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 SPRAY NOZZLE AND METHOD OF DISTRIBUTING LIQUID
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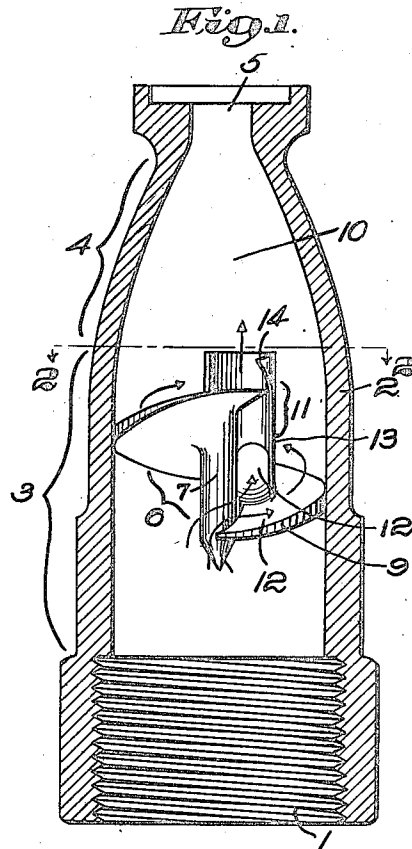
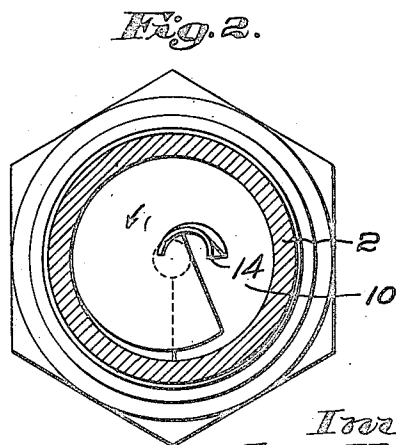


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SPRAY-NOZZLE AND METHOD OF DISTRIBUTING LIQUID.

1,380,834.

Specification of Letters Patent.

Patented June 7, 1921.

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To all whom it may concern:

Be it known that we, LEE H. PARKER and CHARLES H. LONDON, citizens of the United States, and residents, respectively, of Boston, in the county of Suffolk, and Wollaston, in the county of Norfolk, State of Massachusetts, have invented an Improvement in Spray-Nozzles and Methods of Distributing Liquid, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to spray nozzles, and to methods of distributing liquid.

In order that the principle of the invention may be readily understood, we have disclosed in the accompanying drawing one embodiment of the nozzle of our invention and will set forth the best mode known to us for practising our method.

In the drawing—

Figure 1 is a vertical transverse section with the core or inner part in elevation of a spray nozzle constructed in accordance with our invention;

Fig. 2 is a transverse section upon the line 2—2 looking downward in said figure; and

Fig. 3 is a perspective view of the inner or core member detached.

It has heretofore been proposed, as disclosed in the patent to Eneas, No. 1,239,168, dated September 4, 1917, to distribute liquid over an extended area by mixing a plurality of jets within a fixed surrounding confining wall and in compelling issuance of said mixed jets from said wall in a flaring spray of substantially uniform homogeneity. The method disclosed in said patent was desirably practised by the employment of a central jet and one or more surrounding jets, said jets emanating from a liquid stream introduced into the nozzle from any suitable source.

In accordance with the present invention, liquid, such for example as water, is introduced from any suitable source at the end 1 of a nozzle casing 2, the latter being of any suitable shape, but the water, instead of being divided into an inner jet and a surrounding jet or jets, which jets heretofore were preferably separated by a physical wall, is caused at least initially to par-

take in large part at least of a whirling action, whereby it is subjected to centrifugal force. A portion of the liquid and desirably a part thereof which has been initially subjected to the action of centrifugal force is in accordance with our invention separated or removed from the whirling portion of the liquid and is directed inward and preferably into a position which is substantially coincident or in proximity to the axial or central line of the nozzle. Within the scope of our invention, however, the liquid that is thus caused to pass inwardly may or may not be a portion of the liquid to which a whirling action is given. That is to say, the portion of the liquid thus directed inwardly may be received from a source other than that from which the liquid is received that partakes of the whirling action.

