Sept. 23, 1969 R. G. PARKISON 3,468,483

ADJUSTABLE SHOWER HEAD

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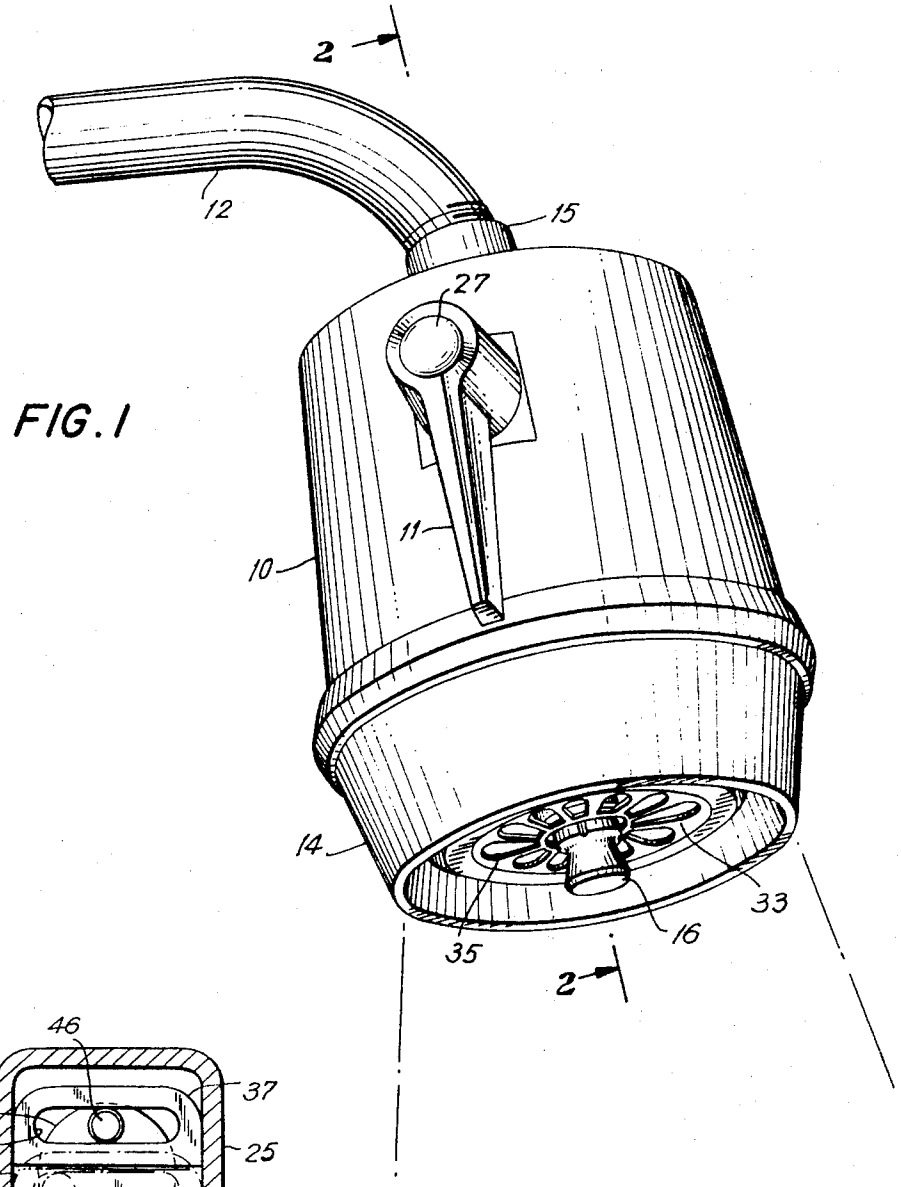


