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[54] SEDIMENT-RESISTING SPRAY OUTLET
7 Claims, 3 Drawing Figs.

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[51] Int. Cl. B05b 15/02, F23d 11/34
[50] Field of Search 239/534, 535, 562, 107, 567, 600

[56] References Cited

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ABSTRACT: A circular spray head is shown that has a fluid chamber formed by clamping upper and lower dished plates against the top and bottom of a central hub. The periphery of the upper-plate curves downward to form the upper lip of an outlet opening that extends completely around and forms a part of the rim of the fluid chamber. The periphery of the lower plate extends upward to form the lower lip of this outlet opening. A ring-shaped fluid distributor having a plurality of successive, circumferentially spaced spray openings located along its length is inserted and maintained in the outlet opening. The fluid distributor is made of a resilient material which deforms slightly in response to fluid pressure to dislodge mineral deposits and keep the spray openings clean.

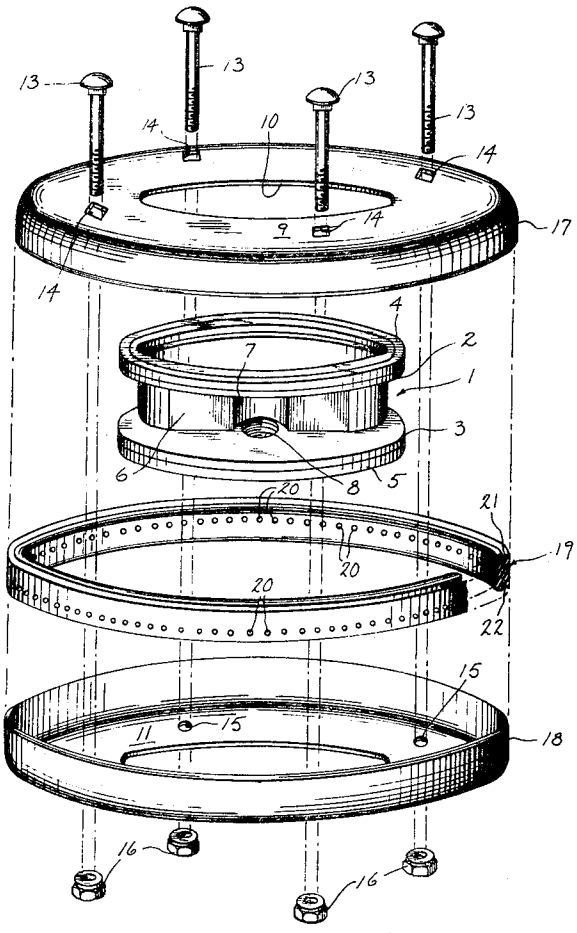


Fig. 1

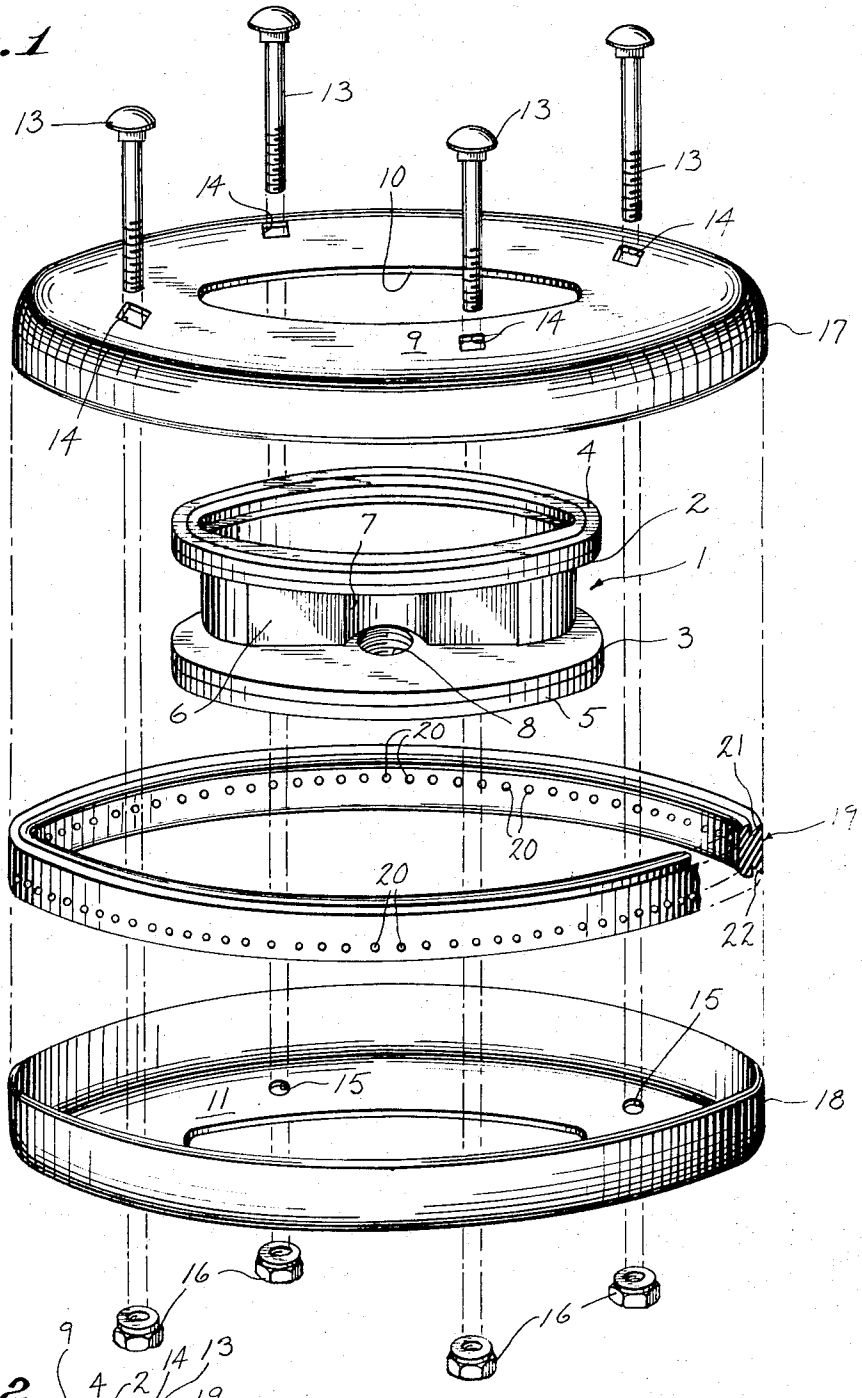


Fig. 2

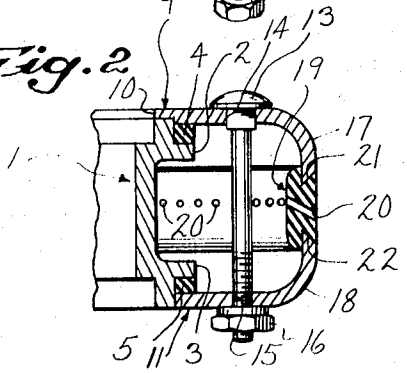
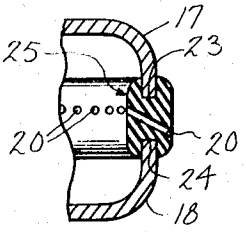


Fig. 3



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SEDIMENT-RESISTING SPRAY OUTLET

BACKGROUND OF THE INVENTION

Spray outlets take various forms, depending usually upon their application. One particular spray outlet configuration is that used with washfountains. The typical washfountain has a circular washbowl with the plumbing extending up the interior of a center post and terminating in a spray head. The spray head has a series of small diameter water outlets, or spray openings, located circumferentially around a water chamber to direct water streams radially outward from the center post and downward into the washbowl.

As with other spray outlets, the washfountain outlets are susceptible to clogging caused by mineral sediments deposited by the water, or from other mineral foreign matter that may be carried in the water and settled out in the spray outlets. This clogging not only prevents the passage of water through individual outlets, but may also deflect the water stream away from its intended direction. This latter problem is particularly annoying when it occurs in washfountains, because the water stream is often deflected out of the washbowl on to the floor, or on to a clothed person using the washfountain.

