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AUTOMATIC SELF-CLEANING SHOWER HEADS

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AUTOMATIC SELF-CLEANING SHOWER HEADS

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The present invention relates to shower heads for use in shower baths and the like, and, the principal object of the invention is to provide a new and improved shower head which is economical to produce, requires few parts, is easy to assemble, 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.

Fig. 1 is a cross-sectional view through a shower head embodying the invention;

Fig. 2 is a similar sectional view showing the shower head in operative position with water flowing through the device;

Fig. 3 is a cross-sectional elevation of a modified form of the invention; while

Fig. 4 is a further modified form of the invention including a ball-joint connection.

My shower heads in use at the present time are provided with a handle interconnected with a water dispersing disc so that the disc may be adjusted in the spray outlet to regulate the type of spray desired. After use of this shower head, the handle must be again operated to provide a gap between the casting and the disc to permit the water to flush out the shower head. In still other shower heads in common usage, the water dispersing disc must be screwed outward from the spray discharge opening to permit flushing out of the sediment.

In both of these prior devices, the accumulation of lime deposits and sediment results in gradual unsatisfactory operation of the shower head, because it has been found from observation that the user often neglects to open the water dispersing disc to flush out the shower head. This necessitates frequent cleaning and maintenance, and often replacement of the entire shower head.

The foregoing disadvantages have all been overcome by the present invention, in which the shower head is entirely automatically self-cleaning. This device instantly and automatically discharges all the accumulated water in the shower head through a large gap around the spray disc after the supply valves have been turned off, flushing out the head, and eliminating the annoying dribble usually encountered in prior shower heads. The spray discharge passages cannot become clogged, thereby eliminating the constant maintenance and service formerly required in shower heads.

Referring now particularly to the drawings, Figs. 1 and 2, these disclose a preferred embodiment of the invention and illustrate a shower head adaptable for installation in a shower stall or above a bath tub in the usual manner. The device consists of a hollow cylindrical casing 5, preferably made of brass, having a threaded connection 6 at its upper end for attachment to the usual inlet water supply piping. The casing 5 is provided at its lower end with a cap member 7 threaded on the open end of casing 5 and defining a spray discharge opening 8 at its lower end. Clamped between the cap 7 and the end of the casing 5 is a guide plate 9 having a gasket 10 arranged around its edge for sealing purposes. The guide plate 9 divides the shower head casing into an upper pressure chamber 11 and a lower discharge chamber 12. Operatively arranged within these chambers 11 and 12 is a piston indicated generally at 13, having a stem 14, a hollow central portion 14 extending through most of its length but closed off on the bottom end, as shown.

A piston head 15 is suitably attached to the upper end of the piston stem 13, and is slidable engagement with the side walls of the pressure chamber 11. A number of openings 16 are arranged on the lower end of piston stem 13 in a position normally within the pressure chamber 11. A restoring spring 17 surrounds the piston stem 13 and extends between the top surface of guide plate 9 and the lower surface of piston head 15, and normally urges the piston assembly in an upward position where the piston head 15 engages the stops or shoulder 26 formed in the casing 5.

Arranged within the discharge chamber 12 is a serrated spring dispersing disc 18, preferably constructed of some plastic material, having the property of inhibiting the formation of lime deposits thereon. The spring disc 18 is provided with a knob portion 19 having a threaded shank passing through a hole in the disc and adapted to clamp the spray disc 18 directly to the lower closed end of the piston stem 13. Clamping plates 20 and 21 arranged on each side of disc 18 serve to reinforce and hold the disk rigidly to the piston stem 13 in the position shown. The serrations around the edge portion of the spray disc 18 indicated at 22, are provided with an angular portion adapted to contact the spray discharge opening 8 of the cap 7 when the disc is operated and serves as a stop to halt the downward movement of the spray disc, as will be pointed out. The piston stem 13 is arranged for reciprocating movement through an axial opening 23 extending through the guide plate 9, and has a fairly close sliding fit with the stem 13.

In the normal position of the parts in the shower head, when no water flows through the device, as shown in Fig. 1, there is a large opening or gap 27 between the serrated edge of spray disc 18 and the spray discharge opening 8. In this position it will be apparent, there is no place surrounding the spray disc in which water can accumulate and dry up to form lime deposits, after the supply pressure has been shut off. Likewise, no water flow can take place through the shower head until the openings 16 have been projected downward through the opening 23 into the discharge chamber 12, thereby insuring that the spray disc 18 is first in its spray discharge position.

