

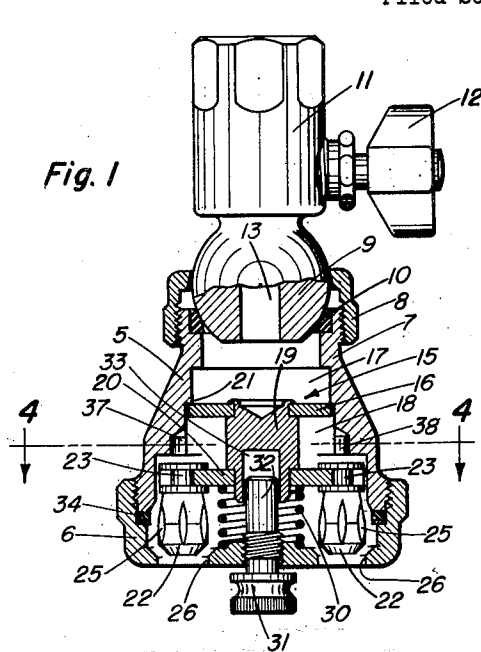
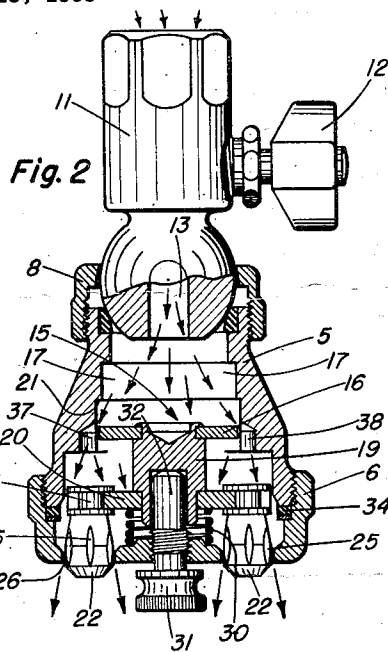
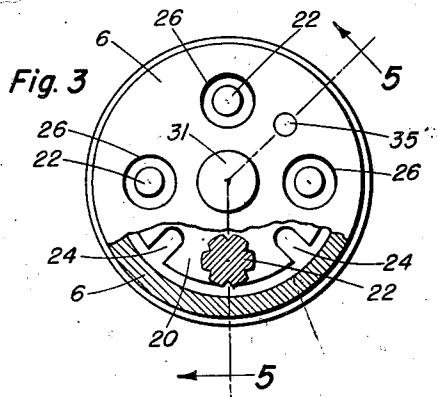
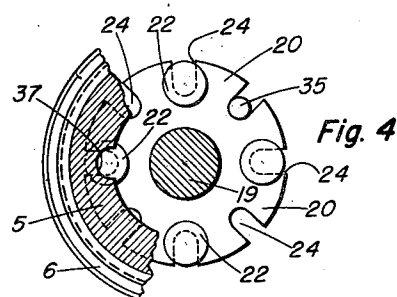
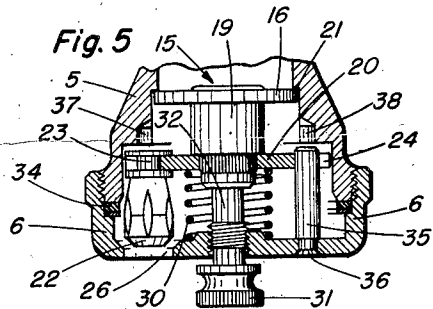
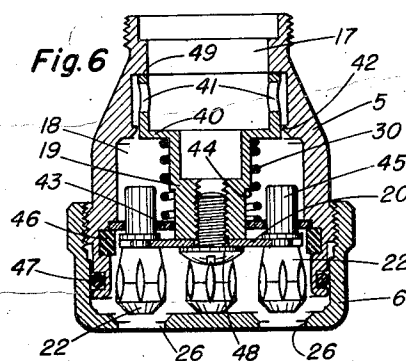
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2,790,677

AUTOMATIC SELF-CLEANING SHOWER HEADS

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AUTOMATIC SELF-CLEANING SHOWER HEADS

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9 Claims. (Cl. 299—59)

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

Another object of the invention is to design an automatically self-cleaning shower head having a plurality of spray dispersing plugs adapted to be automatically projected through spray discharge openings by water flow, and to be automatically withdrawn from said openings when water flow ceases, in order to drain the head.

