J. FRASER
ADJUSTABLE SPRAY SHOWERHEAD
Filed Aug. 9, 1948

INVENTOR
JAMES FRASER

BY
ATTORNEY
UNITED STATES PATENT OFFICE

2,534,549

ADJUSTABLE SPRAY SHOWER HEAD

James Fraser, Wilmington, Del., assignor to
Speakman Company, Wilmington, Del., a corpora-
tion of Delaware

Application August 9, 1948, Serial No. 42,727

3 Claims. (Cl. 299—141)

1 The general object of the present invention is to provide an improved showerhead of the type disclosed in my prior Patent 1,830,684 of November 3, 1931, and of which considerable practical use has been made. More specifically, the object of the present invention is to provide a showerhead of the above mentioned type which possesses the desirable operating characteristics of the showerhead disclosed in and made under the above mentioned patent, but which is inherently capable of production at a lower cost than the showerhead of my prior patent, and which is more easily assembled and disassembled than the showerheads disclosed in my prior patent and heretofore in use.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages and specific objects attained with its use, reference should be had to the accompanying drawing and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

Of the drawings:

Fig. 1 is an elevation of a showerhead, in section on the broken line 1—1 of Fig. 2;

Fig. 2 is an inverted plan view of the showerhead;

Fig. 3 is a plan section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 4a is a section similar to Fig. 4, illustrating a modification; and

Fig. 5 is a partial section on the line 5—5 of Fig. 1.

The improved showerhead shown in the drawings comprises a hollow body or shell A of bell form, provided at its upper end with connection means B of conventional form for attaching the showerhead to a water supply pipe. The lower end or mouth portion of the bell shaped shell or casing A is rabbeted to provide an annular seat C for a disc-like member D which extends across the shell cavity and forms the face or discharge walls of the showerhead. The latter is formed with a plurality of cylindrical discharge openings or orifices D’ spaced in a circle surrounding, and coaxial with the axis of the annular seat C. The showerhead face D is shown as secured to the showerhead body by screws E, each of which is received in a threaded socket formed in the lower end of a corresponding rib-like projection A’ from the inner wall of the shell A. As shown, there are three ribs or projections A’, each of which is parallel to, and elongated in the direction of the axis of the shell A. As shown, a gasket d is held in the seat C above an annular peripheral portion of the face member D. The face member D is provided at its upper or inner side with an uprising post F coaxial with the body A.

The post F forms a guide for the movement of an operating member comprising an apertured disc or spider-like part G, and an integral uprising tubular extension G’ in which the post F is telescopically received. As is clearly shown in Fig. 3, the disc-like part G is formed with slots g extending radially into the part from its periphery.

Six slots g equally spaced about the showerhead axis of the assembled showerhead are shown. Each slot g extends across a central portion, and is intersected by the axis of a corresponding one of the six apertures D’ in the showerhead face. The disc or spider part G is also formed with three rounded peripheral notches g’ each of which loosely receives a portion of the adjacent rib A’ of the showerhead body. The notches g’ alternate with pairs of slots g and are spaced symmetrically with respect to the latter about the axis of the member G. Substantial clearance between the ribs A’ and the walls of the notches g’ is provided so that the ribs do not come into contact with the walls of the notches g’ in normal operation. However, the ribs do facilitate the ready assembly of the showerhead structure.

Each of the slots g receives the reduced upper neck portion H’ of a corresponding flow obstructor or throttling member H which normally has its lower body portion extending through a corresponding orifice D’ in the member D, as is illustrated in Fig. 1. The neck portion H’ of each member H can be moved longitudinally of the slot g’ receiving it, into and out of the latter, and the slot g is wide enough relative to the neck diameter to permit of a limited movement of the neck portion H’ in the slot g in a direction transverse to the axis of the neck. The head portion H2 at the upper end of the neck H and the upper end of the portions H’ of the member H immediately below the neck H’ are shaped to form the upper and lower end walls of an annular groove H3 surrounding the neck H’ and overlapping the portion of the disc G at the margin of the corresponding slot g. The portion H’ of the member H extends between the neck H’ and a cylindrical lower end portion of the member.
H, each coaxial with the neck portion H’. The last mentioned portions of the member H are coaxial with the neck portion H’, and the portion is tapered diminishing in cross section as the distance from the cylindrical lower end portion increases. In the assembled condition of the apparatus, each member H is coaxial with and normally extends through a corresponding orifice D’ in the member D, with a part, at least, of the tapered intermediate portion H’ of the member H within the orifice.

