Another method to achieve different fluid output forms from a spray head is to have several sets of jets each with a distinct flow output and then have a valve that sends the fluid to each set in turn, for example a gentle output set, a more firm ‘needle or stream_ like set, and a firmer massage setting. While in practice this works, it has the disadvantage of requiring complex valving and flow paths internally, or leading to the spray head. In addition the spray head must be of sufficient size to accommodate all the differing jets or outlets, even though at any one time only 1 or a mix of sets is being used. An example of such a spray head is that shown in patent publication US 5,172,866 which uses a valving lever mounted on the spray head to change the flow from one jet output set, or set of outputs to another.

In addition such a multi-set output spray head has the disadvantage that it can only output discrete variations in flow, ie one flow type per outlet type. Thus it cannot output a continuum of flows, such as for when a user may want a flow that sits partway between a gentle and firm output.

Object

Embodiments of the present invention seek to provide a spray head and/or a showerhead which may overcome or ameliorate problems with such spray heads/showerheads at present, or which may at least provide a useful choice, or which has one set of nozzles, jets or outlets from which the user can easily and continually adjust the spray type or form that is output.

In this specification where reference has been made to patent specifications, other external documents, or other sources of information, this is generally for the purpose of providing a context for discussing the features of the invention. Unless specifically stated otherwise, reference to such external documents is not to be construed as an admission that such documents, or such sources of information, in any jurisdiction, are prior art, or form part of the common genera l knowledge in the art.

BRIEF DESCRIPTION OF THE INVENTION

In a first aspect, the present invention provides a spray head adapted for connection to a supply of fluid, comprising or including,

a body to receive the supply of fluid,

a plurality of conical mixing volumes, in fluid connection with the body and supply of fluid, each conical mixing volume having an outlet, each conical mixing volume including,

at least one first inlet for a flow of fluid into the conical mixing volume at an angle to a conical axis thereof, and

at least one second inlet for a flow of fluid into the conical mixing volume substantially parallel to the conical axis,

a valve disposed upstream of the conical mixing volumes, the sliding valve adapted to divide and vary the supply of fluid flow between the at least one first inlet and the at least one second inlet, which in turn varies the form of output of the fluid from the outlet of the conical mixing volumes.

Preferably the valve is a sliding valve, rotary valve, or similar to divide and vary the supply of fluid.

Preferably the at least one first inlet and the at least one second inlet are formed by an open top at a base of the conical mixing volume.

Preferably the at least one second inlet is upstream of the at least one first inlet.

Preferably the outlet is formed by an aperture at a peak of the conical mixing volume.

Preferably the output of the fluid from the outlet can be varied from, and anywhere in between as a continuum, a fine mist to a hard stream, or needles of water.

Preferably there is a plurality of inlet apertures that form the second inlets.

Preferably there are between 2 and 8 of the inlet apertures.

Preferably there are four inlet apertures.

Preferably there is a plurality of the first inlets.

Preferably there are between 2 and 4 of the first inlets.

Preferably there are two first inlets.

Preferably the plurality of conical mixing volumes is part of a first unitary body, as a conical volume plate.

Preferably there is a connection ring that at least covers in part the connection of the cassette to the spray head body.

Preferably the spray head can be mounted on the end of a flexible conduit for the supply of fluid.

Preferably the spray head can be mounted on a rigid conduit for the supply of fluid, for example a shower rail, or through-wall or through ceiling conduit, and maybe rigidly fixed or on an angularly adjustable mount. .

In another aspect, the present invention provides a cassette for a spray head, the cassette fluidly connectable to first fluid supply and a second fluid supply from a spray head body, the spray head body adapted to vary the relative flow rates of the first fluid supply and the second fluid supply, comprising or including,

a first fluid volume, located within the cassette, supplied by the first fluid supply, the first fluid volume suppling fluid to a plurality of first inlets, one or more of the plurality of first inlets to each supply one of a plurality of conical mixing volumes at or towards a base thereof,

a second fluid volume, located within the cassette, supplied by the second fluid supply, the second fluid volume suppling fluid to a plurality of second inlets, one or more of the plurality of second inlets to each supply one of the plurality of conical mixing volumes at or towards a base thereof, upstream of the first inlets, the second inlets located upstream of the first inlets,

wherein the variation in the relative flow rates between the first fluid supply, and the second fluid supply, causes a variation in the form of fluid output from a single outlet of the conical mixing volume at a peak thereof, the outlet being external to the cassette.