Further objects are to provide an automatically self-cleaning shower head having a plurality of spray dispersing plugs cooperating with associated spray discharge openings, in which the character or fineness of the shower spray discharge may be varied or adjusted to suit the wishes of the bather.

Other objects are to provide a new and improved shower head which automatically flushes out sediment and foreign deposits each time after the head is used; which automatically discharges all residual water remaining in the shower head so that no subsequent dribble can occur; and in which no spray discharge can occur until the spray dispersing plugs have been projected into position to produce a spray discharge.

Another object is to design a new and improved shower head having a plurality of spray dispersing plugs cooperating with associated spray discharge openings, in which means are provided for guiding and maintaining the spray plugs in alignment with the spray openings.

There are presently many kinds of shower heads in use, many of which are provided with a manually operable handle or knob connected to a spray dispersing disc arranged so that the disc may be raised or lowered into the spray discharge outlet to regulate the kind of spray discharge desired by the user. After use of this type of shower head, the handle or knob must again be operated to move the disc to open position to permit draining and flushing the water and sediment from the interior of the head.

It has been observed, however, that persons often neglect to fully open and drain the shower head after they have used the same and as a result, the grooves in the spray disc eventually become clogged with lime deposits and sediment, resulting in an unsatisfactory spray discharge or none at all. This necessitates frequent cleaning and maintenance, and often replacement of the entire shower head.

The foregoing disadvantages have been overcome by the shower head of the present invention which is entirely automatically self-cleaning in action. The device operates instantly to discharge the accumulated water in the head after the water supply has been shut off, thereby flushing out the head and also eliminating the annoying dribble encountered in former shower heads.

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

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more fully described, particularly pointed out in the claims, and fully illustrated in the drawings in which:

Fig. 1 is a cross-sectional side view showing a preferred embodiment of the invention;

Fig. 2 is a cross-sectional side view showing the shower head in operated position with water flowing through it;

Fig. 3 is a bottom view of Fig. 1 with parts broken away;

Fig. 4 is a fragmentary portion of the shower head operating mechanism taken along the line 4—4 of Fig. 1;

Fig. 5 is a partial cross-section taken along the line 5—5 of Fig. 3, while;

Fig. 6 is a cross-section of a modified form of the invention in which the spray adjustment is made with the cap member.

Referring now particularly to Fig. 1 of the drawings, this discloses a preferred embodiment of the invention in a shower head arranged for installation for example in a shower stall or above a bath tub in the customary manner. The shower head comprises a bell-shaped casing or body 5 preferably of brass and having a circular cap member 6 threaded on the lower open end thereof. At the upper end, the casing 5 has a neck portion 7 upon which a coupling nut 8 is threaded for holding a universal or ball-joint connection 9 against packing 10 in the neck 7 to effect a water tight seal therewith. This arrangement enables the shower head to be swung in any direction in accordance with the desires of the user of the shower. An internally threaded nipple 11 is preferably formed integral with the ball 9 and has a nut formed on it to facilitate attachment of the shower head directly to a water supply pipe. The nipple 11 is also preferably provided with a manually operable throttle 12 in the side thereof to regulate the rate of flow into the shower head and compensate for different water supply pressures. Both the nipple 11 and ball 9 are drilled with the bore 13 for passage of water into the shower head.

