Oct. 1, 1968 H. SHAMES ETAL 3,403,860

ADJUSTABLE SPRAY SHOWER HEADS

Filed Oct. 29, 1965

FIG. 1.

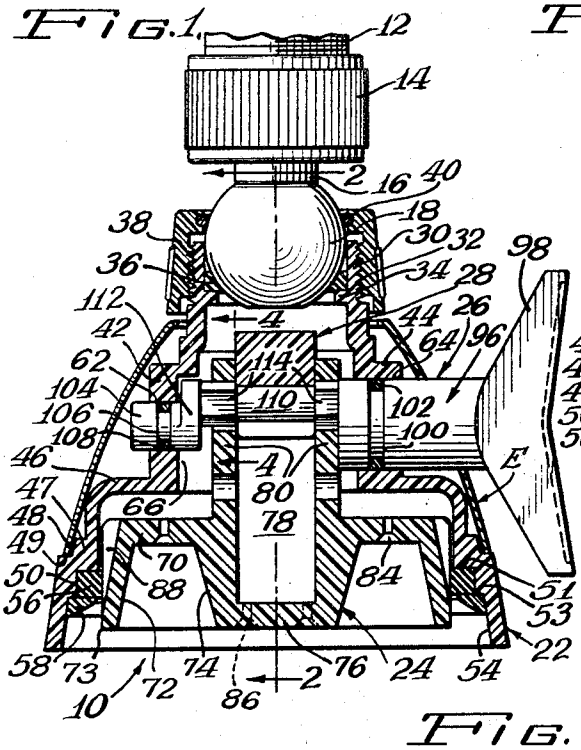


FIG. 2.

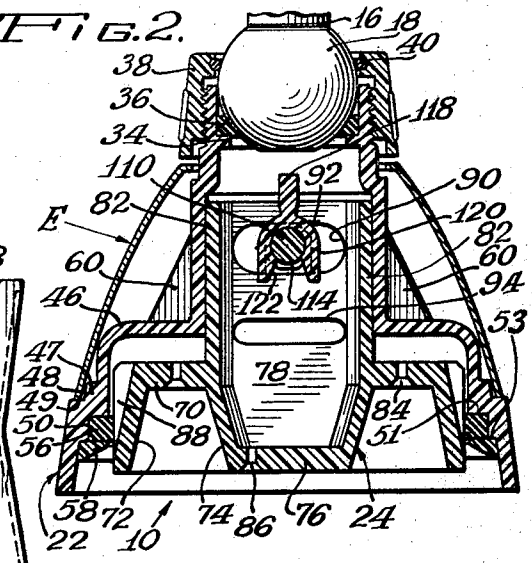


FIG. 4.

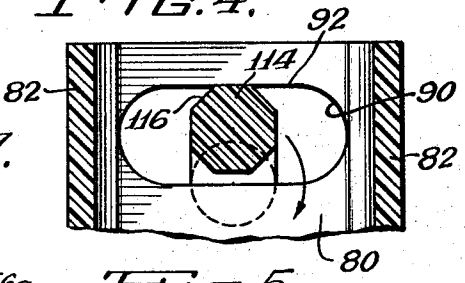


FIG. 7.

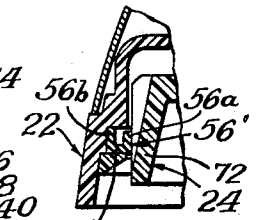


FIG. 3.

FIG. 5.

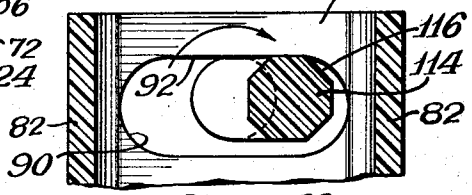
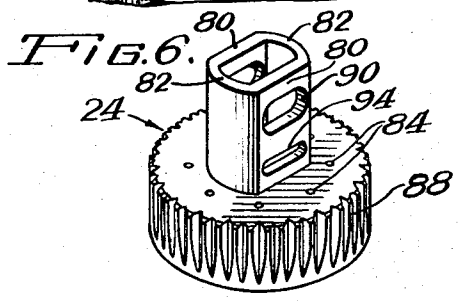


FIG. 6.



