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AUTOMATIC SELF-CLEANING SHOWER HEADS

Filed Jan. 9, 1961

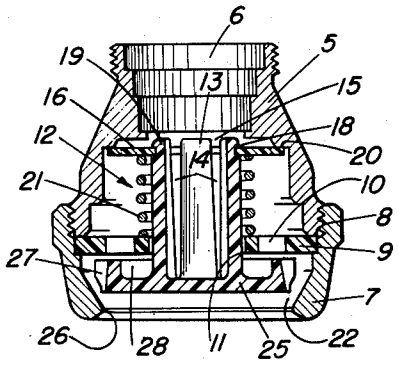


Fig. 1

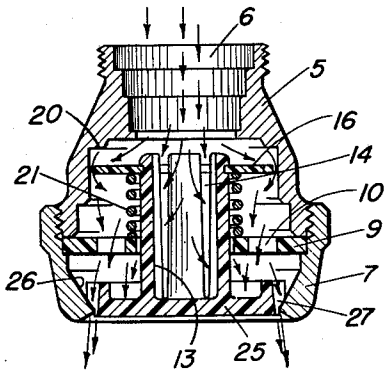


Fig. 2

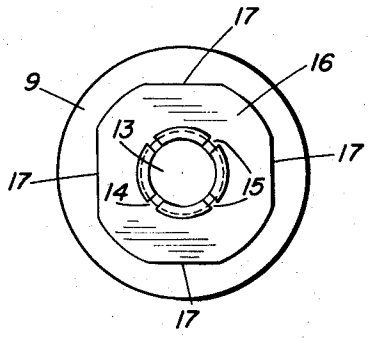


Fig. 3

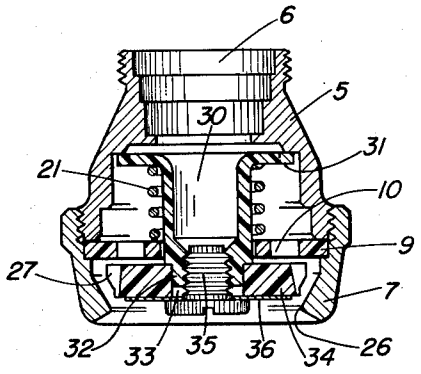


Fig. 4

Fig. 5

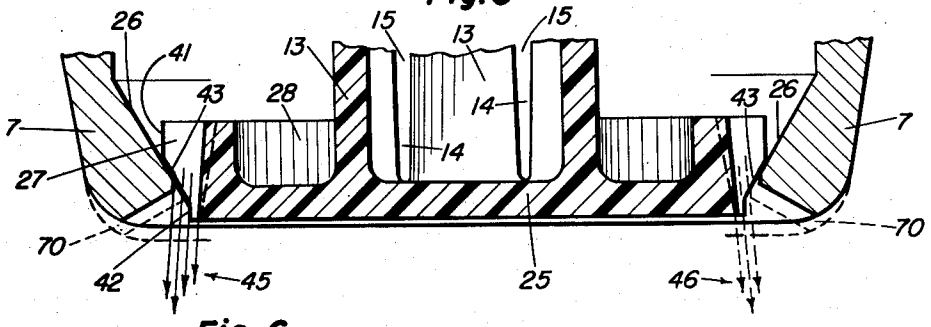
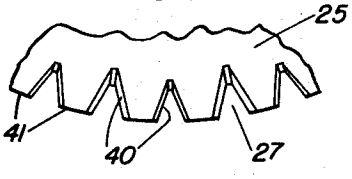


Fig. 6



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AUTOMATIC SELF-CLEANING SHOWER HEADS

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This invention relates in general to shower heads for use in shower baths and the like, and more particularly to a new and improved shower head which is automatically self-cleaning in action.

An object is provision of a shower head which automatically discharges all residual water and sediment, if any, remaining in the shower head and inlet after use, and to eliminate the usual subsequent dribble.

