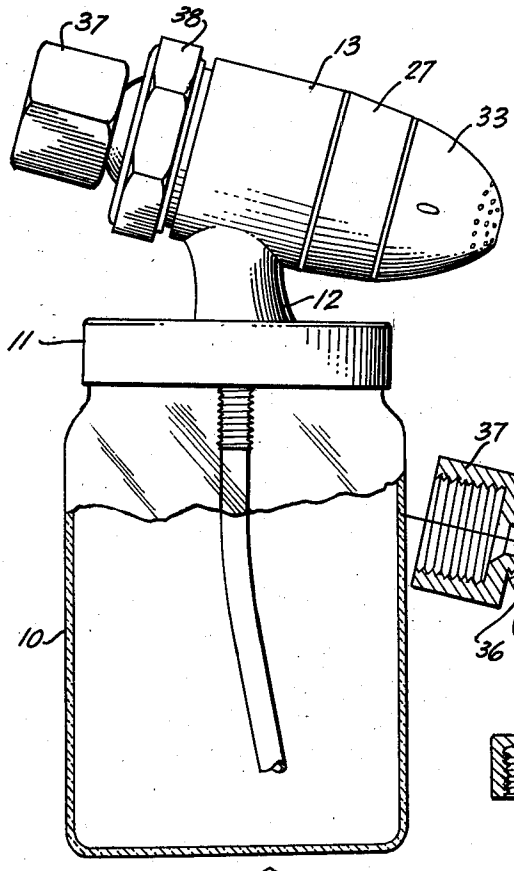
Aug. 15, 1950 F. E. MOSBY, JR 2,518,709

MIXING AND DISPENSING DEVICE

Filed Dec. 8, 1947

Fig. 1



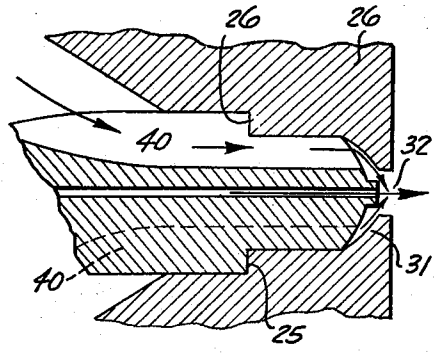


Fig. 4

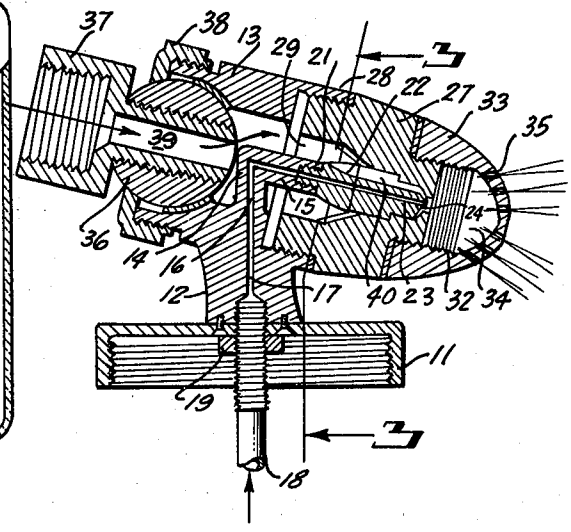


Fig. 2

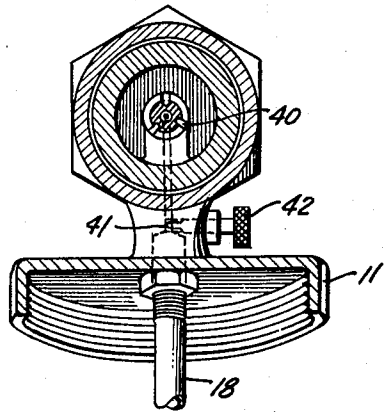


Fig. 3

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MIXING AND DISPENSING DEVICE

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5 Claims. (Cl. 299—84)

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This invention relates to a mixing and dispensing device and more particularly to one for comingling and discharging a plurality of liquids simultaneously.

The device of the present invention is particularly adapted to be used as a showed head in a bathroom although as will be apparent from the following description, the device is not limited to a shower head. In fact the device can be used in any application where a plurality of liquids are to be intermixed and discharged in spray form.