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ADJUSTABLE SPRAY SHOWER HEADS

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ABSTRACT OF THE DISCLOSURE

A shower head is provided constructed primarily from four parts, an outer shell, a hollow piston-like inner body, a shaped control shaft and an assembly retainer. The outer shell has axially spaced coaxial bores of different diameter. The inner body has aperture means with a height dimension intermediate the bore diameters of the outer shell. When the apertures are aligned, the control shaft may be projected laterally through the apertures to assemble the shower head. A snap-on retainer on the control shaft prevents disassembly. The control shaft has a crank portion offset from its pivot axis for cooperation with the aperture means of the inner body to selectively adjust the relative position of the inner body and to thereby vary the spray defining apertures that are defined by tapering grooves on the inner body cooperating with a resilient seal ring carried by and projecting inwardly from the outer shell. The periphery of the crank portion is flatted to retain the inner body at selected axial portions. Preferably all major parts are made of inexpensive moulded plastic.

This invention relates to a selectively adjustable shower head and more particularly relates to a simplified shower head assembly of the selectively adjustable type that is characterized by economy of construction.

Shower heads which are selectively adjustable as to the volume flow of water therethrough have had greatly increased popularity in recent years. However, such devices have continued to have substantially enlarged cost factors when compared with fixed-discharge type shower heads. The principal reason for such enlarged cost factors lies in the fact that assembly of such units is usually more complicated and almost without exception such devices have been made of expensive brass. Furthermore, means must usually be provided for restraining the control therefor in its selected position, and inclusion of such means is usually reflected in accuracy of forming of parts, or in addition of parts, all of which contributes to increased costs. It would be desirable, therefore, to provide a selectively adjustable shower head of reduced cost.

It has also been known heretofore to provide an eccentric on a pivotable control shaft for effecting selective axial movement between parts of an adjustable shower head. In all such constructions the eccentric is cantilever mounted on the pivot control which is made of heavy brass to achieve strength. Such constructions do not suggest how to design an adjustable shower head where the control shaft thereof is made of plastic material having a significantly lower material strength.

The invention herein seeks to achieve lower costs in a selectively adjustable shower head by simplifying construction, by utilizing parts molded of plastic material, and by providing a simplified assembly which permits use of plastic as the material from which the major parts of the shower head are formed.

Thus, the principal object of this invention is to provide a selectively adjustable shower head of very simplified assembly, thus providing for economy and simplicity of construction and permitting of manufacture of the major parts thereof from molded plastic materials.

A further object of this invention is to provide a selectively adjustable shower head which is constructed so as to permit of effective utilization of a unitary control shaft and handle formed of plastic material and constructed to provide a plurality of pre-selected positions at which the shower head will operate to deliver water therefrom at different rates of flow.

Another object of this invention is to provide a shower head construction having simplified means for achieving selective control of at least a portion of the liquid flow discharge therethrough.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

A preferred embodiment of the invention is shown in the accompanying drawing, in which

FIG. 1 is a vertical cross-sectional view through a selectively adjustable shower head constructed in accordance with the invention herein and showing the movable inner body at its extreme raised axial position;

FIG. 2 is a cross-section view taken substantially on line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 1 showing the movable inner body at its extreme axial position;

FIG. 4 is an enlarged fragmentary cross-section view taken substantially on line 4—4 of FIG. 1;

FIG. 5 is a view similar to FIG. 4 but showing the parts of FIG. 4 in an intermediate position for the eccentric portion of the control shaft;

FIG. 6 is a perspective view of the inner body member; and

FIG. 7 is a fragmentary view of the lower edge portion of the outer shell and inner body showing a modified construction.

Referring now to the drawings, there is shown in FIG. 1 a shower head generally indicated at **10** which embodies the features of the invention. At the upper end of FIG. 1 there is illustrated a portion of a conduit **12** through which water is fed into the shower head **10**. As is well known in the art, an adapter, or connector, **14** with tubular neck **16** connected to bored ball means **18** provides a pivot connection for the head **10**.

