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Watkins

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[54] SIMPLIFIED FLAT SPRAY NOZZLE

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[52] **U.S. Cl.**.....**239/590.3,** 239/597

[51] **Int. Cl.**.....**B05b 1/04**

[58] **Field of Search**.....239/568, 590, 590.3, 590.5, 239/596, 597, 598, 601, 602

[56] **References Cited**

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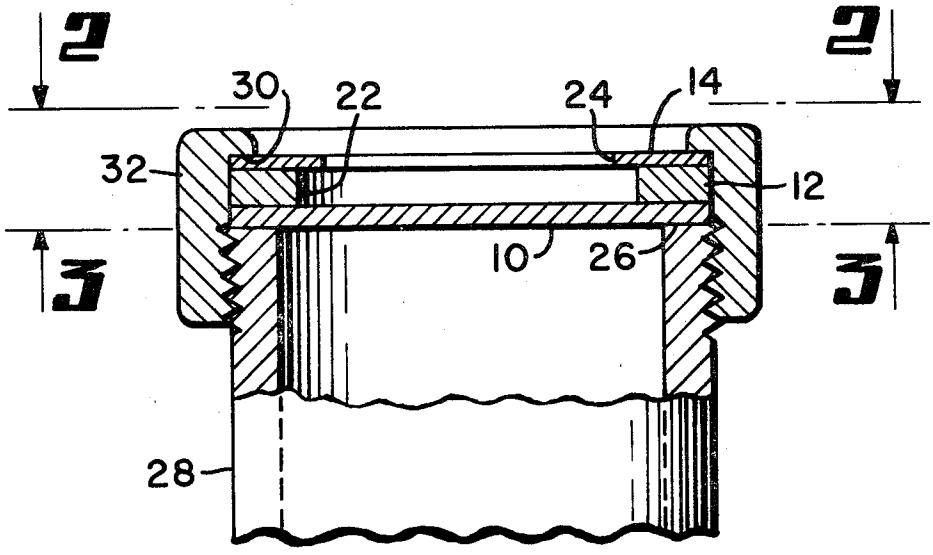
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[57] **ABSTRACT**

The disclosure illustrates a nozzle assembly comprising inlet and outlet plates stacked on either side of a spacer sleeve. The outlet plate has an elongated slot and the inlet plate has a pair of ports offset from and on opposite sides of the slot to promote turbulence within the spacer sleeve. The outlet plate may be made of flexible material so that for higher flow rates the plate deforms and provides a larger opening.

8 Claims, 3 Drawing Figures



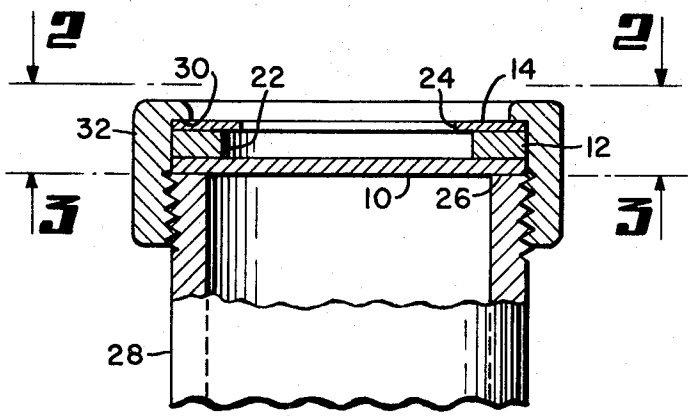


Fig 1

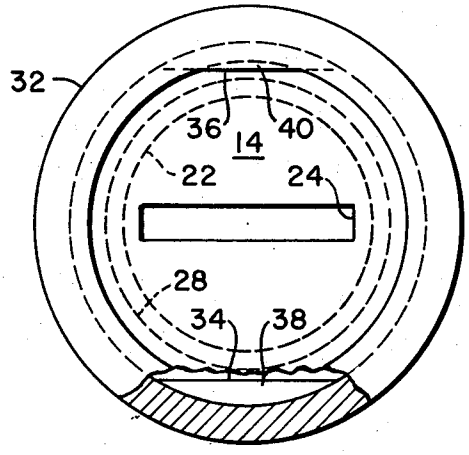


Fig 2

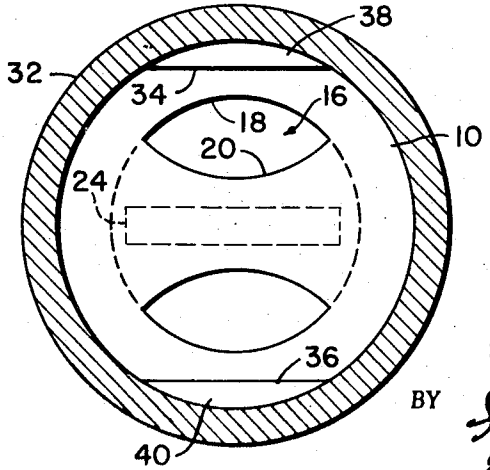


Fig 3

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SIMPLIFIED FLAT SPRAY NOZZLE

The invention relates to nozzles and more specifically to nozzles of the flat spray type.

In the past there have been many different nozzle arrangements proposed to achieve a flat spray. For the most part these have been generally effective but they are complicated and expensive, thus requiring a great deal of precision in their manufacture.