Arranged within the shower head body 5 is a pressure responsive member or piston indicated generally at 15 having a head portion 16 slidable in the casing and dividing the same into an upper pressure chamber 17 and a lower discharge chamber 18. The piston head 16 is disc shaped and attached axially as shown to the upper end of a depending stem 19 which also supports, at its lower end with a press fit, the circular plug supporting disc 20. The upper limit of travel of the piston 15 is limited by the shoulder 21 formed in pressure chamber 17. The plug disc 20 supports and carries a plurality of spray plugs 22, preferably four in number, arranged in a series of recesses or slots 24 formed around the periphery of the disc 20, as shown more clearly in Figs. 3 and 4. The plugs 22 are supported and dependent in the recesses 24 by their reduced neck portions 23 formed in the upper end of the plugs 22 and which loosely fit into the recesses. The spray plugs 22 are assembled on the disc 20 by sliding each one into a recess 24 and are held in place in the body 5 by the inner wall surface of discharge chamber 18. The additional recesses 24 not occupied by the plugs 22 are for passage of water through the plug disc 20 into the space below the disc.

Each spray plug 22 is cylindrical shaped with straight sides up to a point approximately half its length and then tapered inwardly to the top end. The plugs are also provided with a series of spaced longitudinal spray grooves 25 which are widest at the approximate mid point of the plug where they are also deepest and taper together at each end of the plug. The bottom end of each plug may be rounded or tapered as shown. Each spray plug 22 is associated with an individual spray discharge opening 26 extending through the cap member 6 which openings are preferably tapered inwardly to facilitate engagement of

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the associated spray plug 22 therewith. As shown in Fig. 1, the spray plugs 22 are normally positioned out of engagement with the associated spray discharge openings 26 when no water flow takes place through the shower head for a purpose to be hereinafter pointed out. The means for normally holding the plugs out of openings 26 and for retracting them after they have been projected therein, comprises a compression spring 30 extending between the inside surface of cap member 6 and the bottom of plug supporting disc 20. The stop 21 against which piston head 16 abuts, limits the extent of the retraction of the unit and plugs 22. It will be observed that the piston head 16, disc 20 and the plugs 22 are all arranged to operate as a single unitary structure movable within the shower head.

The spray plugs 22 when moved into engagement with the spray openings 26 will cause a certain spray discharge to be emitted between the edges of the openings and the grooves 25 in plugs 22. In order to vary the characteristic of the spray discharge as from a needle spray to a coarse spray, an adjustable means is provided. This adjustment includes a manually adjustable knob 31 threaded axially through the bottom of the cap member 6 and having an upwardly extending shank portion 32 projecting into a recess 33 formed axially in the bottom of piston stem 19. By turning the knob 31 inwardly the gap between the end of shank 32 and the bottom of recess 33 is shortened, thereby reducing the distance the spray plugs 22 are projected into the spray openings, and resulting in the discharge of a relatively fine spray because then the narrowest part of grooves 25 will be opposite the openings. When the knob is turned outwardly, the spray plugs can be projected further through the spray openings before being stopped, resulting in the discharge of a coarser spray because the grooves 25 will then be at a wider part in cooperation with the openings 26.

It is necessary that the spray plugs 22 always be properly aligned with their associated spray openings 26 in order that they may be accurately projected through the holes. For this purpose, a guide pin 35 is provided, as more clearly shown in Fig. 5, which is rigidly held at its bottom end 36 in the cap member 6 and projects upwardly through one of the slots 24 in plug disc 20, as best seen in Fig. 4. Since the cap 6 is tightly threaded on the casing 5, the guiding pin 35 prevents rotary or lateral movement of the disc 20 and piston 15, and consequent misalignment of the plugs with the openings, as the piston moves vertically to project the plugs into and out of openings.

In assembling the piston unit 15, the plugs 22 are inserted in slots 24 around the supporting disc 20 and then the unit is placed on top of the cap member 6 with the shank 32 registering with opening 33 and the plugs 22 in alignment with spray openings 26. The guide pin 35 assures that the alignment prevails while the cap member 6 is being screwed on the open end of the body 5. The peripheral edges of the piston 16 and supporting disc 20 have a relatively loose sliding fit with the chamber walls 18, so they can move without binding and also assist in guiding the spray plugs properly into their associated spray openings. A suitable packing and slip ring 34 clamped between the cap member 6 and the edge of body 5 serves to prevent leakage through the threaded connection therebetween.

