July 31, 1951 N. CHASE 2,562,415

SOLUTION-MIXING SPRAYER

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Fig. 1.

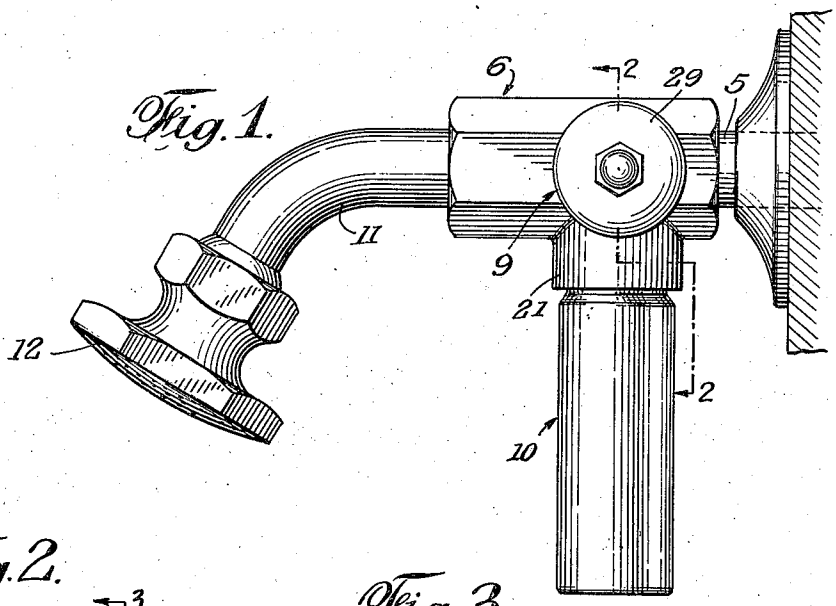


Fig. 2.

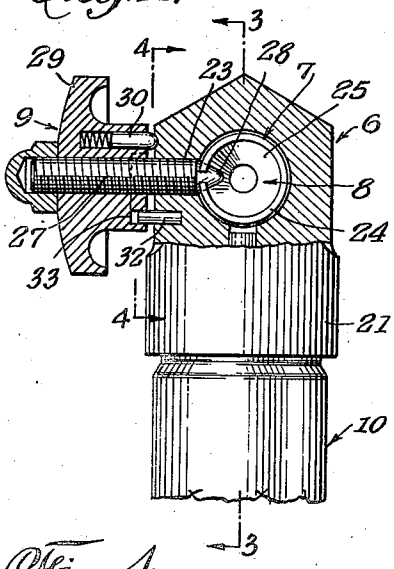


Fig. 3.

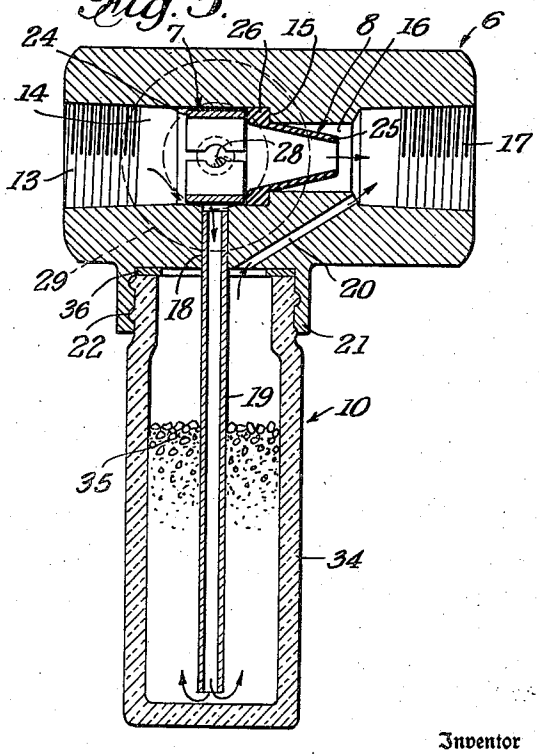
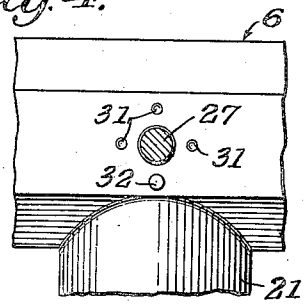


Fig. 4.



