a vertical dispensing tube having an open lower end; a sliding plug valve exactly fitting and wholly withdrawable into the tube, and slidable out and in through the open tube end and being provided with a channel in the upper end of the plug, which channel is reduced in width downwardly to a narrow arc at one side of the plug and one side of the bore of the tube just above the lower end of the tube when the plug is wholly within the tube, thereby entirely closing the lower tube end in readiness to be moved downward to open an outlet from the lower end of the tube underneath the tube end and below the level of the lower end of the plug, upon depression of the plug; a valved pump piston operable in the tube above the plug to force liquid down to lower the plug to bring the lower end of the channel below the bottom of the tube, and to project a stream of liquid outwardly and downwardly aslant beyond and free from the periphery of the plug; said pump piston being provided at its lower end with a thin walled tubular nipple having a square cut end, a valve plate having a flat face fitting against the square cut end of the nipple for instantaneous closing against the nipple by atmospheric pressure on cessation of downward pressure of the pump piston; a valve spring arranged to follow up the closing movement of the pump valve to hold such valve in the atmospherically closed position; and spring means connected to the valve plug to return such plug into the inside of the tube to close the outlet upon cessation of downward pressure on the pump valve, and to avoid exposure to the air of any surface upon which deposit of liquid is made during the dispensing operation.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 6th day of September, 1929.

CHARLES L. BOND.