

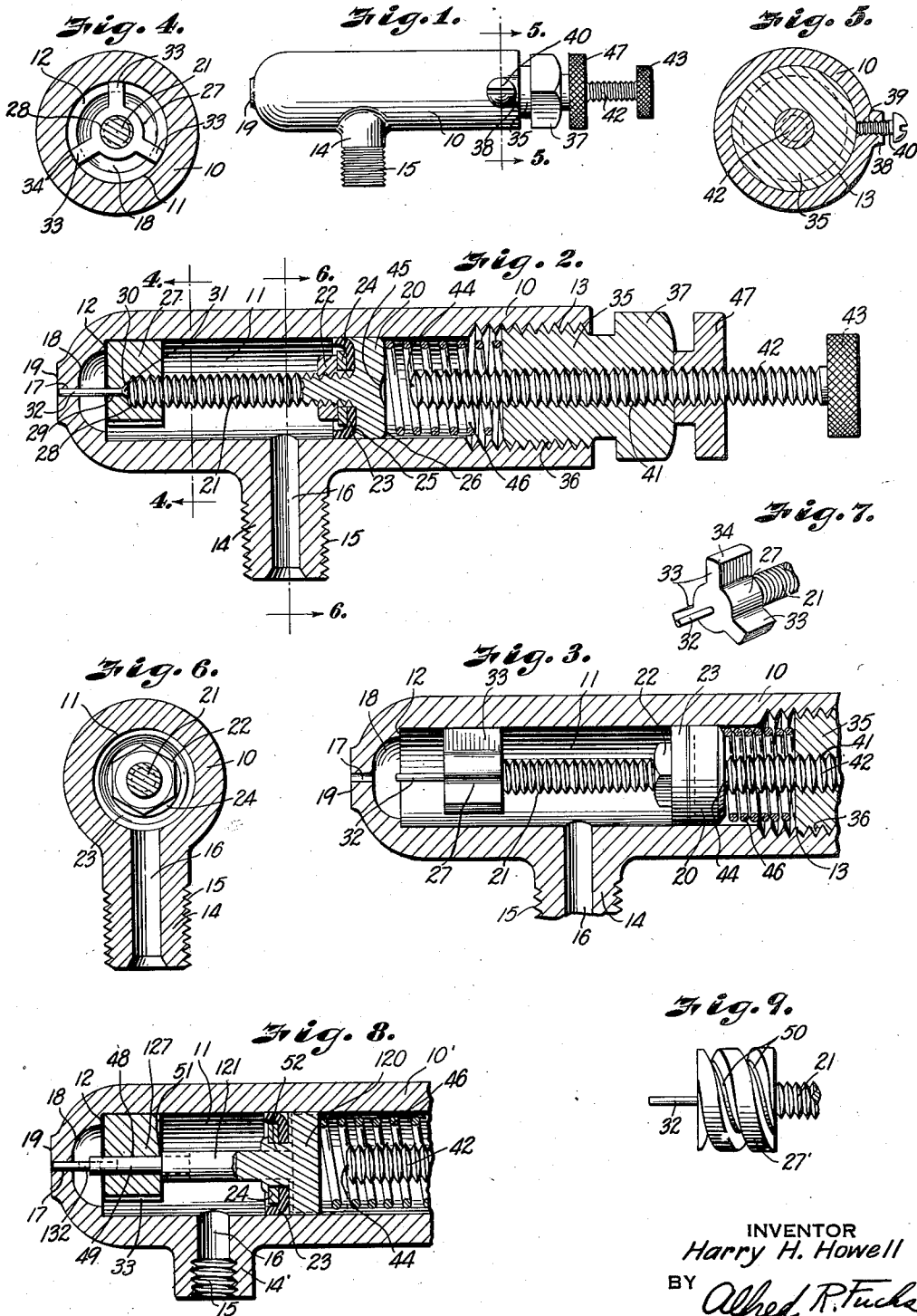
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SPRAY NOZZLE

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SPRAY NOZZLE

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6 Claims. (Cl. 299—59)

My invention relates to spray nozzles, and more particularly to a spray nozzle that is adapted to make a very fine spray of liquid, such as water, that is so finely divided as to have substantially the characteristics of a smoke, rather than a stream or streams of water, or other liquid, having any particular direction of projections.

