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ADJUSTABLE DELIVERY DISPENSER

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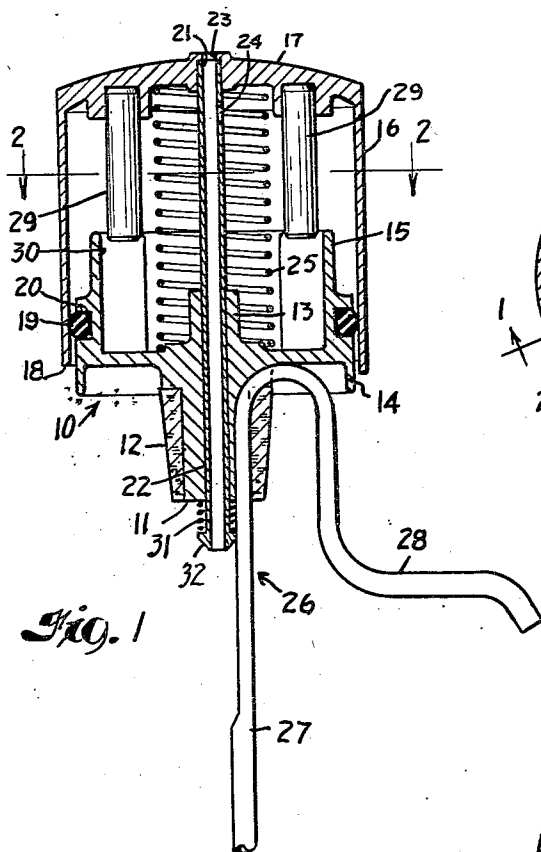


Fig. 1

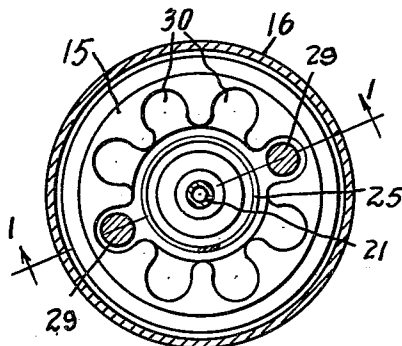


Fig. 2

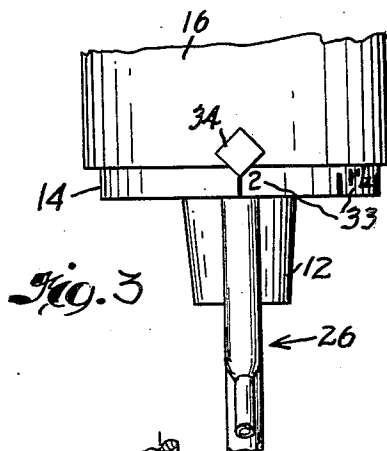


Fig. 3

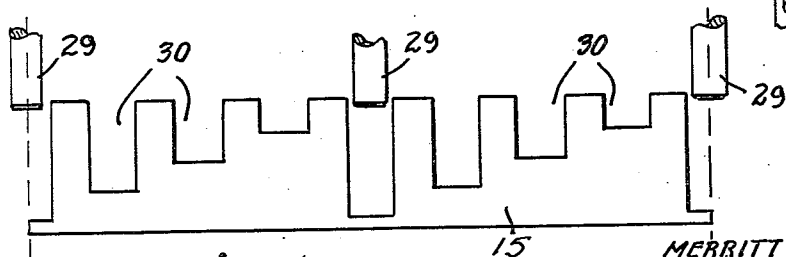


Fig. 4

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ADJUSTABLE DELIVERY DISPENSER

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10 Claims. (Cl. 222—309)

This invention relates to a dispenser for liquids the operation of which is adjustable to provide a varying volume discharge or delivery. More particularly, my new dispenser is of the type comprising a piston-cylinder pumping assembly, and the adjustable delivery is accomplished by means serving variably to limit the displacement or working stroke of such assembly.

It is an object of the invention to provide a dispenser of this type of a construction which is both economical and reliable in operation, the latter applying to the action whereby the delivery adjustment is made as well as to operation in any given position of adjustment. The construction, moreover, is of a nature which permits design of the dispenser along clean, modern lines, especially characterized by the absence of elements or devices projecting exteriorly and not only giving the dispenser a cluttered appearance, but perhaps even encumbering manipulation of the same.

Another object is to provide such a dispenser wherein the stroke-determining means includes structure normally precluding a change in adjustment to prevent unintentional shifting from one delivery volume to another, without, however, rendering such a change inconvenient when desired.

It is also an object of the invention to provide a liquid dispenser having the above-noted characteristics which is adapted to be mounted on a container of the liquid to be dispensed, the dispenser being operative to deliver different predetermined volumes of the liquid from the container in accordance with the adjustment thereof.

A further object is the provision of a container-mounted dispenser including a stationary piston and a pumping cylinder, with means selectively operative differently to determine the delivery wholly confined within the pumping chamber.

