Aug. 30, 1932. O. PETERSON 1,874,612

SIRUP PUMP

Filed May 31, 1930 3 Sheets-Sheet 1

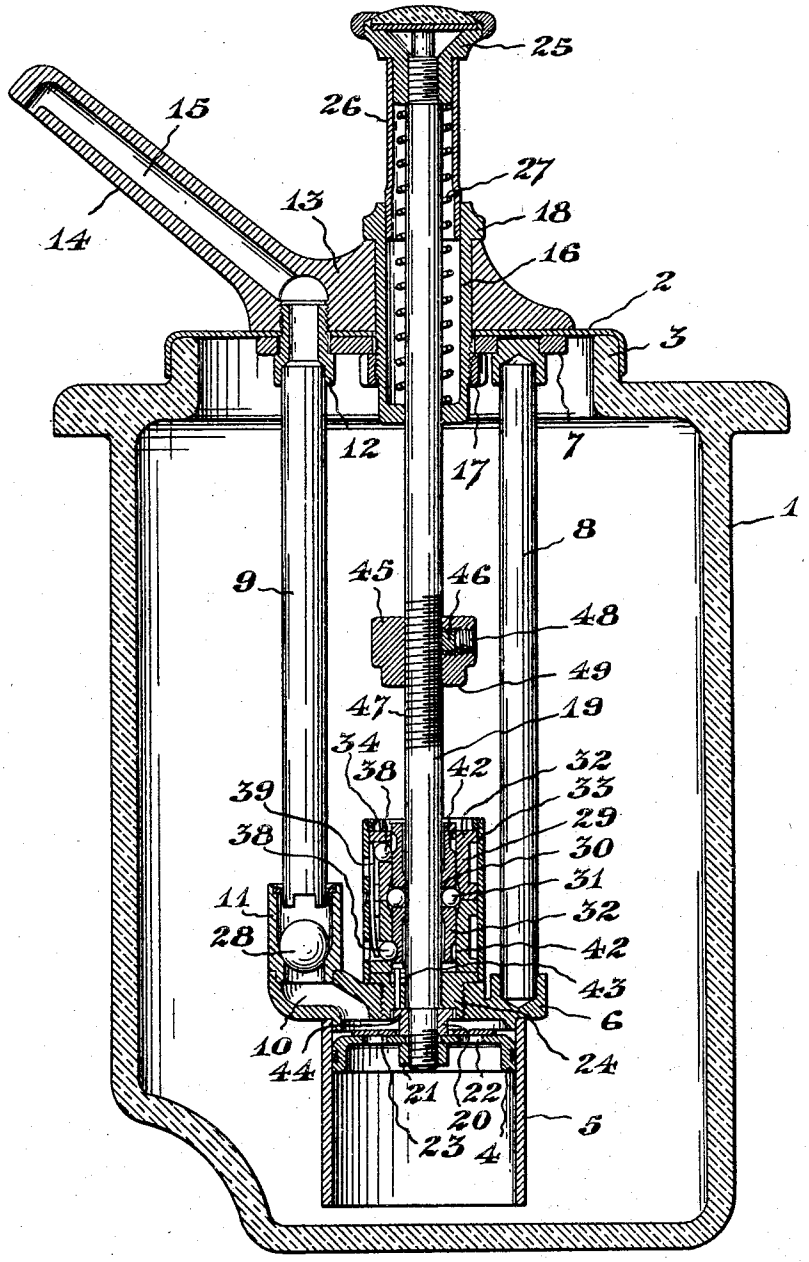


Fig. 1.