It will be seen that the device of the present invention is one in which a primary liquid passing through the device is adapted to entrain or pick up a secondary fluid or liquid by utilization of well-known injector principles. Spray nozzles, shower heads and like devices utilizing this principle have been heretofore proposed but such devices have not thoroughly intermixed the plurality of liquids at or prior to their discharge.

Such prior devices as are known have also been difficult to maintain in proper working condition as the interiors thereof were not readily accessible for cleaning purposes.

The device of the present invention obviates the difficulties had with like devices heretofore proposed for the plurality of liquids are thoroughly intermixed before they are discharged from the device. The intermixing of the liquids is brought about by first atomizing the primary liquid and then forcing the atomized primary liquid under relatively high pressure and at an angle approaching the normal into a stream of the secondary liquid. The primary liquid is forced into the stream of the secondary liquid by directing the former into a hollow substantially spherical stream converging onto the stream of the secondary liquid from all sides thereof and a very thorough and uniform mixture of the two liquids results.

To insure complete comingling of the two liquids, the intermixed liquids are passed into a mixing chamber prior to discharge and as the now comingled liquids enter the chamber just subsequently to the admixing of the two liquids the same are extremely turbulent and this agitation results in even more thorough mixing of the two liquids. The now very thoroughly comingled liquids are discharged from the device through a series of small apertures in the form of a conical spray.

The device is quite easy to maintain in good working use for it can be easily disassembled for cleaning the surfaces of the elements which when assembled form the interior surface of the device.

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This obviates the disadvantages of many of like devices heretofore proposed which were difficult, if not impossible, to clean.

Other features and advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a side elevational view of the device of the present invention;

Figure 2 is a vertical sectional view of the device shown detached from the container forming a reservoir for the secondary liquid;

Figure 3 is a section taken along line 3—3 of Figure 2; and

Figure 4 is an enlarged fragmentary sectional view of that part of the device wherein admixing of the two liquids first occurs.

The illustrated embodiment of the present invention, referring now to the drawing and more particularly to Figures 1 and 2 thereof, comprises an open-ended receptacle 10 which forms a reservoir for the secondary liquid. The external wall portion of the container adjacent the open end thereof is formed with threads or other forms of attaching means for co-action with like means formed internally of a closure member 11 adapted to close the open end of the container 10.

The closure member 11 carries an upstanding stanchion 12 which terminates in a substantially annularly shaped member 13. Extending inwardly somewhat radially from the inner wall of the member 13 is a small conduit 14 which is laterally deflected intermediate the ends thereof to form a projection 15 coaxially extending relative to said annular member 13. In the illustrated form of the present invention the conduit 14 is formed integral with the annular member 13 although if desired it may be separately formed and subsequently attached to the inner wall of the member 13.

The bore 16 of the conduit 14 forms a continuation of a passage 17 centrally extending through the stanchion 12 from a tapped aperture formed in the bottom face thereof. The aperture is aligned with an opening in the closure member 11 and receives the threaded end of a tubular member 18 extending downwardly into the container 10 as shown in Figure 1. To prevent accidental rotation of the tubular member 18, a nut 19 is threadedly mounted onto the end of the same to clamp the tubular member within the aperture of the stanchion.

It will be seen, referring again to Figure 2, that the end face of the projection 15 is formed with a tapped aperture concentric with the bore of the

same for receiving the threaded boss 21 of a plug 22. The plug 22, when the boss thereof is threadedly mounted within the aperture of the projection 15, forms an extension of the latter. The plug 22 is formed with a passage 23 which forms a continuation of the bore 16 of the conduit 14 and its lateral projection 15. The plug 22 terminates at its free end in a small nipple 24 having an opening therethrough communicating with the passage 23 of the plug 22. It will now be seen that there is continuous path for fluid flow from the container 10 to the discharge end of the nipple 24.

The plug 22 is provided with an annular shoulder 25 formed by reducing the end portion of the same adjacent the nipple 24. The shoulder seats against an annular shoulder 26 formed internally of a longitudinally bored body element 27 having a threaded reduced portion received within an annular flange 28 coaxially extending from the one end face of the member 13. The outer diameter of the body element 27 adjacent the reduced portion received within the flange 28 is equal to the outer diameter of the flange to the end that the member 23 and the element 27 form a smoothly contoured body member of tubular shape.