It is a further purpose of my invention to provide a nozzle of the above mentioned character, which can be adjusted so as to produce any degree of fineness of spray between that above referred to as being a cloud-like or smoke-like spray to a very coarse spray, or even substantially a fine stream.

It is a further purpose of my invention to provide a nozzle of the above mentioned character, which is self cleaning, so as to prevent any possibility of clogging thereof, thus preventing any stoppage of the spray or any irregularity or unevenness thereof due to a clogging or partial clogging of the orifice.

It is a further purpose of my invention to provide a spray nozzle of the above mentioned character, which has means for adjusting the fineness of the spray and means for controlling the pressure of the water within the nozzle to thus further control the character of the spray in accordance with such water pressure or other liquid pressure, and to provide means for adjusting said pressure controlling means so that any desired fluid pressure within the nozzle may be obtained.

It is still another purpose of my invention to provide a nozzle with a needle-like or pin-like member entering an orifice so as to slidably fit within the same, but not so tightly that a fine spray of liquid cannot escape between the pin or needle-like member and the wall of the orifice surrounding the same, said pin or needle-like member moving into the orifice when the flow of liquid to the nozzle is interrupted, so as to clean the same of any obstructions that may accumulate therein and keep the same in a clean condition, and being automatically movable into a position to produce the form of spray desired, either within the orifice or adjacent the orifice within the nozzle, upon turning on the supply of liquid to the nozzle.

Other objects and advantages of my invention will appear as the description of the drawing proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawing:

Fig. 1 is a view in side elevation of my improved nozzle.

Fig. 2 is a longitudinal sectional view thereof, shown on an enlarged scale, showing the pin or needle-like member projecting into the orifice.

Fig. 3 is a fragmentary longitudinal sectional view showing the pin or needle-like member withdrawn from the orifice, or with the parts in the position in which the nozzle is adjusted for a relatively coarse spray, and the same is in the position it assumes when the liquid to be sprayed is being supplied under pressure thereto.

Fig. 4 is a section taken on the line 4—4 of Fig. 2.

Fig. 5 is a section taken on the line 5—5 of Fig. 1, on an enlarged scale corresponding to that used in Figs. 2 and 3.

Fig. 6 is a section taken on the line 6—6 of Fig. 2.

Fig. 7 is a perspective view of the pin carrying guide member and adjoining parts.

Fig. 8 is a fragmentary sectional view, similar to Fig. 3, of a modification, and

Fig. 9 is a side elevation partly broken away of the pin carrying means provided in a further modification.

Referring in detail to the drawing, my improved spray nozzle is provided with a chambered body portion 10, which has a longitudinal bore 11 therein, of uniform diameter from the shoulder 12 at the forward end of the nozzle to the internally threaded portion 13 at the rear of the nozzle. The body portion 10 further has a tubular projection 14 extending laterally therefrom, which is externally threaded at 15, which has a passage 16 therein leading into the chamber or bore 11. The forward end of the nozzle is provided with a closed wall portion except for the orifice 17 of small diameter, and the interior of the body portion 10 adjacent the orifice is provided with a dome-like rounded wall portion 18 extending from the shoulder 12 to the orifice 17. The exterior of the nozzle at the spraying end or forward end is provided with a substantially flat wall 19, through which the orifice 17 extends, there being no projections, obstructions or other appurtenances of any kind provided on the exterior of the nozzle that will in any way interfere with the free spraying of the liquid from the orifice 17 and against which the liquid might be projected, which might cause a dripping from the nozzle.

Mounted within the body portion 10 in the bore 11 and slidably fitting therein, is a piston or head 20, which has a screw threaded stem 21 thereon, 55

with which a nut 22 engages that is adapted to hold the cupped washer 23, of leather or similar flexible material, in snug engagement with the member 20, a metallic washer 24 being preferably provided between the cupped washer and the nut 22. The member 20 is preferably slightly rounded so as to have a concave portion at 25 to curve the cupped washer 23 into its cup-like shape, the cupped washer being provided for the purpose of providing a substantially liquid tight joint between the piston or head member 20 provided within the body portion 10, and the wall of the bore 11. The stem 21 is made integral with the head or piston 20 and the piston 20 may be slightly rounded at the corner 26, if desired.