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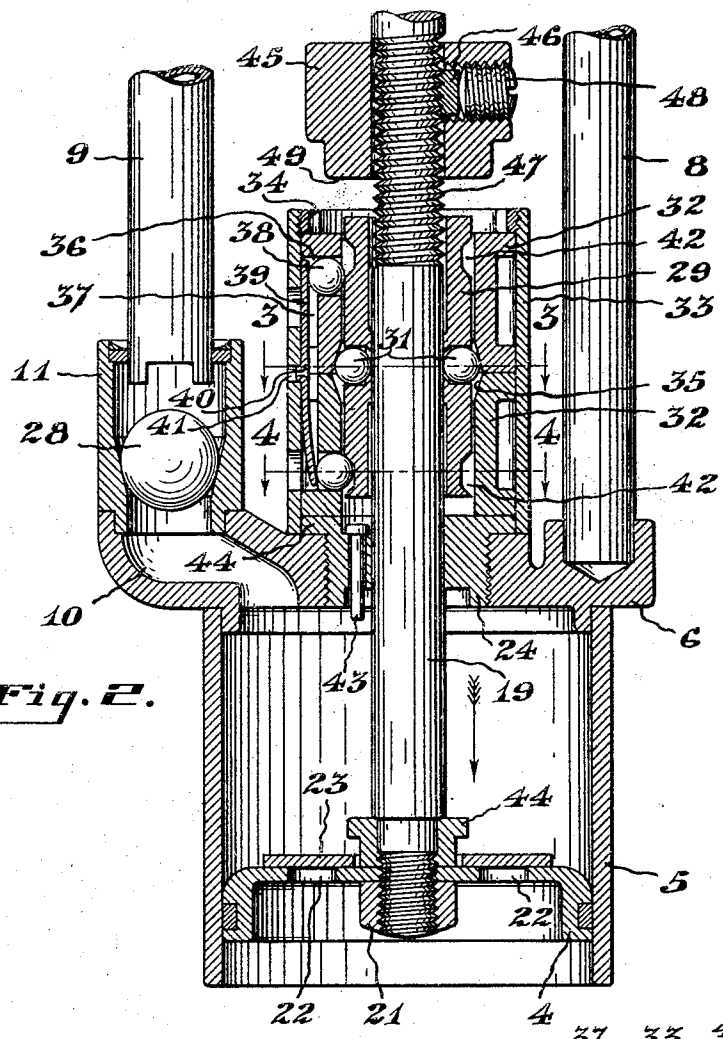


Fig. 2.

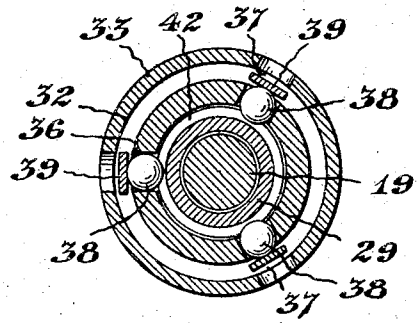


Fig. 4.

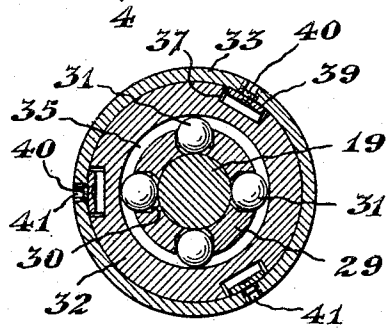


Fig. 3.

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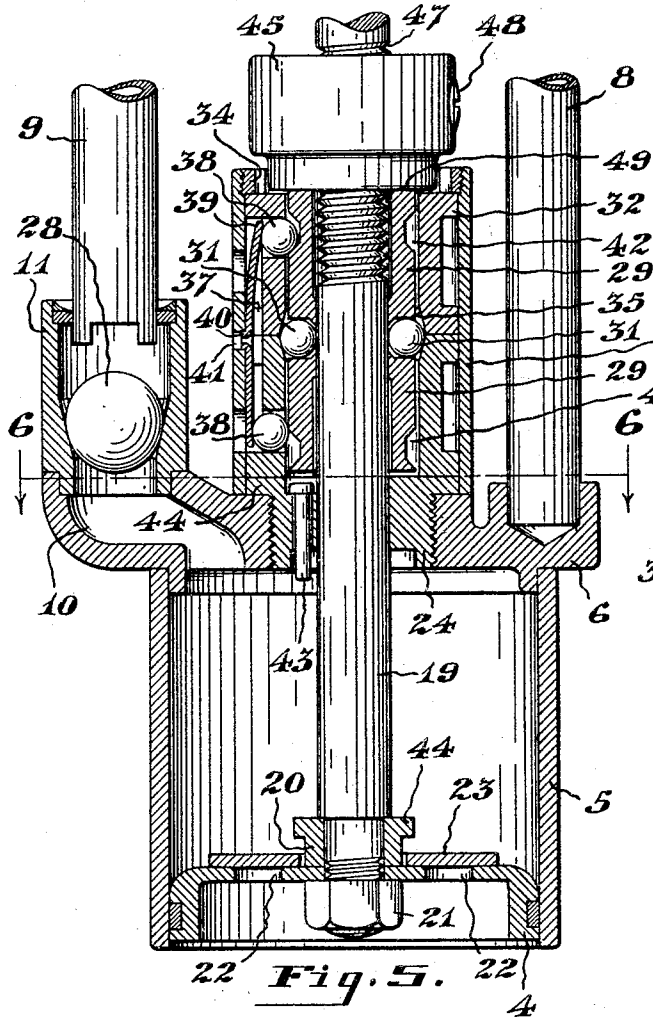


