April 24, 1951 S. LYMAN 2,550,573

WHIRLER SPRAY NOZZLE WITH OVERHANGING LIP

Filed Oct. 5, 1946

Fig. 2.

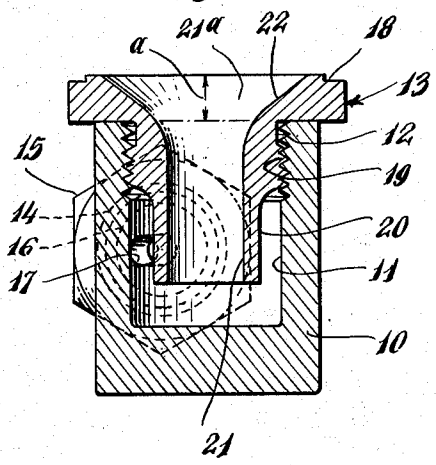


Fig. 1.

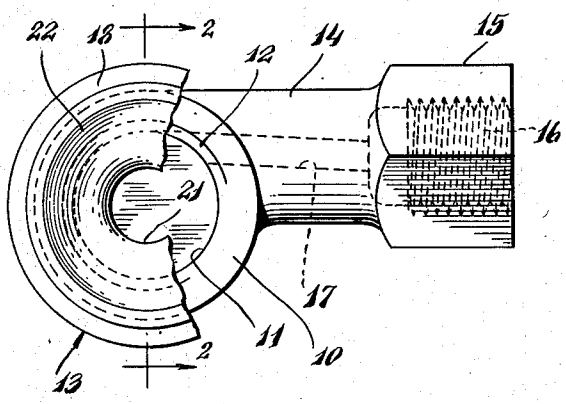


Fig. 4.

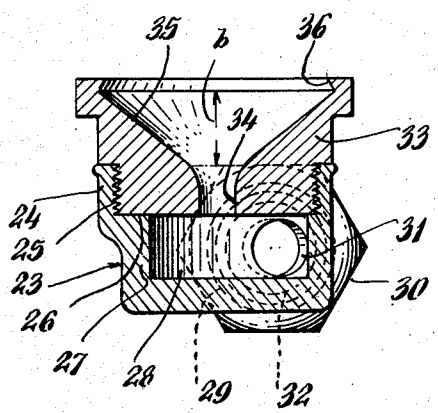
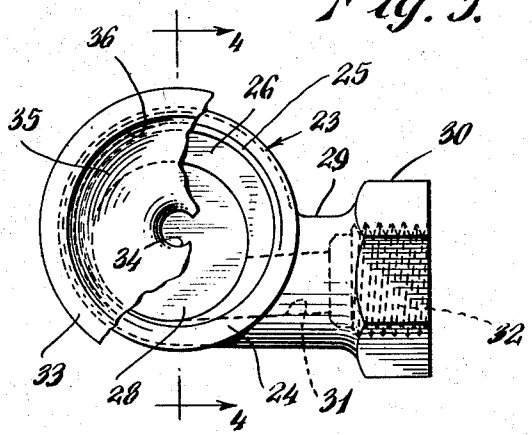


Fig. 3.



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WHIRLER SPRAY NOZZLE WITH OVERHANGING LIP

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1 Claim. (Cl. 299—114)

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My present invention relates to spray nozzles of the type having a whirling chamber and aims to provide certain improvements therein.

Various forms of spray nozzles with whirling chambers have heretofore been made and used for special purposes including use in air conditioning apparatus. Where used in air conditioning apparatus the spray head of the nozzle is usually designed to discharge water in the form of a rotating hollow cone which, as the wall of the cone thins out as it moves outwardly from the spray head, will rupture and break into tendrils, and then into drops which, in turn, are atomized by the action of the air. In all nozzles of this type with which I am familiar, the apex angle of the conical spray does not exceed 90°, thus providing but limited wetting area when used in air conditioning apparatus or the like.