Another object is to provide a shower head having a spray dispersing disc which is automatically projected downwardly in direct response to water flow through the head without the necessity of a pressure build up behind the spray disc so that the shower head operates reliably on low water pressures.

A further object is to design a new and improved automatically self-cleaning shower head in which there are fewer parts, which is easier assembled, and in which the movable parts are made of materials inhibiting the formation thereon of lime deposits and other water borne substances.

An additional object is the provision of a shower head which eliminates most of the machining required for the relatively few moving parts and in which the elements are not necessarily made to precision tolerances.

An object is to design an improved self-cleaning shower head having different spray characteristics, in which the same internal movable parts are utilized for producing either a fine spray or a coarse spray pattern, by simply substituting one shower head spray outlet cap for another cap.

A further object is to provide a new and improved self-cleaning shower head which is economical to produce, requires few parts with no machining, is easily assembled, is simple and durable in construction, reliable in operation, and eliminates constant maintenance and service.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, operation and combination of elements which will be more fully described and pointed out hereinafter together with the accompanying drawings in which:

FIG. 1 is a cross-sectional side view of an automatically self-cleaning shower head embodying the invention;

FIG. 2 is a similar view showing the shower head in operated position with water flowing through it;

FIG. 3 is a top view of the movable element only of the shower head;

FIG. 4 is a cross-section of a modified form of the shower head of the invention;

FIG. 5 is an enlarged cross-sectional view showing how different diameter caps on the shower head result in producing different spray characteristics, while

FIG. 6 is an enlarged bottom view of a section of the spray disc showing the grooves or serrations therein.

With the common type of shower head in current usage, the accumulation of water borne lime deposits and sediment in the shower head results in the gradual unsatisfactory operation of the head because the user many times neglects to screw out the spray dispersing disc to flush the water and debris out of the interior of the head. This necessitates frequent cleaning and maintenance, and many times replacement of the entire head.

In the present invention, the shower head is entirely automatically self-cleaning. The device instantly and automatically discharges all the accumulated water in the shower head after each use, through a relatively large gap around the spray disc, thereby flushing sediment out of the head and additionally eliminating the annoying dribble usually encountered with prior shower heads.

Referring now particularly to FIGS. 1 and 2, the shower head of the invention is usually mounted above a bath tub or in a shower stall and has an inlet supply connection from which it is supported and the usual ball-joint and throttle valve (not shown) on the inlet side. The body or casing **5** is hollow and preferably made of brass, and provided with a threaded inlet **6** for connection to the water supply line. A round cap member **7**, having an opening through which the water is discharged as a spray, is threaded upon the lower end of the casing at **8**, and a combination sealing and supporting plate **9** is clamped at its edges between the lower end of casing **5** and cap **7** to prevent leakage outwardly through the threads **8**. Supporting plate **9** is provided with a series of water passages **10** and an axial opening **11**.

A spray control unit, indicated generally at **12**, is arranged for reciprocal movement within casing **5** and includes a hollow stem **13** extending slidably through the opening **11** of supporting plate **9**. A series of slots **14**, constituting water passages, are formed in hollow stem **13** and extend the full length of the stem with the open ends **15** of the slots at the top end of the stem. The slots **14** are preferably tapered slightly with the widest part at the upper end **15**. A guide plate **16** is arranged on the upper end of stem **13** and has portions of its outer edge in slidable contact with the inner walls of casing **5**. However, as clearly shown in FIG. 3, there are four flat sides **17** formed at the edges of the guide plate **16** to provide a gap and permit free passage of water around the edge portion thereof, and also to permit complete drainage of water from the connection **6** above the shower head.

Guide plate **16** is also provided with a central opening **18** so that it can be snapped over the end **19** of hollow stem **13** and into the groove formed around the end of the stem. The slots **14** enable the upper end of stem **13** to be compressed circumferentially a sufficient amount to snap the guide plate **16** in position and thereby rigidly support the same on the stem. The guide plate **16** normally abuts a shoulder **20** formed at the top end of casing **5** and the unit **12** is held against this shoulder **20** by the restoring spring **21** encircling the hollow stem **13**, and extending between the top side of supporting plate **9** and the bottom of guide plate **16**, as shown.