Fig. 5.

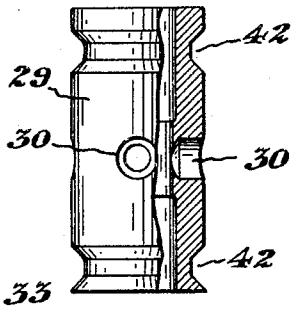


Fig. 7.

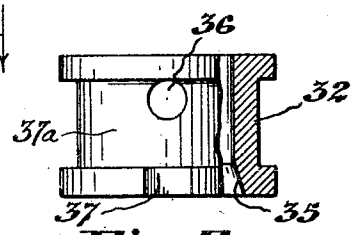


Fig. 8.

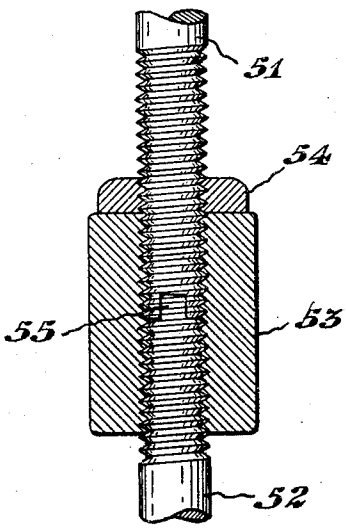


Fig. 9.

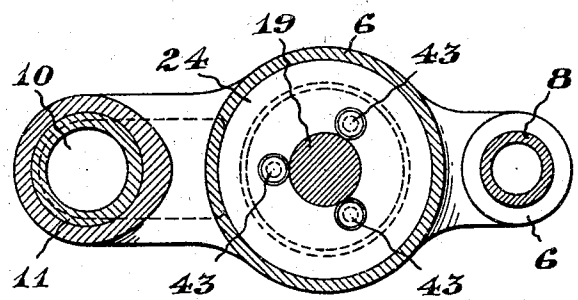


Fig. 6.

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UNITED STATES PATENT OFFICE

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SIRUP PUMP

Application filed May 31, 1930. Serial No. 458,376.

This invention relates to liquid dispensing pumps, and more particularly to those used in soda fountain equipment for dispensing sirups, beverages, and the like.

Heretofore, it has been possible with pumps of this type to dispense a more or less than predetermined measured charge of liquid by manipulation of the operating handle. In other words, it was possible for the operator to move the plunger a fraction of a full stroke and thus cheat the customer by giving less than a predetermined charge or to cheat the owner by giving more than the predetermined charge of liquid.

The present invention contemplates a dispensing pump in which such practice on the part of the fountain operator will be obviated, and one of the objects thereof is the provision of a liquid dispensing pump in which only a predetermined charge of liquid can be dispensed in a single operation of the same.

Another object is to provide a liquid dispensing pump of the plunger type wherein only a full stroke of the plunger can be obtained when operated in either direction.

Another object is to provide a liquid dispensing pump of the plunger type with controlling means for the plunger for restraining the same against reversional movement in incomplete states of the operation.