My invention has for its primary object to provide nozzles of the character set forth which will provide conical sprays of large apex angle and hence require fewer nozzles to wet a predetermined area when disposed at a predetermined distance from said surface to be wetted. A further object is to provide such nozzles which, in addition to providing a large wetting area, will also function to atomize a portion of the water upon discharge so that it may readily commingle with the air to humidify the same. A still further object is to provide nozzles of the character set forth which will consist of but two parts which are simple to manufacture and which can be readily and cheaply assembled.

The foregoing and other objects of my invention not specifically enumerated I accomplish by providing a nozzle consisting of a body member having a whirling chamber and a spray head having an axial discharge passage or orifice having a conical portion which may be either concentric or eccentric with the axis of the whirling chamber, the conical discharge orifice leading outwardly from said whirling chamber. Preferably, the conical discharge orifice has an axial dimension which is less than its diameter at the discharge end, and an apex angle greater than 90°. Said conical discharge orifice may also have an overhanging lip at its discharge end for aiding in atomizing at least part of the water being discharged. The invention will be better understood from the detailed description which follows, when considered in connection with the accompanying drawings showing two embodiments, wherein:

Figure 1 is a top plan view, with a part thereof broken away, of one form of spray nozzle embodying my invention.

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Fig. 2 is a section taken substantially along the plane of the line 2—2 of Fig. 1.

Fig. 3 is a top plan view with a part thereof broken away, of another form of spray nozzle embodying my invention.

Fig. 4 is a section taken substantially along the plane of the line 4—4 of Fig. 3.

Referring first to Figs. 1 and 2 of the drawings, the nozzle therein disclosed comprises a substantially cylindrical housing 10 having a cylindrical whirling chamber 11 therein, the open end of the housing being internally screw-threaded as indicated at 12 to accommodate a spray head 13. The housing 10 has integrally formed and extending laterally therefrom, intermediate its ends and offset with respect to the axis of the housing, an inlet nipple 14, the outer end of which is externally formed with wrench-engaging surfaces 15 and internally formed with screw-threads 16. The inlet nipple has a passage or duct 17 extending therethrough, which, at its inner end, extends substantially tangentially to the cylindrical wall of the chamber 11 so that water under pressure, upon entering the chamber 11 through said duct will be caused to follow the cylindrical wall of the chamber and thus be given a whirling motion.

The spray head 13 is of generally tubular form, has an enlarged flange 18 at one end, an externally screw-threaded portion 19 below said flange for engaging the screw-threads 12 of the housing, and inwardly beyond the screw-threaded portion 19 is of reduced diameter as indicated at 20, so that when the spray head is screw-threadedly connected to the housing the inner end of the spray head will extend into chamber 11 in spaced relation to the cylindrical wall thereof, beyond the tangential passage or duct 17 and in spaced relation to the bottom of the chamber. The bore or orifice through the spray head for a substantial portion of its length extending from its inner end outwardly is of cylindrical form as shown at 21 and merges through a curved surface 21a into a conical bore portion 22 which is of maximum diameter at the outer or discharge end of the spray head. Preferably, the axial dimension a of the conical bore portion is less than the maximum diameter of said conical bore. The apex angle of the conical bore portion 22 may be of any desired degree, although it is preferable that said apex angle should be greater than 90° so as to provide a conical spray which will have a large base area at a relatively short distance from the

spray head. I have found that a spray head with a conical bore apex angle of approximately 110° is especially suitable for nozzles for use in air conditioning apparatus.

In the embodiment of my invention shown in Figs. 3 and 4, a housing 23 has a generally cylindrical portion 24 which is internally screw-threaded at 25, and below said screw-threaded portion is formed with a flat bearing wall 26. Below the flat bearing wall the housing 23 has a substantially cylindrical portion 27 eccentrically disposed in relation to the cylindrical portion 24 and is formed with a cylindrical whirling chamber 28 which is eccentrically disposed with respect to the axis of the housing portion 24 in the same relation as is the cylindrical housing portion 27. Integrally formed with the housing 23 and extending laterally therefrom is an inlet nipple 29 which is offset on the same side of the axes of the housing portions 24 and 27 and terminates in a somewhat enlarged wrench-engaging end 30. The inlet nipple has extending therethrough an axial duct or passage 31, which, at its inner end, leads into the chamber 28 and is substantially tangential to the cylindrical wall thereof. At its outer end the passage 31 is enlarged and internally screw-threaded, as indicated at 32, to provide means for connection with a source of water supply.

