United States Patent [19]

McCollum

[11] 3,893,628

[45] July 8, 1975

[54] **SPRAY HEAD**

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[73] Assignee: **Alsons Corporation**, Somerset, Mich.

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[52] **U.S. Cl.** **239/521**; 239/559; 239/593; 239/601

[51] **Int. Cl.** **B05b 1/26**; B05b 1/18

[58] **Field of Search** 239/461, 499, 502, 504, 239/521–524, 548, 558, 559, 567, 592, 593, 596, 601, 443

[56] **References Cited**

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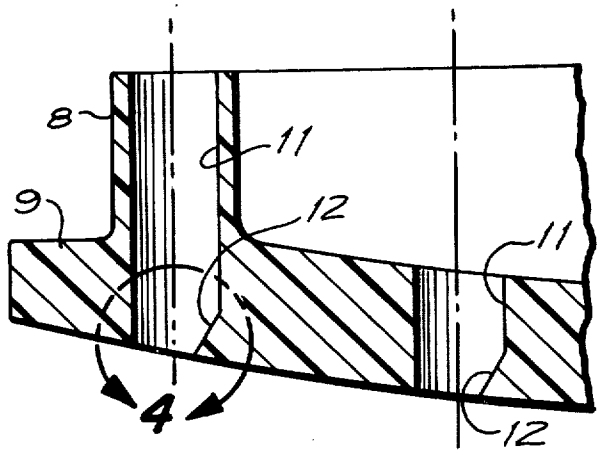
Primary Examiner—Robert S. Ward, Jr.

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[57] **ABSTRACT**

A spray head particularly suited for showers and having a plurality of discharge orifices in which the orifice axes are parallel, the orifices or a selected group of orifices provided with angular deflecting surfaces so arranged that the orifices or the selected group of orifices have D-shaped exits which are so oriented that the spray jets produce a predetermined conical spray pattern rather than coaxially disposed spray jets tending to produce a spray pattern which is essentially cylindrical.