Referring now particularly to Fig. 2, this shows the shower head in its operative position in which it is assumed that the user has turned off the water supply and has cleared by flushing out the head, thereby eliminating the annoying dribble. As shown, a mixing valve is provided on the pressure chamber 11 and the hollow piston 14, and exerts its pressure on the upper end of the guide plate 9. Since the guide plate 9 is positioned in the pressure chamber 11, the whole piston is...
Forced downwardly within the pressure chamber 11 compressing the spring 17. After pressure has built up in the pressure chamber 11, the piston 13 is projected downward through opening 23 in guide plate 9 to a position where the holes 16 are projected into the discharge chamber 12 below guide plate 9. Water flow can now take place from the pressure chamber 11 into the discharge chamber 12 and on the top and around the sides of spray disc 18, as indicated by the arrows in Fig. 2. The movement of the piston 13, as well as the spray disc 18, is halted when the teeth 22 of the spray disc engage the spray discharge opening 8. The water flow can now take place between the serrations 22 and around the edge of the disc 18 and outwardly through the spray discharge opening to produce the shower spray.

It will be noted that with this arrangement no spray discharge can occur until the spray disc is in contact with the discharge opening 8 due to the position of the openings 16 first in the pressure chamber 11, and subsequently when sufficient pressure has built up, in the discharge chamber 12.

The guiding plate 9, according to the invention, provides a number of combined features; first, it serves as a dividing member between the upper pressure chamber 11 and the discharge chamber 12; second, it serves as a stabilizing guide for the piston stem 13, so that the piston head 15 will not be tilted in the downward movement of the piston, guiding the smooth surface along the side walls of the casing; third, the guide plate 9 serves as a blocking member to prevent the discharge of water through the openings 16 until these openings have been projected downward by the water pressure to a position within the discharge chamber 12.

The spray disc 18 is preferably constructed so that the teeth 22 are curved around its edge portion and inclined at two different angles to provide a cone-within-cone type of spray discharge.

When the user has finished with his shower and turns off the water supply into the shower head, the pressure, of course, is relieved in the pressure chamber 11. This causes the spring 17, which has been compressed, to exert its force upwardly, projecting the piston head 15, as well as the piston 13, and spray disc 18, upwardly again until stopped by the shoulder 26 and in the normal position shown in Fig. 1. This action immediately expels all the remaining water within the shower head, leaving a wide gap in the spray disc and the spray discharge openings 8, as shown in Fig. 1. Since the water will all be discharged from the discharge chamber 12, there will be no gradual drip from the head when the water is shut off. Likewise, since the interior is exposed to the atmosphere and no water remains there, the head dries out immediately and no accumulation of lime deposits can occur on the serrated edges of the spray disc to cause eventual distortion of the spray discharge and clogging of the teeth. Any particles of sediment passing in the water stream will also be quickly discharged through the head without danger of clogging the head and causing faulty operation. The foregoing action is entirely automatic and takes place each time that the shower head is used, flushing out the head thoroughly and thereby eliminating servicing and maintenance usually required.

Referring now more particularly to the modification illustrated in Fig. 3, this disclosure shows a head somewhat along the lines of that disclosed in Fig. 1, with the exception that the upward stop for the piston head 15 has been eliminated. Instead, the spray disc 18 in its movement upward is halted directly by the guide plate 9, which serves as a stop when the spacer washer 21 engages it. In this case the piston head 15 is constructed integral with the piston stem 13, and has its outer edge slidable within the walls of pressure chamber 11. This results in a more compact and simpler device. Except as pointed out, the construction and operation of this modification is generally similar to that of Fig. 1.

In the modification shown in Fig. 4, the construction is somewhat similar to the shower head illustrated in Fig. 1, with the exception that the guide plate 9 is provided with an upstanding flange portion 24, which normally masks or covers the openings 16 in the bottom portion of piston 13. A series of openings 25 are also provided in the bottom plate 9 between the flange portion 24 and the clamped edge of guide plate 9. With this construction, it will be apparent that when pressure builds up above piston head 15 and the piston 13 is projected downwardly, the openings 16 will block the passage of water into the discharge chamber 12 until the openings 16 are projected downwardly below the flange portion 24. This provides a better sealing and blocking action than the construction of Fig. 1, to insure more effective downward projection of the disc 18. The openings 25 in addition serve to drain that portion of the pressure chamber 11 below piston head 15 when the water supply is shut off. By permitting entry of air within pressure chamber 11, and the consequent drainage of water therefrom, the spring 17 requires less effort to raise the piston 13 and spray disc 18. In this modification, there is also shown a form of ball joint 30 attached to the inlet end of the shower head to permit swiveling of the shower head in any desired direction by the user. This ball joint could also be provided in all the other figures shown.