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SOLUTION-MIXING SPRAYER

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4 Claims. (Cl. 299—84)

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This invention relates to a device embodying means for mixing a solution into the flow therethrough.

An object of the present invention is to provide a solution-mixing sprayer that embodies an automatic valve controlled by the main flow of liquid, and a manually adjustable metering valve controlling a diverted portion of the main flow to thereby control the solution-mixed flow from the sprayer.

Another object of the invention is to provide in a sprayer, of the character indicated, a novel form of automatically expanding flow control valve.

Another object of the invention is to provide in such a sprayer a novel form of manually adjustable valve for controlling the diverted portion of the main flow through the sprayer.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a side elevational view of a solution-mixing sprayer according to the present invention.

Fig. 2 is a broken sectional view thereof as taken on line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional view taken on line 4—4 of Fig. 2.

The solution-mixing sprayer that is illustrated comprises, generally, an inlet pipe 5, a body 6 connected to said pipe and embodying therein a metering valve 7 for controlling a diverted portion of the main flow through the body from the inlet pipe and an automatic flow control valve 8 therebeyond, means 9 for adjusting the metering valve 7, means 10 receptive of the diverted flow for producing a solution and for discharging the same into the body beyond the flow control valve 8, an outlet pipe 11 comprising a passage for the undiverted flow and the intermixed solution from means 10, and a shower or refresher head 12 for discharging said flow in the form of a spray.

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The device thus generally described may have many uses, and is more particularly adapted for shower or refresher type of bathing wherein the means 10 may embody bath crystals, salts, water softeners, liquid soaps, perfumes, toilet water, bubble bath materials, shampoos, or types of bath additives. According to the invention, these materials are preferably dry or crystalline form.

The body 6 is shown as a length of hexagonal stock that has an internal thread 13 for connecting the same with inlet pipe 5, a longitudinal passage 14 for receiving flow from said pipe and extending to an annular shoulder 15 intermediate the length of the body, a smaller coaxial passage 16 beyond said shoulder and an internal thread 17 for connection to outlet pipe 11, a hole 18 extends transversely downward through the body and intersects passage 14, there being an elongated open-ended tube 19 fixedly held in said hole to receive a portion of the flow from said passage, the same being controlled by valve 7. Another hole 20 extends from passage 16 downward at an angle toward hole 18 to serve as a return passage for the flow into tube 19. Encircling the lower ends of holes 18 and 20, the body is provided with an annular downreaching integral collar 21 that has internal threads 22. A lateral threaded hole 23 intersects passage 14 substantially in line with hole 18.

The metering valve 7 comprises a split sleeve 24 so loosely fitting in passage 14 that flow from pipe 5, in part, may pass between said sleeve and the wall of the passage. As will be later seen, this diverted flow, which enters tube 19, may be regulated by the means 9.

The automatic valve 8 is shown as a conical sleeve 25 that is restricted on the outlet side of the flow and has an annular flange 26 engaged against shoulder 15 and held thereagainst by flow through said sleeve. The sleeve is made of elastic material such as rubber which will expand and contract according to the amount and pressure of liquid passing therethrough. This valve does not shut off the flow at any time, but its restricted end merely expands as the pressure increases to give a greater flow therethrough and automatically contracts when the pressure is reduced. This resistance to flow through said sleeve results in passage 14 being under greater pressure than passage 16. The high pressure in passage 14 causes diverted flow into tube 19 in an amount controlled by the setting of valve 7.