There are numerous mechanisms for use in shower heads to provide self-cleaning of the outlets. Such outlets self-clean generally by mechanisms which vary the size of the water outlets as the water pressure changes to flush or clean the holes through which the water passes. An alternative approach is to form the holes or grooves with a material, such as Delrin, to chemically inhibit the deposit of minerals on the walls of the water outlet. These solutions to the problem involve the use of complex mechanical devices which are impractical to apply to a washfountain, or, as is the case with sediment-resisting materials, are not entirely satisfactory.

Another method of preventing the buildup of sediments in water outlets is the use of soft rubber nozzles, the openings of which expand and contract with water pressure to physically prevent the formation of mineral deposits. Such a rubber nozzle is shown by Broughton in U.S. Pat. No. 3,288,371. Due to the softness of the rubber used to construct these nozzles, each individual opening must be closely surrounded and supported by structure. Such individual treatment of openings is impractical for developing a spray of multiple streams. It is also immediately apparent that this solution would become prohibitively expensive when applied to washfountain spray heads having many outlets. Further, because the soft rubber used is readily deformed by water pressure, accurate aiming of the water stream is difficult and the results erratic.

SUMMARY OF THE INVENTION

The present invention relates to a self-cleaning spray head having a plurality of spray openings located in an elongated outlet in a water chamber. More particularly, the invention relates to a fluid chamber having an inlet that receives fluid under pressure, an outlet for the chamber defined by a pair of spaced lips, and a fluid distributor made of a resilient material inserted in the outlet that has a watertight seal with the lips and a plurality of water-spray openings across its surface.

The fluid distributor has a length and width sufficient to form a watertight seal with the lips of the elongated outlet. The spray openings are distributed along the length of the fluid distributor and communicate through the entire thickness of the fluid distributor between its inside and outside surfaces. The hardness of the resilient material used to make the fluid distributor, its width, its thickness, and the relative diameter and angle of the spray openings to these dimensions, determine the operating characteristics of the sprayhead.

The fluid distributor of the invention has a thickness which is large relative to the diameter of the spray openings so that the water stream can be accurately directed by proper aiming of the spray opening. Also, the hardness of the resilient material is such that deformation of the outlet channels caused by variations in water pressure is sufficient to prevent the formation of mineral deposits in the channels, but insufficient to cause blocking or misdirection of the water streams.

An object of the invention is to provide a self-cleaning spray head which effectively prevents the buildup of mineral sediments in the spray openings, which provides a relatively inexpensive means of forming a spray having numerous water streams, and which provides a spray having water streams which can be accurately aimed to form a pattern.

A more specific objective of the invention is to provide a spray head having spray openings formed by a resilient material which is mechanically worked by variations in water pressure to flush the channel of mineral sediments.

Still a more specific objective is to provide a self-cleaning spray head which is particularly suitable for use on washfountains or similar outlets requiring numerous water streams arranged in an elongated pattern requiring accurate direction of the water streams.

Other features, objects and advantages of the invention will become apparent from the description to follow.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of a spray head assembly embodying the present invention;

FIG. 2 is a cross-sectional view of a portion of the spray head in FIG. 1; and

FIG. 3 is a cross section of an alternative embodiment of that portion of the spray head shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A self-cleaning spray head assembly suitable for use on a washfountain is shown in FIG. 1. The assembly is intended to be supported on a center post (not shown in the drawing) extending vertically from the center of a washbowl. A central hub 1 is adapted to be securely attached to the washfountain center post to provide support for the other elements of the assembly. The hub 1 is a short, hollow, generally cylindrical structure having circular flanges 2 and 3 jutting radially outward from its top and bottom. A top gasket 4 rests in a step formed in the outer top edge of the flange 2. Likewise, a bottom gasket 5 rests in a lower step in the flange 3.

Between the flanges 2 and 3, the cylindrical wall of the hub 1 is intended to form a flat surface 6 extending over a sector of the wall. The surface 6 is further indented to form a concave surface 7. These indentations result in an enlargement of the top surface area of the flange 3 to provide for a water inlet 8.

Resting on the upper surface of the top gasket 4 is an upper dished plate 9 that has an open center 10. The plate 9 has a substantially uniform thickness and its interior surface forms the upper half of a fluid chamber. The open center 10 has a diameter such that it rests upon the upper surface of the top gasket 4.