Each member H is formed with a plurality of peripheral grooves h. Each of the latter is trough shaped in cross section on a plane parallel to the underside of the discs D and G and the inner or bottom edge of each groove is in a plane substantially radial to the axis of the corresponding member H and is convex to said axis. The upper and lower ends of the grooves of each member H are respectively in the intermediate portion H’ and lower cylindrical portion of the member. The diameter of the lower cylindrical portion of each member H is but slightly less than the diameter of each orifice D, and with the spider member G and showerhead face D in the relative positions shown in Fig. 1, in which some of the cylindrical lower end portions of the members H extend into the corresponding orifices D’. The latter are practically plugged and little or no water will enter through the orifices D’, in the event one of the members H extends beyond the outer edge of the orifices D’. In the event the member H extends through the orifices D’, the pressure within the orifices D’ will be then discharged through the orifices even though the water pressure in the showerhead shell is substantial. As the member G is lowered relative to the member D from its position shown in Fig. 3, a free flow path between the wall of each orifice D’ and the member H extending through the latter of progressively increasing area is established.

The upper end of the post G’ is solid and has parallel sides, and is formed with a transverse slot G’ open at one end as shown in Fig. 5. The slot G receives a crank pin I transverse to a plane which includes the axis of the post F and is between and parallel to, the flat sides of the upper end of the post G’ in which the slot G’ is formed.

The crank pin I is carried by a disc J journalled in a cylindrical opening A’ formed in the showerhead body A. The outer portion of the disc J is internally threaded to receive an annular gland K. The annular member K surrounds and is axially movable relative to the crank shaft J’ which supports and is coaxial with the disc J. Packing material L compressed in the portion of the passage A’ surrounding the shaft J’ and part of the disc J and annular member K prevents leakage of the water out of the hollow showerhead even though the discharge apertures G’ are so throttled as to develop a substantial water pressure in the outer showerhead.

As a crank handle H is detachably connected to the outer end of the shaft J’ for use in rotating the latter, and thereby moving the member H axially in the orifice D’ so as to regulate the showerhead discharge.

In the normal use of the improved showerhead, the discharge of water through the orifices D’ is regulated by suitable rotatable adjustments of the crank shaft J’, and corresponding movements of the member G toward and away from the showerhead base D. The resultant axial adjustments of the members H in the corresponding orifices D’ vary the free area for the discharge of water through said orifices. The general operation of the improved showerhead disclosed herein is thus like that of the extensively used showerheads heretofore constructed in accordance with the disclosure of my above mentioned patent. The general advantages and characteristics of the improved showerhead are similar to those of the showerheads constructed in accordance with the disclosure of my present patent and need not be further described or explained herein.

As will be apparent to those skilled in the art, however, the improved showerhead construction disclosed herein is of simpler construction, and is inherently less expensive to construct, than the showerhead of my prior patent, and has some special advantages. The reduction in the cost of construction made possible by the present invention is primarily due to the manner in which the members H are connected to the common adjutant member G. The shape of each member H permits its formation by two relatively simple operations, namely a turning operation which gives the member H its general shape, and a grooving operation which cuts the grooves h. The formation of the member H with its annular grooves surrounding the reduced neck portion H’ of the member H and having upper and lower side walls formed by the head H’ and by the subjacent intermediate section H’ of the member in close sliding engagement with the flat sides of the disc G, provides an inexpensive and durable connection between each member H and the member G. Furthermore, that connection has little or no tendency to significant wear or deformation and holds each member J against tilting or other objectionable movement in normal operation.

