Sept. 22, 1970 E. W. APRI 3,529,774

ADJUSTABLE LIQUID SPRAY APPARATUS

Original Filed July 26, 1966 2 Sheets-Sheet 1

FIG. 1.

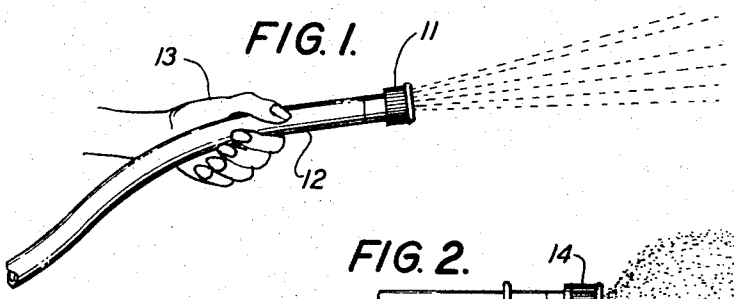


FIG. 2.

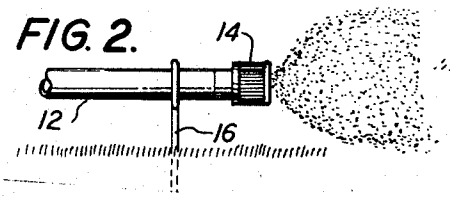
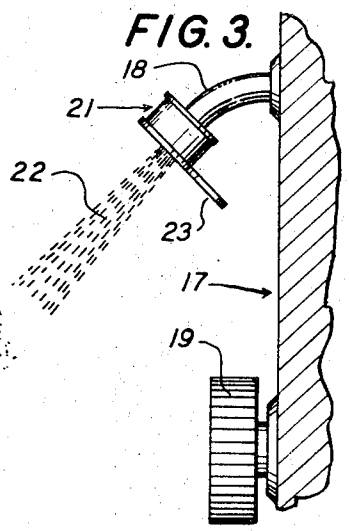


FIG. 3.



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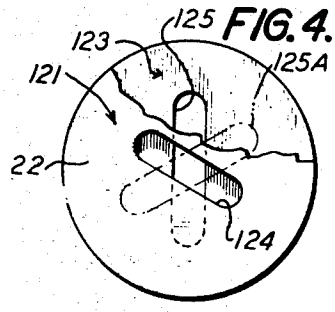


FIG. 4.

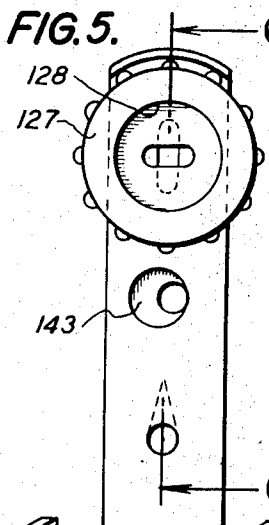


FIG. 5.

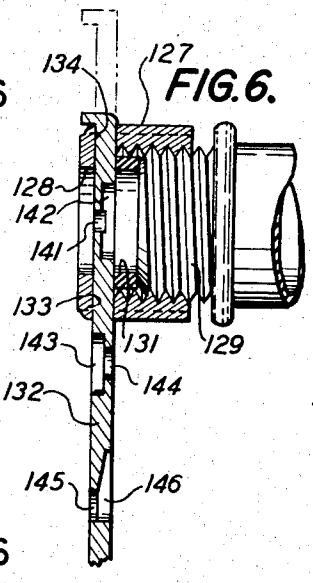


FIG. 6.

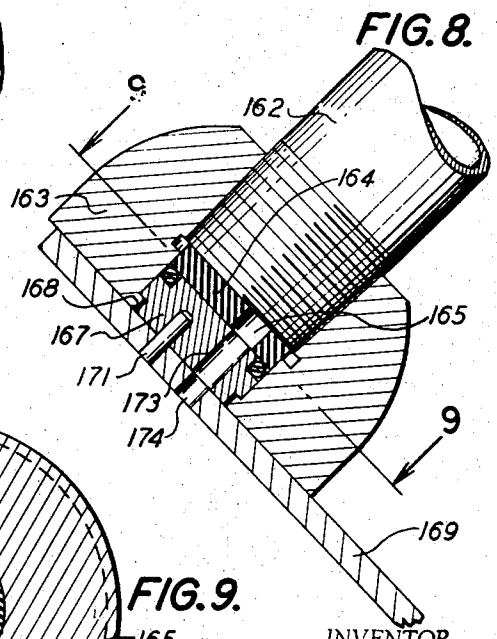


FIG. 8.