A further object is to provide a liquid dispensing pump of the plunger type with means acting on the plunger rod which, when the plunger is being actuated in one direction, automatically locks the plunger against a return movement in the opposite direction until a full stroke is accomplished.

With the above and other objects in view, which will be apparent from the detailed description which follows, the invention consists in certain novel features of construction and combinations of parts which will be readily understood by those skilled in the art to which the invention appertains.

In the drawings which illustrate one embodiment of the invention,

Figure 1 is a vertical sectional view through a liquid dispensing pump showing the same in normal inoperative position in a sirup jar.

Fig. 2 is an enlarged sectional view of the lower part of the pump illustrated in Fig. 1, showing the plunger part-way down and the locking mechanism in position to prevent a return movement of the plunger;

Fig. 3 is a transverse section taken substantially on the line 3—3 of Fig. 2, showing the plunger rod locking means;

Fig. 4 is a transverse section taken substantially on the line 4—4 of Fig. 2;

Fig. 5 is a section similar to Fig. 2 showing the plunger at the bottom of its stroke and the locking mechanism reversed to permit return;

Fig. 6 is a transverse section taken substantially on the line 6—6 of Fig. 5;

Fig. 7 is a side elevation of the collar for supporting the locking means, a portion being broken away to show the same in longitudinal section;

Fig. 8 is a side elevation of the tapered locking sleeve, a portion being broken away to show the same in longitudinal section; and

Fig. 9 is an axial section of a modified form of adjusting collar mounted on the plunger rod.

Referring to the accompanying drawings in which like numerals refer to like parts throughout the several views, the liquid dispensing pump of the present invention is shown, for the purpose of illustration, mounted within a suitable sirup jar or container 1 containing the liquid to be dispensed, and is supported there by means of a peripherally flanged cover-plate 2 arranged to seat on an upstanding flange 3 surrounding the opening of the jar 1.

The pump shown in the drawings is of the type comprising a plunger 4 reciprocable within a cylinder 5 to discharge liquid on its up stroke. The cylinder 5 may be formed of a section of suitable tubing and is mounted on a head 6 which is supported from a reinforcing plate 7 secured to the cover-plate 2. The reinforcing plate 7 has a depending rod member 8 rigidly secured thereto which is suitably secured at its lower end to the head 6 to support one side of the head 6. The other side of the cylinder head 6 is supported from the cover-plate 2 by means of the dis-

charge conduit 9. The head 6 is formed with an outlet passageway 10 which receives a valve collar 11, and the conduit 9 is secured at its lower end to the collar 11. The upper end of the conduit is provided with a threaded nipple 12 which seats against and extends through the plate 7 and cover-plate 2 where it is threaded into the base 13 of the delivery spout 14, the spout 14 being provided with a discharge passage 15 in communication with the conduit 9.

The base 13 for the discharge spout 14 is mounted on the upper side of the cover-plate 2 by means of a cylindrical guide sleeve 16 which extends through the base and cover-plate in axial alignment with the cylinder 5 and is provided with a nut 17 threaded thereonto at its end projecting beyond the reinforcing plate 7 which securely clamps the base 13 between the shoulder 18 formed at the upper end of the sleeve and the cover-plate 2.

The plunger 4 is actuated in the cylinder 5 by a plunger rod 19 having a reduced end portion which extends axially through the plunger 4. A shouldered collar 20 is interposed between the plunger 4 and the shoulder formed on the plunger rod 19 and a nut 21 is threaded on the reduced end of the rod 19 to hold the plunger 4 against the collar 20. The plunger 4 is formed with a number of openings 22 to admit liquid to the upper side of the cylinder on the down stroke of the plunger, and these openings are covered by a floating disk valve 23 surrounding the collar 20 and adapted to seat against the upper side of the plunger on the upward stroke, whereby the same discharges the liquid through the passage 10 into the discharge conduit 9.