At the bottom end of the hollow stem **13** and preferably formed integral therewith, is a spray dispersing disc **25**. This disc is normally positioned as shown in FIG. 1 spaced between the bottom of supporting plate **9** and the spray outlet **26**, and provides a large drainage gap as indicated at **22**. The peripheral edge portion of spray disc **25** is provided with a series of grooves or serrations **27**, constituting the means for providing the spray discharge pattern, as will be further pointed out. At the rear or upper side, the spray disc **25** is formed with a recess **28** immediately below the water passages **10**, and generally in line with the water flow through the passages.

Since the hollow stem **13** and spray disc **25** are preferably formed integral, they may be readily molded of plastic material, such as acetal resin "Delrin," which has a number of desirable advantages including the inhibiting of the formation of water borne deposits thereon, being immune to temperature changes and light in weight. The slots **14** in the stem **13** enable the guide plate **16** to be easily assembled on the stem to provide a unitary structure which is economic in cost, and one requiring no extra machining. The guide plate **16** is also molded of acetal resin, while the supporting plate **9** is preferably made of

polyethylene, since it must also serve as a seal around its edges for the body 5 and cap member 7.

In the normal position of the shower head, as shown in FIG. 1, the head is completely drained of water each time after it is used, the drainage taking place over a path including the gap 22 between the spray disc 25 and cap 26, water passages 10 and slots 14, up to the top end of the casing and the inlet supply connection. Water borne sediment cannot become lodged anywhere in the casing head or parts to jam the same, and "liming up" cannot take place because the interior will dry up and no annoying dribble can occur. The grooves 27 do not retain residual water and retain their jet spray characteristics or pattern indefinitely.

Referring now to FIG. 2, this shows the operated position of the shower head when water flows through it. The initial flow into the casing takes place into the hollow portion of stem 13 and against the top of guide plate 16, thereby projecting the spray control unit 12 downward and compressing the restoring spring 21. An initial preliminary flushing action takes place through slots 14, passages 10, space 22, and around the edges of the grooves 27 to dislodge any debris which may have lodged in the head from the last use of the same. The movement of the spray control unit is halted when the edges of the grooves 27 on spray disc 25 come into engagement with the inclined spray outlet surface 26. A portion of the water flow takes place around the flat edges 17 of guide plate 16, as well as through the lower ends of the slots 14 below the supporting plate 9. The recess 28 in spray disc 25 assists the water flow in holding the spray disc in its projected position. The jet spray emitted through the grooves 27 will be of a certain characteristic, either fine or coarse, depending upon the cap member 7 being used, as will be explained. Cessation of water flow enables the restoring spring 21 to move the spray control unit 12 upwardly until the guide plate 16 stops the movement by engaging shoulder 20. The shower head casing is then automatically drained completely, as has been pointed out heretofore. This drainage, of course, is assisted by the admission of air into the interior of the shower head through the gap 22 which instantly results in the release of the residual water.

In the modification of the shower head depicted in FIG. 4, the casing 5 and cap member 7 are constructed the same as in FIG. 1. However, the spray control unit is made different, in that the hollow stem 30 is molded integral with the guide plate 31 for economy purposes, and there are no elongated slots in the sides of the hollow stem 30. The guide plate 31 has four flats cut in its edge portion similar to that shown in FIG. 3 for passage of water around the edge portion thereof. The lower end 32 of hollow stem 30 fits into an axial opening 33 in spray disc 34 and a clamping screw 35 and thin plate 36 under the screw head support the spray disc 34 rigidly from the lower end of stem 30. The spray grooves 27 around the edge of spray disc 34 are formed the same as those in FIG. 1.

Water flow into this shower head against guide plate 31 and in the hollow stem 30 forces the spray control unit downward so that the grooves 27 on spray disc 34 are moved into spray discharge engagement with the spray opening 26 to emit a spray discharge therefrom. Water flow takes place around the flat sides 17 of guide disc 31, through passages 10 against spray disc 34 and out through the grooves 27. Drainage takes place when the unit is restored by spring 21, through the drain gap 22, as before.

