

Sept. 14, 1954

O. MANNING

2,689,151

SHOWERHEAD

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fig. 1.

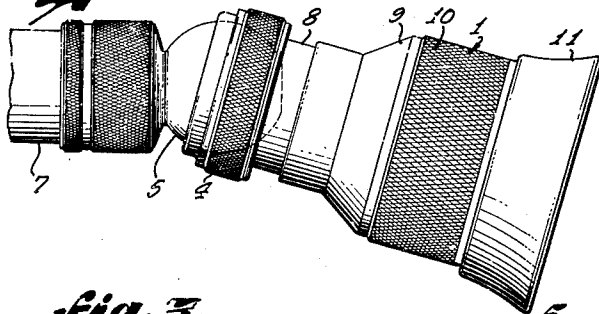


fig. 2.

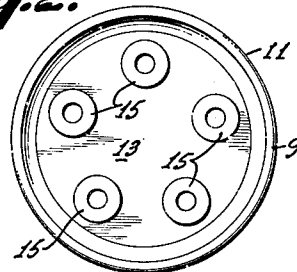


fig. 3.

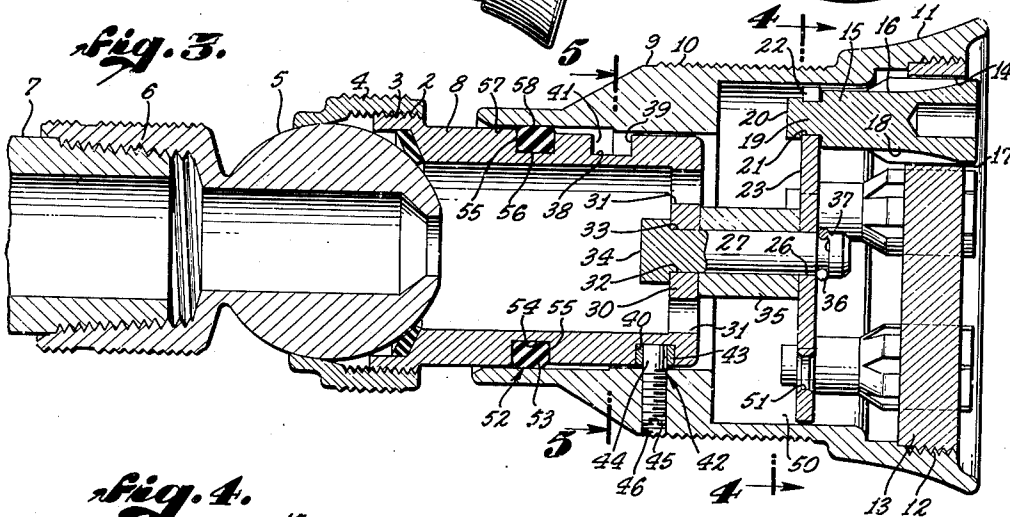


fig. 4.

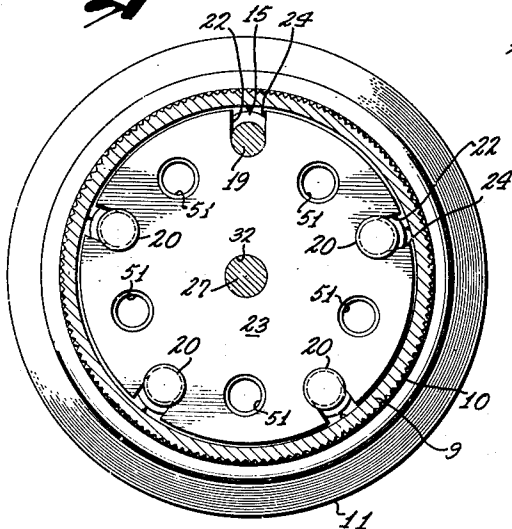
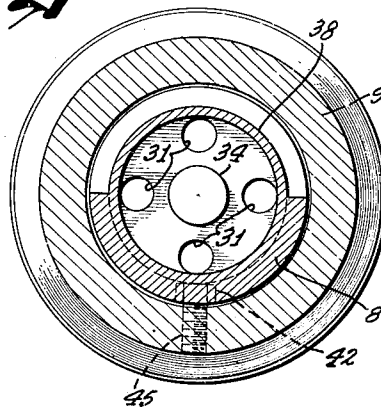


fig. 5.



OSCAR MANNING,
INVENTOR.

BY

W. E. Beatty

ATTORNEY.

UNITED STATES PATENT OFFICE

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SHOWERHEAD

Oscar Manning, Los Angeles, Calif.

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3 Claims. (Cl. 299—136)

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The invention relates to a showerhead and more particularly to a valve device for regulating the spray of water from the hot and cold faucets of a shower bath. It has heretofore been proposed to provide a showerhead wherein the spray is regulated by a plurality of valve plugs each of which slidably fits in a seat member having a corresponding plurality of ports, each plug having one or more tapered slots in the surface thereof. The spray is varied by reciprocating the plugs to expose more or less of these tapered slots. In that case, the plugs are reciprocated as a unit by an eccentric drive which has a rotatable handle at the side of the showerhead.