The end of the plunger rod 19 adjacent the plunger 4 is axially guided by a shouldered nut 24 threaded into the cylinder head 6. The plunger rod extends upwardly through the bottom of the sleeve member 16 and is guided thereby, and is provided with an operating handle 25 at its upper end. The operating handle 25 is provided with a cylinder portion 26 which is telescoped with and adapted to slide axially in the sleeve 16, a coiled compression spring 27 surrounding the rod 19 and engaging the bottom of the sleeve 16, the handle 24 being provided to resiliently hold the plunger in normal inoperative position at the top of the cylinder 5.

In operation, the handle 25 is depressed against the pressure of the coil spring 27 thereby moving the plunger 4 toward the bottom of the cylinder 5 and permitting liquid to raise the disk valve 23 and pass through the opening 22 in the plunger 4 to the upper end of the cylinder. The handle 25 is then released and the spring 27 causes the plunger to return, thus seating the disk valve 23 over the openings and moving the liquid in the cylinder above the plunger through the passage 10, past the check valve 28 and into the discharge conduit 9 and discharge spout 14, the check valve 28 being provided to prevent the return of liquid from the discharge conduit 9 to the cylinder 5.

The pump construction so far described may be said to be conventional, and it can be seen that the least downward movement will permit liquid to be discharged on the return movement.

The present invention, as previously stated, contemplates means to automatically prevent a reverse movement of the plunger until it has made a complete predetermined stroke in one direction, in order that a measured charge of liquid of predetermined amount will be discharged or dispensed at each operation of the pump. This means for preventing reverse movement of the plunger 4 will now be described.

The plunger rod 19 is arranged to axially slide in a sleeve 29 only having bearing engagement with the rod over a relatively small central area, as shown in Figs. 5 and 7. This sleeve 29 is formed intermediate its ends with a number of circumferentially arranged openings 30, each of which carries a hardened steel ball 31, and the sleeve is slidably mounted in a pair of superposed locking collars 32 contained within a cylindrical member 33 that is secured at one end to the threaded head nut 24. An annular externally threaded nut 34 surrounding the plunger rod is threaded into the upper end of the member 33 and prevents axial movement of the collars 32. These locking collars 32 abut against each other adjacent the balls 31 and the inner cylindrical surface of each is tapered at 35 toward the other to provide a housing for the balls 31 which, as shown in Fig. 2, are of slightly greater diameter than the thickest wall portion of the sleeve 29. These tapered surfaces 35 are provided as will be later apparent, to wedge the balls 31 against the plunger rod 19 to prevent movement thereof in a certain direction.

Each locking collar 32 at the end opposite the tapered surface 35 is formed with circumferentially arranged openings 36 which open into circumferential grooves 37ª and which carry suitable ball detents 38. A flat spring member 39 is positioned within the aligned longitudinal grooves 37 of the collars 32 and its ends are arranged to resiliently bear against the ball detents 38 in the respective openings 36 of the collars 32, the spring member 39 having a projection 40 which extends into an opening 41 in the surrounding casing 33. The movable sleeve 29 is provided on its outer surface and at each end with a circumferential depression 42 having divergent side walls. The mean distance between these depressions 42 is slightly greater than the mean distance between the two series of ball detents 38 carried by the locking collars

32, so that when the sleeve 29 is in one position the one series of detents 38 will be held in one of the depressions 42, and when the sleeve 29 is in another position the other series of detents will be held in the other depression 42.

The nut 24 threaded into the head 6 and which surrounds the plunger rod 19 is provided with a number of pins 43 which slidably extend therethrough and which are adapted under certain conditions to be engaged and actuated by the shoulder 44 formed on the plunger spacer collar 20 to move the locking sleeve 29 relative to the collars 32.

The plunger rod 19 is threaded at 47 intermediate its ends above the locking device just described and has an annular member 45 which is provided with a threaded plug 46 that engages the threads 47. A screw 48 is threaded into the member 45 to force the plug 46 into locked engagement with the threads 47 on the plunger rod 19. By loosening the screw 48 the member 45 can be moved to the desired adjusted position on the plunger rod 19 in order to regulate the stroke of the plunger 4. This member 45 has a portion 49 of reduced diameter which is engageable with the sleeve 29 when the plunger is actuated downwardly.