Now the shower head of this invention is formed basically of only four major parts or subassemblies. These four parts are: a molded outer shell **22**, a molded inner body **24** positioned inwardly of the hollow shell **22**, a control shaft **26** with integral handle for manipulating the inner body, and a retainer clip **28** for securing the assemblage together.

Referring now in greater detail to the features of construction shown, the outer shell **22** provided an upper tubular end **30** threaded exteriorly at **32** and defining an inwardly extending inner shoulder **34** against which is adapted to be seated a sealing gasket **36** which also serves as a spherical seat for pivotal engagement with the wall of the bored ball member **18**. The swivel connection is completed by means of an annular nut-type member **38**, which screws onto threads **32**, and whose central bore is just large enough to receive the ball **18** therethrough. The transverse flange of the nut member **38** is recessed to receive thereinto a metal snap ring **40** of stainless steel or brass which is adapted to engage the wall of ball member **18** so as to complete the assemblage and prevent the ball pulling out through the nut **38**.

Turning back to the shell member **22**, the said member is generally of annular shape and formed of a plastic material that has been molded to define a pair of journal enlargements or bosses **42** and **44** located diametrically opposite each other. Below the journal embossments **42** and **44**, the shell **22** is shaped to define a radially extending

wall **46** which turns downwardly to define an annular flange **47** shaped to provide exterior stepped shoulder that provides an upright wall **48** and an adjacent support wall **49** for receiving and supporting the lower end of an escutcheon E which telescopes over the upper end of shell **22** before the control shaft **26** is assembled. The nut member **38** is also designed and arranged to overlay the upper end of escutcheon E to provide a neat appearance. The inner wall of the annular flange **47** is also shaped to provide a stepped shoulder construction which includes an upright cylindrical wall **50** and an adjacent upper annular shoulder **51**. The shell also defines a corner construction which provides an annular horizontal wall **53**, located outwardly of cylindrical wall **50** and spaced below annular wall **51**, and a conically diverging upright wall **54**.

A sealing gasket **56** of square cross-section, and formed of rubber or the like, is positioned in engagement with the walls **50** and **51** and extends radially inwardly of said wall **51**. The sealing gasket **56** is retained in position by a gasket retainer **58** spaced from wall **51**. The retainer **58** may be formed integral with shell **22** or it may be separate therefrom and be secured by any appropriate means such as by adhesives or welding to the walls **53** and/or **54** of the shell **22**. In a preferred construction, retainer **58** is welded to shell **22** by use of ultrasonic power, and such construction avoids machining of the recess in which the gasket **56** is positioned. The size and shape of gasket retainer **58** is such that the innermost edge terminates short of the innermost right cylindrical edge of the gasket **56**. The shell **22** is also provided with a pair of reinforcing ribs, or webs, **60** that are best seen in FIG. 2 and which lie diametrically opposite each other and in a plane perpendicular to the diametric plane through the journal enlargements **42** and **44**.

The journal enlargement **42** is apertured or bored to provide an elongated sleeve **62**, while the embossment **44** is similarly apertured to provide an elongated sleeve **64**. The sleeves **62** and **64** are arranged coaxially and in precise alignment. The axial length of sleeve **62** is less than that of sleeve **64**, and this permits the interior of shell **22**, immediately adjacent the embossment **42**, to be recessed at **66** to permit of movement therein of the eccentric crank as hereinafter disclosed.

The inner body **24** is a piston-like member that is arranged to enter shell **22** through the downstream end of said shell which has a generally increasing interior dimension as one moves in a downstream direction. The inner body is generally shaped to provide a relatively large diameter lower end and a reduced diameter upper stem section. The lower end of body **24** includes a transverse annular wall **70** with an inclined outer flange or skirt **72** and a cup-shaped center **74** having a lower central wall **76** which transversely bounds the central hollow chamber **78**. The reduced upper section of body **24**, that extends above transverse annular wall **70**, includes two pairs of spaced walls, of which one pair **80** are flat and parallel to one another, while the other pair **82** are in the form of arcuate sections that are best seen in FIG. 2 and FIG. 6.

