

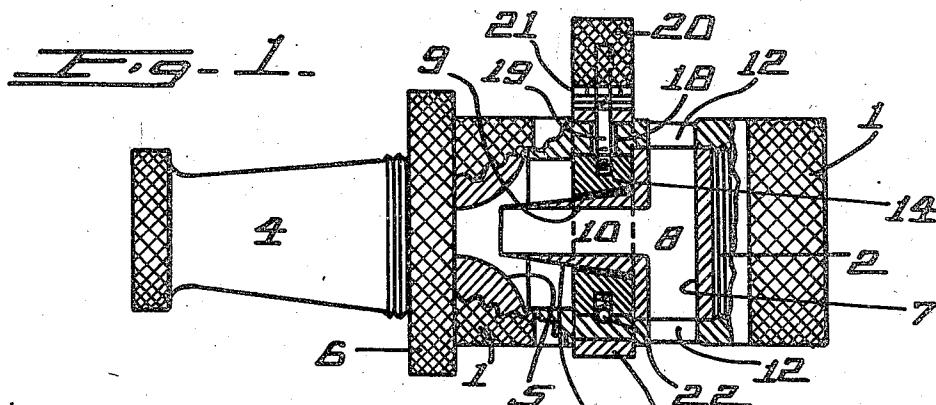
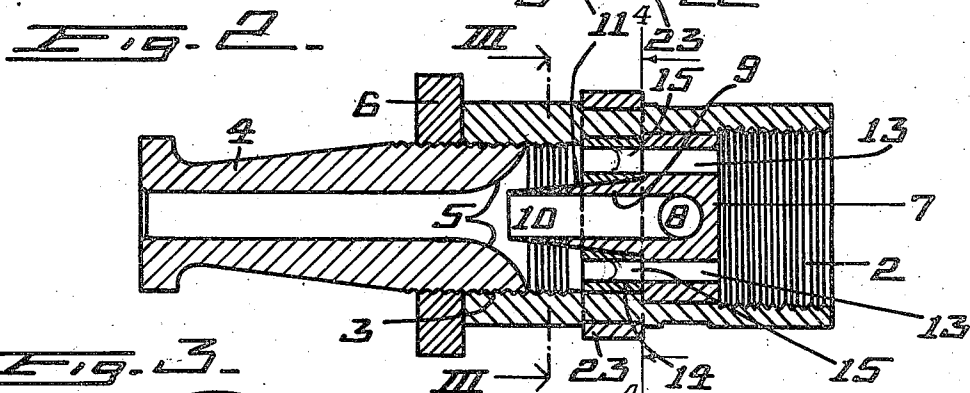
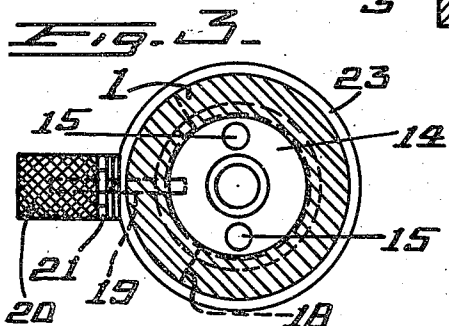
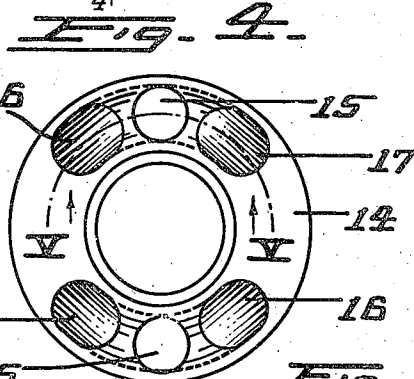
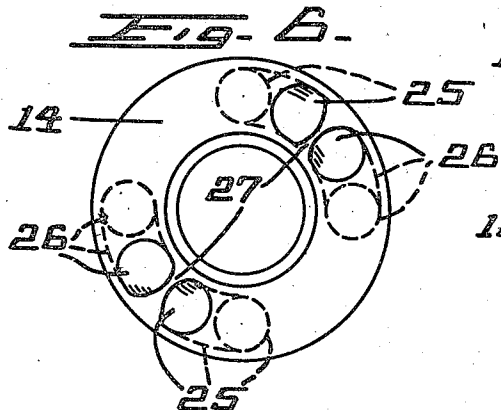
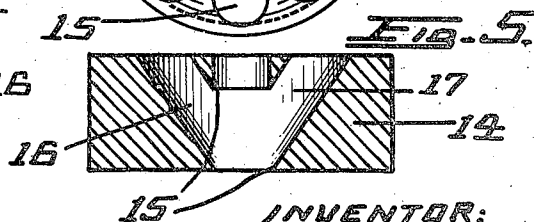
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F. SMITH

