April 20, 1943. E. W. FOX 2,316,781

SOLUTION MIXING AND DISPENSING DEVICE

Filed Feb. 12, 1941

Fig. 1.

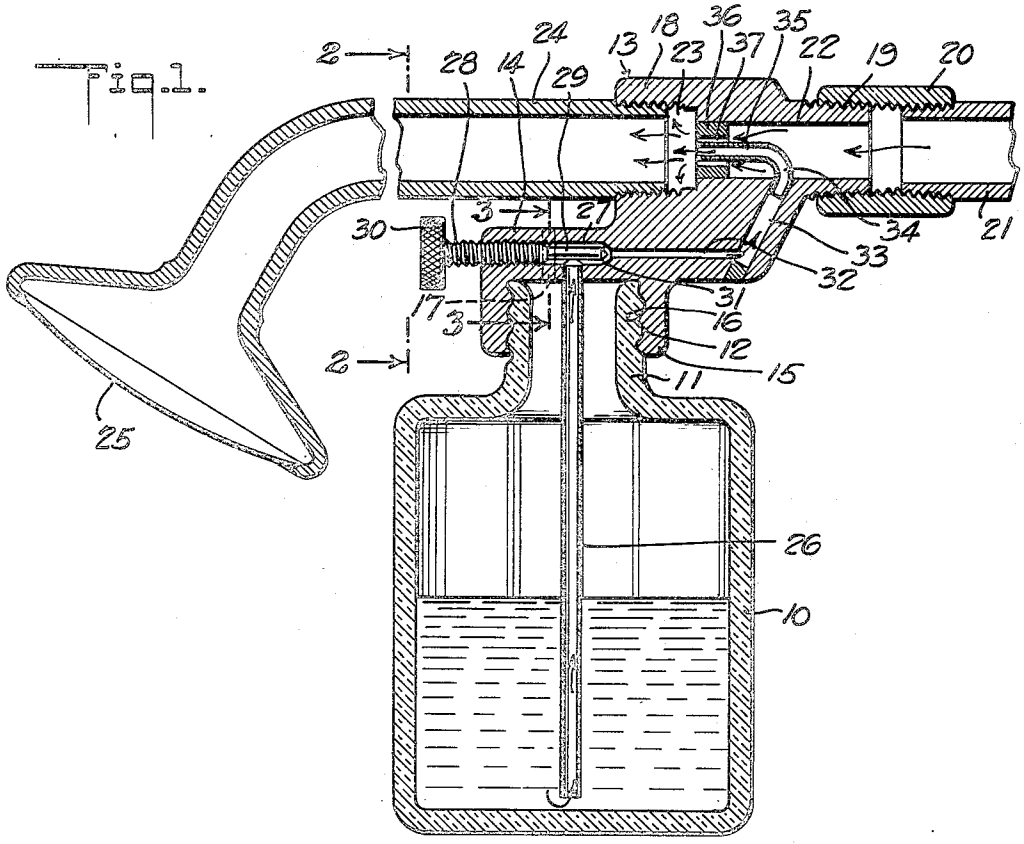


Fig. 2.

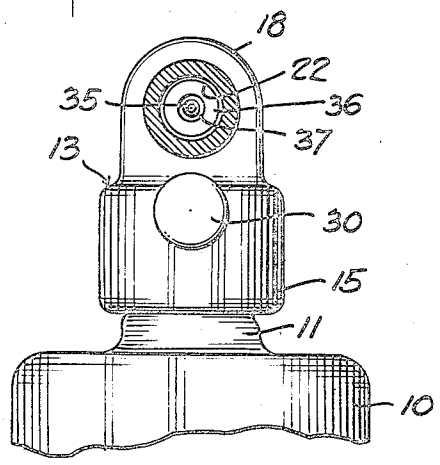
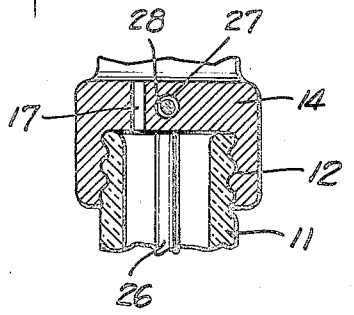


Fig. 3.



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SOLUTION MIXING AND DISPENSING DEVICE

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2 Claims. (Cl. 299—83)

This invention relates generally to the art of dispensing liquids treated with various solutions, and more particularly to a mixing and dispensing device therefor.

An object of this invention is to provide a device of simple, durable and compact construction by which various liquids such as bath oils, water softeners, soaps, perfumes and antiseptics in any predetermined solution strength can be withdrawn from a receptacle by the action of water under pressure flowing in a conduit, and intimately mixed with the water to treat the latter uniformly with the solution, all without placing the receptacle under water pressure which might burst the receptacle, and obviating the need for a fluid-tight joint between the receptacle and water line.

Another object of the invention is to provide a device of the above described character which is economical in the use of the solution; can be adjusted to vary the rate at which the solution is fed to the water line; maintains the predetermined feed of the solution to the water line irrespective of the quantity of solution in the receptacle, and can be manufactured at small cost for various plumbing installations such as a shower bath, in which application of the device to a shower head can be made with ease and dispatch and without modifying the construction at the head.

With these and other objects in view, the invention resides in the combinations and arrangements of elements as set forth in the following specification and particularly pointed out in the appended claims.

In the accompanying drawing,

Figure 1 is a vertical axial sectional view of one form of solution mixing and dispensing device embodying this invention, installed at a shower head to discharge treated water therefrom;

Figure 2 is a fragmentary vertical sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a fragmentary vertical sectional view taken on the line 3—3 of Figure 1.