FIG. 1

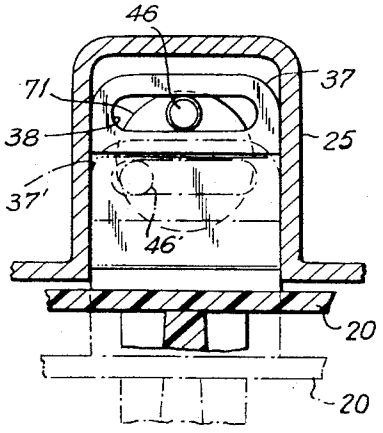


FIG. 3

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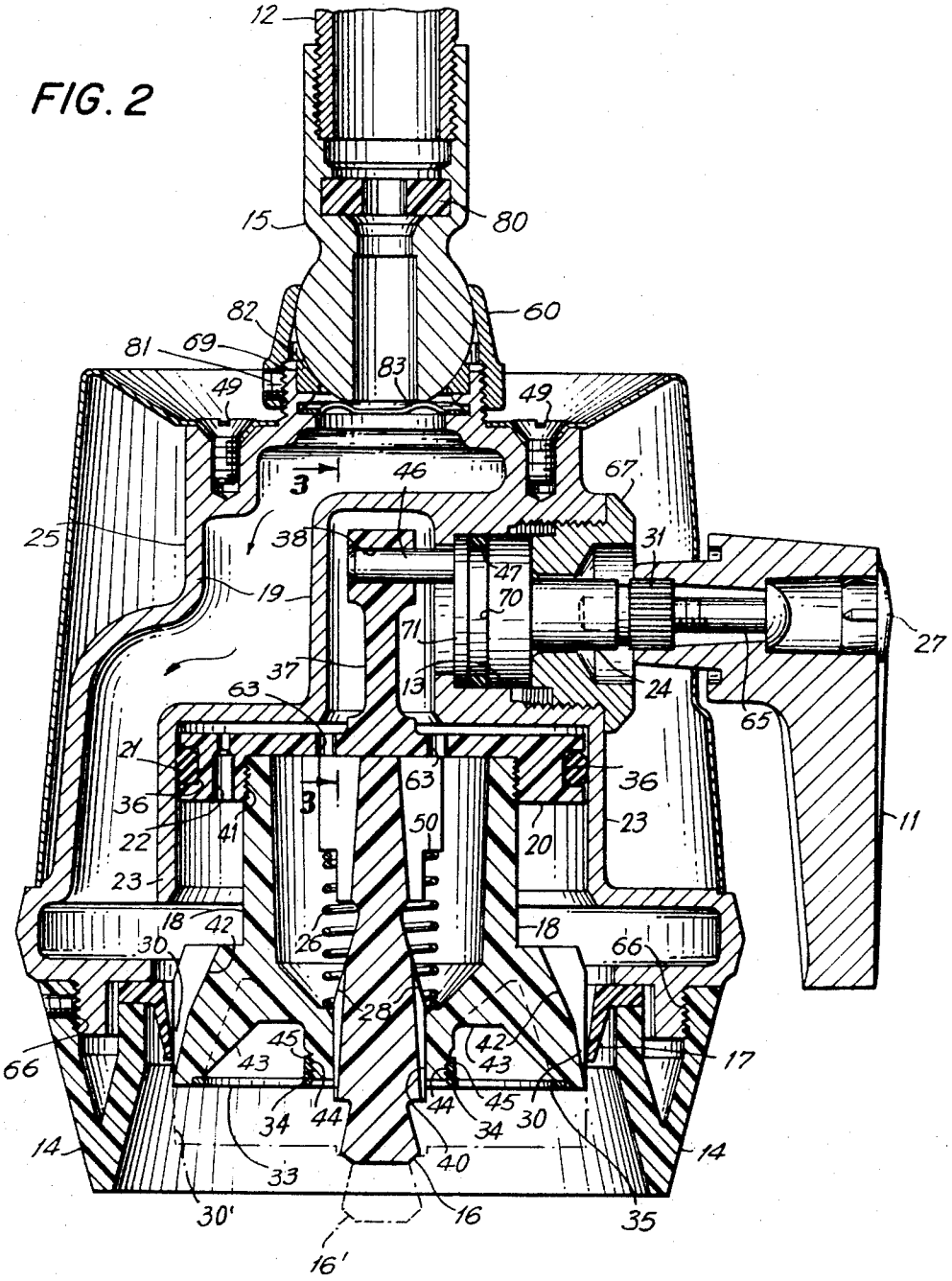
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ADJUSTABLE SHOWER HEAD