A modified adjustable member 53 corresponding to the member 45 is shown in Fig. 9. In this construction the plunger rod is formed in two parts 51 and 52 and the adjacent ends are threaded in the same direction, the member 53 being threaded onto these parts 51 and 52, and provided with a suitable lock nut 54. To adjust the position of the member 53, the locking nut 54 is loosened and the member 53 is threaded in the desired directions. Relative rotation of the rod parts 51 and 52 is prevented by providing a tongue and groove 55 in engagement therebetween.

The normal inoperative position of the dispensing pump of the present invention is shown in Fig. 1. In this position it will be noted that the plunger 4 is at the top of the cylinder 5 and that the shoulder 44 of the spacer 20 engages the pins 43 which abut against the lower annular end of the locking sleeve 29. It will also be noted that the sleeve is in an uppermost position with the lower ball detents 38 positioned in the lower depression 42 by the spring 39, and with the upper detents 38 engaging the outer surface of the sleeve 29. Furthermore the balls 31 are held in a contacting position with both the plunger rod 19 and the tapered surface 35 of the uppermost locking collar 32 by the sleeve 29.

When it is desired to dispense liquid from the jar 1 the plunger operating handle 25 is depressed to move the plunger rod 19 downwardly. The walls of the inclined surface 35 with which the balls 31 are in engagement being divergent from the downward direction of movement of the plunger rod 19, do not exert any wedging action and thus permit the downward movement of the plunger rod 19. Assuming that the operator only wishes to dispense an amount of liquid less than the predetermined quantity, such as the amount represented by the position of the plunger when it has moved downwardly to the position indicated in Fig. 2, he releases the handle 25, and because of the fact that the side walls of the collar 32 with which the balls 31 contact converge toward the return movement of the plunger rod 19 and because of the frictional engagement of the balls 31 with both the surface 35 and the rod 19, any tendency of the rod 19 toward a return movement wedges the balls 31 into tighter engagement with the surface 35 and the rod 19, thus locking the rod 19 against return movement. That is, it is locked against return movement when the plunger 4 has only been moved downwardly on the cylinder loading stroke to the position shown in Fig. 2.

In order to return the plunger to its original position it is then necessary to move the plunger 4 to the full end of its downward stroke and fill the cylinder with the predetermined charge of liquid. As the plunger reaches the end of its downward stroke the portion 49 of the member 45 engages the upper annular end of the sleeve 29 and moves the sleeve downwardly until the ball detents 38 carried by the upper collar 32 align with the upper depression 42 of the sleeve 29, thus shifting the balls 31 into engagement with the tapered surface 35 of the lower locking collar 32. This position is shown in Fig. 5 and it is thus obvious that because of the fact that the lower tapered surface 35 diverges upwardly, the plunger 4 when the pressure is released therefrom will be returned to its uppermost position and will discharge the measured quantity of liquid contained within the cylinder 5. For the reasons previously mentioned, it is further obvious that the operator cannot stop the upward progress of the plunger before it makes a full stroke, in order to move the plunger downwardly and discharge an added amount of liquid. With the locking sleeve 29 in the position shown in Fig. 5, any downward movement of the plunger rod 19 wedges the balls 31 against the lower tapered surface 35 and the plunger rod 19.

As the plunger 4 nears the top of its upward stroke, the flange 44 of the spacer 20 engages the pins 43 and moves the sleeve 29 to the original position shown in Fig. 1.

It is obvious that by adjusting the operating member 45 on the plunger rod 19 to the desired position, that any desired charge of liquid can be admitted since the member 45 determines the position at which the plunger can no longer be moved downwardly.

It is clearly apparent that the present invention provides simple and efficient means for a liquid dispensing pump which permits only a predetermined charge of liquid to be dispensed during a single operation of the plunger and furthermore that with the device of the present invention, the dispensing plunger can be returned to its original position only after a full stroke thereof in the one direction.

The advantages of the above feature are readily apparent for the reason that the non-reversible means described prevents the operator of the dispensing pump from discharging more or less than the charge desired by the owner.

Aside from the specific embodiments of the invention herein shown and described, it will be understood that numerous details of the construction may be altered or omitted without departing from the spirit and scope of this invention.