Referring now more particularly to FIGS. 5 and 6, the spray grooves 27 are formed with tapered sides 40, as in FIG. 6, with the wider portion of the slot at the top side. Alternate slots 27 are of different depth, so that a double concentric cone-shaped spray pattern is emitted. The outer edges of the spray teeth are also shaped with an upper long portion 41 and a shorter lower portion 42 formed close to the bottom of the slot. An angular connecting portion 43 connects the upper and lower edges 41 and 42 together. The angular portion 43 coincides with the angle formed on the inner side 26 of cap member 7, so that when the two angular portions are in engagement, the downward movement of the spray disc 25 is halted. In this position, the double spray characteristic discharged through the slots 27, as indicated by the arrows 45, will be relatively coarse since the angular portion 43 is engaged by the cap member surface 26 at approximately the mid point of angle portion 43.

Some shower bath users, notably women, prefer a finer spray pattern than the one described, and to provide this, according to the invention, the cap member 7 may be readily removed by its threads 8 and a similar cap member 70, such as indicated in dotted lines in FIG. 5, is substituted for the one removed. The cap member 70 has a smaller inner diameter spray opening so that the angular portion 43 of the spray teeth will engage the coinciding angular portion 26 of cap member 70, at a point lower down on the angle 43, thereby constricting the jet streams, as indicated at 46, and producing a finer spray. By providing cap members with different diameter spray openings, any spray characteristics from very fine to extremely coarse may be furnished, depending upon the desires of the user.

The invention having been described more or less specifically as to details, including the modification thereof, it is to be understood that the same is not to be limited thereby, as various changes may be made in the arrangement and proportion of the parts and elements, and that equivalents may be substituted therefor, all without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. In an automatically self-cleaning shower head, a hollow casing having a water supply inlet and a spray outlet therein, a supporting plate arranged across said casing and having a series of water passages therein, a spray disc in said casing arranged in spaced relationship between the bottom of said supporting plate and said spray outlet, a hollow stem on said spray disc extending upwardly and slidably through said supporting plate, said hollow stem having a series of slots therein extending from the top end thereof to the bottom end to permit water to pass therethrough, a guide plate on the upper end of said hollow stem and slidable along the sides of said casing responsive to water flow into said casing, said guide plate having a central opening therein through which the upper end of said hollow stem projects, said guide plate adapted to be removably snapped on the end of said hollow stem and held thereon by compressing the slotted ends of said hollow stem, and a restoring spring around said hollow stem extending between said supporting plate and said guide plate.

2. In an automatically self-cleaning shower head, a hollow casing having a water supply inlet and a spray outlet therein, a supporting plate across said casing having water passages extending therethrough, a spray disc in said casing arranged between the bottom of said supporting disc and said spray outlet, a hollow stem attached to said spray disc and extending upwardly and slidably through said supporting plate, said hollow stem having a series of slots therein, extending from the top end to the bottom end thereof to permit passage of water therethrough, said slots also extending above and below said supporting plate, a guide plate on the upper end of said hollow stem through which said hollow stem extends, means on the end of said hollow stem to enable said guide plate to be removably snapped on the end of said hollow stem by compressing the slotted ends of the hollow stem, and a restoring spring around said hollow stem extending between said supporting plate and said guide plate.

3. In an automatically self-cleaning shower head, a casing having a water supply inlet at one end and a spray outlet at the opposite end, a supporting plate arranged

across said casing and having water passages therethrough, a spray disc in said casing spaced between said supporting plate and said spray outlet, a hollow stem attached to said spray disc and extending upwardly and slidable through said supporting plate, said hollow stem having a series of slots therein extending the full length of said hollow stem, a guide plate secured to the top end of said hollow stem and slidable along the side walls of said casing, said guide plate having flat portions on the edge thereof to permit passage of water around the edge of said guide disc, water flow from said supply inlet adapted to force said guide plate downward in said casing to project said spray disc into spray dispersing engagement with said spray outlet, the water flow through said casing taking place over a flow path extending through said hollow stem and the slots therein, through the water passages in said supporting plate, and between the spray disc and spray outlet.

