Dec. 30, 1952 C. GUSTAFSON 2,623,782

ATOMIZING APPARATUS

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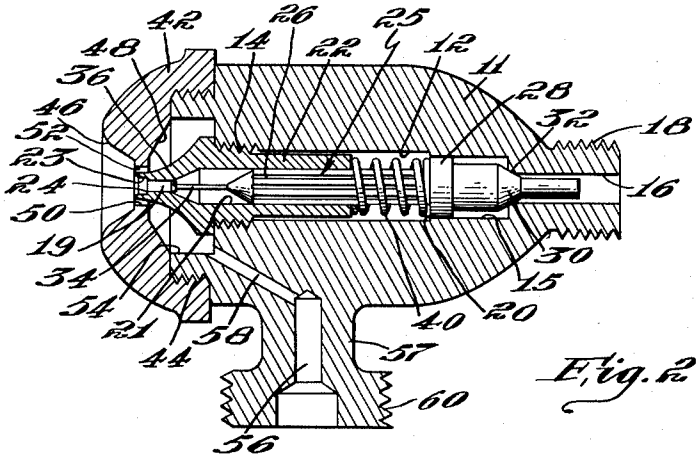


Fig. 2

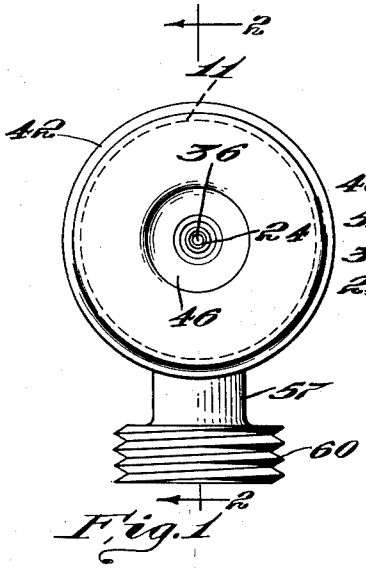


Fig. 1

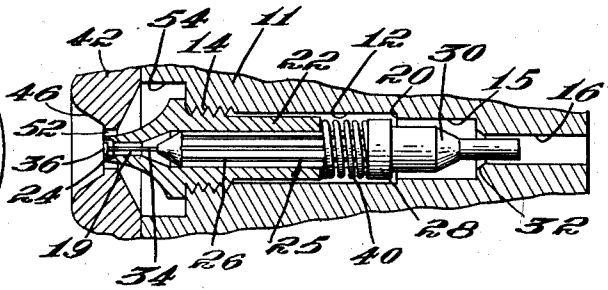


Fig. 3

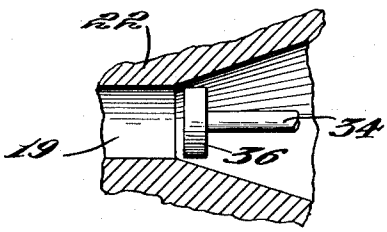


Fig. 4

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ATOMIZING APPARATUS

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2 Claims. (Cl. 299—59)

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This invention relates to atomizing or spray nozzle apparatus, and more particularly to such apparatus of the type which is suitable for providing a humidifying mixture of finely divided water and air.

It is the main object of the present invention to provide nozzle apparatus of the above type which divides a liquid such as water into very fine particles intermixed with another fluid such as air, while regulating its discharge in conformity with the pressure of the liquid supplied thereto, and keeping itself open by continuously automatic action, thereby remaining in operation in spite of accidental dirt and other impurities which in other types of such apparatus often impair proper and continuous operation.

Other objects of the invention are to provide spray nozzle or other humidifying apparatus of the above type which is simple and inexpensive in manufacture and yet rugged and reliable; to provide such apparatus which can be easily disassembled and reassembled for the purpose of cleaning or exchanging the control elements, and which permit adjustment of its operation; and to provide spray nozzle humidifying apparatus which automatically cleans itself each time the fluid supply is turned on or cut off, and which inherently eliminates any particles lodging in the nozzle portion between such cleaning operations.

In one of the aspects of the invention a spray nozzle is provided with a control member having a nozzle cleaning portion which slidably engages the nozzle discharge portion each time a supply of fluid under pressure is connected or disconnected from the inlet of the spray nozzle.