2,405,375

LIQUID DELIVERY APPARATUS

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UNITED STATES PATENT OFFICE

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LIQUID DELIVERY APPARATUS

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2 Claims. (Cl. 261-116)

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According to the present invention it is proposed to provide liquid delivery apparatus with a nozzle having a predetermined size of bore, and to associate therewith means for more or less constricting said bore and for admitting air to the centre of the passing stream of liquid, in such a manner that (between certain limits) any reduction in the volume of liquid passing to the outlet nozzle is compensated or balanced by a corresponding increase in the volume of admitted air, whereby the liquid is aerated and caused to completely fill the bore of the nozzle from which it issues in a perfect jet at the desired velocity, irrespective of the quantity of passing liquid. Means may be associated with the apparatus for ensuring that the liquid issues from the nozzle either in the form of a jet or of a spray. The jet or the spray issues from the same outlet and the same volume of liquid may be passed through said outlet either in jet form or spray form in the same period of time. The means for controlling the spray may cause the latter to have either a clockwise spin or a counter-clockwise spin. Said means comprises a stationary or integral plug having orifices therein for the passage of liquid, and a revoluble rotor or the like provided with a straight bore or bores and with a co-acting helically or angularly arranged bore or bores, means being also provided for manipulating said rotor in order that the several bores thereof may be progressively brought into more or less register with the orifices of the plug. Or a stationary plug provided with orifices may co-act with a revoluble rotor having therein a pair or pairs of angularly arranged bores, in such a manner that upon the rotor being manipulated for one or other of the pair or pairs of bores to more or less register with the orifices of the plug, a correspondingly spinning spray may be produced from the outlet; or the said rotor may be manipulated in such a manner that the land between the bores lies approximately midway across the orifices of the plug to produce a jet of liquid at the outlet of the apparatus.

Alternatively, a single bore in the body or like of the apparatus may co-act with a revoluble rotor having a straight bore and one or more helically or angularly arranged bores therein, whereby upon the rotor being rotated, one or other of the bores therein may be brought into more or less register with the single bore aforesaid for producing a jet, spray or sprays.

The apparatus is provided with means for coupling the same to any appropriate liquid supply,

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and other features of the invention will be elucidated as the present description proceeds.

The invention will now be described with reference to the accompanying drawing, in which—

5 Figure 1 is an elevation, partly in section, of a liquid delivery apparatus constructed according to the invention.

Figure 2 is a sectional plan view of the device illustrated in Figure 1.

10 Figure 3 is a sectional end view on the line III—III of Figure 2, and Figure 4 is an end view taken along the line 4—4 of Figure 2.

Figure 5 is a sectional plan on the line V—V of Figure 4, and Figure 6 is a similar view of Figure 4 of a modification of the invention.

15 In the apparatus depicted in Figures 1 to 5 of the drawing, 1 is the main body of the liquid delivery apparatus of hollow cylindrical formation, provided with an internally screw-threaded bore 2 for coupling to a hose-pipe or other source of liquid supply, and with a further internally screw-threaded bore 3 in which is adapted to screw an outlet nozzle 4 provided with a bore having a flared inner end 5. 6 is a lock-nut.

25 Within the body 1 is secured a cylindrical plug 7 having therein a diametrically arranged bore 8 and a centrally arranged projection 9 provided with a concentric bore 10 and frusto-conical exterior 11. Bores 10 and 8 communicate with 30 each other and the latter registers with orifice 12 in the walls of body 1.

Also provided in plug 7 is a pair of orifices 13, diametrically opposite to each other.

35 Revolvably mounted upon the frusto-conical projection 9 of plug 7, is a rotor or washer 14, in which is a pair of diametrically opposite orifices 15. Preferably equidistantly located on each side of each bore 15 are inclined bores 16 and 17, the outlet end of each of which registers with the aforesaid bore 15.

40 18 is a slot in body 1 through which passes a stud 19 screwing into rotor 14 and provided with a knob 20 and locking means 21, whereby rotor 14 may be manipulated so as to partially rotate within the body 1 of the apparatus. 22 is a ball catch or the like for determining the amount of movement of said rotor, and 23 is an annular ring for covering slot 18 and preventing leakage of liquid.

50 In operation, and when it is desired to cause a jet of liquid to issue from the outlet nozzle 4, rotor 14 is rotated until orifices 15 therein register with orifices 13 in plug 7. Upon the supply of liquid being turned on, said liquid enters bore 2 of body 1, passes through orifices 13 and 15,

around the exterior of projection 11 to flared portion 5 of nozzle 4, and away to the outlet of the latter.