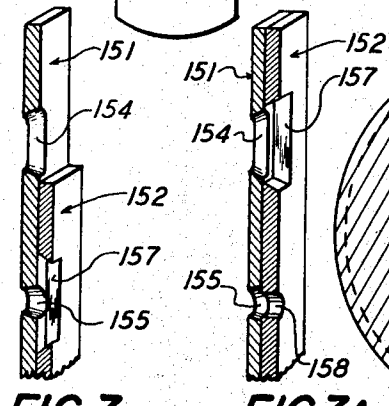


FIG. 7

FIG. 7A.

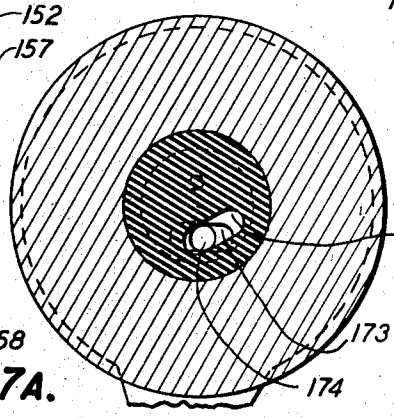


FIG. 9.

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ADJUSTABLE LIQUID SPRAY APPARATUS

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Original application July 26, 1966, Ser. No. 567,975, now Patent No. 3,437,274. Divided and this application Mar. 3, 1969, Ser. No. 803,733
Int. Cl. B05b 1/30
U.S. Cl. 239—579 8 Claims

ABSTRACT OF THE DISCLOSURE

A spray nozzle having a hollow body fitted with apertured discharge inserts movable with respect to the stream flow through the body to present discharge apertures of varied configurations to the stream to change the nozzle discharge pattern. The discharge insert may be a single insert with a plurality of varied apertures or a pair of apertured inserts movable with respect to one another to present varied combinations of aperture shapes.

This application is a division of my copending application Ser. No. 567,975 entitled "Liquid Spray Apparatus" filed July 26, 1966, now U.S. Pat. No. 3,437,274.

A large variety of nozzles is presently in use every day. Spray nozzles for gardening, for use in the kitchen sink of homes and in shower baths range from the very simple to the very complicated. Some conventional nozzles are capable of a wide range of adjustment. Others, like those conventionally used in kitchen sinks, are limited to a particular type of spray. I have invented spray apparatus for use with a source of liquid under pressure which is extremely simple to fabricate and to utilize. It is easily affixed to the end of many types of conduits for liquid under pressure. The apparatus of the invention is equally adaptable to liquid spray usages wherein a particular type of spray pattern is desired, as in insecticide or other chemical sprayers, or may be embodied in apparatus which is adjustable to give a great variety of spray patterns.

The invention contemplates a liquid spray nozzle that comprises a spray head adapted for attachment to a source of liquid under pressure. A discharge wall in the spray head substantially perpendicular to the flow of liquid from the liquid source contains a first shaped aperture in its inner face and a second shaped aperture in its outer face. Each aperture preferably has a major axis, a minor axis and a flow axis. The apertures in each face of the wall communicate and are so disposed that one of the said three axes is displaced with respect to the like axis of the other aperture.

The discharge wall may be embodied in an insert to be placed within a spray head. The insert may be molded of plastic or other material, or may be formed by a stamping process from a metal wafer. The discharge wall may comprise two discs, each of which contains one of the apertures. Each of the discs may be rotatable about the flow axis with respect to the other disc to alter the spray pattern emerging through the reoriented apertures of the discharge wall. The apertures themselves may take many shapes, being defined by figures such as circles, ovals, ellipses, figures with open ends, rectangles and triangles, and also be three-dimensional volumes of varying depth.

Any of the embodiments of the invention is easily fabricated with present technology and assembled with any of the conventional conduits for sources of liquid under pressure. The configurations of the apertures may be achieved through molding, stamping, piercing, milling or other common forming techniques. The invention may be embodied in a spray head of any size. The spray patterns may

vary from a dispersal of minute particles, such as obtained from a fog nozzle to a pulsating, compact stream.

