Sept. 18, 1951 L. T. MART 2,568,240

SPRAY NOZZLE

Filed May 26, 1947

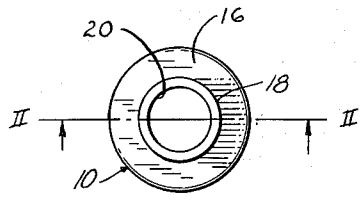


Fig. 1.

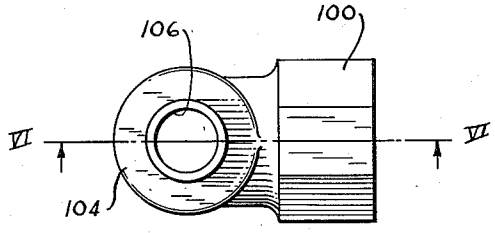


Fig. 5.

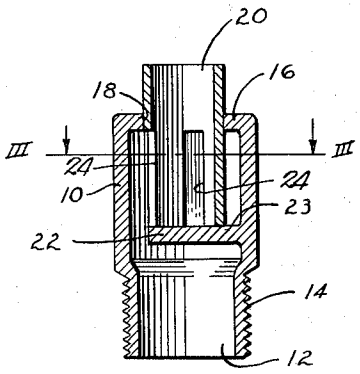


Fig. 2.

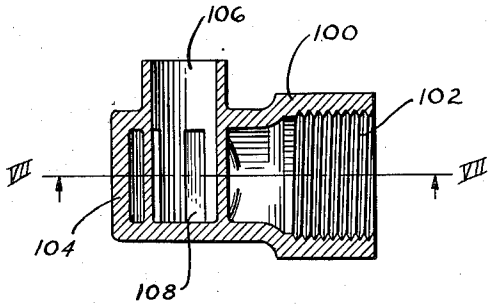


Fig. 6.

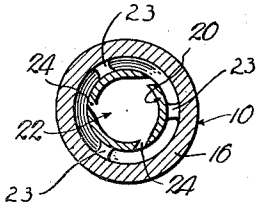


Fig. 3.

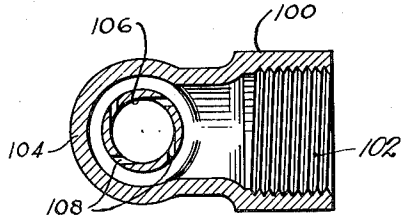


Fig. 7.

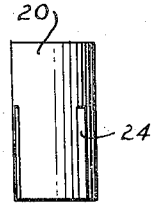


Fig. 4.

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SPRAY NOZZLE

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Application May 26, 1947, Serial No. 750,517

1 Claim. (Cl. 299—114)

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This invention relates to spray nozzles and particularly such nozzles having an inlet port and an outlet orifice between which is provided simple and inexpensive structure for creating a whirling action in the liquid prior to its discharge from the orifice.

One of the important objects of this invention is to provide improvements for nozzles of the character disclosed in my co-pending application, Serial No. 551,516, filed on August 28, 1944 and covering "Spray Nozzle," now abandoned.

A further important object of this invention is the provision of a spray nozzle having a hollow body provided with a cylindrical member which projects through one wall of the body and that has tangential slots formed therein to receive the liquid and establish a whirling action prior to its emanation from the outlet end of the cylindrical member.

A still further object of this invention is to provide a spray nozzle capable of creating a whirling action to the liquid through the medium of a single cylindrical member having a length and diameter proportioned with respect to the tangential openings formed therein.

Other objects of this invention are to provide a spray nozzle of the aforementioned character, wherein there is a precise relation between the length and width of the slots, between the diameter of the cylindrical member and the width of the slots and between the length of the cylindrical member and the length of the slots.

Other objects of this invention will be made clear or become apparent during the course of the following specification, reference being had to the accompanying drawing, wherein:

Fig. 1 is a top plan view of a spray nozzle made in accordance with my present invention.

Fig. 2 is a substantially central longitudinal sectional view taken on line II—II of Fig. 1.

Fig. 3 is a cross sectional view taken on line III—III of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a side elevational view of the cylindrical member used in the nozzle shown in Figs. 1 to 3 inclusive.

Fig. 5 is a top plan view of a nozzle embodying a modified form of my present invention.

Fig. 6 is a cross sectional view taken on line VI—VI of Fig. 5; and

Fig. 7 is a cross sectional view taken on line VII—VII of Fig. 6.

Heretofore, spray nozzles of the type employed to break streams of liquid into globules or mist have had a whirl chamber and a discharge orifice, the diameter or size of the latter being much

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smaller than the diameter or cross-sectional area of the former. The restriction of flow from the whirl chamber is objectionable and is overcome when a cylindrical open end member is employed in accordance with the present invention. Cost of construction is lowered when the whirl chamber and outlet orifice are the same cross-sectional area and additional advantages will appear in the following descriptive matter.