In such operation, each member H normally occupies a position in which its axis is coincident with the axis of the orifice H’. It necessarily occupies that position whenever the member G is raised to move any part of the cylindrical lower end portions of the members H into the orifices D’, and when the member G is lowered to obtain the desired discharge through said orifices, the outflowing water tends to maintain each member H in coaxial relation with the orifice G.

Fig. 4a illustrates a modification in the form of the member H which consists in providing a thin integral outer orifice D’ formed in the showerhead portion of the member H, and joining the outer end of the portion H’ of the member H. The use of the flange H’ permits of a suitable angle of taper of the subjacent portion H’ of the member H, while at the same time providing an area of contact between the upper side of the flange H’ and the underside of the disc C at the margin of the slot G receiving the neck H’ of the member, ample for the purpose of avoiding any significant tendency of the latter to tilt out of the position in which its axis is perpendicular to the flat sides of the disc G.

From time to time in the life of a showerhead, it is necessary to open up the showerhead cavity for inspection and cleaning, and for the renewal of the gasket wall D. Such operations are facilitated by the fact that with the members D, G and H constructed and proportioned in the preferred manner, a gasket D, if desired, may be formed in a unit which can be removed, inspected and replaced without separation of the members. In initially assembling the unit, the members H are first inserted in the slots, and thereafter the cylindrical lower end portions of the member H are inserted in the corresponding orifices D’.

While the pressure required to force the lower end portions of each member H through the corresponding orifices D’, may, and should be minute, the parts are preferably so proportioned...
that the frictional resistance to the collective movement of the members H through the orifices D' is great enough to prevent the accidental separation of the members H from the member D under ordinary handling stresses when the assembled unit comprising the members D, G and H is disconnected from the showerhead shell.

In this connection it is noted by way of illustration and example, that in a commercial showerhead design comprising obstructive members H of the form shown in Fig. 4a, the overall length of the device H is 3/8", the cylindrical lower end portion is 3/8" long; the thickness of the head portion H' is 1/4"; the thickness of the flange H" is 3/32"; the distance between the adjacent parallel surfaces of the head H" and flange H" is about 1/3", and is approximately .001" greater than the thickness of the slotted portion of the disc G; the diameter of the neck portion H' is 3/4", the width of each slot g in the disc G is 1/8"; the diameter of the cylindrical lower end portion of the member HA is .437 with a tolerance of either direction of .005"; the diameter of each aperture D' in the showerhead face member D is .4385 with a tolerance of .005" in either direction; and the inclination of the surface elements of the conical intermediate portion H" of the element H to the axis of that element is 10°.

The precise dimensions just stated by way of illustration and example are not critical, except and to the extent that the diameter of each orifice D' is advantageously so little in excess of the diameter of the lower cylindrical portion of the member HA that it is possible to provide a snug sliding contact between them, and that the width of the annular groove H" between the head H" of the member J and the subjacent portion of the member H is so little in excess of the thickness of the portion of the disc G adjacent each slot g, as to prevent any significant tilting movement of the axis of the member relative to the planes of the parallel flat surfaces of the disc G. The described sliding fit of each member H in the corresponding orifice D' of the showerhead face D provides frictional resistance to the simultaneous movement of the cylindrical lower ends of the member H through the orifices D' to permit the members D, G and H to form parts of a unit which can be handled as a unit when detached from the showerhead shell without risk of separation of the unit parts when subjected to separating forces no greater than the ordinary handling stresses.

As is made apparent by Figs. 1 and 3, the ribs A' and grooves g' of the showerhead shell and member G, respectively, facilitate the ready assembly of the showerhead, with the seat G' in the desired relation to the seat for the crank disc J.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Further may be described, what I claim as new and desire to secure by Letters Patent, is:

