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R. N. EHRHART

SPRAY NOZZLE

Filed June 16, 1921

Fig. 1.

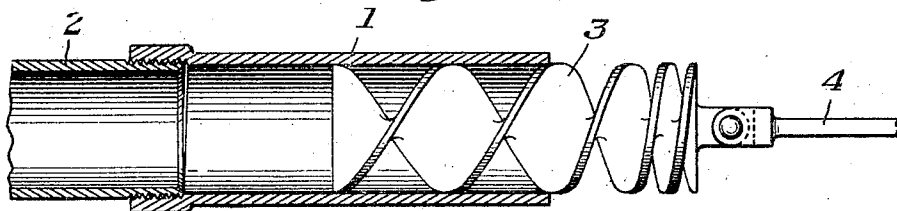
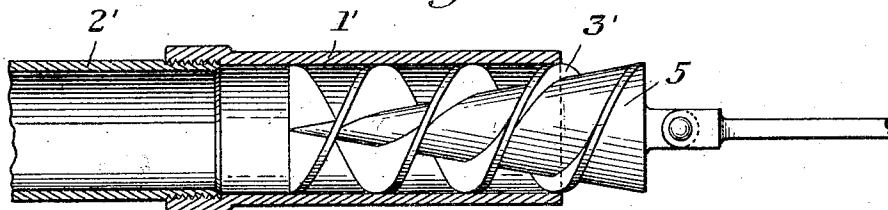


Fig. 2.



INVENTOR.

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his attys.

UNITED STATES PATENT OFFICE.

RAYMOND N. EHRHART, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO ELLIOTT COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SPRAY NOZZLE.

Application filed June 16, 1921. Serial No. 477,972.

To all whom it may concern:

Be it known that I, RAYMOND N. EHRHART, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Spray Nozzles, of which the following is a full, clear, and exact description.

The present invention relates broadly to nozzles, and more particularly to that type of nozzles known as spray nozzles, which, by their construction, impart a whirling motion to the fluid passing therethrough, so that the fluid is torn into small particles by the centrifugal force generated by the centrifugal action due to the rotary motion.

An important object of the present invention is to provide a spray nozzle of such construction that it may be easily adjusted to accommodate the same to various quantities of fluid passing therethrough so as to always produce the desired breaking-up of the fluid.

Another object of the invention is to provide a spray nozzle of such construction that it may be used as successfully with a comparatively small quantity of fluid as with relatively greater quantities.

A further object of the invention is to provide a spray nozzle of such construction that the cross-sectional area of the passage for the fluid may be increased or decreased in such manner that the nozzle will function properly over great ranges of flow.

The foregoing and other objects, together with their attendant advantages, will be apparent as the invention becomes better understood by reference to the accompanying specification and drawings forming a part thereof, it being premised that changes may be made in the various details and the manner of operation within the scope of the appended claims without departing from the spirit of the invention.

Figure 1 is a longitudinal sectional view through a portion of a spray nozzle with the movable vane in elevation and

Figure 2 is a similar view of a slightly modified form of construction.

With spray nozzles, as ordinarily constructed, there is usually provided a fixed vane within the nozzle for imparting rotary motion to the fluid passing therethrough. Such nozzles require a certain quantity of fluid to flow before the whirling velocity

reaches such a value that the resulting centrifugal force will disrupt the fluid, for example, water, into a fine spray. The present invention provides means whereby nozzles of this type will function properly over great ranges of flow, i. e., with small or large quantities of fluid.

Referring more particularly to the drawings, there is illustrated in Figure 1 an embodiment of my invention, largely diagrammatic, comprising a stationary member or casing 1, having a suitable fluid supply connection 2. Mounted within the discharge end of the stationary member is a movable vane 3 of any desired construction. As illustrated in this figure, the vane comprises a twisted or cast body forming a plurality of passages for the fluid. With the movable vane in the position illustrated in Figure 1, the nozzle is adapted for use with comparatively large quantities of water, or other fluid. With such quantities of fluid, the rotational movement induced by the vane will, by virtue of its centrifugal force, tear the fluid to pieces in the form of a spray as it issues from the nozzle. Obviously, however, if there is a small flow of water from such a nozzle, the rotational velocity imparted will be so low that the issuing stream is but indifferently effected by centrifugal force, so that instead of a fine spray being formed by the issuing water, no material spraying effect is produced.