The stem 21 is threaded throughout its length and screw-threadedly receives the guide member 27 thereon, said guide member having a relatively large internally threaded opening 28 therein to receive the stem 21, and having a small opening 29 therein coaxial with the opening 28 and connected therewith by means of a slightly flaring bore 30, which is adapted to receive the head portion 31 provided on a pin or needle-like member 32. It will be noted, that, if the guide member 27 is tightened down on the stem 21 with the needle-like member 32 in place, the needle-like member 32 will be fixed in position in the guide member 27 in a central position and in alignment with the orifice 17.

The guide member 27 fits slidably in the bore 11 and is adapted to engage the abutment 12 when in its forwardmost position, at which time the pin 32 is projected into the orifice 17 and extends almost entirely through the same. The member 27 is shown more in detail in Fig. 7, having a central hub portion and wings or ribs 33 that project therefrom and have curved outer faces 34 conforming to the curvature of the bore 11. It will be obvious that there are passages between the ribs 33, through which the liquid can pass to reach the orifice 17, and that the member 27 divides the chamber within the body portion 10 into two portions, one between the member 27 and the orifice 17, and the other between the member 27 and the piston or head 20, the two chambers being in communication through the passages provided between the ribs 33 of the member 27 and the wall portion of the bore 11.

A plug 35 is provided, which has an externally threaded portion 36 engaging with the threaded portion 13 of the body portion 10, said plug having a polygonal head portion 37 thereon, by means of which the same can be turned. The body portion 10 is also provided with a boss 38 thereon, through which the screw threaded opening 39 extends that receives the set screw 40 for locking the plug member 35 against rotation in the threaded portion 13 of the member 10.

The plug 35 also has an axial, internally screw-threaded, bore 41 extending entirely there-through, and an adjustable stop member 42, which is made in the form of an externally screw threaded stem, is adapted to be threadedly engaged with the bore 41 and has a knurled knob or head 43 thereon, by means of which the same can be turned to adjust the position of the rear extremity 44 thereof, which is adapted to be engaged by the member 20 to limit movement of the piston 20 in a rearward direction, or in a direction away from the orificed end of the nozzle. Normally the end 44 of the stop member 42 is spaced from the head or piston 20 when the pin 32 is projected into the orifice 17, a seat being provided at 45 for the end 44 of said member 42.

However, the member 42 can be adjusted so as to positively hold the member 20, and thus the members 21 and 32, in the position shown in Fig. 2, when the nozzle will be adjusted to produce a cloud or smoke-like spray of liquid, which is so fine that there is no appreciable direction to the flow of the water or other liquid as it leaves the orifice 17.

Mounted between the plug member 35 and the head 20 is a coiled compression spring 46, which bears against the head or piston 20 and against the plug 35, tending to force or project the piston, and thus the pin 32 to the left in Fig. 2, or in other words, to project the pin 32 into the orifice 17. The pressure exerted by the spring 46 can be regulated by adjustment of the position of the plug 35, and a pressure compensating means is thus provided, so that the pressure of the liquid in the chamber 11 can be regulated relative to the pressure of the liquid entering through the passage 16, so that the piston 20 is moved to the right to open the nozzle, causing the same to spray liquid whenever a predetermined pressure condition exists in the chamber 11.

It will be obvious that by adjusting the plug, this pressure can be kept at a predetermined amount, independent of the pressure of the supply entering through the passage 16. The amount of movement that the pin 32, the piston 20 and the guide member 27 has to the right, whenever the liquid under pressure is supplied through the passage 16, depends upon the position of the member 42, and thus can be varied if desired to produce the kind of a spray that is wanted, by means of the pin 32, the orifice 17 and the dome-like wall portion 18 adjacent the orifice. The position of the parts, such as the guide member 27 and the pin 32, determine the character of the spray that is produced. The pressure, of course, also determines this, but any variations in pressure or any adjustments necessary for different pressures provided in the source of supply, can be made by adjusting the plug 35. In order to lock the member 42 in adjusted position, a knurled lock-nut 47 is provided on the screw threaded member 42, said nut 47 engaging with the outer end of the plug to lock the member 42 in adjusted position.