Removably fitted within the housing 23 by engagement with the screw-threads 25 is a spray head 33, the inner end of which is adapted to bear against the flat surface 26, said spray head having an axial bore therethrough, the inner end portion of which is of cylindrical form, as indicated at 34, and the outer portion of which is of generally conical form 35 leading from the cylindrical portion and extending outwardly with the greatest diameter of the cone adjacent the discharge end of the spray head. In this embodiment as in Fig. 2, the axial dimension *b* of the conical portion 35 is less than the maximum diameter of the conical bore. Preferably, however, at the discharge end of the conical bore of the spray head said head is formed with an overhanging annular lip 36 the inner wall of which is of conical form in inverted relation to the conical discharge passage 35.

Comparing Figs. 2 and 4, it will be noted that in Fig. 2 the discharge bore or orifice through the spray head is coaxial with the chamber 11, and the cylindrical portion 21 of said spray head orifice is of larger diameter than the inlet passage or duct 17, while in Fig. 4 the discharge passage or orifice in the spray head is eccentric with respect to the axis of the chamber 28 and the cylindrical portion 34 of said passage is of smaller diameter than the inlet passage 31. These differences in construction arise from the fact that the embodiment of my invention shown in Figs. 1 and 2 is intended for low pressure operation, that is, with pressures between 5 and 10 p. s. i., and the embodiment shown in Figs. 3 and 4 is intended for use with relatively high pressures, namely 20 to 40 p. s. i.

In the use of the nozzles hereinbefore described, water, upon being admitted under pressure into the respective chambers 11 and 28, is given a whirling or rotating action which causes the water to develop a vortex and pass outwardly through the cylindrical portion of the spray head and then, due to the centrifugal force of the water, along the conical portions thereof to be discharged in a conical spray. Although atomization of the discharged water cone will take place in both types of spray heads at varying distances from the discharge orifice depending upon the apex angle and the pressure of the water, the overhanging lip construction of Fig. 4 will serve to create additional atomization immediately beyond the discharge end of the spray head due to the breaking of a portion of the conical film of the water into droplets upon being forced over said inturned lip.

Although the particular nozzles herein disclosed are intended for use in air conditioning apparatus, the form shown in Figs. 1 and 2 for humidifiers and the form shown in Figs. 3 and 4 for air washers, it is to be understood that no limitation is herein claimed for the use of the nozzles per se.

It will be further understood that while I have shown and described certain preferred embodiments of my invention I do not wish to be limited to the specific constructional details disclosed, since these may be varied within the range of engineering and mechanical skill without departing from the spirit of my invention as defined in the appended claim.

What I claim is:

A spray nozzle comprising a housing having therein a whirl chamber for liquid, an inlet for the liquid into said chamber extending tangentially to the wall of the whirl chamber, and a spray head having an axial generally conical discharge orifice with its largest diameter in proximity to the discharge end, said discharge end of the spray head having an inwardly directed annular lip extending axially beyond the largest diameter end of the conical orifice, the inner wall of the lip being tapered in opposed relation to the taper of the conical discharge orifice.

SAMUEL LYMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
26,038	Button et al.	Nov. 15, 1859
1,078,433	Hadden et al.	Nov. 11, 1913
1,504,000	Simmons	Aug. 5, 1924
1,625,042	McArdle	Apr. 19, 1927
1,714,850	DeWhalley	May 28, 1929
1,826,776	Gunther	Oct. 13, 1931
1,931,792	Giordano	Oct. 24, 1933
1,961,408	Wahlin	June 5, 1934
1,964,255	Faast	June 26, 1934
2,247,897	Wahlin	July 1, 1941

FOREIGN PATENTS

Number	Country	Date
24,870	Great Britain	June 27, 1907