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FIG. 2



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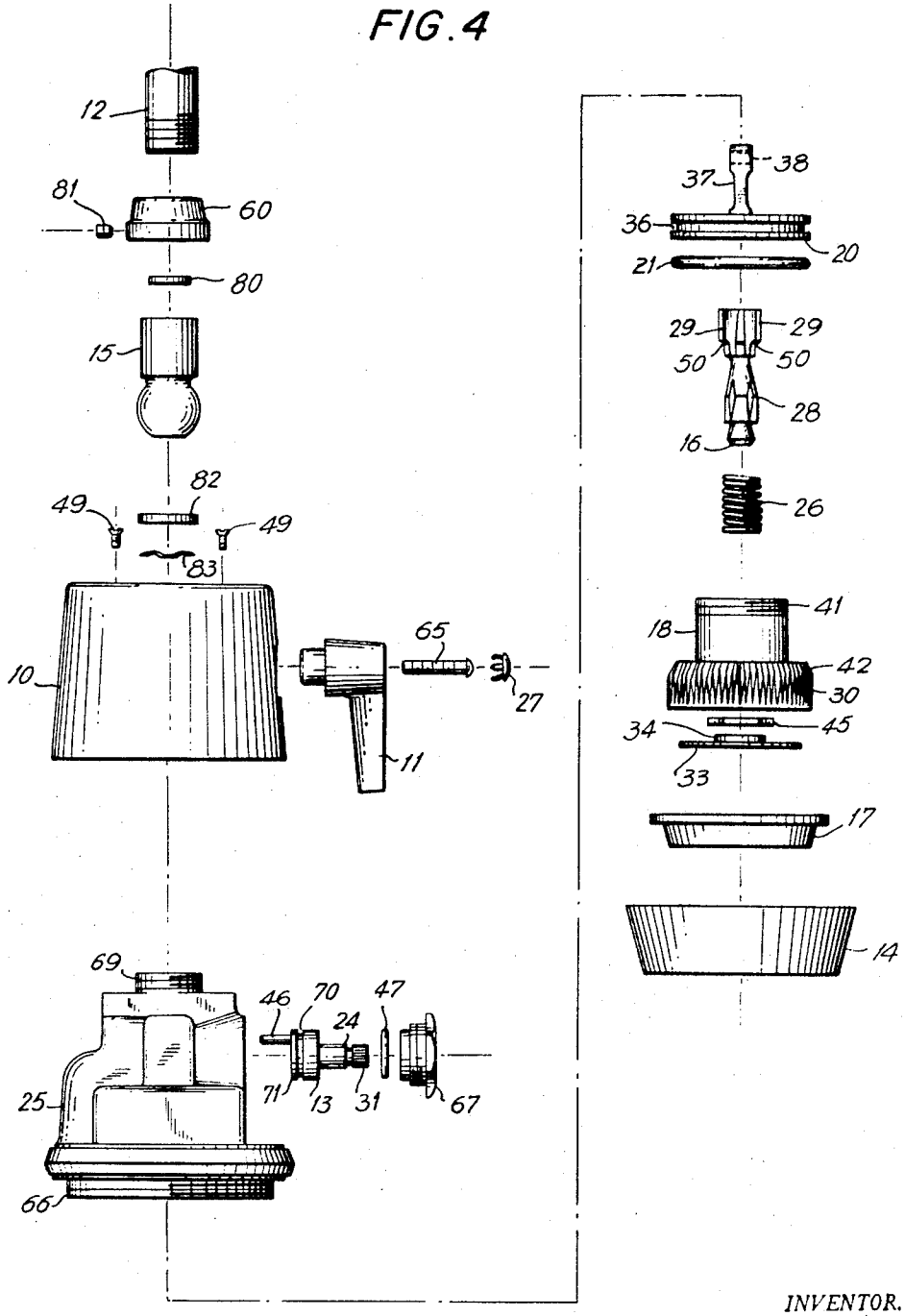
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ADJUSTABLE SHOWER HEAD