In copending application S. N. 163,689 filed May 23, 1950, for Showerhead, now Patent 2,657,955, November 3, 1953, I have described and claimed an improved type of showerhead which avoids the use of the eccentric and the separate handle at the side of the showerhead, while regulating the plugs by means of the casing of the showerhead. Also the parts were made in such a form that they could be manufactured on an automatic screw machine. That application discloses and claims broadly inner and outer casing parts having a rotary reciprocating coupling between an inner casing part carrying the plugs for rotation without reciprocation, and an outer casing part which rotates and reciprocates to change the position of a port plate relatively to the plugs.

The present application relates to an improvement in the construction in the pending application. In my former construction, it has been found that an inexperienced user will rotate the outer casing until it reaches a stop or abutment, and thinking that something is wrong, forces the outer casing and strips the threads. This has been overcome according to the present invention by dispensing with shoulders to limit the movement of the outer casing and by providing a rotary reciprocating coupling between the casing parts in the form of an endless cam groove and cam follower. The cam grooves limits and defines the movement of the outer casing part between the open and closed positions of the valves, while providing for operation of the showerhead by rotation of the outer casing part in either direction. While the water pressure in the showerhead has a tendency to operate the coupling and move the outer casing outwardly to shut off the valves, this is overcome by frictional drag provided by a ring seal which serves also to prevent leakage through the coupling. This frictional drag however can be

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readily overcome by manual operation of the showerhead.

For further details of the invention, reference may be made to the drawings wherein Fig. 1 is a side view in elevation, full scale, of a showerhead according to the present invention.

Fig. 2 is an end view of the showerhead of Fig. 1.

Fig. 3 is an enlarged sectional view, scale 2 to 1 of the showerhead of Fig. 1.

Figs. 4 and 5 are sectional views on lines of the corresponding numbers in Fig. 3, looking in the direction of the arrows.

Referring to the drawings, the showerhead 1 at its inner end has external threads 2 for the internal threads 3 on a sleeve 4, forming a socket for the stationary spherical coupling member 5 connected by threads 6 to the pipe 7 which forms the outlet from the hot and cold valves, now shown, of a shower bath. The threads 2 are on an inner cylindrical casing member 8 which telescopes in an outer coaxial cylindrical casing member 9. The outer casing 9 has a knurled surface 10 forming a hand grip to operate the showerhead. Casing 9 at its outer end has an enlarged flange 11 having a thread coupling 12 with a port plate 13 which is fixed in position in and moves with the casing 9. Port plate 13 has a plurality of ports like 14, one for each of the five plug valves like 15. Each plug valve like 15 has a plurality of external grooves like 16, these grooves merging with the periphery at the outer end of the plug as shown at 17 and increasing in depth in an inward direction as shown at 18. The inner end of each plug like 15 has a stem like 19 and a head like 20, forming a groove 21 to receive the radial slot like 22 in a header 23. Each slot like 22 is open at the periphery of the header as shown at 24 in Fig. 4, so that the plugs can be moved laterally into the slots like 22 when the showerhead is assembled.

The header 23 has an axial hole 25 providing a bearing on an axial stem 27. The inner end of the inner casing 8 has a spider 30 having a plurality of ports like 31, four being shown, to pass the water into the casing 9. Spider 30 has a central hole 32 providing a bearing for the inner end 33 of stem 27. The head 34 on the inner end of stem 27 serves as a stop to limit the outward movement of stem 27. Around stem 27 between spider 30 and header 23 is a spacing sleeve 35 and header 23 is held against outward movement on stem 27 by a U-shaped lock pin

36 removably held in a groove 37 on the outer end of stem 27.

The outer end of casing 8 at its external surface is provided with an endless cam groove 38 and having upright sides like 39. The outermost portion of groove 38, in an axial direction, is shown in the drawings at 40 and the innermost portion is shown at 41, these limits lying in the plane of the drawing, and the groove 38 slanting in the same way around opposite sides of the casing part 8 between these limits, the groove being endless and lying substantially in a plane. The outer casing 9 has a cooperating cam follower 42 comprising a hollow cylindrical roller 43 removably carried by the inner end 44 of a screw 45 mounted in the thread bore 46.

The cam follower roller 43 is larger than the bore 46 and is mounted in position, when the parts are assembled, by placing the roller 43 at the top of casing 8 in groove 41, by orienting casing 9 until bore 46 is also at the top, and by telescoping casings 8 and 9 and by inspection determining when the bore 46 is centered with the interior of roller 43, whereupon the screw 45 is inserted and screwed into position. Before thus coupling casings 8 and 9 together, it is convenient to first insert the stem 27 with the sleeve 35 on it. By inserting the finger or other device to hold the head 34, the header 23 is placed in slant position on the outer end of stem 27 so that one of the slots like 24 will be accessible at the outer portion of flange 11, to receive the groove 21 at the inner end of a plug. The header 23 is then rotated by hand, this rotation bringing the existing plug within the flange 11 so that it will not drop off while the next plug like 15 is being inserted in another groove like 21. This is continued until all plugs like 15 are in place on header 23, header 23 is moved onto stem 27 and the lock pin 36 is snapped in place. All of this is done while the port plate 13 is absent. With plugs 15 in place on header 23, the port plate 13 is slipped over the outer ends of the plugs like 15 and screwed in place with thread coupling 12. From this it follows that the external diameter of the plugs 15 is slightly less than the diameter of the ports like 14.