I claim:—

1. In a liquid dispensing pump, a reciprocable plunger, an operating rod therefor, a handle secured to said rod for imparting a down stroke to said rod and plunger, spring means for imparting an up stroke to said rod and plunger, and means directly engageable with said rod permitting a full down stroke only and a full up stroke only of said rod and plunger, said means comprising an axially movable sleeve surrounding said rod, a stationary shell surrounding said sleeve, a plurality of ball members carried by said sleeve engageable with said rod, and means on said shell for wedging said ball members against said rod during reverse movement of said rod after partial strokes in one direction.

2. In a liquid dispensing pump, a reciprocable plunger, an operating rod therefor, a handle secured to said rod for imparting a down stroke to said rod and plunger, spring means for imparting an up stroke to said rod and plunger, and means directly engageable with said rod permitting a full down stroke only and a full up stroke only of said rod and plunger, said means comprising an axially movable sleeve surrounding said rod, a cylindrical housing around said sleeve having tapered circumferential surfaces converging away from said rod, ball members carried by said sleeve and being movable perpendicular thereto in engagement with said rod and one of said tapered surfaces, and means for shifting said sleeve to move said balls into engagement with said rod and the other of said tapered surfaces.

3. In a liquid dispensing pump, a reciprocable plunger, an operating rod therefor, a handle secured to said rod for imparting a down stroke to said rod and plunger, spring means for imparting an up stroke to said rod and plunger, and means directly engageable with said rod permitting a full down stroke only and a full up stroke only of said rod and plunger, said means comprising an axially movable sleeve surrounding said rod, a cylindrical housing around said sleeve having tapered surfaces converging away from said sleeve, ball members carried by said sleeve and being movable transversely therewith in engagement with said rod and one of said tapered surfaces, and spaced means on said rod at opposite sides of said sleeve arranged at the end of a full stroke thereof to shift said sleeve and move said ball members into engagement with said rod and the other of said tapered surfaces.

4. In a liquid dispensing pump, a plunger, an operating rod for reciprocating said plunger, and means directly engageable with said rod to prevent reverse movement of said rod until said rod has completed a full stroke in either direction, said means comprising an axially movable sleeve surrounding said rod and having transverse openings through the walls thereof, ball members positioned in said openings, a pair of abutting collars around said sleeve, each having an inner surface tapered toward and adjacent the other, said surfaces converging away from said sleeve, said ball members always being in engagement with one of said tapered surfaces and said rod in order to wedge against said rod to prevent reverse movement, and means for shifting said sleeve to move said balls into engagement with said rod and the other of said tapered surfaces after a full stroke of said rod.

5. In a liquid dispensing pump, a plunger, an operating rod for reciprocating said plunger, and means directly engageable with said rod to prevent reverse movement of said rod until said rod has completed a full stroke in either direction, said means comprising an axially movable sleeve surrounding said rod and having transverse openings through the walls thereof, ball members positioned in said openings, a pair of abutting collars around said sleeve, each having an inner surface tapered toward and adjacent the other, said surfaces converging away from said sleeve, said ball members always being in engagement with one of said tapered surfaces and said rod in order to wedge against said rod to prevent reverse movement, means for shifting said sleeve to move said balls into engagement with said rod and the other of said tapered surfaces after a full stroke of said rod, and resilient detent means engageable with said sleeve to prevent inadvertent shifting of said sleeve.

6. In a liquid dispensing pump, a reciprocable plunger, an operating rod therefor, a handle secured to said rod for imparting a down stroke to said rod and plunger, spring means for imparting an up stroke to said rod and plunger, and means directly engageable with said rod permitting a full down stroke

only and a full up stroke only of said rod and plunger, said means comprising an axially movable sleeve surrounding said rod, a cylindrical housing around said shell having tapered surfaces converging away from said sleeve, ball members carried by said sleeve and being movable transversely therewith in engagement with said rod and one of said tapered surfaces, spaced means on said rod at opposite sides of said sleeve arranged at the end of a full stroke thereof to shift said sleeve and move said ball members into engagement with said rod and the other of said tapered surfaces, and resilient dentent means movable through said shell to engage said sleeve and prevent inadvertent movement thereof.