Of course, the guide member 27 serves, to some extent, to restrict the passage between the main portion of the bore 11 to the right of said member 27 and that portion at the left thereof between the member 27 and the orifice 17. It may sometimes be desirable to produce a whirling action of the liquid as it enters this space between the guide member and the orifice, and in Fig. 9 a modification of guide member is shown, in which such whirling action of the liquid is produced. The guide member 27' is provided with an internally screw threaded bore for receiving the member 21, similarly to the member 27, and also has the pin 32 mounted therein in substantially the same manner as previously described, said pin entering the orifice 17. The other parts of the nozzle are substantially the same as previously described, except for the spiral passage 50 provided in the member 27', said passage 50 causing the water or other liquid, as it enters the chamber between the member 27' and the orificed end of the nozzle, to be set in rotation to produce a whirling action of said liquid, which, in certain adjustments of the member 32, will produce a different effect on the spray as it leaves the nozzle than where no such spiral passage is provided.

In the form of the invention shown in Fig. 8 the parts are all made in the same manner as in the form of the invention shown in Figs. 1 to 7 inclusive, and bear the same reference numerals, except for certain modifications of the housing, guide member and piston or head and stem carried thereby, which will be described below. The housing 10' is made in the same manner as previously described, except that the tubular projection 14' is internally instead of externally threaded. The guide member 127 is made of the same external shape as the guide member 27, but fits with a drive fit in the bore 11 so as to be seated against the shoulder 12 in fixed position. Instead of being provided with a threaded opening and an internal shoulder, it has the longitudinal bore 43 of uniform diameter therein, in which the reduced portion 49 of the stem 121 is slidably mounted, a stop shoulder 51 being provided between the main portion of the stem 121 and the reduced portion 49. A pin 132 is formed integrally on the extremity of the stem 121 and enters the opening 17 functioning in the same manner as the pin 32 previously described.

The stem 121 has a head or piston 129 formed integrally thereon, which cooperates with the spring 46 and adjustable stop 42 in the same manner as was described as being the case with the head or piston 20. The pin 121 is provided with an enlargement 52 adjacent the head 129, which is upset against the washer 24 to clamp said washer 24 and cupped gasket 23 in position on the head 129. This form of the invention has certain advantages in cheapness of manufacture that make it desirable.

In any form of the invention, after the nozzle is adjusted to produce a fine spray, or any other character of spray that may be desired, except the extremely fine smoke-like spray previously mentioned, the adjustment of the parts is such that, when liquid enters the passage 16, the pressure built up within the bore 11 will cause the piston 20 or 120 to be projected toward the end 44 of the stop member 42 and cause said piston to assume the position shown in Fig. 3, or the dotted line position shown in Fig. 8, or some similar position, dependent upon the distance that the member 42 is adjusted inwardly or outwardly relative to that shown in Figs. 3 and 8. This causes the stem 21 or 121 and the pin 32 to be moved to the right, as shown in Figs. 3 and 8, withdrawing the pin 32 from the orifice 17 and producing a spray of the character described, which flows from the orifice 17 without engaging any projection or other deflecting means that might serve as an obstruction to the liquid sprayed from the orifice 17, and thus preventing any drip from the nozzle, such as frequently occurs where there are obstacles or obstructions of some kind, such as deflectors, utilized externally of the nozzle in alignment with the orifice for the purpose of producing a spray. This makes it possible to use the applicant's nozzle in a horizontal position for producing a fine spray without getting any drip, and makes it unnecessary to provide any holders or shields or drip catching devices of any character whatsoever in conjunction therewith.

What I claim is:—

1. In a nozzle of the character described a body portion having a longitudinal bore therein and a spray orifice in one end thereof, said orifice being free of any obstruction externally thereof, means slidably mounted in said bore comprising a guide member having a head spaced therefrom, a pin carried by said guide member adapted to enter said

orifice and project substantially therethrough, means for limiting the movement of said slidable means toward said orifice to space said guide member from said orifice and adjustable means for limiting the movement of said slidable means away from said orifice, said body portion having an inlet between said orifice and slidably mounted member, said head being provided with gasket means to provide a substantially fluid-tight joint between the same and the wall of said bore.

