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NOZZLE

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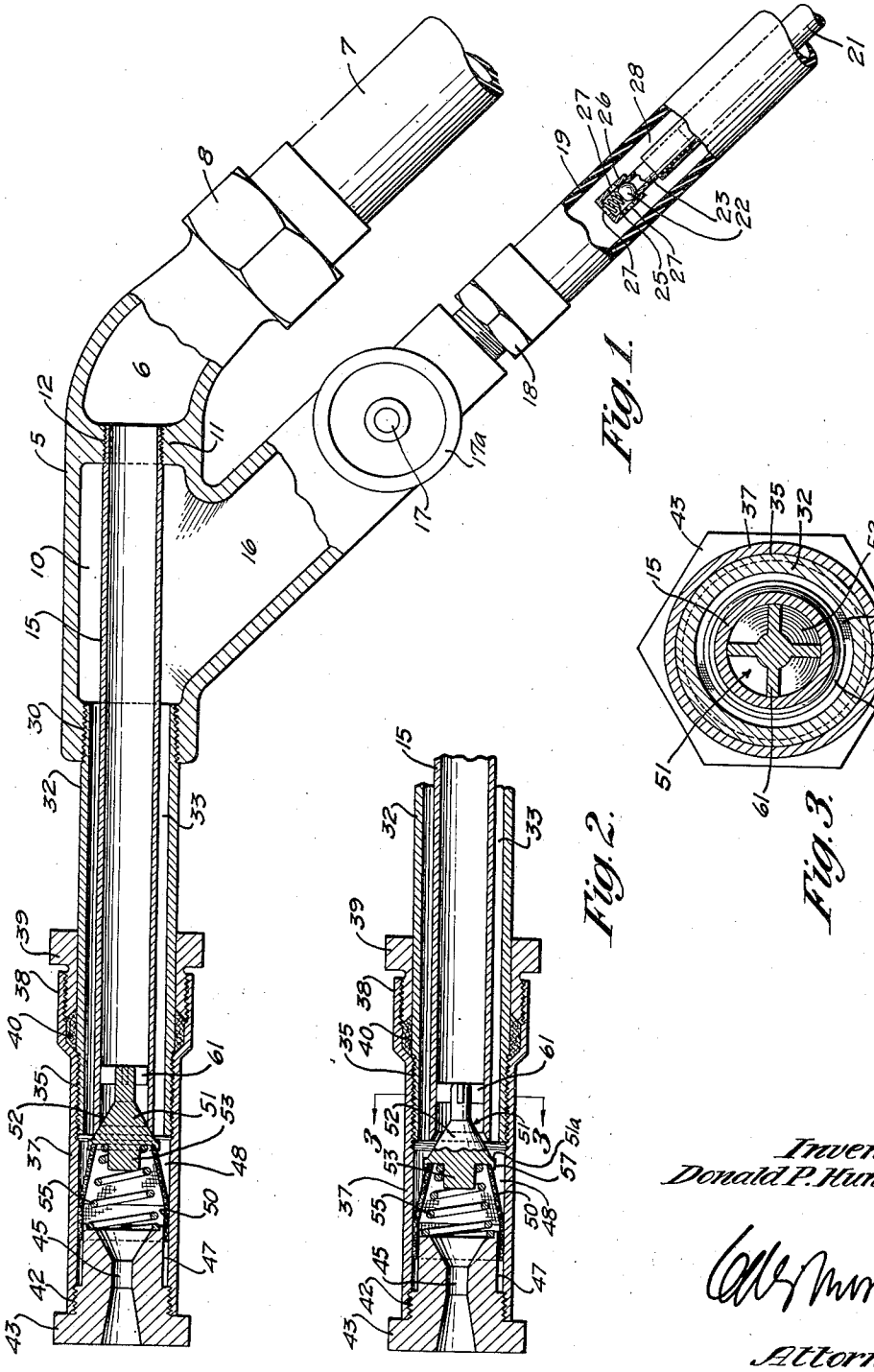


Fig. 1.

Fig. 2.

Fig. 3.

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NOZZLE

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5 Claims. (Cl. 239—140)

My invention has to do with nozzles and, more particularly, it relates to nozzles within which a plurality of liquid streams are intimately admixed before being sprayed therefrom.

While my nozzle is of course suitable for various uses, I have found it particularly efficient and suitable as the nozzle element of a vehicle washing unit, for instance, wherein a cleaning chemical solution is intimately admixed with water and air.

I am of course aware that other nozzle devices have been designed for such uses, but my observation has been that they possess certain inherent shortcomings which serious impair their efficiency. For instance, they are not so designed as will positively prevent contamination of the main water supply by the cleaning chemicals, which usually takes place when a back pressure in the nozzle forces the chemical solution back into the water supply. Another shortcoming is that prior devices do not efficiently admix the various liquids making up the solution to be sprayed.

