

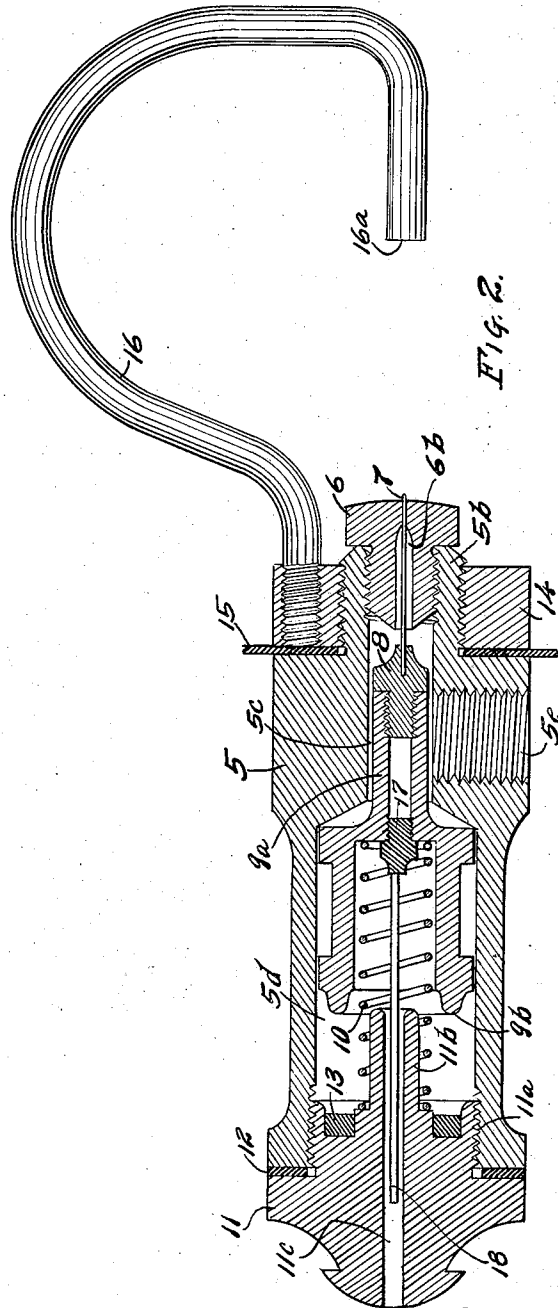
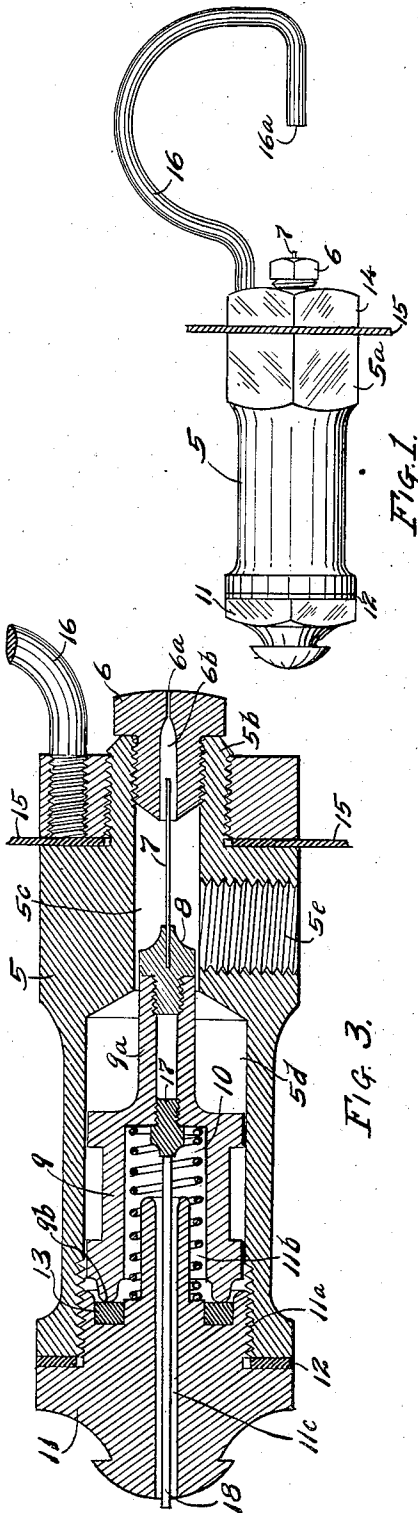
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SPRAY FORMING DEVICE