These and other advantages of the invention are apparent from the following detailed description and drawing in which like parts have like reference characters:

FIG. 1 illustrates an embodiment of the invention in use on a hand-held garden hose;

FIG. 2 is an elevational view of a spray nozzle in accordance with the invention on a hose held by a ground-supported bracket;

FIG. 3 is a fragmentary view of an adjustable bath shower spray nozzle;

FIG. 4 is a sectional elevation, partly broken away, of a discharge wall comprised of two aperture discs;

FIG. 5 is a front elevation of an alternate embodiment of a nozzle in accordance with the invention having a discharge wall insert with selectively interchangeable aperture combinations;

FIG. 6 is a sectional elevation taken along line 6—6 of FIG. 5;

FIGS. 7 and 7A illustrate in section alternate positions of a split discharge wall insert;

FIG. 8 illustrates in sectional elevation a shower head in accordance with the elevation; and

FIG. 9 is a fragmentary sectional view taken along line 9—9 of FIG. 8.

FIG. 1 illustrates a spray head **11** in accordance with the invention attached to a conventional garden hose **12** and being held in the hand **13** of a user.

In FIG. 2 a spray head **14** is attached to a garden hose **12** which is held by a ground bracket **16**.

FIG. 3 illustrates a shower installation **17** in which a water conduit **18** is controlled by a hand valve **19**. An adjustable spray head **21** in accordance with the invention emits a shower stream **22**. The stream may be controlled by means of control handle **23** of the spray head.

Each of the three figures is shown with a spray head emitting a different type of spray. The type of spray pattern is dependent upon the relationship and configuration of the apertures in the discharge wall of the spray head.

In FIG. 4 an alternate discharge wall insert **121** is comprised of two circular discs **122, 123**. Each disc has an elongate central slot **124, 125**. The slots may differ in length. Let us regard slot **124** as being the aperture in the obverse face and slot **125** as being the aperture in the reverse face. The two discs may be locked in the orientation shown in FIG. 4 by pressure of the water hose coupling impinging upon a resilient washer to wedge the two discs within a spray head. The discs may be reoriented so that the second aperture may be moved to the position **125A** of FIG. 4. This new orientation may be achieved by releasing the pressure on the washer and turning the disc from the front end of the spray apparatus. Reorientation also may be achieved by removing the water conduit, reorienting the discs and then replacing them in the spray head body. Thus the embodiment shown in FIG. 4 is adjustable to give a wide range of spray patterns without the necessity of using alternate discharge wall inserts.

FIGS. 5 and 6 illustrate a further embodiment of the invention adapted to give diverse spray patterns with the same apparatus. An internally threaded spray head body **127** has a large circular front outlet **128**. The body receives the threaded end **129** of a conventional garden hose or other water conduit. An annular resilient gasket **131** intervenes between the hose end and a slidable discharge wall member **132**. The wall member slides within diametrically opposed slots **133, 134** in the spray head body adjacent outlet **128**.

The discharge wall member has three pairs of aligned apertures. Aperture pair **141, 142** is in effective position within the spray head. Pair **143, 144** is outside of the

spray head and thus inoperative. Aperture pair **145, 146** is also in inoperative position.

Due to the fact that the pairs of apertures result in differing spray patterns when the stream flow is reversed with respect to the orientation of the apertures, the apparatus of FIGS. 5 and 6 affords a spray nozzle wherein six different spray patterns are readily available. Three patterns may be achieved by sliding adjustment without removing the discharge wall member from the spray head. Three different patterns may be achieved by removing the member and reversing it with respect to stream flow within the spray head.

FIGS. 7 and 7A illustrate a modification of the apparatus of FIG. 5 wherein the discharge wall member comprises two wall strips **151, 152**, each with variously shaped apertures extending through the strips at equal intervals along a vertical line in the strip. As shown fragmentarily in FIGS. 7 and 7A, strip **151** has apertures **154, 155**. Strip **152** has apertures **157, 158**. The strips may have additional apertures. The apertures may change in configuration from face to face of each strip, being conical or tapered. Thus, in addition to being able to change the combination of obverse and reverse face apertures, the respective configurations of the apertures with respect to stream flow may be changed by reversing the face of one strip with respect to the adjacent strip. Therefore, one pattern change can be effected by moving aperture **157** of strip **152** to coincide with aperture **154** instead of aperture **155** of FIG. 7. A second series of spray patterns may be obtained by reversing strip **152** such that the spray pattern resulting from coincidence between the axes of any two apertures differs from the spray pattern achieved with coincidence of the axes in the strip orientation of FIG. 7.