Should it be desired to convert the jet into a spray, rotor 14 may be rotated until the inlet ends of bores 16 thereof register with orifices 13 in plug 7, whereupon the liquid is given a turning or spinning movement in a clockwise direction and issues from orifices 15 in rotor 14 and consequently from nozzle 4 in the form of a clockwise-spinning spray. Alternatively, the rotor may be moved in the opposite direction to bring the inlet ends of bores 17 into register with orifices 13 aforesaid, whereupon the liquid issuing from nozzle 4 is given a counter-clockwise spinning direction. In both cases, the same volume of liquid passes through the nozzle in spray form as will pass through it in jet form when orifices 15 and 13 register.

By gradually moving the rotor 14 from the central position to either side of bores 16 or 17, the jet gradually changes to a spinning spray, the extent of said spray becoming gradually shorter but increasingly wide.

Simultaneously with the passage of liquid around the projection 9 to the outlet of the nozzle, a flow of air is induced through orifices 12, 8 and 10, which mingles with the liquid at the outlet of 11 and aerates said liquid in such a manner as to always maintain the bore of the nozzle 4 full of a mixture of liquid and air and consequently insures a perfect flow from said nozzle.

In a modification of the invention, a rotor of the type illustrated in Figure 6 of the drawing may be substituted for the one shown in Figures 4 and 5, which embodies two pairs of angularly arranged bores 25, 26. In these circumstances when it is desired to obtain a jet, rotor 14 is adjusted until the land 27 between each pair of bores 25, 26, lies centrally across the bores 13 of plug 7, whereupon the liquid passing from inlet 2 is equally divided by said lands and issues in the desired jet from the end of nozzle 4. Movement of the rotor in one direction or the other shuts off water from either bores 25 or bores 26, to produce a correspondingly spinning spray. In addition, the jet may be adjusted or balanced by slight movement of the rotor, or the extent and width of the spray may be varied in a similar manner to that already described with reference to the rotor illustrated in Figures 4 and 5 of the drawing.

In all embodiments of the invention it must be understood that the flared inner end of the bore of nozzle 4 may be regulated or adjusted backwards and forwards relative to the projection 9 of the air supply means, which has the effect of reducing said bore or of enlarging the same. If desired, nozzle 4 may be screwed down until the said flared end seats itself upon the end

of portion 9, in which case the water supply to the outlet is completely shut off.

It has been found in practice that it is best to employ a nozzle 4 with a bore of larger diameter than would normally be used with liquid delivery apparatus, whereby advantage may be taken of a copious supply of liquid at considerable pressure. In the event, however, of the quantity or pressure of supply decreasing, from any cause, adjustment of the portions 4 and 9 relative to each other may be effected.

It has also been found that the higher the pressure of the liquid passing through the nozzle 4, the greater the ingress of air at bores 8, 10, 12, and that the mixture of air and water keeps filled the bore of said nozzle, consequently producing a perfect jet of liquid at all pressures.

Should it be desired to temporarily reduce the length of the jet or spray or to increase the volume of liquid issuing from the apparatus, this may be achieved by an operative placing his fingers over the orifices 12 or 8, as the case may be, so as to exclude the ingress of air.

When using the spray apparatus it may be found preferable to use either the clockwise-spinning spray or the counter-clockwise spinning spray, according to the direction of the wind, a feature of considerable advantage in fire-fighting or water cooling.

In the event of the apparatus being used for hydropathic treatment, a powerful massage effect is obtained both with the jet of aerated water and with the spinning sprays.

What I claim as my invention and desire to secure by Letters Patent is:

1. A liquid delivery apparatus comprising a tubular body adapted to be connected to a source of liquid supply, an outlet nozzle connected to one end of said body, a stationary member in said body, said member having air passages and liquid passages therein, said air passage terminating in a centrally disposed discharge passage and a rotor having a straight opening and communicating side openings, and means for operating the rotor for selectively moving said openings into registration with the liquid supply passages so as to control the flow of the liquid from the nozzle.

2. A liquid delivery apparatus comprising a tubular body adapted to be connected to a source of liquid supply, an outlet nozzle connected to one end of said body, a stationary plug having a transverse air passage communicating with a centrally disposed passage, said plug having spaced liquid openings, a rotor revolvably mounted on the plug and provided with openings arranged to register with the liquid openings in the plug for controlling the flow of the liquid through the nozzle, and means for manipulating said rotor.

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