In yet another aspect, the present invention provides a kit of parts for a spray head, comprising or including,

a spray head including a head and a body, connectable to a supply of fluid, and within the body there is a valve to output and vary the relative flow rates of a first supply of fluid and a second supply of fluid from the body,

a cassette to fluidly connect to the body and first and second supplies of fluid, the cassette, comprising or including,

a first fluid volume, located within the cassette, supplied by the first fluid supply,

the first fluid volume suppling fluid to a plurality of first inlets, one or more of the plurality of first inlets to each supply one of a plurality of conical mixing volumes at or towards a base thereof,

a second fluid volume, located within the cassette, supplied by the second fluid supply, the second fluid volume suppling fluid to a plurality of second inlets, one or more of the plurality of second inlets to each supply one of the plurality of conical mixing volumes at or towards a base thereof, upstream of the first inlets, the second inlets located upstream of the first inlets,

wherein the variation in the relative flow rates between the first fluid supply, and the second fluid supply, causes a variation in the form of fluid output from a single outlet of the conical mixing volume at a peak thereof, the outlet being external to the cassette.

Preferably the valve is a sliding valve, rotary valve, or similar to divide and vary the supply of fluid.

Preferably the kit includes mountings or fixings for the spray head to a flexible or rigid conduit for the supply of fluid.

As used herein the term ‘and/or’ means ‘and’ or ‘or’, or both.

As used herein ‘(s)’ following a noun means the plural and/or singular forms of the noun.

shortly, but in summary moving the control 11 will vary the output of the spray 33 of the spray head 1.

Also shown in the head 2 is a plurality of outlets 7, in the example shown these are arranged in a series of concentric circles. However, the outlets 7 may be arranged in any desired pattern, including, but not limited to a row, or rows of straight lines, square, rectangular, triangular or whatever form is desired.

Also, while the head 2 as shown is a circular form, it also may take any shape as desired, including, but not limited to, multisided, hollow through its centre, or any other form as desired.

The path of the supply of fluid 5 into the body 3 via the connection 4 is shown in Figures 6 and 7. Entering the body 3 the fluid travels to a valve 12. In the preferred form the valve is a sliding valve, but could also be a rotary valve, or similar to divide and vary the supply of fluid between the first supply of fluid and the second supply of fluid as described below.

The sliding valve 12 in the embodiment shown has a valve body 13, which the control 11 slides along the main axis of the body 3. The fluid exits the valve body 13 through the valve aperture 14. Shown in Figure 7 the fluid becomes a first supply of fluid and passes through the head to feed the first inlets. This will be described in more detail shortly.

The sliding valve body 13 has at least one seal 32 towards the lower end, and preferably a seal at the upper end also to ensure water tightness, yet allow the valve body 13 to slide easily. In the embodiment shown these are lip seals 32. The control 11, seals 32, and valve body 13 are contained within a housing 34 which in singular or multipart form can slide into the body and be retained there. This allows for ease of assembly as well as replacement and maintenance. The housing and its assembly may slide in from either end, as necessary, of the body 3. A cap 36 covers the end of the body 3 distal from the connection 4.

In the preferred form, as shown in Figures 6 and 7 there is no seal of the fluid divider 15 against the exterior of the valve body 13. Rather the seals 32 define a sealed volume to prevent fluid exiting the volume. As there is no seal between the fluid divider 15 and the valve body 13 fluid is free to move between the first fluid supply 23 and second fluid supply 24, even when the slider and valve body 13 are at the two extremes of their movement. This allows balancing of the pressure between the two supplies. Further in

one form of the preferred form of the present invention, even when the valve body is at the extreme of its movement to supply the first fluid supply, there is still part of the valve aperture 14 exposed to supply fluid to the second fluid supply, and vice versa.