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FIG. 4



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United States Patent Office 3,468,483
Patented Sept. 23, 1969

3,468,483

ADJUSTABLE SHOWER HEAD

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Filed May 2, 1967, Ser. No. 635,465
Int. Cl. B05b 1/32, 1/26
U.S. Cl. 239—460 9 Claims

ABSTRACT OF THE DISCLOSURE

An adjustable shower head for the distribution of liquids having a control handle for regulating the flow of the spray. The control handle is counterbalanced against the forward pressure of the liquid on the shower head nozzle for all line pressures by utilizing a balance piston coupled to the control handle and communicative to the liquid to counteract the forward pressure of the fluid.

This invention relates to an improved shower head mechanism.

More specifically, this invention relates to a shower head having a fingertouch control for dispersing the spray from its nozzle for an improved distribution over a broad range of line pressures.

In the construction of shower heads, and particularly those applicable for use in installations where it is desirable to maintain a restricted and controlled flow of water for distribution over tubs and the like, considerable effort has been expended to provide a unit which will produce a confined spray, the center area of which is distributed substantially evenly. Moreover, it is desirable to provide a shower head having a control arm for regulating the velocity and flow of the water exiting from the nozzle while maintaining the spray over an evenly distributed area for a variety of line pressure adjustments.

In conventional shower heads control adjustments are provided for regulating the flow and velocity of the spray by constricting one or more openings of the nozzles at the outlet of the spray head. Depending on the construction of these types of shower heads, the water pressure has a tendency to operate the control valve to either move the nozzles and their respective openings outward to increase the flow of water, or to move the coupling surrounding the nozzles outwardly to shut off the nozzle valves. This difficulty is overcome by applying a high frictional drag to the control arm in the form of a gland packing type seal so as to frictionally bias the rotational movement produced by the water pressure against the internal movable parts of the shower head. In practice it has been found that the frictional drag applied to the control arm eventually wears out through repeated usage so that it becomes difficult to maintain a set adjustment of the control arm of the shower head. In addition, this wear results in leakage around the trunnion of the control arm.

In the present invention a shower head is provided having an external control member which does not employ a frictional drag having all of the above-described inherent disadvantages, but employs a pressure balancing of the movable members within the shower head, so that there is virtually no tendency to actuate the control arm in response to water flow through the shower head regardless of the selected setting of the control arm. The force produced by the water pressure employed as a reverse bias is directly proportional and equal in magnitude to the force produced by the pressure of the forward flow of water acting on the movable member connected to the control handle so that both forces remain counter-balanced over the entire range of line pressures. Since the forces acting on the control handle are counter-balanced, no frictional drag need be incorporated into its design.

The control handle will thus operate upon the application of very little manual force or finger touch control for any adjustment of pressure to the shower head. Due to its ease of operation the control arm may be moved to make any necessary adjustment of the spray nozzle by only one hand of the user without causing the entire shower head to swivel on its ball-joint coupling and become misdirected.

It is therefore an object according to the present invention to provide an adjustable shower head mechanism having an adjustment handle which is counterbalanced against the forces produced by the water pressure within the shower head when in use.

It is another object according to the present invention to provide a shower head which may be adjusted by "fingertouch" control to regulate the flow of water therethrough.

It is another object according to the invention to provide a shower head which is simple and decorative in design, easy to assemble, inexpensive in cost, and reliable in operation.

Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings, which disclose the embodiments of the present invention. It should be understood, however, that the drawings are designed for the purpose of illustration only, and not as a definition of the limits of the invention, as to which reference should be made to the appended claims.