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SPRAY FORMING DEVICE

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8 Claims. (Cl. 299—59)

This invention relates to a humidifying apparatus and particularly to such an apparatus in the form of a nozzle and associated baffle adapted to produce a very finely divided spray.

5 It has heretofore been proposed to produce a fine spray or mist by projecting a very fine jet of liquid against a flat surface. It has been found, however, that a ridge of liquid builds up about the point of contact of the jet, interfering with the lateral movement of the liquid particles so that a great deal of liquid is not converted into spray but runs off of the surface.

15 It is an object of this invention to provide means for projecting a very fine jet of liquid in combination with a surface extending substantially at right angles to the axis of said jet, said surface being quite small so that there is no opportunity for a ridge of liquid to be formed thereon.

20 It is a further object of the invention to provide a nozzle for projecting a fine jet of liquid and a small flat surface perpendicular to the axis of said jet against which it is projected, said nozzle having a very small discharge aperture preferably between fifteen thousandths of an inch and three hundredths of an inch in diameter, the area of the flat surface against which the jet is projected being preferably between two hundredths and eleven hundredths of a square inch respectively.

30 It is another object of the invention to provide a nozzle having a very fine discharge aperture, a member of very small diameter adapted to be disposed in said discharge aperture and means controlled by the pressure of the liquid and a resilient means for controlling the position of said member.

40 These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawing, in which like reference characters refer to similar parts throughout the several views and in which:—

45 Fig. 1 is a view in side elevation of the device;

Fig. 2 is a central longitudinal section showing the parts in one position; and

Fig. 3 is a similar view of the nozzle portion showing the parts in a different position.

50 Referring to the drawing, a device for producing a fine spray is shown comprising a nozzle member for projecting a fine jet, which nozzle member is shown as having a body portion 5. This body portion is of general cylindrical form, the forward portion 5a being of hexagonal form in cross section. The body portion 5 has a re-

duced and exteriorly threaded front portion 5b and portion 5b is interiorly threaded to receive a discharge member 6. Discharge member 6 has a front portion of hexagonal shape in cross section and the same is provided at its front end with a very fine aperture 6a. In the rear of aperture 6a member 6 has a larger central passage 6b which tapers at its front end into the aperture 6a. While the diameter of aperture 6a may vary somewhat, in practice it has been found that the best results are obtained when said aperture is made no smaller than about sixteen thousandths of an inch in diameter corresponding to a No. 78 drill and no larger than thirty-one thousandths of an inch in diameter corresponding to a No. 68 drill. Body member 5 has a central bore 5c extending rearwardly from the interiorly threaded part of portion 5b and said bore is enlarged in the rear part of the member 5 as shown at 5d. Member 5 also has an inlet opening 5e at one side which is interiorly threaded to receive a suitable connection. A very small needle-like rod 7 is provided adapted to pass into and through the aperture 6a. Rod 7 is secured to a member 8 having a reduced portion threaded into the stem portion 9a of a plunger member 9, which plunger member 9 is illustrated as having a central reduced portion and as being loosely movable longitudinally in the enlarged bore 5d. The stem portion 9a is loosely movable in the bore 5c and loosely guided therein. Plunger 9 is interiorly bored to receive one end of a coiled compression spring 10. The other end of spring 10 seats on a shoulder formed on an end member or plug 11 having a reduced exteriorly threaded portion 11a threaded into the interiorly threaded rear portion of bore 5d. A gasket washer 12 is shown as disposed between member 11 and the rear end of member 5. Member 11 has an inwardly projecting reduced portion 11b surrounded by spring 10 and serving to hold said spring in position. Member 11 is provided with an annular recess about the surface or shoulder engaged by the end of spring 10, which recess receives a washer 13 of fiber, leather, rubber or similar material. The rear end of plunger 9 is provided with an annular rib 9b shown as substantially semi-cylindrical in cross section, the same being adapted to engage with washer 13. Member 11 is provided with a central bore or passage 11c extending from its rear end through portion 11b. A member 17 is threaded into the rear end of the opening in plunger 9 and a rod 18 is centrally carried thereby, said rod projecting rearwardly