Another way of achieving the pressure balancing is to adjust the clearance between the fluid divider 15 and the valve body 13. In yet another way is to remove the top lip seal 32 (farthest from the inlet of the fluid supply 5) to allow a portion of fluid to always flow to the second supply. This is possible as the top lip seal 32 can be optional in that it only seals between the two fluid supplies and not to the outside of the spray head. In this way the level of spray adjustment can be tuned by the size and shape of the valve aperture 14, the clearance between the fluid divider 15 and the valve body 13 and the presence (or not) of the top lip seal 32.

The ability to define and tune the adjustment range of the spray is achieved by allowing a defined amount of water to always flow to the second supply. This controls how fine the spray goes at maximum adjustment – more flow to the second supply makes it less fine and vice versa. If the two flows are completely separated then the spray would be too fine at full adjustment.

Shown in Figure 8 the control 11 and hence the sliding valve 12 and valve body 13 have been moved (upwards in the figure as shown) such that the valve aperture 14 now sits across a fluid divider 15. In doing so the fluid passing out the valve aperture 14 is now divided, into the first fluid supply 23 and a second fluid supply 24. The relative position of the valve aperture 14 across the fluid divider 15, moved by the control 11, will vary the ratio of the first supply of fluid 23 and the second supply of fluid 24. Stops may also be present to control the ends movements of the valve body 13, or may be provided by the length of the slot 53 in the body 3.

Shown in Figures 10 and 11 is a partially exploded view of the spray head 1. The spray head 1 is exploded into a connection ring 30 that acts as a trim, cassette 37 and the head 2 and body 3. In the preferred embodiment the cassette mounts into the concavity of the head 2, and has clips 38 that protrude from its periphery. The clips 38 are further shown in Figure 14, and are part of the face plate 21 (described later). The clips 38 in the form shown are ramped on their leading edge, and are stepped on their trailing edge. This will be understood when it is known that the clips 38 engage in complimentary recesses 39 in the interior of the head 2.

The cover plate 22 is shown in front view and rear view in Figures 19 and 16 respectively. The cover plate fastens the components together using the fasteners 43 to form the cassette. It also is made from a substantially rigid resilient material such as a plastics material or similar. The cover plate 22 forms the second fluid volume between its front surface and the rear of the top plate 20. The second fluid volume is fed by the second fluid supply 24 as shown at least in Figure 19. The cover plate 22 also allows for through pass of the first fluid supply 23 via the first fluid supply pathway, on its way to the first fluid volume. Thus the cover plate forms a sealed conduit from the head 2, through the second fluid volume 26. The cover plate seals at its front periphery to the back periphery of the top plate 20.

A further, or second variation of the spray head 1 for use in a shower or similar is shown in Figures 21 through 27, either as a hand held spray head, or mounted to a rail or similar in known ways. In this embodiment there is no separate connection ring 30 to act as a trim. Instead the head 2 has no complimentary recesses 39 apparent on its external periphery and receives and holds the faceplate 21 and resulting cassette as earlier described. This embodiment reduces the component count, but functions in an identical way.

While the spray head 1 has been discussed here as connected to a shower flex and may be connected to a shower rail in know ways, it may also be mounted in other ways. For example rather than by a flexible hose, it could be directly plumbed to a supply of fluid, whether in front or behind a wall or ceiling, and could be rigidly connected, or could be on an angularly adjustable mount.

Also the sliding valve, or its actuation, may be distanced from the spray head 1. For example, if the spray head 1 is mounted overhead for example from a ceiling, then the sliding valve, or control therefor, could be mounted on a wall, fluid supply rail, or similar at a level reachable by the user.

The foregoing description of the invention includes preferred forms thereof. Modifications may be made thereto without departing from the scope of the invention.

CLAIMS

1. A spray head adapted for connection to a supply of fluid, comprising or including,

a body to receive the supply of fluid,

a plurality of conical mixing volumes, in fluid connection with the body and supply of fluid, each conical mixing volume having an outlet, each conical mixing volume including,

a. at least one first inlet for a flow of fluid into the conical mixing volume at an angle to a conical axis thereof, and

b. at least one second inlet for a flow of fluid into the conical mixing volume substantially parallel to the conical axis,

a valve disposed upstream of the conical mixing volumes, the valve adapted to divide and vary the supply of fluid flow between the at least one first inlet and the at least one second inlet, which in turn varies the form of output of the fluid from the outlet of the conical mixing volumes.