In the drawings wherein similar reference characters denote similar elements throughout the several views:

FIG. 1 is an isometric view slightly in elevation of the novel shower head according to the invention;

FIG. 2 is a cross-sectional view taken along section 2—2 through the control handle of the shower head according to the invention;

FIG. 3 is a view taken along section 3—3 of FIG. 2; and

FIG. 4 is an enlarged view illustrating the assembly of the shower head according to the invention.

Referring to FIG. 1, there is shown the shower head according to the invention having a substantially cylindrical escutcheon **10** with a control handle **11** mounted thereagainst. The front of the shower head includes a conically-shaped skirt **14** which surrounds the outlet of the shower head. Concentrically disposed within the skirt is a center distributor **16**. Skirt **14** also surrounds a face plate **33** concentrically disposed around center distributor **16**.

Referring now to FIGS. 2–4, the shower head according to the invention is shown pivotably supported from ball joint **15**. Ball joint **15** is coupled to the threaded end of pipe **12**. Resilient washer **80** seats in a recess in ball joint **15**, and provides an automatic regulation of the maximum flow to the shower head. Ball joint **15** customarily includes a coupling nut **60** which contains an internal helical thread having the same diameter and pitch to correspond to an externally threaded flange **69** defining the inlet at the top of the body of the shower head.

When coupling **60** is engaged to flange **69**, it is customary to seat ball joint **15** on washer **82** contained within the inlet. A spring washer **83** is also provided to maintain seat washer **82** against ball **15** in order to impede the free pivoting of the shower head on ball joint **15**. A set screw **81** is engaged in coupling **60** against pipe **12** to lock the shower head to ball joint **15**.

Flange **69** is an integral portion of body member **25** which supports the internally disposed moving parts of the shower head. Adjacent to the threads at the top surface of body member **25** are a plurality of screws **49** which hold the decoratively finished escutcheon **10** in a fixed position surrounding body **25**. Body **25** includes a main passageway **19** which at its top is communicative to the

flow of water from inlet pipe 12 through ball joint 15. Mounted within body 25, and forming an integral part thereof, is a vertical cylinder 23. Positioned within cylinder 23 is a balance piston 20 having an annular O-ring 21 retained within an annular slot 36 formed along the wall of piston 20. O-ring 21 provides a sliding fluid seal between the piston and the internal walls of cylinder 23.

At the top of piston 20 and forming an integral part therewith is a vetrically projecting flange 37 which contains at its end an elongated horizontal slot 38. Piston 20 also includes a small through-hole 22 communicative between its top and bottom surfaces. Moreover, piston 20 also includes a plurality of drain holes 63 through its body and disposed around flange 37.

Along the undersurface of piston 20 is contained an internal helical thread 41 which corresponds in diameter and pitch to an external helical thread disposed at the end of a vertical cylindrical projection of a shower director 18. The lower conically-shaped flange portion of shower director 18 contains a plurality of flutes 30 formed longitudinally along its external surface completely around its periphery. Moreover, the vertical guide angle to which flutes 30 approach the opening of shower director 18 is relieved by a flush angle 42 adjacent to its mid-portion.

Looking upward from the bottom of shower director 18 there are disposed a plurality of integral supporting webs 43 between center aperture 40 and the rim containing flutes 30. Webs 43 provide additional strength to the rim of shower director 18 to counteract compressive forces which act on flutes 30 during the operation of the shower head. Disposed concentrically around aperture 40 is an external thread 44 for receiving a locking nut 45 having a corresponding internal thread.

A center distributor 16, mounted coaxially within shower director 18, contains a plurality of flutes 28 on the periphery of its downwardly projecting shank. On the periphery of the upper portion of center distributor 16 are a plurality of legs 29 which terminate in a step 50 toward the mid-portion of the distributor. Step 50 serves as a retaining surface for receiving one end of spring 26.