In another aspect a piston is integrally or otherwise fastened to a control member slidably arranged in a conduit or passage in a body, which piston cooperates with a shoulder in the passage to cause a pressure drop balancing the force exerted by a spring biasing the control member thereby to limit the travel of the nozzle cleaning portion. Such travel is preferably but not necessarily limited, so that the cleaning portion cooperates with a suitably formed portion of the body conduit to produce an essentially cone-shaped spray pattern.

In still another aspect the cleaning portion is connected to the remainder of the control member by means of a yieldable needle-shaped portion which extends through the conduit when the cleaning portion is in its extended operating position, the needle-shaped portion being sufficiently flexible to bend thereby to dislodge particles tending to clog the body conduit.

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A further feature of the invention is, in addition to the piston or other means for regulating the fluid discharge dependent upon the fluid pressure, provision of valve means which check the fluid supply while the fluid pressure is below a given value.

In still another aspect the invention provides a humidifying device which combines two nozzles for two fluids, one of which may be liquid and the other gaseous, these nozzles being so correlated that the two fluids, both supplied under pressure, intermingle and form an especially fine spray which is propelled a considerable distance beyond the nozzle.

These and other objects and aspects will appear from the following description of a typical embodiment illustrating the novel characteristics of the invention. This description refers to a drawing in which:

Fig. 1 is a front elevation view of the spray apparatus;

Fig. 2 is a section on line 2—2 of Fig. 1 showing the position of the control member when no fluid is being supplied to the nozzle;

Fig. 3 is a fragmentary sectional view showing the control member in its extended operating position; and

Fig. 4 is a detail section of the fluid orifice with the cleaning portion of the needle withdrawn.

In Figs. 1 and 2, numeral 11 denotes the main body of the spray apparatus according to this embodiment of the invention, which body 11 has a centrally bored conduit or passage 12. One end of the passage 12 is threaded as at 14, the other end being twice reduced in diameter as at 15 and 16 respectively, to form two shoulders 20 and 32. The passage portion 16 extends through the wall at the rear of the body 11 which is reduced in diameter to form a boss for an external thread 18 which is adapted to connect with a suitable supply fluid under pressure (not shown). A head 22 for closing the front end of the passage 12 is provided with external threads which engage the internal threads 14 in the body at the end of the passage. The head 22 is provided with centrally located discharge passage 19, the outer end 23 of which is bored to a greater diameter thereby forming a shoulder 24. The opposite end 21 of the passage 19 also is of a greater diameter so that it reciprocatingly accommodates a fluted portion 26 of a slidable control member 25. The front end of the fluted portion 26 tapers to a yieldable needle-like support portion 34 having a cylindrical shaped nozzle cleaning portion 36 at the forward end thereof. The diameter of the cleaning portion 36 is such

that it makes a sliding fit with the passage 19. Formed integrally with the opposite end of the fluted portion 26 is a piston 28 which slidably engages the passage 15 when the control member 25 is in the retracted position shown in Fig. 2. Rearwardly of the piston 28 is a cone-shaped portion 30 which cooperates with a seat in the shoulder 32 between the passages 15 and 16 to form a check valve. The control member 25 is biased rearwardly to seat the check valve by means of a spring 40, one end of which bears against the piston 28, the other end being seated upon the end of the head 22 with conical portion 30 seated on 32, the cleaning portion 36 slightly clears passage 19, as shown in Fig. 4.

The forward end of the body 11 is closed by a cap 42 which is secured thereto by means of the threads 44. Centrally located in the front and rear of the cap 42 are two frustoconical recesses 46 and 48 respectively, the apexes of which are connected by a cylindrical aperture 50. The cap 42 and the head 22 are proportioned so that the tapered front end of the head projects through the aperture 50 until it is flush with the truncated end of the recess 46. The diameter of the aperture 50 is sufficiently greater than the diameter of the tapered end of the head 22 that an annular passageway 52 is formed therebetween.