1. A showerhead comprising a hollow body with an opening at one end, a circular showerhead face member normally extending across said opening and detachably connected to said body, and formed with a plurality of circular orifices spaced about its axis and having their axes parallel to said axis, a spider element member for movement toward and away from said member and comprising a disc portion coaxial with said member and formed with radially extending slots spaced about the axis of the spider element, each of said slots extending across the central portion of a corresponding one of said circular orifices and being open at its outer end, said disc portion having parallel top and bottom surface portions adjacent each slot and transverse to said axis, a plurality of flow obstructors each coaxial with and normally extending through a corresponding one of said orifices and having a lower end portion of a diameter only slightly smaller than the orifice diameter, and having a reduced neck portion adjacent its opposite end and extending through the corresponding one of said slots and of a diameter smaller than the slot width to permit transverse movements of the neck in the slot, and having portions at the upper and lower end of said neck portion with bearing surfaces in sliding engagement with the said top and bottom surfaces adjacent the corresponding slot, each flow obstructors being movable radially into and out of the corresponding slot through the open outer end of the latter when said spider member and orifice plate are displaced from one another and are out of said hollow body, and being held in said slot by said face member when the spider and plate are in their normal relative positions with the lower portion of each obstructor received in the corresponding face plate orifice, each flow obstructors having an intermediate tapered portion diminishing in cross-section from its cylindrical lower end portion toward said neck portion, and mechanism for adjusting said spider relative to said face member between an upper position in which the cylindrical end portions of the obturators are received in and substantially close said orifices, and a lower portion in which said intermediate portion of each obturator is within the corresponding orifice and the discharge area through each orifice depends on the distance between said member and said orifice.

2. A showerhead as specified in claim 1, in which the said face member spider element and flow obstructors form a unit insertable in and removable from said showerhead, and in which the diameters of said orifices and flow obstructors are so nearly equal as to create frictional resistance to the simultaneous movement of the cylindrical lower portions of the flow obstructors through the orifices in the showerhead face member which normally prevents the unit parts from being separated by ordinary stresses.

3. A showerhead comprising a hollow body with a circular opening at one end and a substantially cylindrical portion adjacent and substantially coaxial with said opening and having internal ribs spaced about the axis of said body and opening and having threaded sockets in said ribs, a circular shower face member normally extending across said opening and formed with a plurality of circular orifices spaced about its axis and having their axes parallel to said axis, means for detachably connecting said face member to said body comprising screws each extending through said face member and into said threaded sockets, a spider element mounted in said body for movement toward and away from said member and comprising a disc portion axial with said member and formed with radially
extending slots spaced about the axis of the latter and formed with peripheral notches which loosely receive said ribs and thereby facilitate the assembly of the showerhead, each of said slots extending across the central portion of a corresponding one of said circular orifices and being open at its outer end, said disc portion having parallel top and bottom surface portions adjacent each slot and transverse to said axis, a plurality of flow obstructors each coaxial with and normally extending through a corresponding one of said orifices and having a lower end portion of a diameter only slightly smaller than the orifice diameter, and having a reduced neck portion adjacent its opposite end and extending through the corresponding one of said slots and of a diameter smaller than the slot width to permit transverse movements of the neck in the slot, and having portions at the upper and lower ends of said neck portion with bearing surfaces in sliding engagement with said top and bottom surfaces adjacent the corresponding slot, each flow obstructer having an intermediate tapered portion diminishing in cross-section from its cylindrical lower end portion toward said neck portion, and mechanism for adjusting said spider relative to said face member between an upper position in which said intermediate portion of each obstructer is within the corresponding orifice, so that discharge area through each orifice depends on the distance between said member and spider.

JAMES FRASER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,354,391</td>
<td>Fraser</td>
<td>Sept. 28, 1920</td>
</tr>
<tr>
<td>1,416,391</td>
<td>Van Brunt</td>
<td>May 16, 1922</td>
</tr>
<tr>
<td>1,593,134</td>
<td>Niedecken</td>
<td>July 20, 1926</td>
</tr>
<tr>
<td>1,768,919</td>
<td>Moore</td>
<td>July 1, 1930</td>
</tr>
<tr>
<td>1,830,694</td>
<td>Fraser</td>
<td>Nov. 3, 1931</td>
</tr>
<tr>
<td>2,011,568</td>
<td>Cornell</td>
<td>Aug. 20, 1935</td>
</tr>
<tr>
<td>2,326,825</td>
<td>Bucknam</td>
<td>Aug. 17, 1943</td>
</tr>
</tbody>
</table>