It will be seen that the hollow body element 27 circumscribes the plug 22 and that the latter completely fills the passageway 29 formed by the bore of the element intermediate the ends of the same. The passageway although of a relatively large constant diameter throughout its initial course progressively decreases to a diameter substantially that of the plug and is sharply reduced at the shoulder 26 to a diameter just slightly larger than that of the reduced portion of the plug. The wall of the passageway 29 circumscribing the end portion of the plug carrying the nipple 24, as best seen in Figure 4, is dome-shaped or formed as a spheroidal surface 31. This portion of the passageway leads to a relatively small diametered terminal portion forming an orifice 32 in the end face of the body element 27.

A somewhat conical cap or nozzle 33 threaded onto a reduced portion of the element 27 completes the body member of the device. The cap or nozzle is provided with a cavity or chamber 34 the one wall of which is perforated to form a plurality of outlet openings 35. The chamber 34, it will be noted, communicates with the passageway 29 through the orifice 32 of the body element 27.

The device is intended to be connected to a source of primary liquid under pressure such as the conventional household water supply line. To this end the annular member 13 is provided with a spherical socket for receiving a ball 36 mounted to one end of a female fitting 37 adapted to threadedly receive a male fitting, not shown, carried by the water line. The ball 36 is held within the socket by a flanged ring 38 loosely mounted to the fitting 37 and internally threaded for engaging external threads formed on the one end of the annular member 13.

The ball 36 is formed with a passage 39 for conducting water under pressure from the fitting 37 to the interior of the annular member 13 which is in communication with the passageway 29 of the element 27. Although the plug 22 completely fills the passageway 29 as above described, water is passed along the plug through a plurality of circumferentially spaced grooves 40 longitudinally formed in the outer surface of the same.

The stream of water flowing through the passageway 29 is therefore broken up or divided into three circumferentially spaced streams, the velocity of which is relatively high. It will be seen, referring now to Figure 4, that the grooves 40, lead water, forced into the passageway 29, at a high velocity against the spheroidal surface 31. The streams of water impinging against the spheroidal surface 31 are atomized and directed by the surface in spheroidally converging streams into mutual intersection at the orifice 32.

As will be understood the reduced water passage formed between the end face of the nipple 24 and the spherical surface 31 decreases the pressure at the discharge end of the passage 23 to induce a flow of the secondary liquid held by the container 10 up through the tubular member 18, passage 17, bore 16, passage 23 to the nipple 24 from whence it is discharged. It will be seen that the secondary liquid is discharged from the nipple at the point where the atomized water is forcibly directed as a converging stream into the orifice 32. As the atomized water has a relatively high velocity and converges onto the secondary liquid from all sides thereof the two liquids are thoroughly intermixed. Furthermore, as the spherical sheet of atomized water converges onto the secondary liquid at the orifice 32, the comingled liquids are forced through the same into the mixing chamber 34 where the liquids are more thoroughly comingled before they are discharged under pressure through the openings 35 in the form of a spray.

It will be seen now that the water and the secondary liquid are very thoroughly comingled before the same are discharged. As has been seen the water is first atomized before it is diverted into the orifice where the secondary liquid is discharged from the nipple 24 and the atomized water will more completely mix with the secondary liquid than would a solid stream of water. Furthermore as the comingled liquids enter the mixing chamber in a very turbulent state the mixing action, because of the agitation of the liquids and expansion of the same in the chamber, is increased and the liquids are intimately intermixed before discharge through the openings 35.

The secondary liquid may be any type of liquid desired such as bath oils, soaps, perfumes, antiseptics or the like. The secondary liquid might be a liquid fertilizer or an insecticide for it will be apparent that the device of the present invention might be attached to a garden hose or like source of water under pressure and used to dispose a liquid fertilizer, an insecticide or other solutions useful in horticulture.

To permit a user to vary the solution strength of the discharged liquids, a valve 41 is formed in the passage 17. The valve is provided with an actuator 42 by means of which the valve can be moved to decrease or increase the flow of the secondary liquid up through the passage 17.

As the body forming the spray head of the device of the present invention is formed of a plurality of easily detachable pieces the interior of the same can be quickly exposed for cleaning if it should appear that such action was necessary during use of the device.

Although the now preferred embodiment of the present invention has been shown and described herein it is to be understood that the present invention is not to be limited thereto for it is susceptible to changes in form and detail within the scope of the appended claims.