2. The spray head of claim 1 wherein the valve is a sliding valve, rotary valve, or similar to divide and vary the supply of fluid.

3. The spray head of claim 1 or 2 wherein the at least one first inlet and the at least one second inlet are formed by an open top at a base of the conical mixing volume.

4. The spray head of any one of claims 1 to 3 wherein the at least one second inlet is upstream of the at least one first inlet.

5. The spray head of any one of claims 1 to 4 wherein the outlet is formed by an aperture at a peak of the conical mixing volume.

6. The spray head of any one of claims 1 to 5 wherein the output of the fluid from the outlet can be varied from, and anywhere in between as a continuum, a fine mist to a hard stream, or needles of water.

7. The spray head of any one of claims 1 to 6 wherein there are a plurality of inlet apertures that form the second inlets.

8. The spray head of any one of claims 1 to 7 wherein there are four inlet apertures.

9. The spray head of any one of claims 1 to 8 wherein there is a plurality of the first inlets.

10. The spray head of any one of claims 1 to 9 wherein the plurality of conical mixing volumes is part of a first unitary body, as a conical volume plate.

11. The spray head of any one of claims 1 to 10 wherein each of the conical mixing volumes at least in part defines the at least one first inlet.

12. The spray head of any one of claims 1 to 11 wherein the at least one first inlet is at substantially ninety degrees to the conical axis.

13. The spray head of claim 10 wherein each of the second inlets is in a second unitary body, as a top plate and wherein the top plate seals to the conical volume plate.

14. The spray head of claim 10 or 13 wherein there is a face plate located downstream and sealed to the conical volume plate.

15. The spray head of claim 14 wherein the face plate has apertures there through for the outlets.

16. The spray head of any one of claims 1 to 15 wherein the valve is a sliding valve, said sliding valve including a valve body which slides along a major axis of the body.

17. The spray head of claim 1 wherein the at least first one inlet is at a tangent to the conical axis.

18. A cassette for a spray head, the cassette fluidly connectable to first fluid supply and a second fluid supply from a spray head body, the spray head body adapted to vary the relative flow rates of the first fluid supply and the second fluid supply, comprising or including,

a. a first fluid volume, located within the cassette, supplied by the first fluid supply, the first fluid volume suppling fluid to a plurality of first inlets, one or more of the plurality of first inlets to each supply one of a plurality of conical mixing volumes at or towards a base thereof,

b. a second fluid volume, located within the cassette, supplied by the second fluid supply, the second fluid volume suppling fluid to a plurality of second inlets, one or more of the plurality of second inlets to each supply one of the plurality of conical mixing

volumes at or towards a base thereof, upstream of the first inlets, the second inlets located upstream of the first inlets,

wherein the variation in the relative flow rates between the first fluid supply, and the second fluid supply, causes a variation in the form of fluid output from a single outlet of the conical mixing volume at a peak thereof, the outlet being external to the cassette.

19. The cassette of claim 18 wherein the variation in the relative flow rates is achieved by a sliding valve in the spray head body.

20. A kit of parts for a spray head, comprising or including,

a. a spray head including a head and a body, connectable to a supply of fluid, and within the body there is a sliding valve to output and vary the relative flow rates of a first supply of fluid and a second supply of fluid from the body,

b. a cassette to fluidly connect to the body and first and second supplies of fluid, the cassette, comprising or including,

c. a first fluid volume, located within the cassette, supplied by the first fluid supply, the first fluid volume suppling fluid to a plurality of first inlets, one or more of the plurality of first inlets to each supply one of a plurality of conical mixing volumes at or towards a base thereof,

d. a second fluid volume, located within the cassette, supplied by the second fluid supply, the second fluid volume suppling fluid to a plurality of second inlets, one or more of the plurality of second inlets to each supply one of the plurality of conical mixing volumes at or towards a base thereof, upstream of the first inlets, the second inlets located upstream of the first inlets,

wherein the variation in the relative flow rates between the first fluid supply, and the second fluid supply, causes a variation in the form of fluid output from a single outlet of the conical mixing volume at a peak thereof, the outlet being external to the cassette.