6 Claims, 7 Drawing Figures



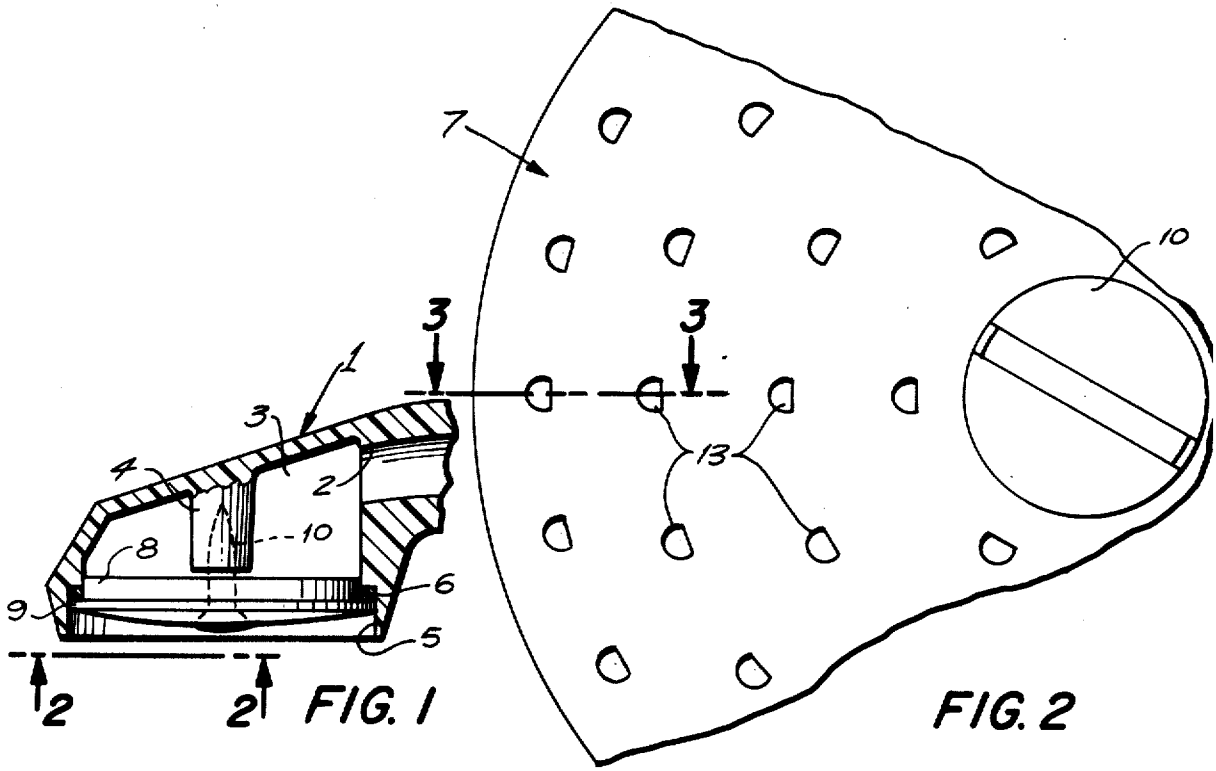


FIG. 1

FIG. 2

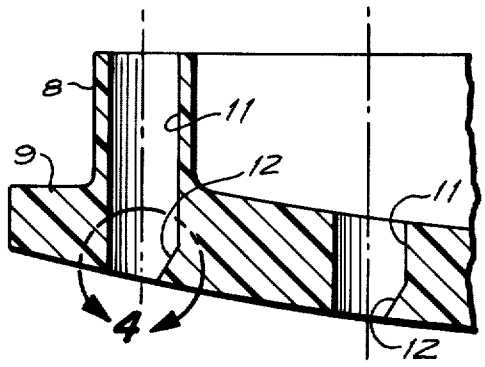


FIG. 3

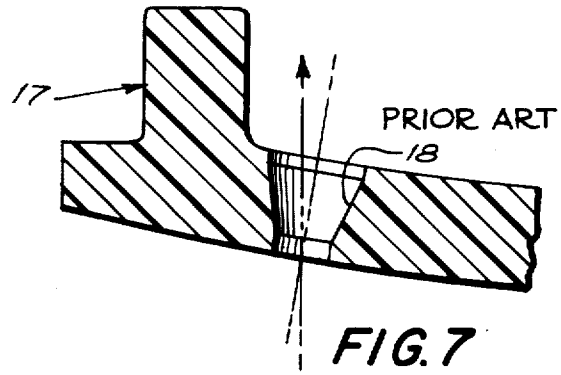


FIG. 7

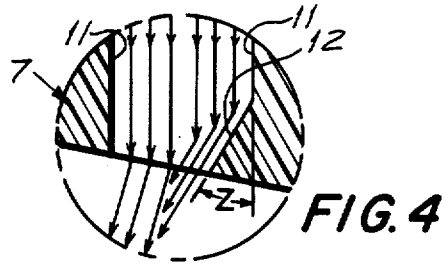


FIG. 4

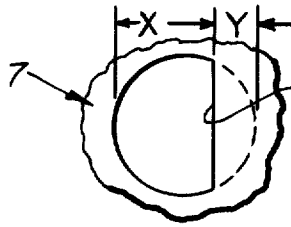


FIG. 5

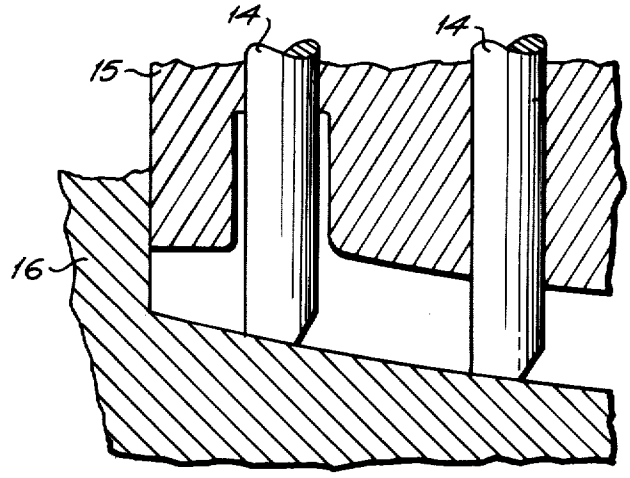


FIG. 6

SPRAY HEAD

BACKGROUND OF THE INVENTION

The present invention is directed to a spray head intended primarily, but not limited to use in bathing showers. It is preferred that the spray pattern from such spray heads be conical rather than cylindrical, and also that at any given distance from the spray head, the spray jets are uniformly spaced. Ideally, this may be accomplished by shaping the spray head surface to form a spherical zone and arranging the orifices in radiating relation from a common center.

To produce smooth jets from such orifices would require that the mold cores forming such orifices be disposed in radiating relation from a common center; this is virtually impossible, or at least too costly. An approach to this has been made by providing conical orifices radiating from a common center, but fixing the mold cores so as to move in parallel axes. If this is done a conical spray pattern is accomplished; however, molds so constructed produce orifice openings which are ragged to the extent that the spray pattern is not uniformly distributed. In fact, only a few of say, 60 orifice need be ragged to produce an irregular pattern; even one orifice producing a misdirected jet could spoil the spray pattern.

SUMMARY OF THE INVENTION

The present invention is directed to a spray head which overcomes the problem indicated and is summarized in the following objects:

First, to provide a spray head having a contour defining essentially a spherical zone in which the orifices or a selected group of orifices have deflector faces so arranged that the axes of the orifice bores are parallel; but the water issuing from the orifices produce a predetermined divergent spray pattern.

Second, to provide a spray head, as indicated in the preceeding object, in which the orifices, or a selected group of orifices have exit ends which are D-shaped and so oriented that the resulting spray jets not only produce the desired divergent paths, but also the water in each jet diverges increasing the size of each jet, this being accomplished without producing irregularities in the jet pattern.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary sectional view of a typical hand held spray head housing showing the spray head edgewise.