During a part of the assembly of the shower head spring 26 is fitted over center distributor 16 until it engages step 50. Spring 26 has a diameter slightly larger than aperture 40 of shower director 18 so that when distributor 16 is coaxially mounted therethrough, the opposite end of spring 26 will shoulder around aperture 40 within director 18. The assembly contained within director 18 is then threadably engaged to balance piston 20 so that the compressional force of spring 26 will urge distributor 16 against the internal surface of balance piston 20. By design, flutes 28 on the periphery of distributor 16 engage the inner walls and partially close off aperture 40.

Control handle 11 engages a cam shaft 24 at its end through a corresponding keyway 31. Cam shaft 24 includes in its mid-portion an enlarged cylindrically-shaped retaining flange 13 having an annular groove 70 radially disposed in its periphery to receive an O-ring 47. An end cap 67 having a center bearing surface for pivotably supporting cam shaft 24 is threadably engage to body 25 so as to abut slidably against flange 13 to prevent longitudinal translation of shaft 24. Handle 11 is also retained to the end of cam shaft 24 by means of set screw 65 threadbly engaged through the axis of keyway 31. A decorative plug 27 is press-fitted into the screw opening of handle 11 in order to hide the screw 65 and enhance the appearance of the handle.

O-ring 47 serves as fluid seal to prevent water leakage from the connection of handle 11 in body 25. The fluid in contact with O-ring 47 provides a sufficient amount of lubrication to minimize any inherent frictional drag so that handle 11 may rotate cam 24 upon finger-touch control. Secured on camming surface 71 of cam 24 is an eccentric pin 46. Pin 46 extends sufficiently from camming surface 61 to pivotably engage slot 38 at the end of flange 37 on piston 20. The combination of the cam engaged

to the flange portion of piston 20 forms a slotted yoke drive for converting the rotational motion of handle 11 into a vertically reciprocating motion of piston 20 with respect to cylinder 23.

Surrounding the bottom opening of body 25 is a downwardly projecting cylindrical flange 66 having an external thread for receiving and securing skirt 14 thereto. In the assembly of skirt 14 to body 25, a director ring 17, having a downwardly projecting tapered flange, is inserted concentrically around shower director 18 and against the base of body 25. Director ring 17 is constructed from a resilient material so that its downwardly directed tapered flange surface is resiliently urged against flutes 30 of director 18. Director ring 17 is held in place securely against the base of body 25 by the rim of the internal wall of skirt 14. The base of director ring 17 is made sufficiently thick so that the tightening of skirt 14 onto threaded flange 66 will cause a slight compression of the base of ring 17 simultaneous with the full tightening of skirt 14 against flange 66.

A disc-shaped face plate 33 having a concentrically disposed flange portion 34 is threadably engaged to shaft 44 of director 18. The appearance of the face plate 33 is enhanced with a chemically etched decorative motif that can be seen in FIG. 1.

The dynamic operation of the shower head according to the invention is as follows:

When water under pressure is fed from feed pipe 12 through ball joint 15 into channel 19, it divides into two directions at the base of shower head within body 25.

Since director 18 serves as a fluid obstruction across the outlet of body 25, the pressure of the water in channel 19 against the base of director 18 tends to urge the assembly of the director and piston 20 downward to further open the nozzles of the shower. To counteract this tendency, the water under pressure is made accessible to the underside of balance piston 20 so that the pressure thereagainst simultaneously urges the cylinder assembly upwards to counteract the downward force. The effective surfaces of both the underside of piston 20 and the base of director 18 are constructed approximately equal so that the forces produced by the pressure of the water in channel 19 are substantially equal and opposite in direction and therefore counter-balanced. Thus the resultant force produced by the pressure acting upon the nozzle assembly of the shower head according to the invention will remain substantially equal to zero throughout the entire range of line pressures applied to the shower head. Since these forces are substantially counter-balanced, it is possible to make adjustments of the opening of the nozzle by only lightly touching control arm 11. Unlike conventional shower heads no self-induced frictional drag is provided in the control of the nozzle opening so as to impede any adjustments that may be required.