into the passage 11c and being disposed axially of said passage.

The nozzle is usually adapted to be secured in a casing and a nut 14 is provided adapted to be screwed onto the portion 5b. The casing, a portion of which is shown as 15, is usually clamped between nut 14 and the front portion of member 5. A rod 16 is provided shown as having one end threaded into nut 14, said rod extending forwardly and being curved laterally and then bent substantially at a right angle to extend reversely. Said rod has a flat end surface 16a extending at right angles to the axis of aperture 6a and being arranged coaxially of aperture 6a.

The operation is as follows:—

When the device is not in operation the parts will be in the position shown in Fig. 2. At this time spring 10 moves plunger 9 to the forward end of bore 5d and rod 7 is projected through aperture 6a. Said rod is guided into said aperture by the passage 6b and the converging walls thereof. The passage through member 11 is at this time open. When it is desired to form the spray, liquid such as water is admitted to body member 5 through the inlet 5e which will have a suitable pipe connected thereto. The liquid will be under considerable pressure and will act on the front end of plunger 9, moving the same rearwardly and compressing spring 10. Some of the liquid will pass plunger 9 and a small amount of the water or liquid will pass through the passage 11c which forms a bleed opening. Plunger 9, however, is soon moved rearwardly to the position shown in Fig. 2 so that the annular portion 9b engages the washer 13, thus closing the opening through passage 11c. When plunger 9 moves rearwardly the rod 18 is moved through the end of opening 11c. This movement of rod 18 insures that passage 11c will be kept open and free from deposits or obstruction. All of the water is now forced through the aperture 6a, it being noted that rod 7 is withdrawn from aperture 6a when plunger 9 is moved rearwardly. Opening 11c is closed and the full pressure of the water is on the front side of plunger 9 while only atmospheric pressure is on its rear side. A very fine jet of water is projected from aperture 6a and this jet forcibly impacts against the surface 16a. The water or liquid is immediately broken up into very fine particles which move outward in all directions so that a fine mist or spray is produced. The area of surface 16a must be kept within certain limits to prevent the building up of a ridge of water about the point of impact of the jet from the nozzle. It has been found that when a No. 78 drill is used to make the aperture 6a, that the limit of diameter of surface 16a, is about $\frac{3}{8}$ of an inch. If a No. 68 drill is used to make the aperture 6a then the diameter of the surface 16a must not exceed $\frac{3}{8}$ of an inch. In fact, any diameter over $\frac{3}{8}$ of an inch is too large as a wall or ridge of water will form. In practice it has been found that the best results are obtained when the diameter of member 16a is not over $\frac{1}{8}$ of an inch. It has been found in practice that all of the water in the jet is transformed into the mist or spray. There is no dripping of water from the surface 16a and no water collects thereon. The aperture 6a is kept free from obstructions due to the deposit of salts or foreign matter therein by the action of the rod 7.

From the above description it is seen that applicant has provided a simple and very efficient device for producing a fine liquid spray. The nozzle is automatically kept clean and the parts

of the nozzle are very easily and quickly assembled and can be disassembled quickly if desired. The device has been amply demonstrated in actual practice and found to be very successful and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A nozzle having in combination, a body member, a discharge means in the front of said body member having a very small discharge aperture therethrough, said body member having a bore communicating with said aperture, a plunger loosely slidable in said bore, a small needle-like rod carried by said plunger and adapted to extend through said aperture, a spring urging said plunger to position with said rod disposed in said aperture, said body member having an opening in the rear of said plunger coaxial with said plunger, said plunger having a valve portion thereon adapted to close communication between said bore and said opening and said body member having an inlet opening leading to said first mentioned bore whereby pressure of liquid entering said inlet opening will move said plunger against the pressure of said spring, said valve will close said first mentioned opening and said rod will be withdrawn from said aperture and a small rod carried by said plunger movable into and through said first mentioned opening.