2. In a nozzle of the character described, a body portion having a longitudinal bore of substantially uniform diameter therein and a spray orifice in one end thereof, means slidably mounted in said bore, comprising a pair of spaced members slidably mounted in said bore and a reduced elongated stem connecting said members to provide an elongated chamber in said bore between said members, a pin projecting endwise from one of said members adapted to enter said orifice, means in said bore spaced from said orifice adapted to be engaged by the member from which said pin projects for limiting the movement of said pin into said orifice, means for limiting the movement of said pin away from said orifice comprising an adjustable stop engaged by said other member, resilient means engaging said other member for moving said pin into said orifice, and a cupped gasket mounted on said other member providing a fluid-tight joint between said other member and said bore, passages being provided between said bore and said pin carrying member, said body portion having an inlet between said pair of spaced members.

3. In a nozzle of the character described a body portion having a bore of substantially uniform diameter therein and having a minute discharge orifice at one end of said body portion, a stop shoulder in said bore spaced from said orifice, a guide member slidably mounted in said bore, a pin-like member carried by said guide member, said pin-like member projecting substantially centrally from said guide member and slidably fitting in said orifice, a piston slidably mounted in said bore, elongated means of reduced diameter connecting said guide member and said piston to provide an elongated chamber in said bore between said guide member and piston, means for projecting said pin-like member into said orifice to clear the same of obstructions, means for admitting fluid to said bore between said piston and guide member for moving said pin-like member out of said orifice and adjustable means for limiting the movement of said pin-like member away from said orifice, said guide member engaging said stop shoulder to limit the movement of said pin-like member into said orifice.

4. In a nozzle of the character described a body portion having a bore of substantially uniform diameter therein and having a minute discharge orifice at one end of said body portion, a stop shoulder in said bore spaced from said orifice, a guide member slidably mounted in said bore, a pin-like member carried by said guide member, said pin-like member projecting substantially centrally from said guide member and slidably fitting in said orifice, a piston slidably mounted in said bore, elongated means of reduced diameter connecting said guide member and said piston to provide an elongated chamber in said bore between said guide member and piston, adjustable means for projecting said pin-like member into said orifice to clear the same of obstructions, means for admitting fluid to said

bore between said piston and guide member for moving said pin-like member out of said orifice and adjustable means for limiting the movement of said pin-like member away from said orifice, said guide member engaging said stop shoulder to limit the movement of said pin-like member into said orifice.

5. In a nozzle of the character described a body portion having a bore of substantially uniform diameter therein and having a minute discharge orifice at one end of said body portion, a stop shoulder in said bore spaced from said orifice, a guide member slidably mounted in said bore, a pin-like member carried by said guide member, said pin-like member projecting substantially centrally from said guide member and slidably fitting in said orifice, a piston slidably mounted in said bore, elongated means of reduced diameter connecting said guide member and said piston to provide an elongated chamber in said bore between said guide member and piston, sealing means carried by said piston and having wiping engagement with the wall of said bore, means for projecting said pin-like member into said orifice to clear the same of obstructions, means for admitting fluid to said bore between said piston and guide member for mov-

ing said pin-like member out of said orifice and adjustable means for limiting the movement of said pin-like member away from said orifice, said guide member engaging said stop shoulder to limit the movement of said pin-like member into said orifice.

6. In a nozzle of the character described a body portion having a bore of substantially uniform diameter therein and having a minute discharge orifice at one end of said body portion, said bore having a concavely curved end wall in which said orifice is located and said body portion having a flat end face through which said orifice extends to provide an orifice free of all obstructions externally thereof, a pin-like member in said bore adapted to enter said orifice to clear the same of obstructions, means for mounting said pin-like member for guided movement in said bore, means for projecting said pin-like member into said orifice, means limiting the projection of said pin-like member into said orifice to space said mounting means from said concave wall adjacent said orifice and fluid pressure operated means for moving said pin-like member against the action of said projecting means.

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