Therefore it is an object of the present invention to provide a highly simplified and economical nozzle assembly that produces a flat spray discharge pattern.

These ends are accomplished by a nozzle assembly comprised of inlet and outlet plates on opposite sides of a spacer having a through passage. The outlet plate has an elongated slot and the inlet plate has a pair of ports offset from the slot to promote turbulence within the spacer.

The above and other related objects and features of the present invention will be apparent from a reading of the description of the disclosure shown in the accompanying drawing and the novelty thereof pointed out in the appended claims.

In the drawing:

FIG. 1 is a longitudinal sectional view of a simplified flat spray nozzle assembly embodying the present invention;

FIG. 2 is a plane view of the nozzle of FIG. 1 taken on line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view of the nozzle of FIG. 1 taken on line 3—3 of FIG. 1.

Referring now to the drawing, there is shown a nozzle assembly comprising a stacked inlet plate **10**, a relatively thin spacer **12** and an outlet plate **14**. As shown herein the plates **10**, **14** are circular and the spacer **12** is in the form of a sleeve having an inner diameter **22** forming a through passage. However, they may be of other shapes and produce equal results.

Inlet plate **10** has a pair of spaced ports **16**, as shown particularly in FIG. 3. Ports **16** are formed from first and second intersecting arcuate sides **18** and **20**. As herein shown, edge **18** approximates the inner diameter **22** of spacer **12**. The outlet plate **14** has an elongated slot **24** providing a generally flat spray discharge. As evident in both FIGS. 2 and 3 when viewed in an axial direction inlet ports **16** lie on opposite sides of the elongated slot and are offset from it. In addition, their centers are 180° apart from one another and lie along a line extending at right angles from the midpoint of slot **24**.

Plates **10** and **14** and spacer **12** may be secured in the stacked arrangement by one of a number of methods such as soldering, brazing or welding. As herein shown they are merely sandwiched against the end face **26** of a fluid-carrying conduit **28** by a shoulder **30** integral with a sleeve **32** which is threaded onto conduit **28**.

Plates **10** and **14** and spacer **12** each have a pair of flat indexing surfaces **34** and **36** so that they are retained between projections **38** and **40** of conduit **28** to properly locate them with respect to one another.

In operation fluid is introduced through an interior passage **34** of conduit **28** and passes through ports **16** into the through passage formed by the inner diameter **22** of spacer **12**. Fluid then passes inward to the elongated slot **24** where the streams from ports **16** meet and cause a turbulence along the slot. The fluid is then discharged in a flat spray pattern from slot **24**. The meeting of the separate streams just upstream of slot **24** causes a substantial turbulence which greatly enhances atomization. This enables the valve to be operated over a substantially increased flow range.

For further increases in the range of flow rates plate **14** may be made from flexible material. At higher flow rates it deforms, increasing the flow area between plate **10** and up to slot **24**. This change in area thus obtained substantially increases the maximum output of the nozzle. This enables the slot to be sized to handle low flow rates but at the same time permit it to expand to adequately handle much higher flow rates.

The nozzle described above is highly simplified and can be manufactured in high volume production using only the simplest of manufacturing techniques. This greatly reduces the cost of the nozzle and makes it quite suitable for a wide range of applications.

While the preferred embodiment of the present invention has been described, it should be apparent to those skilled in the art that other variations may be utilized without departing from the spirit and scope.

Having thus described the invention what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. A flat spray nozzle assembly comprising:
   - a relatively thin spacer having a central through passage;
   - an inlet plate stacked on one side of said spacer and having a plurality of spaced ports forming inlets to said passage; and
   - an outlet plate stacked on the opposite side of said spacer and having a narrow elongated slot for discharge of fluid from said passage in a flat spray, said spaced ports lying on opposite sides of and being offset from said elongated slot, whereby the flow from said ports creates a turbulence along said elongated slot.

2. A nozzle assembly as in claim 1 wherein:
   - said spacer is generally in the form of a sleeve having a relatively small axial dimension, the inner diameter of said sleeve forming said central through passage; and
   - said inlet and outlet plates are generally circular plates having a diameter substantially equal to the outside diameter of said spacer sleeve.

3. A nozzle assembly as in claim 1 wherein said outlet plate is yieldable.

4. A nozzle assembly as in claim 1 having a pair of spaced ports positioned substantially along a line extending normal to and at the midpoint of said elongated slots.

5. A nozzle assembly as in claim 4 wherein:
   - said spacer is in the form of a sleeve having a relatively small axial dimension, the inner diameter of said sleeve forming said central through passage;
   - said inlet and outlet plates are generally circular having outside diameters substantially equal to the outside diameter of said spacer sleeve;
   - said ports are spaced 180° apart from one another.

6. A nozzle assembly as in claim 5 wherein said spaced ports are formed by a pair of intersecting arcuate sides, one side of which conforms to the curvature of the inner diameter of said sleeve.

7. A flat spray nozzle assembly as in claim 6 wherein said outlet plate is yieldable.

8. A nozzle assembly as in claim 7 for insertion in a nozzle holder wherein said spacer sleeve, inlet and outlet plates each have at least one flat indexing surface whereby said plates and spacer are properly oriented with respect to one another.

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