The transverse annular wall **70** is provided with a series of spray apertures **84** therein, and the lower central wall **76** may also be provided with a plurality of spray apertures **86** therein. The outer periphery of the upright wall **72** is provided with a series of inclined grooves **88** formed therein which operate to provide alternate grooves and ridges. The upright wall **72** also is arranged in sliding engagement with the inner edge of the gasket **56** so that those lands, or portions between grooves **88**, which engage the gasket are in sealing relation therewith. The inclined grooves **88** begin in the upper surface of the transverse wall **70** and extend at an incline downwardly through the upright wall **72** but terminate in the upright outer surface of the wall **72** at a point spaced above the lower edge **73** of the wall **72**. The pair of flat parallel walls **80** are provided with a first pair of registering apertures **90** which are best seen in FIGS. 2, 4 and 5 and each of which is elongated laterally to provide a straight upper bearing edge **92**, that lies in a plane perpendicular to the directions in which the body **24** is axially movable relative to outer shell **22**. Spaced below the apertures **90** in each of the walls **80** is a laterally enlarged flow aperture **94** which communicates the interior, or hollow center, **78** of the piston-like inner body **24** with the flow space defined between the inner body **24** and the outer shell **22**. It will be understood that water flowing into the upper open end of the stem of body **24** and into the space **78** will move laterally through apertures **94** and then through the discharge openings **84** and **86** and along the grooves **88** to provide a shower pattern. The spacing of the walls of grooves **88** from the adjacent upright walls on the shell cooperates to define the discharge apertures around the exterior periphery of body **24**.

The control shaft **26** includes a stem portion generally indicated at **96** and a handle **98** formed integral therewith. The stem portion **96** has a cylindrical portion of relatively large diameter which slidably fits in the sleeve **64** and which is provided with an annular groove **100** for receiving thereinto an O-ring type sealing gasket **102** which is slidably received in sleeve **64** but which operates to effect sealing contact with the walls of sleeve **64**. Another portion of stem **96** is in the form of a reduced cylindrical part **104** which slidably enters into and through sleeve **62**, and which is annularly recessed at **106** to receive thereinto an O-ring type seal **108** which slidably enters sleeve **62**, but which provides the necessary sealing contact therewith. The stem sections **96** and **104** are substantially precisely coaxial with each other. Another portion of stem **96** is shaped to provide an elongated eccentric **110** which is located offset from the axis of stem section **104** but which is located within the laterally projected confines of the greatest cylindrical surface of stem **96**, and which eccentric is connected to the cylindrical portion **104** by a crankarm **112**. The portions of eccentric **110** which extend through and are located in the plane of the apertures **90** defined in the upright walls **80** are shaped to provide an octagon cross section, as best seen in FIGS. 4 and 5. The spaced octagon sections are at **114**, and the peripheral flat bearing faces thereof are indicated at **116**.

The retainer clip **28** is shaped to define a central portion **118** that may be gripped or grasped as a handle and which merges into an axially elongated, bifurcated, or saddle, portion **120** that provides a pair of spaced arms with inwardly extending shoulders **122** spaced closer than the maximum diameter of eccentric **110** and which thus provides for snap-on engagement with the eccentric portion **110** that is located between the octagonal portions **114**. The maximum width of the retainer clip **28** is such as to permit it to enter shell **22** through the upper tubular end **30**, and to and past shoulder **34** slidably enter between the walls **80** and to fit in closely spaced relationship thereto, while still permitting snap-on fitting of the retainer clip onto the eccentric **110**. The inner periphery of saddle **120** is rounded to permit of rotation of the eccentric **110** relative to clip **28**.