Referring more particularly to the drawing, the nozzle casing 2 is represented as generally cylindrical throughout the portion 3 and as tapering throughout the portion 4 to an exit or discharge orifice 5. Within the nozzle casing and either structurally separate therefrom or cast or otherwise formed therewith, we provide a core or inner part or member indicated generally at 6 in Figs. 1 and 3. Desirably said core or member is provided with an inner portion 7, which is here shown as having a downwardly tapered lower end 8. Obviously the form of the inner portion 7 may be varied within the scope of our invention, but it should be such as to reduce the obstruction to the water to a minimum.

Surrounding the inner portion 7 is a spiral or helix 9 which may pass as many times as desired about the inner member and if desired a plurality of spirals or helices may be provided. Desirably said spiral or helix terminates at the lower end of or below the mixing chamber 10.

In the disclosed embodiment of our invention means are provided to separate from the whirling mass or jet of liquid a certain portion thereof and to direct the same inwardly. To this end, we have shown a baffle or abutment 11, which extends longitudinally of the nozzle and desirably at or about the axis thereof. The said baffle or abutment is desirably curved in cross section substantially as indicated and at its

lower end may be so shaped as indicated at 12 as to change the direction of flow of the liquid gradually from a direction that is substantially transverse to the nozzle into a direction that is longitudinal of the nozzle. Desirably also the vertical edge 13 of the baffle or abutment is inclined either throughout its whole extent or preferably at its upper end as indicated most clearly at 14, so as to direct or throw the stream of liquid toward the axial center of the nozzle.

We have herein represented the baffle or abutment 11 as receiving liquid from the lower portion of the spiral or helix 9 but it may within the scope of our invention receive liquid from a separate source.

It will be observed that there is no inner or axial jet initially provided as in the construction shown in the said Eneas patent. Nevertheless the original flow of the liquid is so broken up by the construction described that the several portions of the stream enter the mixing chamber 10 and are thoroughly mixed therein, so as to be discharged through the exit 5 in a spray of substantially uniform homogeneity in transverse section throughout.

Desirably the several parts of the inner or core member 6 are integral with each other, but they may be formed or assembled in any suitable manner within the scope of our invention, and they may be formed integrally with or may be structurally separate from the inner face of the nozzle casing 2 as desired.

Desirably the liquid that passes radially inward of the spirals or helices is a part of the original stream entering through the nozzle inlet 1, but within the scope of our invention the liquid that passes inward without partaking of the centrifugal or whirling action or partaking thereof in part may be received from sources other than that from which the remaining portion of the liquid is received. In other words, we may introduce liquid from two or more sources, but the construction shown is that preferably employed.

In that form of the invention herein shown, the baffle or abutment extends above the upper face of the spiral or helix 9, and therefore a portion of the liquid passing along the upper face of such spiral or helix will be subjected to the action thereof. Obviously the said baffle or abutment may be of any desired longitudinal extent.

Having thus described one embodiment of a nozzle of our invention and the best mode known to us for practising our invention, we desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

Claims:

1. A spray nozzle comprising a shell or casing having an inlet and an outlet, means to subject all the entering liquid to a centrifugal or whirling action, and means to cause the simultaneous withdrawal and inward projection of a portion of the liquid so subjected to a centrifugal or whirling action.

2. That method of spraying liquid which comprises introducing the same into a confined space, subjecting all of the entering liquid to a centrifugal or whirling action, and causing the simultaneous withdrawal and inward projection of a portion of the liquid so subjected to a centrifugal or whirling action.

3. That method of spraying liquid which comprises introducing the same into a confined space, subjecting all of the entering liquid to a centrifugal or whirling action, causing the simultaneous withdrawal and inward projection of a portion of the liquid so subjected to a centrifugal or whirling action, mixing all the portions of the liquid within the confined space, and permitting the issuance therefrom.

4. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral, said spiral having a baffle positioned to withdraw from the action of said spiral a portion of the liquid supplied thereto from the inlet and to pass the same inwardly and forwardly toward the outlet.

5. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a baffle to project a part of the liquid inward toward the axial line of the nozzle.

6. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a forwardly extending baffle positioned to act upon the liquid in advance of the base of the spiral.

7. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a forwardly extending baffle curved in cross section.

8. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a forwardly extending baffle curved in cross section and positioned to direct the liquid acted on thereby to the center of the nozzle.

9. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a forwardly extending deflecting baffle, and a mixing chamber in advance of the said spiral and baffle.

10. A spray nozzle comprising a shell or casing having an inlet and an outlet and a core within the shell or casing having a spiral provided with a deflecting baffle, said baffle extending substantially parallel to the axis of the nozzle and adjacent to the inner border of said spiral.

11. A spray nozzle comprising a shell or casing having an inlet and outlet, means to subject all the entering liquid to a centrifugal or whirling action, and including spiral means extending at least once about the axis of the nozzle, and a baffle extending longitudinally of the nozzle and intersecting liquid from the spiral means at two points.

12. A spray nozzle comprising a shell or casing having an inlet and outlet, a vane to subject all the entering liquid to a centrifugal or whirling action, and a baffle extending longitudinally of the nozzle for a materially greater distance than the thickness of the vane measured in a direction axially of the nozzle or parallel to the axis of the nozzle, said baffle being positioned to act upon a part only of said entering liquid and so to act thereon between the limits of said vane measured axially of the nozzle.

13. A spray nozzle comprising a shell or casing having an inlet and an outlet, a spiral to subject all the entering liquid to a centrifugal or whirling action, and a baffle positioned to deflect a portion of the liquid from said spiral and to direct it inwardly and forwardly toward the outlet.

14. A spray nozzle comprising a shell or casing having an inlet and an outlet, a spiral to subject all the entering liquid to a centrifugal or whirling action, and a baffle positioned to deflect a portion of the liquid from said spiral and to direct it forwardly toward the outlet, said baffle being of materially greater longitudinal extent than the thickness of the spire or web of said spiral measured axially of the nozzle.

15. A spray nozzle comprising a shell or casing having an inlet and an outlet, spiral means to subject all the entering liquid to a centrifugal or whirling action, and a baffle member positioned to act initially upon entering liquid in proximity to the axial line of the nozzle, and to withdraw said liquid from the action of the spiral means.

16. A spray nozzle comprising a shell or casing having an inlet and an outlet, a spiral 9 to subject all the entering liquid to a centrifugal or whirling action, an upstanding baffle or abutment 11 in close proximity to the axis of the spiral and a mixing chamber 10 in advance of the spiral and the abutment, said abutment having a longitudinal extent in the direction of the axis of the shell or casing at least substantially equaling the

longitudinal extent of the spiral measured in the same direction.

17. A spray nozzle comprising a shell or casing having an inlet and an outlet, spiral means 9 to subject all the entering liquid to a centrifugal or whirling action, and a baffle member 11 positioned within the outer margin of said spiral means 9 and constructed and arranged to direct the liquid inwardly.

18. A spray nozzle comprising a shell or casing having an inlet and an outlet, means to subject all the entering liquid to a centrifugal or whirling action, and unitary means structurally distinct from the shell or casing to cause the withdrawal and inward projection of a portion of the liquid so subjected to a centrifugal or whirling action.

19. That method of spraying liquid which comprises introducing the same into a confined space, subjecting all of the entering liquid to a centrifugal or whirling action and causing the withdrawal and inward projection of a portion of the liquid so subjected to a centrifugal or whirling action, prior to contact of the withdrawn portion of the liquid with the wall of the confined space.

20. A spray nozzle comprising a shell or casing having an inlet and an outlet, spiral means to subject all the entering liquid to a centrifugal or whirling action, and a baffle member positioned to direct along its face toward the nozzle outlet that portion of the liquid that is nearest the axial line of the nozzle, but to permit the remaining portion of the liquid to follow said spiral means.

21. A spray nozzle comprising a shell or casing having an inlet and an outlet, spiral means to subject all the entering liquid to a centrifugal or whirling action, and a baffle member positioned to compel the central portion only of the liquid to follow along its face toward the nozzle outlet.

22. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a deflecting baffle, said baffle being concave and positioned to present its concave face to the entering liquid, at substantially the base of the spiral.

23. A spray nozzle comprising a shell or casing having an inlet and an outlet, and a core within the shell or casing having a spiral provided with a deflecting baffle, said baffle being concave and positioned to present its concave face to the entering liquid in proximity to the axial line of the nozzle.

In testimony whereof, we have signed our names to this specification.

LEE H. PARKER.
CHARLES H. LANDON.