2. A nozzle having in combination, a member having a bore therein and a small discharge aperture at its front end communicating with said bore and having an inlet opening communicating with the front end of said bore, said member also having an opening at its rear end and a second member loosely movable in said bore and movable in one direction by fluid pressure and past which liquid entering said inlet opening may flow, means for moving said second member in the opposite direction, valve means carried by said second member constructed and arranged to close said last mentioned opening when said second member is moved rearwardly.

3. A nozzle member having in combination, a body member, a discharge member at one end of said body member having a very small aperture, said body member having a bore communicating with said aperture, a plunger movable in said bore, a small needle-like rod arranged to enter said aperture and connected to said plunger, resilient means normally acting to position said plunger with said needle-like rod disposed in said aperture, said body member having an inlet opening in front of said plunger, said body member having an opening in the rear of said member, a seat surrounding said opening, said plunger having a valve portion adapted to engage said seat and close said opening when said plunger is moved rearwardly by pressure of liquid entering said inlet opening and a rod carried by said plunger adapted to move in and through said last mentioned opening.

4. A nozzle having in combination, a member having a bore therein, a fine discharge aperture at its front end communicating with said bore and an opening at its rear end communicating with said bore, a plunger loosely movable in said bore having a valve portion thereon adapted to

close said opening when said plunger is moved by pressure of liquid and rods carried by said plunger adapted respectively to extend into and through said aperture and opening in the movement of said plunger by pressure of liquid.

5 5. A nozzle having in combination, a member having a bore therein and a small discharge aperture at its front end communicating with said bore and having an inlet opening communicating with the front end of said bore, said member also having an opening at its rear end, a second member loosely movable in said bore past which liquid entering said inlet opening may flow, said second member being movable in one direction by pressure of liquid in said first mentioned member, means for moving said second member in the opposite direction, valve means carried by said second member constructed and arranged to close said second opening when said last mentioned member is moved rearwardly and a plunger carried by said second member movable into and through said second opening to clean the same.

25 6. A nozzle having in combination, a body member, a discharge means in the front of said body member having a very small discharge aperture therethrough, means movable into and through said aperture, a second member past which fluid may flow carrying said second named means, resilient means in said body member acting on said second member to move the same to position with said second named means in said aperture, said second member being movable by a pressure of fluid in said body member to withdraw said second named means from said aperture, said body member having an opening in the rear thereof, and a member carried by said second member and movable into and through said opening.

40 7. A nozzle having in combination, a member

having a bore therein and a small discharge aperture at its front end communicating with said bore and having an inlet opening communicating with the front end of said bore, said member also having a comparatively small opening at its rear end, a second member loosely movable in said bore past which liquid entering said inlet opening may flow to said second named opening, valve means carried by said second member constructed and arranged to close communication between said bore and said second named opening when said second member is movable rearwardly, means also carried by said second member movable into and through said second named opening to clean the same and means carried by said second member movable through said aperture for cleaning the same.

8. A nozzle having in combination a member having a bore therein and a discharge aperture of very small diameter at its front end communicating with said bore and having an inlet opening communicating with the front end of said bore, said member also having an opening of greater diameter than said aperture extending through its rear end to said bore, a second member loosely movable in said bore past which liquid entering said inlet opening may flow, and adapted to be moved in one direction by said liquid longitudinally of said bore, a valve seat surrounding said second named opening, valve means carried by said second member constructed and arranged to engage said seat and close communication between said bore and said second named opening when said second member is moved rearwardly, means carried by said second member extending through said second named opening to clean the same of any obstruction and a small rod carried by said second member movable through said aperture.

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