4. In an automatically self-cleaning shower head, a casing having a water supply inlet at one end and a spray outlet at the opposite end, a supporting plate arranged across said casing having water passages therethrough, a spray disc in said casing spaced between said supporting plate and said spray outlet, a hollow stem attached to said spray disc and extending upwardly and slidable through said supporting plate, said hollow stem having a series of slots therein extending the full length of said hollow stem, a guide plate secured to the top end of said hollow stem and slidable along the side walls of said casing, said guide plate having flat portions on the edge thereof to permit passage of water around the edge of said guide disc, water flow from said casing supply inlet adapted to force said guide plate downward in said casing to project said spray disc into spray dispersing engagement with said spray outlet, the water flow through said casing taking place through said hollow stem and the slots therein, through the water passages in said supporting plate, and between the spray disc and spray outlet, a portion of the water flow also taking place around the flat sides of said guide plate and through the bottom end of the slots in said hollow stem, and a restoring spring around said hollow stem for withdrawing said spray disc from said spray outlet upon the cessation of water flow to permit drainage of residual water from said shower head.

5. In an automatically self-cleaning shower head, a casing having a water supply inlet at one end and a spray outlet at the opposite end, a supporting plate arranged across said casing and having water passages therethrough, a spray disc in said casing spaced between said supporting plate and said spray outlet, a hollow stem attached to said spray disc and extending upwardly and slidable through said supporting plate, said hollow stem having a series of slots therein extending the full length of said hollow stem, a guide plate secured to the top end of said hollow stem and slidable along the side walls of said casing, said guide plate having flat portions on the edge thereof to permit passage of water around the edge of said guide plate, water flow from said supply inlet adapted to force said guide plate downward in said casing to project said spray disc into spray dispersing engagement with said spray outlet, the water flow through said casing taking place through said hollow stem and the slots therein, through the water passages in said supporting plate, and between the spray disc and spray outlet, a portion of the water flow also taking place around the flat sides of said guide plate and through the bottom end of the slots in said hollow stem, and a restoring spring around said hollow stem for withdrawing said spray disc from said spray outlet upon the cessation of water flow to permit drainage of residual water from said shower head, complete drainage of water from said head taking place through the gap between said spray outlet and said spray disc, the water passages in said supporting plate, the slots in said hollow stem, and from the inlet supply above said guide plate.

6. In an automatically self-cleaning shower head, a hollow casing having a water supply inlet on one end and a spray outlet on the other end, a supporting plate arranged in said casing between the ends thereof, and a movable spray controlling unit in said casing comprising a hollow stem extending through said supporting plate, a guide plate on the upper end of said stem, a spray disc on the lower end of said stem, a restoring spring extending between said supporting plate and said guide plate for normally holding said guide plate against the top of said casing and said spray disc spaced from said spray outlet, water flow into said casing projecting said spray disc into spray discharge engagement with said spray outlet, said hollow stem having a series of slots extending the length of said hollow stem to enable water flow to take place therethrough above said supporting plate and below the same, drainage of water also taking place through said slots after water flow ceases, said spray disc having an annular recess on the rear side thereof arranged directly below the water passages in said supporting plate whereby the water flow impinges directly into said recess to positively project the spray disc downward into spray engagement with said spray outlet.

7. A movable spray control unit for a self-cleaning shower head comprising a hollow stem having a guiding disc on one end and a spray disc on the other end, said spray disc having a water impinging recess on the rear side thereof, said hollow stem having a series of slots formed therein extending between said spray disc and said guiding disc for passage of water therethrough, and means for removably attaching said guiding disc to said hollow stem.