Other objects and advantages will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a longitudinal sectional view of a dispenser made in accordance with the present invention, the plane of the section being indicated by the line 1—1 in Fig. 2;

Fig. 2 is a transverse section taken on the plane of the line 2—2 in Fig. 1;

Fig. 3 is a fragmentary side elevation of the device; and

Fig. 4 illustrates in developed form the relationship of cooperable stop members used to effect the desired adjustment in the delivery of the dispenser.

Referring now to the drawings in detail, the construction illustrated comprises a piston assembly, designated generally by reference numeral 10, formed with a lower

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central extension 11 of stepped diameter. A tapered stopper sleeve 12 of cork, rubber, plastic, and the like, is engaged about the reduced extremity of such downward extension and is used to mount the piston assembly on a bottle or other container for liquid, the stopper being inserted in the mouth of the same.

The piston assembly is also formed with a central extension 13 at the opposite or inner side and a downwardly extending peripheral flange 14. A ring-like stop portion 15, to be described more in detail later, extends inwardly or upwardly at the periphery of the piston assembly as, in part, a cylindrical extension of the lower flange 14.

A cylinder 16 substantially completely closed at one end 17 and open at the other end 18 is disposed about the piston assembly to form a pumping chamber therewith. The two parts are relatively reciprocal and sealed by means of a ring 19 made of resiliently deformable material and seated in a groove 20 provided therefor in the inwardly extending peripheral portion of the piston assembly. A tubular member 21 is secured to the top wall of the cylinder and extends axially downwardly through a bore 22 in the central portion of the piston assembly in order to guide the reciprocation, which in normal operation would be constituted by movement of the cylinder relative to the piston assembly since the latter is held stationary on a liquid container. At the point of connection between the cylinder top wall and such tubular guide 21, the former is provided with a port 23 for the entrance of air, and a second part 24 in the tubular member itself provides communication, first, between supply port 23 and the pumping chamber and, second, from such chamber to the liquid container through the lower portion of the guide.

A main coil spring 25 is arranged axially between the piston assembly and the upper end of the cylinder normally to urge the cylinder outwardly and maintain the same in an extended condition. It will be clear that upon blocking of the supply port 23 with the finger or hand of a user and pushing downwardly on the cylinder, a charge of air is forced through the tubular member into an associated container. The dispenser assembly also carries a discharge tube 26 having a main vertical section 27 for positioning in the container and a bent end portion 28 in the nature of a spout, this tube being received in a groove formed in the piston assembly and overlain by the stopper 12.

The desired adjustment in the delivery, whereby a user may select one of a plurality of volumes for discharge, is provided by the stop member 15 of the piston assembly in cooperation with two stop pins 29 secured to the cylinder top wall in diametrical opposition. The member 15 is, as previously noted, a ring-like inward extension of the piston assembly, and it is formed with a series of end notches or recesses 30 in pairs of different longitudinal extent. In the construction illustrated, these recesses are open at the inner periphery of the member and are, of course, adapted to receive the stop pins upon advance of the cylinder. As shown most clearly in Fig. 4, the stop member 15 provides a plurality of steps adapted to be abutted by the ends of the stop pins and thereby provide different limits on the working stroke of the assembly. Four such steps are shown but this number may obviously be increased or decreased as desired.

The cylinder and the piston assembly are relatively rotatable, so that the stop pins 29 may be variably aligned with the steps, the adjustment most usually being accomplished by turning of the cylinder. To protect against an inadvertent change in adjustment, I provide a small counterbalancing spring 31 acting between the lower end of the piston assembly and a head 32 formed on the end of the tubular guide 21 in opposition to the main spring. The dimensioning of the stop members and the spring

forces are such that the cylinder is normally maintained in the position shown in Fig. 1, whereby the lower ends of stop pins 29 project partially into the selected recesses 30 of the stop member 15. Accordingly, the relative rotation whereby adjustment is accomplished is normally precluded and the cylinder must first be axially withdrawn against the counterbalancing spring until the stop pins clear the member 15 before it can be rotated. This provides a positive setting which may nevertheless be very readily altered when desired.

Each setting provides displacement of a given volume of air from the pumping chamber to the liquid container and results in a corresponding volume of liquid being discharged from the latter. The settings are made effective to produce those delivery flows desired, and indication of the same is provided by cooperable marking on the cylinder and piston assembly. As shown, this comprises a series of lines and numeral indicia 33 embossed or otherwise applied on the piston assembly flange 14 and a pointer or indicator device 34 at the lower edge of the cylinder, such lines being spaced in accordance with rotative positioning of the stop pins relative to the steps 30.