From the foregoing, it will be apparent that a very compact, simple and reliable operating shower head has been devised, in which few parts are required, and because of the automatically self-cleaning feature requires no subsequent servicing or maintenance.

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 form and proportions 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 casing having a water supply inlet and a spray outlet therein, a guide plate across said casing dividing said casing into a pressure chamber and a discharge chamber, a movable piston having a hollow stem with a piston head on one end and a water flow openings on the opposite end, a guide plate and a spray disc arranged across the upper end of said pressure chamber and having its edge portion in slidable contact with the walls of said pressure chamber during the full stroke of said piston, said guide plate having an opening therein through which said piston stem is adapted to slide, the openings in said piston stem being normally positioned directly above said guide plate in said pressure chamber, a spring around said piston stem extending between the top of said guide plate and said piston head, said piston head being adapted to be projected downward to slide along the walls of said pressure chamber by water discharge whereby said piston stem is projected downward through said guide plate opening against the compression of said spring and whereby said piston stem openings are projected into said discharge chamber below said guide plate to permit water flow therein, said piston head effective to force the water flow to take a straight path through said stem opening and to prevent flow around the edge portion of said piston into said pressure chamber below said piston head, and a spray dispersing disc carried on the lower end of said piston stem in said discharge chamber, said spray dispersing disc being normally positioned out of spray engagement with said casing spray outlet and projected into engagement with said spray opening by the movement of said piston stem to produce a spray discharge in cooperation therewith.

2. In an automatically self-cleaning shower head, a casing having a water supply inlet and a spray outlet...
therein, a movable piston in said casing comprising a hollow cylindrical stem having side openings in the lower end thereof and a piston head on the upper end adapted to slide along the wall of said casing, said piston head comprising a pressure disc arranged across the upper end of said pressure chamber and having its edge portion in slidable contact with the walls of said pressure chamber during the full stroke of said piston, a guide plate arranged across said casing having an opening therein through which the lower end of said piston stem extends, said guide plate separating said casing into an upper pressure chamber and a lower discharge chamber, a stop formed in the upper end of said pressure chamber for said piston head, a spring guide plate and a connecting portion of said guide plate and said piston head to normally hold said piston head against said stop, a spray dispersing disc supported on the lower end of said piston stem in said discharge chamber and in a position normally out of engagement with said spray outlet to provide a wide gap therebetween for drainage, the side openings in said piston stem being normally positioned above said guide plate whereby water flow into said pressure chamber is blocked and acts against said piston head and stem to project said piston stem downwardly through said guide plate opening only when said piston stem has been projected below said guide plate into said discharge chamber and when the spray disc is positioned in said spray outlet to produce a spray discharge.

3. In an automatically self-cleaning shower head, a casing having a water supply inlet at its upper end and a spray discharge outlet at its lower end, a guiding plate arranged across said casing and dividing the same into a pressure chamber and a discharge chamber, a piston having a hollow stem extending through an opening in said guiding plate, a piston head on the top end of said stem arranged in said pressure chamber, said piston head comprising a pressure disc arranged across the upper end of said pressure chamber and having its edge portion in slidable contact with the walls of said pressure chamber during the full stroke of said piston, a spray disc on said stem arranged in said discharge chamber and spaced from said discharge outlet, said hollow stem having openings at the top end extending into said pressure chamber and directly adjacent the top side of said guiding plate, water flow into said pressure chamber forcing said piston head downward together with said stem to project said stem openings into said discharge chamber, said piston head effective to force the water flow to take place only through said stem opening and to prevent flow around the edge portion of said piston into said pressure chamber below said piston head, said stem also carrying said spray disc into engagement with said spray outlet to produce a spray discharge therefrom, means for returning said piston to its normal position after water flow ceases whereby said spray disc provides a wide opening with said spray outlet to drain the discharge chamber, a stop in said casing contacted by said piston head for limiting the upward movement of said piston, and cooperating stop means on said spray disc and said spray outlet for limiting the downward movement of said piston.