A portion of the water in contact with the underside of piston 20 flows through aperture 22 to the top side of the piston and provides lubrication to O-ring 21 within cylinder 23. In order to prevent the pressure from building up to any great extent on the top side of piston 20 a plurality of drain holes 63 adjacent to center flange 37 of piston 20 permit the water to drain into the center cavity of director 18 and to pass out between flutes 28 of distributor 16 as part of the center spray of the shower head. In addition, center distributor 16 is held in its upward position with a relatively light spring 26, and a relatively small pressure above piston 20 and in the chamber containing spring 26 in shower director 18 causes the center distributor 16 to move downward which progressively increases the area for fluid to escape at the fluted periphery of center distributor 16.

The rotation of handle 11 will cause the entire nozzle assembly comprising director 18 and piston 20 to move upwardly or downwardly and thus decrease or increase respectively the opening of the nozzle formed by director ring 17 and flutes 30. When piston 20 is in its uppermost

position (as shown) so that the nozzle opening is almost completely obstructed, the shower head produces a high-velocity, needle-like spray.

As the nozzle is opened by the downward movement of its assembly (as shown by the dotted line sgement) the angularly relieved portion **42** of flutes **30** will come into contact with director ring **17** and will provide a significantly increased opening of the nozzle over the remaining portion of the displacement of the assembly. This relief in the guide angle of flutes **30** permits any foreign particles which become entrapped between the flutes to be flushed out by the large volume of water flowing through the nozzle.

While only a single embodiment of the present invention has been shown and described, it will be understood that many changes and modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. An adjustable shower head for the distribution of liquids comprising:

a hollow body member,

an inlet at the top of said body member for the introduction of a liquid under pressure,

an outlet at the other end of said body member,

obstruction means disposed a cross said outlet for obstructing the flow of liquid therethrough,

a fluid control coupled to said obstruction means and having a portion externally accessible from said body wherein said obstruction means can be moved with respect to said body member for adjusting in the spray of liquid leaving said outlet, and

pressure means coupled to said obstruction means and responsive to the pressure of said liquid within said body member for providing a force on said obstruction means substantially equal in magnitude and oppositely directed to the force resulting from the pressure of the liquid against the obstruction means.

2. The shower head as recited in claim **1** wherein said outlet includes a resilient ring, said ring having a depending flange portion surrounding said obstruction means.

3. The shower head as recited in claim **2** wherein said obstruction means comprises a fluid director having a plurality of flutes communicative to the outlet of said shower head, said flutes being urged in sliding contact against the depending flange portion of said ring.

4. The shower head as recited in claim **3** wherein said pressure means comprises a cylinder having a first end communicative to the pressure of said liquid and a second end substantially communicative to the atmosphere, a piston slidably engaged to the inner walls of said cylinder, said piston being secured to said director at the first end of said cylinder and secured to said fluid control at the second end of said cylinder.

5. The shower head as recited in claim **4** wherein said piston includes an annular slot within the walls thereof, a resilient O-ring disposed within said slot and in compression with the walls of said cylinder, and a restricted aperture in said piston for communicating a portion of the liquid from said first end to said second end of said cylinder to lubricate said piston.

6. The shower head as recited in claim **5** wherein said fluid control comprises;

a handle pivotably mounted through said body member and accesible externally thereof,

a cam shaft having an eccentric pin mounted thereon,

a flange bracket secured to said piston and extending through the second end of said cylinder, said bracket having an elongated slot at its end extending transversely thereof, said pin engaging said slot to transform (to translate) the rotational movement of said handle into reciprocating movement of said piston with respect to said cylinder and thereby displace said director across the outlet of said shower head.

7. The shower head as recited in claim **6** wherein said director includes a centrally disposed cavity.

8. The shower head as recited in claim **6** additionally comprising means communicative to the second end of said cylinder for draining the liquid collected therein into said director cavity.

9. The shower head as recited in claim **8** wherein said director additionally comprises a spray distributor coaxially disposed in said director, for distributing said liquid therecollected in the form of a spray.

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