8. A movable spray control unitary structure for a self-cleaning shower head comprising a hollow stem having a guiding disc on one end thereof and a spray disc on the opposite end, said hollow stem having a plurality of slots therein extending between said spray disc and said guiding disc, the slots being open on the upper end of said hollow stem, said guiding disc having a central opening therein whereby the guiding plate is snapped over the end of said hollow stem, the slots enabling the end of said hollow stem to be compressed laterally to snap the guiding plate thereon.

9. A movable spray control unit for an automatically self-cleaning shower head of the type having a housing with a water inlet, a water outlet, and a barrel portion adjacent the inlet, said movable spray control unit comprising a hollow stem having a thin guiding disc on one end and a spray disc on the other end, one of said discs being formed integral with said hollow stem, said guiding disc being slidable along the barrel portion and having at least one cutaway portion to permit passage of water therearound, a relatively thin supporting plate for said unit having an axial opening therein through which said hollow stem is adapted to reciprocate, said supporting plate having a series of water passages formed therein spaced around said hollow stem, said supporting plate being positioned adjacent said spray disc and in the opposite end of said hollow stem from said guiding disc, and a restoring spring around said hollow stem extending between the top of said supporting plate and the bottom of said guiding disc for normally urging said spray disc towards the bottom of said supporting plate, the flat edges on said guiding disc providing openings for drainage of water from above said guiding disc, said drainage occurring between said flat edges and said barrel portion, then downward through the water pasasges in said supporting plate, around the edges of said spray disc and outward through said shower head outlet, whereby complete drainage of the shower head takes place each time the water flow is shut off.

10. A movable spray control unit for an automatically self-cleaning shower head of the type having a housing with a water inlet, a water outlet, and a barrel portion adjacent the inlet, said movable spray control unit compris-

ing a hollow stem having a guiding disc on one end and a spray disc on the other end, said hollow stem and said guiding disc being formed integral with one another, said guiding disc being in slidable engagement with the barrel portion and having flat edges around the edge thereof for passage of water therearound, each of said flat edges being spaced from an adjacent flat edge by a portion of the guiding disc in slidable engagement with the barrel, a supporting plate for said unit having an axial opening through which said hollow stem extends and is guided therein, said supporting plate having a series of water passages therein and being positioned adjacent said spray disc and on the opposite end of said hollow stem from said guiding disc, a restoring spring around said hollow stem extending between said supporting plate and said guiding disc, the flat edges on said guiding disc providing openings for drainage of water from above said guiding disc, said drainage occurring between said flat edges and said barrel portion, then downward through the water passages in said supporting plate, around the edges of said spray disc and outward through said shower head outlet, whereby complete drainage of the shower head takes place each time the water flow is shut off.

11. An automatic complete draining shower head, said shower head including, in combination,

a housing having a water inlet, a water outlet, a barrel portion adjacent the water inlet having an interior shoulder, and a movable spray control unit in the housing, said spray control unit including,

a hollow stem,

a thin guiding disc on one end of the hollow stem,

a spray disc on the other end of said hollow stem, one of said discs being formed integral with said hollow stem,

said guiding disc having a portion of its periphery in sliding engagement with the barrel portion,

the balance of its periphery being cut away at a plurality of locations to thereby provide complete drainage from above said guiding disc when its buts against the interior shoulder, and water flow therearound during operation,

a relatively thin supporting plate for said unit having an axial opening therein through which said hollow stem is adapted to reciprocate,

said supporting plate having a series of water passages formed therein spaced around said hollow stem,

said supporting plate being positioned adjacent said spray disc and at the opposite end of said hollow stem from said guiding disc, and

a restoring spring around said hollow stem extending between the top of said supporting plate and the bottom of said guiding disc for normally urging said spray disc towards the bottom of said supporting plate and the guiding disc into abutment against the interior shoulder,

the cut away portions on said guiding disc providing openings for drainage of water from above said guiding disc, said drainage occurring between said cut away portions and said barrel portion, then downward through the water passages in said supporting plate, around the edges of said spray disc and outward through said outlet, whereby complete drainage of the shower head takes place each time the water flow is shut off.

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