It will accordingly be seen that my new dispenser employs stroke-varying means completely enclosed within the assembly, and thus out of sight, and of a nature permitting ready and convenient adjustment; the overall appearance is highly attractive by virtue of its simplicity.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, main spring means operative resiliently to maintain the cylinder extended with respect to the stationary piston assembly, a pair of stop elements carried by said cylinder in diametrical opposition and extending longitudinally in the direction of the piston assembly, a cooperable ring-like stop member on the inner side of the piston assembly, said stop member having corresponding sets of end notches of different depth for selective engagement with the cylinder stop elements to limit advance of the cylinder, the latter being rotatable for indexing of its stop elements with respect to such notches, thereby to adjust the limit of such advance, and counterbalancing spring means acting against the main spring means normally to maintain the ends of the cylinder stop elements within the selected notches of the ring-like member, whereby the cylinder must be extended further than normal for rotation of the same, the main spring means, stop elements, and stop member being wholly within the pumping chamber.

2. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, main spring means operative resiliently to maintain the cylinder extended with respect to the stationary piston assembly, a stop element carried by said cylinder and extending longitudinally in the direction of the piston assembly, a cooperable ring-like stop member on the inner side of the piston assembly, said stop member having a series of end notches of different depth for selective engagement with the cylinder stop element to limit advance of the cylinder, the latter being rotatable for indexing of its stop element with respect to such notches for adjusting the limit of such advance, and counterbalancing spring means acting against the main spring means normally to maintain the end of the cylinder stop element within a selected notch of the

ring-like member, whereby the cylinder must be extended further than normal for rotation of the same, the main spring means, stop element, and stop member being wholly within the pumping chamber.

3. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, main spring means operative resiliently to maintain the cylinder extended with respect to the stationary piston assembly, first and second cooperable stop members carried respectively by said piston assembly and cylinder for the limiting advance of the latter, one of said stop members being ring-like with a series of end notches of different depth, the cylinder being rotatable to index the other stop member with respect to such notches, thereby adjustably to determine the limit of cylinder advance, and counterbalancing spring means acting against the main spring means normally to maintain such other stop member within a selected notch, whereby the cylinder must be moved outwardly further than normal for such indexing thereof, said first and second stop members being wholly within the pumping chamber.

4. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, main spring means operative resiliently to maintain the cylinder extended with respect to the stationary piston assembly, first and second cooperable stop members carried respectively by said piston assembly and cylinder for limiting advance of the latter, one of said stop members being ring-like with a series of end notches of different depth, the cylinder being rotatable to index the other stop member with respect to such notches, thereby adjustably to determine the limit of cylinder advance, and counterbalancing spring means acting against the main spring means normally to maintain such other stop member within a selected notch, whereby the cylinder must be moved outwardly further than normal for such indexing thereof.

5. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, main spring means operative resiliently to maintain the cylinder extended with respect to the stationary piston assembly, and first and second cooperable stop members carried respectively by said piston assembly and cylinder for limiting advance of the latter, one of said stop members being ring-like with a series of end notches of different depth, the cylinder being rotatable to index the other stop member with respect to such notches, thereby adjustably to determine the limit of cylinder advance, said first and second stop members being wholly within the pumping chamber.

6. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly and forming a pumping chamber therewith, and first and second cooperable stop members carried respectively by said piston assembly and cylinder for limiting advance of the latter, one of said stop members being formed with a series of circularly arranged steps for selective engagement with the other stop member, the cylinder and piston assembly being relatively rotatable adjustably to position such other stop member with respect to such steps, said first and second stop members being wholly within the pumping chamber.

7. An adjustable delivery dispenser comprising a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston assembly

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and forming a pumping chamber therewith, spring means operative to bias the cylinder outwardly, longitudinally interfitting stop members carried respectively by the piston assembly and cylinder, the piston assembly and cylinder being relatively rotatable to place the stop members in different positions of adjustment in which they variably limit advance of the cylinder, and resiliently deformable means acting against the spring means normally to hold the cylinder in such extended condition that the stop members are partially interfitted, such partial interfit precluding relative rotation of the cylinder, whereby the same must be moved outwardly to change the relation of the stop members.

8. In a dispenser, a cylinder, a plate in said cylinder which is reciprocable and rotatable relative thereto, spring means acting between the plate and cylinder, stop members respectively carried by the plate and cylinder for variably limiting relative movement of the same against the spring means, said stop members longitudinally interfitting in various positions of rotative adjustment, and counterbalancing means acting in opposition to said spring means, said counterbalancing means normally maintaining the plate and cylinder with said stop mem-

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bers partially interfitted releasably to preclude such rotative adjustment, the cylinder and plate thereby being first moved axially apart for relative rotation thereof.

9. In a dispenser, a piston, a relatively reciprocable and rotatable cylinder enclosing said piston, stop means adjustable by relative rotation of said cylinder variably to limit the relative reciprocation thereof, said stop means being totally enclosed by the cylinder, and means for the supply and discharge of fluid to and from the cylinder.

10. In an adjustable delivery dispenser, a piston assembly adapted to be mounted and held stationary on a container of liquid to be dispensed, a cylinder disposed for reciprocation about said piston and forming a pumping chamber therewith, said cylinder being rotatable about its axis on the piston assembly, and stop means adjustable by such rotation of the cylinder variably to limit reciprocation of the same, said stop means being totally enclosed within the cylinder.

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