The upper plate 9 is complimented by a lower dished plate 11, the interior surface of which forms the lower half of the fluid chamber. The lower plate 11 has a center opening 12 of a diameter to fit against the lower gasket 5. When assembly bolts 13 are inserted through equally spaced holes 14 located in the upper plate 9 and passed downward through corresponding holes 15 in the lower plate 11, and the assembly nuts 16 are tightened against the bottom surface of the lower plate 11, the two plates 9 and 11 are drawn tightly against their respective gaskets 4 and 5 to form watertight seals therewith.

When the plates 9 and 11 are attached together in the foregoing fashion, the periphery of the upper plate 9 curves downward to form an upper lip 17, which defines an elongated upper edge for an outlet running around the entire rim of the fluid chamber formed by the plates 9 and 11. Likewise, the periphery of the lower plate 11 curves upward to form a lower lip 18 that defines the lower edge of the elongated outlet. Located within this elongated outlet is a fluid-distributor ring 19, such that when the upper and lower plates 9 and 11 are assembled in position, the edges of the upper and lower lips 17 and 18 are drawn tightly against the top and bottom edges of the fluid distributor ring 19 to form watertight seals. Equally spaced around the circumferential length of, and passing from

the inside to outside surfaces of the fluid distributor ring **19**, are numerous fluid spray openings **20** that provide for the exit of fluid in fine streams that contribute to form a spray pattern.

A cross-sectional view of the fluid distributor ring **19** and the plates **9**, **11** is shown in FIG. **2**. In the preferred embodiment of the invention the upper and lower lips **17** and **18** are beveled to mate with upper and lower V-shaped grooves **21** and **22** formed in the top and bottom edges of the fluid distributor ring **19**. This particular configuration performs two important functions. First, the outside surface of the fluid distributor ring **19** is flush with the outside surfaces of the upper and lower plates **9** and **11** to improve the appearance of the spray head and render it more impervious to vandalous acts. Secondly, the configuration provides a good watertight seal between the upper and lower lips **17** and **18** and the top and bottom edges of the fluid distributor ring **19**. The V-shaped grooves **21** and **22** in the fluid-distributor ring **19** have a shape similar to but slightly smaller than the beveled edges of the lips **17** and **18**. Consequently, the lips **17** and **18** wedge tightly into the grooves **21** and **22**, producing a substantial horizontal sealing pressure against the sides of the grooves **21** and **22**. Additionally, a vertical sealing pressure is provided between the beveled edges of the lips **17** and **18** and the beveled sides of the grooves **21** and **22** when the upper and lower dishes **9** and **11** are drawn tightly together.

When completely assembled and operating, water under pressure enters through the water inlet **8** to fill the fluid chamber. Fluid pressure builds in the chamber and water is forced through the spray opening **20** in streams that form a symmetric spray pattern about the center post of the washfountain. When the water is shut off, pressure in the fluid chamber drops and the waterflow through the openings **20** terminates. During this operating cycle the pressure exerted against the inside surface of the fluid distributor ring **19** and on the inside surfaces of the openings **20** may vary considerably. These pressure variations are believed to cause some deformations in the resilient spray opening walls which serve to flush or cleanse the walls of mineral deposits which might otherwise accumulate.

The spray openings **20** are located midway between the upper and lower edges of the fluid distributor ring **19** and are inclined in a downward direction running from the interior surface of the fluid chamber to the exterior surface, or in other words, inclined with respect to an axis defining thickness of the fluid distributor **19**. This downward inclination of the openings **20** provides the obvious function of directing the water streams out and downward into the washbowl. It is also believed, however, that an improved self-cleansing action is provided by inclining the outlet openings **20** in this fashion. More particularly, when the water pressure inside the fluid chamber increases, the fluid distributor ring **19** may deform or bow outward slightly from between the lips **17** and **18**. This deformation causes the openings **20** to bend slightly along their lengths. It is believed that such bending occurs and that it aids in the dislocation of mineral deposits on the interior surfaces of the spray openings **20**.