Under such conditions, by the use of the present invention, the vane may be moved further into the nozzle by suitable means 4 attached thereto. This movement of the vane will vary the cross-sectional area of the passages provided for the fluid due to the gradually changing shape of the vane. In this manner, the whirling velocity of the escaping fluid can easily be kept up to any desired value with any flow within the limit of the nozzle.

With the form of the invention illustrated in Figure 2, the same results are accomplished by changing the position of the movable vane 3' with respect to the stationary member 1'. In this form of the invention, the vane comprises a conical body portion 5 on which the vane is formed in any desired manner. It will be apparent that by gradually moving the vane into the stationary housing, the cross sectional

area of the fluid passages is gradually decreased whereby smaller amounts of water or other fluid may be given the desired whirling velocity.

5 The advantages of the present invention arise from the adjustable construction by reason of which a desired spraying effect can be produced with any flow of fluid within the capacity of the nozzle.

10 I claim:

1. A nozzle for spraying liquids, comprising a casing, a relatively movable member having a flow passage of varying cross sectional area cooperating therewith for imparting a rotary motion to the liquid passing through said casing, and means for adjusting the relative position of said casing and said member to vary the extent of said member within said casing and effective on the liquid, substantially as described.

2. A nozzle for spraying liquids, comprising a stationary member, a movable member having a discharge outlet cooperating therewith to form a substantially helical passage of decreasing cross-section in the direction of flow of the liquid and means for moving said movable member through said outlet, substantially as described.

3. A nozzle for spraying liquids, comprising a substantially cylindrical stationary member having an outlet, means cooperating with said member and forming a passage of gradually varying cross sectional area throughout its length which imparts rotary motion to the liquid passing through said member, and means for adjusting the position of said means with relation to the stationary member to vary the area of the outlet, substantially as described.

4. A member for spraying liquids, comprising an outer member, a movable member cooperating therewith, and forming a substantially helical passage of varying cross section for decreasing the discharge area of the nozzle as the movable member is moved into the outer member, and means for moving said movable member, substantially as described.

5. A nozzle for spraying liquid by imparting rotary motion to the liquid stream, and means for simultaneously varying the effective flow area through the nozzle and for varying the effective discharge area of the nozzle, substantially as described.

6. A nozzle for spraying liquid by imparting rotary motion to the liquid stream, and means for conserving the extent of rotary motion of said stream throughout the capacity range of the nozzle to maintain substantially constant whirling velocity

irrespective of the volume of flow, substantially as described.

7. A nozzle for spraying liquid, comprising means for imparting a rotary motion to the liquid, and means for maintaining the desired rotary motion to effect uniform breaking up of the liquid as the quantity of the liquid decreases, substantially as described.

8. A nozzle for spraying liquid, comprising means for imparting a rotary motion to the liquid and means for simultaneously varying the effective flow area through the nozzle and for varying the discharge area of the nozzle as the flow through the nozzle varies, substantially as described.

9. A nozzle for spraying liquid, comprising a casing, a movable member having a flow passage of gradually changing cross-sectional area for imparting a rotary motion to the liquid, and means for adjusting the position of said member, substantially as described.

10. In a spray nozzle, a hollow member having a discharge outlet, a member cooperating therewith and forming a passage whose area diminishes in the direction of flow, said second member being capable of movement to a position in which it is not entirely surrounded by the first member, said movement being effective for gradually varying the effective outlet area, substantially as described.

11. In a spray nozzle, a hollow member, a second member enclosed thereby, said hollow member being of substantially uniform bore where it cooperates with the second member and said second member having a substantially uniform diameter on such portions as fit inside of said hollow member, said second member providing a passage of diminishing area in the direction of liquid flow between said members, substantially as described.

12. In a spray nozzle, a hollow member, a second member enclosed thereby, said hollow member being of substantially uniform bore where it cooperates with the second member and said second member having a substantially uniform diameter on such portions as fit inside of said hollow member, said second member providing a passage of diminishing area in the direction of liquid flow between said members, and means for adjusting the position of said second member, substantially as described.

In testimony whereof, I have hereunto set my hand.

RAYMOND N. EHRHART.