Referring specifically to the drawing, the invention in its illustrated embodiment is composed of a receptacle 10 preferably transparent such as a glass jar, the neck portion 11 of which is externally threaded at 12 or provided with another form of attaching means for co-action with fastening means on a metallic body 13. The body 13 comprises a circular cap portion 14, the depending circular flange 15 of which is internally threaded at 16 to threadedly receive the neck portion 11 of the receptacle and detachably secure the receptacle to the body, it being noted that it is unnecessary to provide for a fluid-tight joint between the receptacle and cap portion 14, and that the latter is provided with an air intake port 17.

The body 13 includes a radially disposed projection 18 on the cap portion 14 which is externally threaded at its outer end, as indicated at 19, for connection to a coupling 20 applied, for example, to the water supply line 21 at a shower head, as is conventional construction. From said outer end of the projection 18 extends an axial bore constituting an intake passage 22 open at its inner end into a mixing chamber 23 of considerably larger diameter than that of the passage. The wall of the chamber 23 is threaded to receive the usual pipe section 24 to which the spray head 25 of the shower head is attached, it being noted that the bore of the pipe section 24 constitutes an outlet passage from the mixing chamber 23 and is larger in diameter than the intake passage 22 to prevent any such back pressure in the latter which would interfere with the efficient operation of the invention. It will be understood that in installing the invention, the pipe section 24 is unscrewed from the coupling 20, and the projection interposed therebetween.

Projecting axially from the inner side of the cap portion 14 into the receptacle 10 is a suction tube 26 which clears the bottom of the receptacle and communicates at its upper end with a radially or transversely disposed passage 27 in the cap portion. The passage 27 is threaded to receive the threaded shank 28 of a needle valve 29, a knob 30 being fixed to the shank 28 by which adjustment of the needle valve can be made with respect to a valve seat 31, so as to control the flow of solution from the receptacle through the tube 26 and passage 27 to a smaller continuing passage 32 which communicates with an oblique passage 33 opening to the intake passage 22 in a direction away from the mixing chamber 23.

Fixed in the discharge end of the oblique passage 33 is the elbow portion 34 of a nozzle 35 coaxially related to the intake passage 22 and terminating at the discharge end of the latter in a sleeve 36 fixed in the passage 22 to co-act with the nozzle in defining a restricted annular passage 37 around the nozzle to effect a large increase in water velocity at the discharge orifice of the nozzle during operation of the invention which is as follows:

With the desired liquid solution supplied to

the receptacle 10, and the latter applied to the body 11 as shown in Figure 1, water under pressure from the supply line 21 will be forced at increased velocity through the restricted annular passage 37 and will induce sufficient suction in the nozzle 35, passages 33, 32 and 27, and in the tube 26, to draw solution therethrough from the receptacle 10 into the mixing chamber 23 wherein the solution mixes with the water entering the mixing chamber so as to dispense the treated water from the shower head.

By adjusting the valve 29 the amount of solution supplied to the water can be varied and can be discontinued by closing the valve. Thus, treated water of various strengths can be dispensed from the shower head as desired or the water dispensed untreated. Irrespective of the quantity of solution in the receptacle, the predetermined amount of solution will be withdrawn from the receptacle in accordance with the adjustment of the valve 29, so that there will be no waste of solution, as is of importance in the use of relatively expensive substances in solution. Furthermore, the receptacle is not subjected to the water pressure in the supply line so that danger of bursting the receptacle by clogging of the tube 26 or passages in the body 13 is obviated, and no fluid tight seal is necessary between the receptacle and the body.

What is claimed is:

1. A dispensing device for liquids comprising: a receptacle adapted to contain a solution to be dispensed; a body having a vented cap portion applied to the receptacle to close the latter; the body having co-axially related intake and outlet passages and an intervening mixing chamber; a suction tube depending from said cap portion into the receptacle; the body having a connecting passage with which said tube communicates laterally, said connecting passage terminating in an oblique passage communicating with the intake passage in a direction towards the inlet end of the latter; a solution nozzle having an elbow portion projecting from the oblique passage and a rectilinear portion co-axially related to the intake passage, with the orifice of the nozzle at and facing towards the mixing chamber; means defining an annular restriction surrounding said rectilinear portion of the nozzle to provide a zone of sufficiently increased velocity of liquid delivered under pressure to the intake passage that solution will be sucked from the receptacle and will discharge from said orifice to mix in said chamber with the liquid, whereby to dispense treated liquid from the outlet passage; a valve seat in said connecting passage between the suction tube and intake passage; and a valve adjustably mounted in said connecting passage for co-action with said seat in varying the flow of solution under the induced suction.

2. A dispensing device for liquids comprising: a receptacle adapted to contain a solution to be dispensed; a body having a cap portion and a radial projection thereon provided with co-axially related intake and outlet passages and an intervening mixing chamber; the cap portion having an air vent and provided with means to detachably secure the receptacle thereto; the cap portion having a transverse passage and a suction tube communicating therewith and depending into the receptacle; said projection having an oblique passage communicating with the transverse passage and with the intake passage in a direction towards the inlet end of the latter; a solution nozzle projecting from said oblique passage and having its orificed end co-axially related to the intake passage at and facing said mixing chamber; means defining a restriction in the intake passage at the orifice of said nozzle to cause the velocity of pressure liquid supplied to the intake passage to suck solution from the receptacle through the nozzle into the mixing chamber so as to dispense treated liquid from the outlet passage; a valve seat in said transverse passage between the suction tube and intake passage; and a valve co-acting with said seat and having a shank threadedly mounted in the transverse passage for adjustment to vary the rate of solution flow.

ELLIS W. FOX.