7. In a liquid dispensing pump having a plunger rod, means permitting only a predetermined charge to be dispensed, comprising a sleeve surrounding said rod having transverse openings therein, ball members loosely mounted therein and in engagement with said rod, a housing for said sleeve having a pair of tapered inner circumferential surfaces converging away from said sleeve, one of said surfaces being in engagement with said balls to wedge the same against said rod during reverse movement of said rod until after a full stroke of said rod in the opposite direction, and means for shifting said sleeve to move said balls into engagement with the other of said surfaces, whereby to wedge said balls against said rod during the opposite reverse movement until after a full stroke thereof opposite to the first mentioned full stroke.

8. In a liquid dispensing pump, a reciprocable plunger, an operating rod for said plunger, handle means for imparting a stroke to said rod in one direction, spring means for imparting a stroke to said rod in the opposite direction, and means directly engageable with said rod permitting a full stroke only of said rod in either direction, said means comprising ball members engageable with said rod, stationary means engageable with said ball members, and a movable means to cause a wedging action of said ball members with said stationary means and said rod whereby to permit a full stroke only of said rod.

9. In a liquid dispensing pump, a reciprocable plunger, an operating rod for said plunger, handle means for imparting a stroke to said rod in one direction, spring means for imparting a stroke to said rod in the opposite direction, a wedging member having a curved surface making rolling contact with said rod, a member having a wedging surface inclined to the axis of said rod for contacting with the wedging member to wedge said wedging member against said rod in one direction of movement of said rod, a second member having an oppositely inclined wedging surface for contacting with the wedging member to wedge it against said rod in the other direction of movement of said rod, control means for throwing said wedging member out of engagement with one of said inclined wedging surface members and into engagement with the other inclined wedging surface member, and means carried by said rod for operating said control means to limit the movement of said rod to a full stroke in either direction.

10. In a liquid dispensing pump, a reciprocable plunger, an operating rod for said plunger, handle means for imparting a stroke to said rod in one direction, spring means for imparting a stroke to said rod in the opposite direction, a rolling member contacting with the surface of said rod, a rigid sleeve having internal wedging surfaces inclined oppositely relative to the axis of said rod, a longitudinally shiftable sleeve for selectively moving said rolling member out of contact with one of said wedging surfaces and into contact with the other of said wedging surfaces, and means carried by said rod for moving said shiftable sleeve in the direction of movement of said rod for reversing the wedging action of said rolling member relative to said rod.

11. In a liquid dispensing pump, a reciprocable plunger, an operating rod for said plunger, handle means for imparting a stroke to said rod in one direction, spring means for imparting a stroke to said rod in the opposite direction, a rigid sleeve having internal wedging surfaces inclined oppositely relative to the axis of said rod, a wedging member interposed between the rod and said rigid sleeve member, a longitudinally shiftable sleeve for selectively moving said wedging member out of contact with one of said wedging surfaces of the rigid sleeve and into contact with the other of said wedging surfaces of the rigid sleeve, and means carried by said rod for moving said shiftable sleeve in the direction of movement of said rod for reversing the wedging action of said wedging member relative to said rod.

12. In a liquid dispensing pump, the combination of a reciprocable plunger, an operating rod for the plunger, handle means for imparting a stroke to said rod in one direction, spring means for imparting a stroke to said rod in the opposite direction, a rigid sleeve surrounding the operating rod and having internal wedging surfaces inclined in opposite directions relative to the axis of said rod, a pair of spaced spring pressed locking detents carried by said rigid sleeve and extending through the inner face of said sleeve, an apertured control sleeve carrying a pair of pockets for receiving said spring pressed detents, said pockets being spaced a greater distance than the distance between said detents, whereby said spring pressed detents lock said

control sleeve in one of two alternative positions, wedging means disposed within the aperture of the control sleeve and alternately engaged with one or the other of said wedging surfaces of said rigid sleeve by movement of the control sleeve, and means carried by the operating rod for moving the control sleeve from one alternative position to the other alternative position at the end of each rod stroke.

In testimony whereof I affix my signature.

OTTO PETERSON.