I claim:

1. A device of the type described, comprising: a body having a passageway therethrough; means for admitting a pressurized liquid into one end of said passageway; means intermediate the ends of said passageway for dividing the stream of liquid flowing through said passageway into a plurality of parallel, circumferentially spaced smaller streams having a relatively high velocity; baffle means disposed substantially transversely of said smaller streams at the discharge ends thereof for impact-atomizing said streams and convergently directing the atomized streams into mutual intersection; and a conduit from a source of secondary liquid leading into said body and terminating at said intersection centrally of said smaller streams whereby a supply of said secondary liquid is induced into the smaller streams at the mutual intersection thereof thereby intermixing and comingling said liquids.

2. A device of the type described, comprising: a body having a passageway therethrough; means for admitting a pressurized liquid into one end of said passageway; means intermediate the ends of said passageway for dividing the stream of liquid flowing through said passageway into a plurality of parallel, circumferentially spaced smaller streams having a relatively high velocity; baffle means disposed substantially transversely of said smaller streams at the discharge ends thereof for impact-atomizing said streams and convergently directing the atomized streams into mutual intersection; a conduit from a source of secondary liquid leading into said body and terminating at said intersection centrally of said smaller streams whereby a supply of said secondary liquid is induced into the smaller streams at the mutual intersection thereof thereby intermixing and comingling said liquids; and an expansion chamber located forwardly of said mutual intersection into which said comingled liquids are directed for further intermixing.

3. A device of the type described, comprising: a body having a passageway therethrough; means for admitting a pressurized liquid into one end of said passageway; means coaxially mounted within said passageway intermediate the ends thereof and cooperative with the wall of said passageway for dividing the stream of liquid flowing through said passageway into a plurality of parallel, circumferentially spaced smaller streams having a relatively high velocity; baffle means disposed substantially transversely of said smaller streams at the discharge ends thereof for impact-atomizing said streams and convergently directing the atomized streams into mutual intersection; a conduit from a source of secondary liquid leading into said body and terminating at said intersection centrally of said smaller streams whereby a supply of said secondary liquid is induced into the smaller streams at the mutual intersection thereof thereby intermixing and comingling said liquids; and wall means forming an expansion chamber located forwardly of said mutual intersection into which said comingled liquids are directed for further intermixing; and at least a part of said wall means being perforate and exit means for forming said intermixed liquids.

4. A device of the type described, comprising: a body having a passageway therethrough; means for admitting a pressurized liquid into one end of said passageway; means intermediate the ends of said passageway for dividing the stream of liquid flowing through said passageway into a plurality of parallel, circumferentially spaced smaller streams having a relatively high velocity; the wall of said passageway circumscribing the discharge ends of said smaller streams being dome-shaped and forming a spheroidal surface against which said smaller streams are impinged to impact-atomize the liquids thereof and to convergently direct the same in spheroidally moving streams into mutual intersection; and a conduit from a source of secondary liquid leading into said body and terminating at said intersection centrally of said smaller streams so as to enable the latter to induct secondary liquid from said source into central contact with said spheroidally moving streams at the mutual intersection thereof whereby said liquids are intermixed and comingled.

5. A device for mixing and dispensing a plurality of liquids, comprising: a tubular body; means for admitting a pressurized liquid into the one end of said body and directing the same longitudinally of said body; a conduit connectable to a source of fluid leading into said body and having a terminal portion coaxially disposed in the bore of said body; plug means coaxially carried by and forming an extension of said terminal portion closing the bore of said body, said plug means having a plurality of circumferentially spaced, longitudinally extending channels formed in the outer surface thereof for dividing the liquid directed longitudinally of said body into a plurality of small streams having a relatively high velocity; the bore of said body terminating in a spheroidal surface circumscribing the free end of said plug means against which said small streams are impinged, said spheroidal surface constricting the bore of said body and terminating in a discharge orifice, the streams impinged against said spheroidal surface being atomized and convergently directed by the same into mutual intersection at said orifice; said plug means having a passage therethrough communicating with the bore of said conduit whereby a flow of fluid from said source is induced therefrom by the convergent flow of liquid over said spheroidal surface, said fluid being induced into said liquid at the mutual intersection of said streams and thereby comingled with said liquid.

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