As the ports like 14 are laterally spaced, that is they are not at the axis of casing 9, as casing 9 is rotated, the plugs 15 rotate with it but do not reciprocate, due to the various abutments above described on stem 27 and on the stem 19 of plugs 15. The rotary reciprocating coupling provided by the endless cam groove 38 and cam follower 42 advances the outer casing 9 inwardly as it is rotated, from a position wherein the plug valves 15 shut off the ports 14 to a position where the port plate 13 fully opens the plug valves 15. The casing 9 goes from fully closed to full open position when the casing 9 is rotated one-half revolution in either direction and when the plug valves 15 are fully open, the casing 9 may be rotated in either direction one-half revolution to shut off the plug valves 15. Intermediate positions of casing 9 in either direction give a graduated flow as the grooves 16 are tapered as above described.

The casing 9 has an intermediate cylindrical chamber 50 into which the stem 27 projects. The header 23 has a plurality of ports like 51, five being shown in Fig. 4, staggered with the slots 22. The header 23 is circular and while it is smaller in diameter than the diameter of chamber 50, the water pressure acting on header 23 tends to cause the cam roller 43 to move to the outermost position in groove 38 as shown in Fig. 3, and shut off

the plug valves 15. This is prevented, in part, by not making the lead of cam groove 38 too great, the lead shown being satisfactory, and in part by the friction drag provided by seal 52. Seal 52 comprises an O-ring 53 of neoprene or the like, in a groove 54 at the outer surface of casing 8, inwardly of cam groove 38. The sealing ring 53 is flattened against the sides and bottom of the groove 54 as shown at 55 and 56 and is also flattened, as shown at 58, against and makes sliding sealing contact with the inner cylindrical wall 57 at the inner end of casing 9. Sealing ring 53 may be packed in or may have a coating of graphite. The seal 52 also prevents leakage of water at the inner end of casing 9.

For ease of assembly and to prevent sediment in the water from clogging the rotary support for plug valves 15, it is preferred to have a loose fit between the hole 32 in spider 30 and stem 27 and also between the hole 26 in header 23 and stem 27. However one or the other of these bearing supports may be made a tight fit if desired, either one or both thereof providing a rotary support for the plug valves 15 about the axis of the coaxial casings 8 and 9.

Various other modifications may be made in the invention without departing from the spirit of the following claims.

I claim:

1. A spray head comprising a relatively stationary inner cylindrical casing part, a coaxial relatively movable outer cylindrical casing part, a rotary reciprocating coupling between said casing parts, said coupling comprising an endless inclined cam groove on the outside of said inner casing part and a cooperating cam follower on the inside of said outer casing part, a port plate fixed to the outer end of said outer casing part, said port plate having laterally spaced ports, valve plugs slidably fitting in said ports respectively, said inner casing part having an outer end having a spider, and a rotary support for said plugs carried by said spider coaxial with said casings, said rotary support having abutment means preventing reciprocation of said plugs on rotary reciprocation of said outer casing part.

2. A spray head comprising a relatively stationary inner cylindrical casing part, a coaxial relatively movable outer cylindrical casing part, a rotary reciprocating coupling between said casing parts, said coupling comprising an endless inclined cam groove on the outside of said inner casing part and a cooperating cam follower on the inside of said outer casing part, a port plate fixed to the outer end of said outer casing part, said port plate having laterally spaced ports, valve plugs slidably fitting in said ports respectively and rotatable with said port plate on rotation of said outer casing part, said inner casing part having an outer end having a spider, a rotary support supporting said plugs for rotation about the axis of said casings, said support comprising an axial stem on said spider and a header for said plugs on said stem, said rotary support having abutment means preventing reciprocation of said plugs on rotary reciprocation of said outer casing part.

3. A spray head comprising a relatively stationary inner cylindrical casing part, a coaxial relatively movable outer cylindrical casing part, means coupling said casing parts for longitudinal movement of said outer casing part on rotation of said outer casing part, said coupling means comprising an endless inclined cam groove on the outside of said inner casing part and a cooper-

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ating cam follower on the inside of said outer casing part, a port plate fixed to the outer end of said outer casing part, said port plate having laterally spaced ports, valve plugs slidably fitting in said ports respectively and rotatable with said port plate on rotation of said outer casing part, said inner casing part having an outer end having a spider, a rotary support for said plugs carried by said spider coaxial with said casings, said rotary support having abutment means preventing reciprocation of said plugs on rotary reciprocation of said outer casing part, said inner casing part

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inwardly of said coupling means having an external groove and a sealing ring therein, said outer casing part having an inner end having an interior cylindrical wall in frictional sealing contact with said sealing ring.

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