4. In an automatically self-cleaning shower head, a casing having a water supply inlet and a spray discharge outlet, a guiding plate dividing said casing into a pressure chamber and a discharge chamber, a hollow piston stem having a piston head on the upper end and water ports extending through the lower end thereof into said pressure chamber above said guide plate, said piston having a portion also projecting through and slidable in said casing in engaging in said guide plate, said guide plate having an upward flange around the opening there through normally blocking the water ports in said piston stem, a spray dispersing disc supported on the lower end of said piston stem in said discharge chamber and below said guide plate, said spray dispersing disc being normally positioned in spaced relationship to said spray discharge outlet in said casing to permit draining of said discharge chamber, water flow into said casing forcing said piston stem downward to project said water ports below said upward flange in said guide plate and thereby permit water flow into said discharge chamber, said spray dispersing disc also being thereby projected into spray discharge engagement with said spray outlet, and means in said pressure chamber for restoring said piston and said spray dispersing disc to normal position upon cessation of water flow through said casing.

5. In an automatically self-cleaning shower head, a cylindrical casing having a water supply inlet at the upper end and a spray discharge outlet at the lower end, a cup-shaped piston slidable in said casing having a hollow depending stem therein, a guide plate fixed across said casing below said piston and having an opening therein through which the piston stem slidable extends, said guiding plate dividing said casing into a pressure chamber and a discharge chamber, an upward flange on said guide plate around the opening there through, and extending into said pressure chamber, a spray dispersing disc in said discharge chamber attached to said piston stem below said guiding plate and normally spaced from said spray discharge opening, a spring around said piston stem between said guiding plate and said piston, said piston having openings in the lower end thereof extending into said pressure chamber which are normally blocked by said upward flange on said guiding plate, said piston effective responsive to water flow for projecting said dispersing disc into spray discharge engagement with said discharge opening, and said piston openings below said upward flange into said discharge chamber, said upward flange preventing said spray discharge from taking place until said dispersing disc is in actual engagement with said upward flange, said spray dispersing disc and said spray discharge outlet for stopping the movement of said dispersing disc, said spring being effective to restore said dispersing disc and piston when water ceases to flow through said casing.

6. In an automatically self-cleaning shower head, a cylindrical casing having a water supply inlet at the upper end and a spray discharge outlet at the lower end, a piston slidable in said casing and having a hollow depending stem with a piston head on one end, a guiding plate fixed across said casing below said piston and having an opening therein through which the piston stem slidable extends, said guiding plate dividing said casing into a pressure chamber and a discharge chamber, an upward flange on said guiding plate around the opening there through and around said piston stem, and projecting into said pressure chamber, a spray dispersing disc attached to said piston stem below said guiding plate in said discharge chamber and normally spaced from said spray discharge opening, a spring around said piston stem between said guiding plate and said piston, said piston having openings in the lower end thereof extending into said pressure chamber which openings are normally blocked by said upward flange on said guiding plate, said piston head movable along the length of said pressure chamber responsive to water flow for projecting said dispersing disc into spray discharge engagement with said discharge opening, and projecting said piston openings below said upward flange, said upward flange preventing said spray discharge from taking place until said dispersing disc is in actual engagement with said...
discharge outlet, and cooperating means on said dispersing disc and said spray discharge outlet for stopping the movement of said dispersing disc, said spring being effective to restore said dispersing disc and piston when water ceases to flow through said casing.

7. In an automatically self-cleaning shower head, a cylindrical casing having a water supply inlet at the upper end and a spray discharge outlet at the lower end, a piston slidably in said casing and having a hollow depending stem with a piston head on one end, a guiding plate fixed across said casing having an axial opening therein through which the piston stem slidably extends, said guiding plate dividing said casing into a pressure chamber and a discharge chamber, an upstanding flange on said guiding plate around the axial opening therethrough and around said piston stem, said guide plate having a series of drainage holes extending between said chambers, a spray dispersing disc attached to said piston stem below said guiding plate in said discharge chamber and normally spaced from said spray discharge opening to provide a gap for draining said casing, a spring around said piston stem between said guiding plate and said piston, said piston stem having openings in the lower end thereof extending into said pressure chamber which openings are normally blocked by said upstanding flange on said guiding plate, said piston head movable along the walls of said pressure chamber responsive to water flow for projecting said dispersing disc into spray discharge engagement with said discharge opening, and projecting said piston openings below said upstanding flange, said upstanding flange preventing a spray discharge from taking place until said dispersing disc is in actual engagement with said discharge outlet, cooperating means on said dispersing disc and said spray discharge outlet for stopping the movement of said dispersing disc, said spring being effective to restore said dispersing disc and piston when water ceases to flow through said casing, whereby a wide gap is provided for draining said discharge chamber, the holes in said guide plate also draining said pressure chamber.

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