FIGS. 8 and 9 illustrate a spray apparatus in accordance with the invention particularly adapted for use as a shower bath spray nozzle. A water pipe **162** is threadably engaged with a spray head body **163**. A resilient gasket **164** resides within a cavity within the spray head body. The gasket has an elongate slot **165** which is asymmetrically disposed with respect to the center line of the gasket. A cylindrical insert **167** resides within the cavity and is retained by an annular cavity lip **168**. The insert and gasket define a discharge wall. A control handle **169** is secured to the outer face of the insert by a plurality of pins, such as pin **171**. Alternatively, the handle and the insert may be joined by various waterproof adhesives.

The insert has a distribution chamber **173**. The chamber connects to an aperture **174** in the control handle. Apertures **165** and **174** may be said to act as the first and second apertures of the spray device. As can be seen from FIG. 9, communication between the two apertures is altered by revolution of handle **169**. Each degree of revolution changes the spray pattern because the positions of the two apertures with respect to one another are changed. Opening **173** acts primarily to connect the two apertures but imposes its own constrictions upon the emerging spray pattern. Therefore, a change in the configuration of either of the three openings **165, 173, 174** alters the spray pattern. The configurations therefore are determined by the type of spray desired for the particular usage and that basic spray pattern can then be altered by manipulation of control handle **169**.

The embodiment of FIG. 8 has configurations that adapt the emitted spray for shower bath use. Liquid emerges in a pulsating spray of seemingly individual droplets of about one-eighth inch diameter. The effect on a user is similar to that obtained with conventional massage equipment.

I claim:

1. A liquid spray nozzle for attachment to a source of liquid under pressure comprising a spray head adapted for connection to the source, a discharge wall in the spray head across the flow path of liquid from the liquid source, means for moving said wall in a plane transverse to the flow path of liquid, a first shaped aperture in the inner face of the discharge wall, and a second shaped aperture in the outer face of the discharge wall communicating with the first aperture; each of said apertures being centrally located and having a major axis, a minor axis, and a flow axis, one of said axes of the first aperture being displaced with respect to the like axis of the other aperture.

2. A spray nozzle in accordance with claim **1** wherein the discharge wall comprises a pair of abutted wall members each containing an aperture, said wall members being movable with respect to one another to selectively vary the orientation of one aperture with respect to an aperture in the other wall member.

3. A spray nozzle in accordance with claim **1** wherein the discharge wall comprises a wall member, a first pair of aligned apertures in the faces of the wall member, a flow outlet in the spray head, a second pair of aligned apertures in the wall member, and means for aligning selectively one of the pairs of aligned apertures with the flow outlet for discharge of liquid therethrough.

4. A spray nozzle in accordance with claim **2** wherein each wall member contains a plurality of apertures spaced along the member.

5. A spray nozzle in accordance with claim **4** wherein each wall member is elongate and extends exteriorly of the spray head.

6. A spray nozzle in accordance with claim **3** wherein the wall member is elongate and extends exteriorly of the spray head.

7. A liquid spray nozzle for attachment to a source of liquid under pressure comprising a spray head adapted for connection to the source, a discharge wall in the spray head across the flow path of liquid from the liquid source, means for moving said wall in a plane transverse to the flow path of liquid, a first shaped aperture in the inner face of the discharge wall, and a second shaped aperture in the outer face of the discharge wall communicating with the first aperture; each of said apertures having a major axis, a minor axis, and a flow axis, one of said axes of the first aperture being displaced with respect to the like axis of the other aperture and each shaped aperture having parallel chordal side walls.

8. A spray nozzle in accordance with claim **7** wherein the discharge wall comprises a first resilient gasket member, a shaped aperture in the gasket member, a second insert wall member, a shaped aperture in the second insert wall member, means restraining the second wall member in the spray head, and means for changing the orientation of the second wall member with respect to the aperture in the first resilient member.

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U.S. Cl. X.R.

239—596, 599, 601