FIG. **2** is a greatly enlarged fragmentary bottom view of the spray head taken from **2—2** of FIG. **1.**

FIG. **3** is a greatly enlarged fragmentary sectional view of the spray head illustrating two of the spray orifices.

FIG. **4** is a further enlarged fragmentary sectional view of the exit portion of a spray orifice with arrows indicating the flow pattern of a jet issuing from the orifice.

FIG. **5** is an end view of the orifice shown in FIG. **4.**

FIG. **6** is a fragmentary sectional view corresponding to FIG. **3** showing adjacent portions of the die for casting the spray head.

FIG. **7** is an enlarged sectional view corresponding to FIG. **3** showing a conventional form of a spray discharge orifice.

The spray head is mounted on a conventional spray head housing fitted on a spray outlet or formed at one end of a conventional hand held spray device. The latter type of housing designated **1** is indicated fragmentarily in FIG. **1** and includes an inlet **2** extending through the handle which intersects a distributor cavity **3** having a central boss **4.** The distributor cavity **3** is circular and provided with a counterbore **5** which receives an O-ring **6.**

The spray head includes a spray head disk **7** having a rim **8** which fits within the counterbore **5** and a marginal flange **9** which overlies the O-ring **6.** The spray head disk **7** is provided with a central opening which receives a central fastening means **10** such as a screw which is secured in the central boss **4.**

The spray head disk is provided with a plurality of cylindrical bores **11,** the axis of which are in parallel relation. The bores are arranged in circular sets. One set may extend through the rim **8.**

Each bore or a selected set of bores is provided at its discharged end with a beveled face **12** so that the exit orifice is D-shaped as indicated by **13.**

Referring particularly to FIGS. **4** and **5,** the width of the oriface is designated X. The portion of the oriface which is closed by the beveled face is designated Y and the slope of the beveled face is designated Z.