In the modified form of construction shown in FIG. 7, parts similar to those in the previous figures, are similarly numbered. In FIG. 7 the annular sealing gasket between the shell **22** and the inner body **24** is shown at **56'** and is generally of U-shape with an inner leg **56*a***, an outer leg **56*b*** and a bight **56*c***. The bight **56*c*** is positioned flat against the gasket retainer **58** and the legs of the U extend from the bight generally axially of shell **22** and upstream so that the pressurized liquid in the shower head **10** tends to enter between legs **56*a*** and **56*b*** thus forcing leg **56*a*** to tend to flex radially inwardly and sealingly more tightly against the portions of wall **72** of the inner body **26**.

In the assembly of the head **10**, the escutcheon E with lateral aperture therein is telescoped onto shell **22** with inner body **24** positioned therein. Axial movement between body **24** and shell **22** will locate apertures **90** in alignment with sleeves **64** and **62** to permit of simple slip-through assembly of control shaft **26** through the lateral

aperture of the escutcheon and through said aligned apertures and sleeves. Then, entry of retainer clip **28** through the upstream end of shell **22** and securement to shaft **26** secures the parts together, after which the swivel connection including nut-type member **38** is connected to the upstream end of the shell **22**.

With regard to the octagonal shaped sections **114** of the eccentric **110**, it has been found that the flats **116** defined by the faces of the octagonal periphery operate to serve as positioning means to retain the movable inner body **24** in a plurality of pre-selected or dwell positions relative to shell **22**. Furthermore, the flats **116** provide elongated bearing surfaces cooperating with the flat edges **92** of apertures **90**. The latter factor increases the stability of the inner body **24** to be retained in the various pre-set positions because of increased friction between such cooperating bearing surfaces and by reducing the effective length of the moment arm of forces on the eccentric relative to what the friction and moment arm would be if the eccentric was merely cylindrical.

It will be understood that when the inner body **24** is moved downstream relative to shell **22** the peripheral channels defined by grooves **88** are opened up permitting greater volume of water to flow therethrough for a heavy stream, and when the body **24** is retracted upstream the effective size of grooves **88** is reduced to provide a finer spray, such as a needle shower in the extreme upper position. In all positions there is flow through apertures **84** and **86**. The grooves **88** may all be of the same size and shape or may be of such size as to provide alternate deep and shallow grooves, so as to provide two sets of peripheral streams of different relative size and discharge character. An important feature in the construction disclosed is terminating the grooves **88** in the side surface above the lower edge **73** of wall **72**, because when the inner body **24** is molded, there is avoided any flash that might occur if the grooves terminated at edge **73**.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In an adjustable shower head of the type having an outer axially-elongated shell, an inner body movable axially of the outer shell to vary the pattern of water flow discharged through flow apertures that are partially defined by adjacent surfaces on the body and shell, and a manual control for selectively varying the relative positions of the shell and inner body, the improved construction comprising, in combination: the outer shell and inner body each defining thereon a pair of spaced registering apertures which are registrable with the other pair of apertures, an elongated pivotable control shaft arranged to extend through and into the registered pairs of apertures to axially retain the inner body in assembled position in the outer shell, a snap-on type retainer clip on said control shaft arranged to engage one of the parts through which said control shaft extends to prevent said control shaft from being withdrawn from any of said apertures, the pair of registering spaced apertures in the outer shell being coaxial but of different diameter and being elongated to define registering cylindrical bearing sleeves, said control shaft defining thereon a pair of spaced coaxial cylindrical bearing segments of different diameter respectively positioned simultaneously in said cylindrical bearing sleeves, and each said cylindrical segment carrying an O-ring for slidable sealing engagement with the cylindrical bearing sleeves in the outer shell.

2. A device as in claim **1** wherein said inner body defines a central hollow passageway bounded by a pair of spaced parallel walls in which are located the said pair of registering apertures, and the retainer clip being of a size to enter the central hollow passageway of the inner body and being axially elongated to fit between said pair of spaced parallel walls on the inner body in closely spaced relation to said walls.

3. A device as in claim **1** wherein the spaced coaxial bearing segments of the control shaft are interconnected by an elongated shaft segment whose axis is eccentric to the axis of said bearing segments but is located within the axially projected cylindrical confines of the bearing segment of greatest diameter, and spaced portions of said eccentric shaft segment having a plurality of flats formed thereon.