The rear recess 48 in the cap connects with a substantially annular passage 54 located between the body 11 and the head 22. This passage 54 in turn is connected by a passage 53 to a passage 56 in a neck 57 projecting from the body 11. At the end of the neck 57 is a head having external threads 60 for connecting with a supply of compressed air (not shown) in any conventional manner.

In operation the compressed air supply is first connected to the nozzle, with the components of the apparatus as shown in Figs. 1 and 4, so that air under pressure flows through the passages 56 and 53 into the angular passage 54 and thence out through the cylindrical passage 52. Water or other liquid to be atomized is then supplied to the conduit 16. When the pressure of such liquid reaches a predetermined value, the force exerted upon the control member 25 is sufficient to overcome the force exerted by the biasing spring 40, thereby to crack the check valve seated upon the shoulder 32. The fluid pressure then exerted upon the effective area of the piston 28 further compresses the spring 40 until the piston leaves the conduit portion 15 and the liquid flows along the fluted portion 26 into the conduit 21. This movement of the control member 25 forces the nozzle cleaning portion 36 through the nozzle portion 19, thereby to clean out any particles of dirt which may have accumulated therein which would otherwise tend to interfere with the operation of the nozzle.

The forward movement of the control member 25 is limited by the increase in fluid pressure drop across the edge of the piston 28 and the shoulder 20, the control member moving to a piston where the back pressure plus spring force balances the fluid supply pressure. In this position the front end of the nozzle cleaning portion 36 is flush with the truncated end of the recess 46 as is shown in Fig. 3, so that the rear edge of the cleaning portion cooperates with the shoulder 24 to produce a conical shaped spray pattern which is thoroughly atomized by the compresed air from the passage 52. It will be noted that spring 40 is not fully compressed in this position, providing continuously floating operation of head 22.

Any particles of foreign matter which tend to lodge in the passage 19 thereby to clog the nozzle are dislodged by the force exerted on the particle by the fluid pressure which bends the needle portion 34 thereby permitting the particle to pass out through the front of the nozzle.

When the fluid supply is shut off so that the fluid pressure disappears, the control member 25 is returned to the position shown in Fig. 2 by the action of the spring 40 thereby to close the check valve and prevent dripping at pressures below which atomizing takes place. This rearward movement of the control member also slides the cleaning portion 36 back through the nozzle conduit 19 thereby providing a second positive cleaning action.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. An atomizer comprising a body enclosing a chamber, a liquid inlet port and a liquid outlet duct communicating with the chamber, a discharge passage forward of the duct, said passage having walls generally codirectional with and of greater inside diameter than the duct, a flow control member movable within said chamber between rear and forward positions in response to the flow of liquid through the chamber, a support portion extending forwardly from the control member, said support portion being thinner than the duct, a cleaning portion of greater diameter than the support portion at the forward end of the support portion and aligned with the duct and movable with the control member from an initial position within the chamber through the duct and thence to a position beyond the duct, said cleaning portion snugly fitting the duct to clean the duct on movement therethrough, said control member when in forward position holding the cleaning portion in said discharge passage so that said cleaning portion and walls form an obstructed channel causing a turbulence in the flow of liquid through the discharge passage thereby breaking the liquid into a fine spray.

2. An atomizer comprising a body enclosing a chamber, a liquid inlet port and a liquid outlet duct communicating with the chamber, a discharge passage forward of the duct, said passage having walls generally codirectional with and of greater inside diameter than the duct, a flow control member movable within said chamber between rear and forward positions in response to the flow of liquid through the chamber, a support portion extending forwardly from the control member, said support portion being thinner than the duct, a cleaning portion of greater diameter than the support portion at the forward end of the support portion and aligned with the duct and movable with the control member from an initial position within the chamber, through the duct and thence to a position beyond the duct, said cleaning portion snugly fitting the duct to clean the duct on movement therethrough, said control member when in forward position holding the cleaning portion in the discharge passage so that said cleaning portion and walls cause a turbulence in the flow of liquid through the discharge passage thereby breaking the liquid into a fine spray, said support portion being longer

than said duct and flexible to allow lateral movement of the said portion and support when said portion is beyond the duct, the lodging of particles in the duct causing said portion to flex said support and dislodge the particles, whereby said duct is automatically cleaned both at the start of and during operation of the apparatus.

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