It is therefore among my objects to provide a device of this character which will positively prevent contamination of the main water supply by chemicals used in forming the spray solution.

It is another object to provide a device wherein proper admixture and atomizing of the liquids are obtained.

Another object is to provide efficient means in such a device for controlling the amounts of elements admitted to the solution forming portion of the nozzle.

Another object is to provide a device which may be economically manufactured, which is easy to disassemble and reassemble for cleaning purposes and which is capable of long life.

Still further objects and corresponding accomplishments are inherent in my invention and those, as well as the objects specifically set forth hereinabove, will become obvious from the following detailed description of one preferred adaptation of the invention, for which purpose I shall refer to the accompanying drawing, in which:

Fig. 1 is a side view, partly in section and partly in elevation, showing certain parts in one position;

Fig. 2 is a fragmentary sectional view showing said parts in another position; and

Fig. 3 is a cross-section on line 3—3 of Fig. 2.

Referring now to the drawing, I show a body 5 having a liquid inlet chamber 6 at its forward end into which liquid under pressure is admitted through a hose or the like 7 connected to the body by an adapter 8. In this adaptation of my invention, I show chamber 6 as the water inlet chamber.

A second chamber 10 is also provided in the body forward of and separated from chamber 6 by a wall 11, which wall is provided with a threaded opening 12 in which is threadedly mounted the inlet end of a water delivery tube 15. Opening into chamber 10, at an angle of about 45° there is a passageway 16 controlled by a valve 17 of conventional form, said valve being actuated by manually turning the hand wheel 17a. Connected to passageway 16 by an adapter 18, I show a supply hose 19, which carries at its interior and disposed longitudinally therein a smaller hose 21. A tube 23 is inserted in the end of hose 21 and the discharge end of tube 23 forms a seat for a ball valve 22 which is urged into closing position against its seat by means of a coil spring 25 seating at its other end against the end wall of a housing cup 26. Cup 26 is fitted onto the outlet end of tube 23 and has fluid passing openings 27 through its end and side walls. In this example of my invention, I pass a cleaning chemical, such as a liquid soap, through hose 21 under suitable pressure to unseat ball valve 22 and be discharged into hose 19; and in the annular space 28 between the exterior of hose 21 and the interior wall of hose 19, I pass air under suitable pressure, the air and cleaning solution entering chamber 10 together. The angle at which passage 16 communicates with chamber 10 gives to the stream of air and chemical solution a swirling action. Chamber 6 is curved in longitudinal section so that the water entering it under pressure is given a swirling movement as it enters the inlet end of tube 15.

The outlet end of body 5 is provided with a threaded opening 30 to receive the threaded inlet end of a tube 32. The previously described tube 15 is of smaller diameter than tube 32 and is mounted longitudinally therein to provide an annular passageway 33 between the exterior of tube 15 and the interior of tube 32. The outlet end of tube 32 is threaded at 35 to threadedly receive the inner end of the nozzle holding sleeve 37, which has an enlarged and interiorly threaded end 38 to receive the packing nut 39 and packing 40. The outlet end of sleeve 37 is interiorly threaded at 42 to threadedly receive the nozzle outlet tip 43, through which there is a Venturi-shaped outlet opening 45. The inner end 47 of the nozzle tip member is

of reduced diameter and over it one end of a relatively fine mesh, cone-shaped, atomizing screen 50 is fitted. A mixing chamber 48 is provided between the inner end of the nozzle tip member and the discharge end of tube 15.

The outlet end of tube 15 is beveled to provide a seat for a water outlet control plunger 51. Plunger 51 is cone-shaped at 52 medially between its ends and has a reduced diameter portion 53 at its outer end to receive one end of a coil spring 55, which spring seats at its other end against the inner end of the outlet nozzle tip member. Spring 55 is disposed within the cone 50 and the inner end of the screen fits into a socket provided by the annular flange 57 of plunger 51. The inner end of plunger 51 is formed as a spider 61 (Fig. 3) which is slidably mounted in tube 15 and acts to hold the plunger 51 centered in the end of tube 15.

From the foregoing description, it will be seen that the cleaning solution, under pressure, enters through tube 21 from a supply source not shown, and the air under pressure enters through passageway 28 from a pressure tank, not shown. The pressure in the cleaning solution line unseats ball valve 22 when valve 17 is open so that the solution is ejected into the air stream. When valve 17 is closed, the air pressure in tube 19 is of course increased, which increased pressure aids spring 25 in seating ball 22 to close the outlet end of tube 21. Assuming valve 17 to be open, the mixture enters chamber 10 at an angle which imparts to it a swirling motion and thence it moves along passageway 33 to the outlet end of tube 32, where it is met by and admixed with the water stream entering chamber 48 from tube 15. Plunger 51 has a portion 51*a* presenting a straight annular face towards the outlet end of tube 15, against which the liquid discharged through tube 15 impinges to aid in moving plunger 51 off its seat against the pressure of spring 55 and against fluid pressure in chamber 48. Face 51*a* also further acts to break up the liquid emerging from tube 15. The tapered face of plunger 51 directs the water stream outwardly to intersect the air and cleaning solution entering chamber 48 from passage 33. The air-water-cleaning solution mixture is then forced through the screen 50, thus thoroughly atomizing it before it enters the Venturi-shaped outlet 45.