Operation of the spray head is as follows:

Water flowing outwardly through a bore **11** would normally continue axially therefrom with such deflection as might occur by reason of the force of gravity. The beveled face **11** causes a portion of the water to be deflected angularly which has the net effect of directing the issuing jet as a whole in an angular direction with respect to the axis of the bore. The amount of such deflection depends upon the size of the angle Z. It has been found that an angle of 9° 30′ is an optimum angle. This angle may be constant for all of the spray outlets or may vary, for example, a lesser angle for the central outlets and a greater angle for the peripheral outlets.

As shown particularly in FIGS. **4** and **5,** if the width of Y is increased the percentage of total angular flow is increased with the result that more deflected water impinges on the axially flowing water increasing the resulting divergent path of the jet; conversely reducing the width of Y, reduces the divergence of the jet. The increase in width of Y may be accomplished by extending the length of the triangle identified by the angle z or by changing the extent of angle z. Thus, the jets may be so prearranged as to produce any desired pattern or density distribution.

As shown in FIG. **2,** the beveled faces **12** are located at the radially inner sides of the bores in order to produce a divergent spray pattern. It is preferred that the surface of the spray head disk **7** define a spherical zone, however, the desired spray pattern may be obtained if the disk were flat.

Reference is directed to FIG. **6.** As previously indicated the bores **11** are disposed in parallel relation, thus their core pins **14** are in parallel relation. Thus, the core pins may be fixed in the mold block **15** which forms the backside of the spray head disk. Or if desired, the core pins may be fixed to a common mounting plate, not shown, so as to be simultaneously withdrawn. The axially outer ends of the core pins abut the mold block **16** which casts the front side of the head disk **7.** To maintain contact with the front mold block, the core pins **14** may be spring loaded or hydraulically

loaded. Alternatively, and preferably, the core pins **14** are fixed in place and in order that their outer ends be perfectly matched to the surface of the front mold block **16.** Their extremities may be ground by use of a disk shaped to match the concave surface of the mold block **16** and the use of a fine grinding matrix. It has been found that the D-shaped exit ends **13** may be formed free of any irregularities which would cause the jet streams or portions thereof to deviate from the intended pattern.

Reference is made to FIG. **7.** Attempts have been made to produce a diverging spray pattern by providing a spray head disk **17** having a spherical zone contour and providing bores **18** which are conical and the axes of which are normal to the surface of the disk **17.** In order to form these bores, it is necessary that the cores define axes which diverge outwardly. If this is done, there is relative side movement when the part is withdrawn from the core pins. This side movement renders it extremely difficult to extract the part without damaging the surface of the bores, particularly at the orifice ends as a result, the spray pattern is irregular.

Having fully described my invention it is to be understood that I am not to be limited to the details herein set forth, but that my invention is of the full scope of the appended claims.

I claim:

1. A spray head, adapted to be placed over means forming a water distribution cavity for discharge of water therefrom, the spray head comprising:

a. a disk member;

b. a plurality of discharge bores formed in the disk member;

c. a set of deflector means within selected bores adjacent the exit ends thereof, each deflector means forming with the remaining portion of the corresponding bore an asymmetrical discharge orifice; said deflecting means directing angularly a portion of the water passing through the bore to cause impingement thereof against the remaining water passing in the bore as it issues from the discharge orifice to deflect the resulting water jet in angular relation to the axis of the corresponding bore; the set of discharge means being relatively oriented and so proportioned as to cause the water jets to produce a preselected spray pattern.

2. A spray head as defined in claim **1,** wherein:

a. the discharge orifices having said deflector means are D-shaped.

3. A spray head as defined in claim **1,** wherein:

a. the disk member defines essentially a spherical zone.

4. A spray head as defined in claim **1,** wherein:

a. the disk member includes a marginal rim; and the rim as well as the area surrounded by the rim are provided with discharge bores.

5. A spray head as defined in claim **1,** wherein:

a. each bore is cylindrical and each deflector means includes a deflecting surface within the corresponding bore in angular relation to the axis of the bore.

6. A spray head as defined in claim **5,** wherein:

a. the deflecting surface defines an angle in the order of 9½°.

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