In one form of the spray nozzle chosen for illustration and shown in Figs. 1 to 4 inclusive, the number 10 designates a hollow body having a fluid inlet 12 at one end thereof. This end of the body 10 is externally threaded as at 14 for attachment to appropriate couplings serving to connect the same to conduits or the like leading from a source of pressurized liquid supply.

The body 10 has an end wall 16 formed thereon in opposed relation to the liquid inlet opening 12 and this end wall 16 is perforated as at 18 for receiving an insert member 20. This insert 20 is in the form of an open end cylinder as indicated in Figs. 2 and 4 of the drawing and is press-fitted or otherwise mounted within the perforation 18 of wall 16 to the end that the same is rigidly held against displacement. One end of this insert member extends outwardly beyond the outermost face of the wall 16 as clearly illustrated in Fig. 2. The opposite end of member 20 is within the body 10 and is closed by a solid portion of spider 22. Radial arms 23 support the spider 22 as shown in Fig. 3.

A plurality of elongated slots or notches 24 are formed in the member 20. These slots 24 are in spaced apart relation and arranged longitudinally of the insert 20. Two or more of these slots 24 are provided in the insert member 20 and three are illustrated in Fig. 3. Slots 24 are formed tangentially within the insert 20 for the purpose of causing the liquid to whirl as it enters members 20 from the inlet opening 12 of body 10.

It is to be noted that the relatively small outlet orifice and upper dome which usually forms a part of the conventional nozzles has been eliminated. This omission is made possible only through precise form and proportionate size of the insert member 20 and its slots 24.

In order to create the proper whirling action within the insert 20, it is necessary that the length of each of the slots 24 be at least four times their width. Furthermore, it is necessary that the inside diameter of the insert 20 be at least four times the said width of each of the slots 24. If these dimensions are maintained, the proper

whirling action will take place within the insert 20 irrespective of the number of slots 24 which are formed in the insert 20.

Obviously, the extent of the spray or, in other words, the major conical diameter thereof emanating from the outermost outlet end of the insert 20, is dependent upon the length of the insert 20 with respect to the length of the slots 24. Therefore, the length of this insert 20 may vary according to particular desires, but in order to create the proper whirling effect within the insert 20 prior to emanation of the liquid therefrom, it is necessary that this insert 20 have an overall length equal to at least one and one-quarter times the length of the slots 24, the proper whirling action therein will still be maintained.

The principle just described with respect to the spray nozzle shown in Figs. 1 to 4 inclusive, is substantially the same in the nozzle shown in Figs. 5 to 7 inclusive. In this modification however, a body 100 has an internally threaded inlet opening 102 at one end thereof and its opposite end is closed with a solid wall 104. A cylindrical member 106 is provided with a plurality of slots 108 in the same manner as above described with respect to the nozzle shown in Figs. 1 to 4 inclusive. In this instance, however, the tubular member 106 is shown to be cast integrally with the body 100 and extends thereinto through one side thereof.

Obviously insert member 106 may be separately formed as above set down but is here shown to be a cylindrical member 106 extending laterally into the body 100 through one side wall thereof to the opposite wall which serves to close the innermost end of the tubular member 106. Furthermore, as illustrated in Fig. 1, four of the slots 108 may be provided instead of three as illustrated in Fig. 3 and as above set forth, the number of slots 108 is optional provided only that there be two or more and that the precise widths and lengths thereof is maintained as above specified.

Tubular member 20 has an outside diameter substantially less than the inside diameter of the body 10 whereby a space is provided between the walls of member 20 and the walls of body 10 to permit the flow of the liquid from the inlet opening 12 into the member 20. By the same token, the member 106 is spaced from the end wall 104, permitting liquid to flow into the body 100 through all the slots 108.

It is apparent that the spray nozzle embodying my present invention may be made in virtually any size, without affecting the efficient operation thereof whatsoever. Furthermore, although nozzles of this character have previously been made having fewer number of parts, this nozzle is actually lighter in weight per unit of liquid converted into spray than many of such conventional devices. This weight factor is particularly important in nozzles where increases in size of the spray body is desired without a disadvantageous increase in weight. The nozzle above described is precisely balanced to the end that an equal spray flow emanates from the nozzle rather than a spray head having a heavier flow on one side thereof than on the other.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

A spray nozzle of the character described comprising a hollow body having a liquid inlet port and a tubular, cylindrical member extending from within the body through one wall thereof to a point exteriorly of the body, said member having the innermost and the outer ends thereof closed and open respectively and provided with a plurality of tangential openings for placing the body in communication with the interior of said member, said openings being elongated and each having a length equal to at least four times their respective widths, the inside diameter of said member being equal to at least four times the said width of the openings.

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