If the air and cleaning solution stream should be under such pressure as might tend to back up in tube 15 and into the water supply, such action is prevented by the plunger 51, against which such back pressure would act and which is normally urged into seating position by the spring 55.

The tension on spring 55 may be varied by screwing or unscrewing sleeve 37 onto or off tube 32, a fluid tight seat being maintained between tube 32 and sleeve 37 by the packing washer 40. Such movement of the sleeve with respect to the tube also serves to vary the size of chamber 48.

If it is desired, after the cleaning solution is applied to the surface being cleaned, to use the water stream alone for rinsing purposes, it is only necessary to manually close valve 17 to shut off the air and cleaning solution from entering chamber 10. By virtue of the ball valve 22, the air stream is prevented from backing up into the cleaning solution line.

While, in the foregoing, I have resorted to considerable detail of structure and association of parts in describing one particular example of my invention, I wish it to be understood that I have done so merely to make my invention understood and that I do not limit my invention to such details. On the contrary, my invention is only to be limited as appears in the appended claims.

I claim:

1. A nozzle device comprising: a body having therein a plurality of concentric passageways communicating at their inlet ends with said respective fluid inlets, a check valve in one of said passageways including a cone-shaped plunger having its apex disposed towards the outlet end of said passageway and adapted to seat against said outlet end, a coil spring urging said valve into seating position, a mixture chamber in the body with which the outlet ends of said concentric passageways communicate, a restricted outlet in the body communicating with the chamber and a cone-shaped screen mounted longitudinally in the chamber between the outlet ends of said passageways and the inlet end of said restricted outlet, said screen housing said spring and being disposed with its apex end towards the outlet ends of said passageways.

2. In a nozzle device for mixing and spraying a liquid solution, a body having therein a mixing chamber, a discharge outlet communicating with the chamber and a plurality of fluid passing lines discharging into the chamber, a valve means associated with the discharge end of one of said lines and adapted to be opened by fluid pressure within said line, said means including a tapered plunger in the discharge end of said line and seating against its discharge end, and pressure means in the chamber for urging said valve into seating position, said plunger presenting an annular impact surface towards the discharge end of said line against which the fluid passing from said line impinges, said impact surface being perpendicular to the axis of the plunger.

3. A nozzle device comprising: a body having a plurality of fluid inlets, concentric passageways in the body communicating at their inlet ends with said respective fluid inlets, a mixture chamber in the body with which the outlet ends of the concentric passageways communicate, an outlet in the body communicating with the chamber, a cone valve mounted in the outlet end of the innermost of the concentric passageways, a recess in the base end of said valve, a tubular screen having its inner end seated in said recess and extending longitudinally of the mixture chamber towards the outlet, said screen tapering from a relatively reduced diameter at its inner end to a relatively larger diameter at its outer end whereby the fluid emerging from the outlet ends of the concentric passageways will strike the exterior face of the tapered portion of the screen.

4. A nozzle device comprising a body having a pair of fluid inlets, an outer tube, an inner tube mounted longitudinally and concentrically in the outer tube and terminating in a common plane therewith whereby to provide a pair of concentric passageways communicating at their respective inlet ends with said respective fluid inlets, a sleeve threadedly mounted at its inner end on the discharge end of the outer tube and having a larger internal diameter than that of said outer tube, a nozzle member in the outer end of the sleeve, said nozzle member being spaced from the discharge ends of said tubes whereby to provide a mixing chamber therebetween, and a cone valve in the discharge end of the inner tube, said valve having a base portion presenting a baffle surface perpendicular to the longitudinal axis of the inner tube.

5. A nozzle device comprising a body having a

pair of fluid inlets, an outer tube, an inner tube mounted longitudinally and concentrically in the outer tube and terminating in a common plane therewith whereby to provide a pair of concentric passageways communicating at their respective inlet ends with said respective fluid inlets, a sleeve threadedly mounted at its inner end on the discharge end of the outer tube and having a larger internal diameter than that of said outer tube, a nozzle member in the outer end of the sleeve, said nozzle member being spaced from the discharge ends of said tubes whereby to provide a mixing chamber therebetween, a cone valve in the discharge end of the inner tube, said valve having a base portion presenting a baffle surface perpendicular to the longitudinal axis of the inner tube, and a tubular screen mounted longitudinally in the chamber and extending from the said base to the nozzle member.

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