The means 9 comprises a threaded stem 27 in hole 23, the same being provided with a conical end 28 that serves to both locate sleeve 24 and spread or release the same for normal contraction. The screw stem 27 is fed axially by means of a knob 29 thereon which when threaded inward, expands sleeve 24 to restrict flow into tube 19 and, when said sleeve is in full expanded engagement with the wall of passage 14, completely shuts off such flow. The knob is shown with a spring-urged selector pin 30 that cooperates with detent seats 31 formed in a face of the body to hold the means 9 in selected adjustment, the number of said detent seats being variable according to whether fine or coarse adjustments are required. A stop in 32 carried by the body and extending into an arcuate slot 33 in the knob prevents loss of the knob and controls its adjusting movement within the end limits of slot 33.

The means 10 embodies tube 19 and a preferably transparent container 34 that is removably held by the threads 22 of collar 21. Said container is adapted to hold a quantity of material 35 as hereinabove mentioned. The tube 19 extends into said material short of the bottom of the container. A gasket 36 seals the container from leakage around its open end.

The operation of the device is quite simple. Water flows into passage 14, is retarded by valve 8 to build up pressure in said passage resulting in part of the water seeking egress through tube 19. The main flow passes through valve 8, expanding the same according to the pressure developed, and the diverted flow circulates from the bottom of tube 19 up through the material 35. This latter flow dissolves some of this material and the resultant solution then passes through hole 26 and intermixes with the main flow beyond valve 8 in low pressure passage 16. This mixture then passes through outlet pipe 11 and finally, as a spray, out of head 12.

It will be seen that the flow is not manually regulated but the flow through means 10 is so regulatable that a desired solution can be obtained.

While I have illustrated and described what I now regard as the preferred embodiment of my invention, the construction is, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular form of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a sprayer structure, a body having a flow passage formed with an intermediate annular shoulder, a flow-retarding member comprising an elastic tubularly conical member positioned axially in said passage with the reduced end thereof on the outlet side of the passage, said member being provided with an annular flange engaging said shoulder and held thereagainst by the pressure of flow through the passage, said body having a hole for diverted flow resulting from increased pressure on the inlet side of the passage caused by said conical sleeve, a split sleeve loosely disposed in said passage on the inlet side of the body and aligned with said hole, and manual means for variably expanding said split sleeve to control flow into said hole.

2. In a sprayer structure, a body having a flow passage formed with an intermediate annular shoulder, a flow-retarding member comprising an elastic tubularly conical member positioned axially in said passage with the reduced end thereof on the outlet side of the passage, said member being provided with an annular flange engaging said shoulder and held thereagainst by the pressure of flow through the passage, said body having a hole for diverted flow resulting from increased pressure on the inlet side of the passage caused by said conical sleeve, a split sleeve loosely disposed in said passage on the inlet side of the body and aligned with said hole, and manual means for variably expanding said split sleeve to control flow into said hole, said latter means comprising a threaded stem penetrating the body and entering said passage, said stem having a conical end in the slit of the sleeve for both locating and wedging the same to spread condition with respect to the wall of the passage.

3. In a sprayer structure, a body having a flow passage formed with an intermediate annular shoulder, an elastic flow-retarding member positioned axially in said passage and having a larger flow-receiving end and a smaller flow-retarding and discharging end, an outer annular flange on the larger end of the member and engaged with said annular shoulder and held thereagainst by the pressure of flow through said passage, said body having a hole for diverted flow resulting from increased pressure on the inlet side of the passage caused by said elastic member, a split sleeve loosely disposed in said passage on the inlet side of the body, and aligned with said hole, and manual means for variably expanding said split sleeve to control flow into said hole.

4. In a sprayer structure, a body having a flow passage, a flow-retarding member intermediate the ends of said passage and held therein by pressure of flow in the passage, said body having a hole for diverted flow resulting from increased pressure on the inlet side of the passage caused by said flow-retarding member, a split sleeve loosely disposed in the passage on the inlet side of the body and aligned with said hole, and manually-operable means for variably expanding said split sleeve to control flow into said hole.

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