A cross-sectional view of a portion of a second embodiment of the invention is shown in FIG. **3**. In this alternative embodiment the edges of the lips **17** and **18** are squared rather than beveled. These edges are received and mate tightly with upper and lower U-shaped grooves **23** and **24** formed in the top and bottom edges of a fluid distributor ring **25**. The H-shaped fluid distributor ring **25** formed as a result of these upper and lower grooves **23** and **24**, provides a good watertight seal between the lips **17** and **18** and the edges of the fluid distributor ring **25**.

It should be obvious to those skilled in the art that the invention can be practiced by using fluid distributor rings having configurations other than those disclosed herein. The particular configurations shown in FIGS. **2** and **3** have been used in spray heads to provide substantially improved service over prior spray heads. This improved performance was obtained by constructing the fluid distributor ring of rubber having a hardness in the range of 40 to 60 durometer. It is apparent, however, that the dimensional relationship, or ratio between the thickness of the fluid-distributor ring and its width, as measured respectively between the inside and outside surfaces of the fluid distributor and between the edges of the lips **17** and **18**, will affect the results. Likewise, the size and shape of the spray openings relative to these dimensions can affect performance. If the fluid distributor ring is made of an excessively hard rubber, or the dimensional ratio of its thickness to its width is too high, the water pressure may not deform the spray openings enough to dislodge mineral deposits. On the other hand, if an excessively soft rubber is used, or if the dimensional ratio of the fluid-distributor ring is too small, excessive deformation may occur causing the spray openings to block, cause misdirection of the water streams, or cause the rubber to fatigue from excessive working. Therefore, the use of a rubber fluid distributor having a hardness outside the recommended range of 40 to 60 durometer may give improved service where the dimensional ratio is appropriately altered from those ratios shown in the embodiments of FIGS. **2** and **3**.

It should be apparent to those skilled in the art that the invention disclosed herein is not limited solely to application on washfountains. The invented spray head is particularly applicable where it is desired to produce an accurate spray pattern formed by spray openings that are arranged sequentially along a line. More specifically, the self-cleaning spray head as contemplated by this invention, is particularly useful where the spray pattern desired can be formed from a resilient fluid distributor which can be inserted in an elongated opening in the fluid chamber.

There are numerous alterations to, and applications for, the spray head which do not depart from the spirit of the invention. In contrast to the foregoing description, the following claims particularly point out and distinctly claim the subject matter which the applicant regards as his invention.

What is claimed is:

1. A self-cleaning spray head which comprises:

a fluid chamber with an inlet and an elongated outlet having a width and length; and

a fluid distributor having an inside and an outside surface inserted in said elongated outlet and characterized by the following features: it is made of a resilient material; the ratio of the thickness of the fluid distributor, as measured by the distance between its inside and outside surfaces, to the width of said elongated outlet is within the range of 0.5 to 2; the hardness of the fluid distributor is within the range of 40 to 60 durometer; and there are a plurality of spray openings formed in said fluid distributor and running from its inside surface to its outside surface.

2. A self-cleaning spray head as recited in claim **1**, wherein said spray openings are substantially straight and inclined with respect to the axis used to measure the thickness of said fluid distributor.

3. A self-cleaning spray head for a washfountain which comprises:

a fluid chamber made of a rigid material having a rim extending a distance around a vertical center axis, and an elongated opening in the chamber wall located along said chamber rim; and

a fluid distributor inserted and retained in said elongated opening, which fluid distributor is made of a resilient material having a plurality of spray openings spaced successively along its length to provide a spray pattern when water under pressure is forced through said spray openings, and in which the deformation of the fluid distributor caused by the water pressure, inhibits the collection of mineral deposits in said spray openings.

4. The self-cleaning spray head as recited in claim **3**, wherein said fluid distributor is constructed of rubber having a hardness in the range of 40 to 60 durometer.

5. The self-cleaning spray head as recited in claim **3**, wherein said fluid distributor has a thickness which is measured perpendicular to, and is at least one-half as large as, the

width of said elongated opening, and the fluid distributor has grooves along its marginal portions to receive and mate with the walls of said fluid chamber.

6. The self-cleaning spray head as recited in claim 3, wherein said rim and elongated opening extend completely around the central axis in a horizontal plane.

7. The self-cleaning spray head as recited in claim 6, wherein said fluid distributor is a ring made of rubber having a hardness in the range of 40 to 60 durometer.

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