4. A device as in claim **2** wherein the apertures in said spaced parallel walls are elongated with one elongated edge of each said aperture located in a plane perpendicular to the directions in which the inner body is axially movable relative to the outer shell, and the portions of said control shaft extending through said spaced apertures each being eccentric relative to the pivot axis of said control shaft and having a plurality of flats defined thereon for bearing engagement with the said one elongated edge of said aperture, to provide for positioning the inner body in a plurality of selective positions axially of the outer shell.

5. A device as in claim **1** wherein the outer shell has a discharge end, axially spaced walls on the outer shell adjacent said discharge end defining an inwardly opening peripheral recess, and an annular resilient sealing member in said peripheral recess extending inwardly of said spaced walls to sealingly but slidingly engage portions of the inner body, and to provide wall means for in part defining the apertures through which water spray is discharged.

6. A device as in claim **5** wherein the annular resilient sealing member is generally U-shape with the legs of the U positioned to extend from the bight thereof generally axially and upstream relative to the outer shell, so that liquid pressure in the shower head will urge the inner peripheral leg of the resilient member toward sealing engagement with the inner body.

7. A device as in claim **1** wherein the exterior of the outer shell is shouldered generally adjacent the downstream end, the upstream end of the outer shell being exteriorly threaded, an annular escutcheon shell telescopingly receiving the upstream end of the outer shell and supported on said shoulder, and ball mounting means for cooperating with the upstream end of the outer shell including a threaded nut member cooperating with the threaded end of the shell and arranged to retain the escutcheon shell axially in position on said outer shell.

8. A device as in claim **1** wherein the outer shell is generally of annular shape with the shell increasing in size in the direction downstream, the inner body being generally piston shaped for entrance into said outer shell through the downstream end thereof, the upstream end of the piston shaped inner body being tubular to provide a water passageway, and the retainer clip being of smaller dimension than the opening at the upstream end of the inner shell, so as to enter the inner shell for snap-on securement to the control shaft.

9. In an adjustable shower head of the type having an outer axially-elongated shell, an inner body movable axially of the outer shell to vary the pattern of water flow discharged through flow apertures that are partially defined by adjacent surfaces on the body and shell, and a manual control for selectively varying the relative positions of the shell and inner body, the improved construction comprising, in combination: the outer shell and inner body being formed of plastic, the outer shell having a pair of diametrically spaced sleeve-like bearings of different diameter formed integrally thereon, the inner body defining an aperture therein whose periphery serves in part as a cam follower, the dimension of the aperture in the inner body in the direction of axial movement of said inner body being intermediate the different diameters of the pair of

sleeve-like bearings, and an elongated control shaft molded of plastic and defining thereon two spaced journal portions of different diameter, one of said journal portions being adapted to enter and move through the aperture in the inner body, said journal portions being respectively arranged to be pivotally mounted in said spaced sleeve-like bearings, and a cam portion on the control shaft spaced between said journal portions and arranged to engage the cam follower portion of said aperture in the inner body.

10. In an adjustable shower head of the type having an outer axially-elongated shell, an inner body movable axially of the outer shell to vary the pattern of water flow discharged through flow apertures that are partially defined by adjacent surfaces on the body and shell, and a manual control for selectively varying the relative positions of the shell and inner body, the improved construction comprising, in combination: the outer shell and inner body being formed of plastic material upon which water-carried minerals do not tend to deposit, said outer shell defining a pair of spaced coaxial apertures of different diameters, the inner body defining a laterally elongated aperture having a minimum height dimension intermediate the said two diameter dimensions, the outer shell and inner body being adapted for assembly with all said apertures in register to provide a laterally extending passageway in

which the three different size apertures are arranged in sequence of size, an elongated pivotable control shaft formed of plastic material and arranged to extend through all the said registering apertures of said laterally extending passageway to assemble the shower head and to axially retain the inner body in assembled position in the inner shell, and a snap-on type retainer clip attached on said control shaft after the shower head is assembled and arranged to engage one of the parts through which said control shaft extends to prevent said control shaft from being withdrawn from any of said apertures.

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