It is desirable that no spray discharge take place from the spray openings 26 until sufficient water pressure has been built up within pressure chamber 17 above piston 16. This insures that the plugs 22 will have first been properly guided and projected into their associated spray openings. The piston head 16 is therefore arranged in pressure chamber 17, so that the full inlet pressure is initially exerted upon the top of the piston until the unit has traveled a distance downward sufficient to project the spray plugs into their spray openings, and is then

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stopped by the adjustable shank 32. Just before this stop position is reached, the edge of piston 16 encounters two oppositely disposed recesses or slots 37 and 38 formed in the side walls of discharge chamber 18. In this position the water is permitted to flow through the recesses 37 and 38 and around the edge of piston 16 into the discharge chamber 18 and outward through the spray openings 26. The continued force of the water flowing through the shower head will maintain the piston 16 projected downward even on relatively low inlet pressures.

The various parts of the shower head and their association having been described, the operation will now be pointed out specifically, reference being had to Fig. 2 which illustrates the parts in operated position with temperature water flowing through the head and a spray discharge being emitted therefrom. Water flowing under pressure enters passage 13 and builds up pressure in chamber 17 above the piston head 16. As the pressure increases, the piston 16 is forced downward carrying all the other elements attached thereto with it. During this movement the spray plugs 22 are accurately guided into alignment with the spray openings 26 by the guide pin 35, while the whole unit is prevented from tilting by the edges of disc 20 and piston 16 being guided in the side walls of the casing. The adjusting pin 32 sliding in opening 33 also serves to properly guide the elements. No spray can be discharged during this initial movement.

When the spray plugs 22 have been projected with their lower ends partially into spray openings 26, the piston 16 will have traveled to a point beyond the bottom edge of slots 37 and 38, so that the water can flow through these slots and around the edge of the piston, by-passing the same, and into discharge chamber 18, as shown by the arrows. The continued water pressure causes the piston to be further projected downward and to result in the spray plugs being fully projected into the spray openings, depending upon the adjustment previously made. The projected movement is halted by the engagement of the shank 32 of adjusting screw 31 with the bottom of hole 33 in rod 19. Water flow now takes place as indicated through the recesses 24 not occupied in plate 20 (see Fig. 4) by the spray plugs 22, through the grooves 25 around each plug, and outward through spray openings 26 therebetween into a circular or cone-shaped spray discharge from each opening. The character of the spray discharge, ranging from a needle to a coarse discharge, is determined by the adjusting screw 31, so that any wide or narrow point on the length of grooves 25 will be stopped opposite the spray openings. The parts will remain in the aforesaid projected position so long as the water flow prevails, regardless of fluctuations in pressure. As a consequence of the downward movement of spray supporting disc 20, the restoring spring 30 is also compressed. The rate of water flow through the shower head may be regulated to the desired value or to compensate for different pressures by appropriate adjustment of the knob 12 in the nipple 11.

Upon cessation of water flow into the shower head as when the user shuts off the control valve, pressure is no longer exerted against the top of piston 16, and as a result the compression spring 30 is free to exert its stored up energy to restore the parts to normal position again as shown in Fig. 1. The disc 20 and piston 16 immediately move upward to the stop 21, carrying along spray plugs 22 and withdrawing them fully from the spray openings 26. A wide gap is thereby established as seen in Fig. 1, between the plugs and their respective openings, so the interior of the casing is drained completely. This immediate flushing action carries along and discharges all sediment and eliminates the constant dribble experienced in former shower heads. Furthermore, since no water remains in the head and around the plug grooves to dry up and form lime deposits, the shower

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head does not become clogged and unserviceable, thereby eliminating constant cleaning and maintenance. Since the action is entirely automatic, no manual cleaning operation is necessary and the previously selected spray adjustment of the user is maintained.

Referring now particularly to Fig. 6, this shows a modification of the invention in which the spray adjustment is made by rotation of the cap member 6 instead of the knob 31 as in Figure 1. This arrangement includes a cup-shaped piston 40 having water passages 41 in the sides thereof and a depending stem 19. The cup-shaped piston 40 travels in pressure chamber 17, which chamber has a restricting or guiding shoulder 42 formed on the bottom end wall of the chamber, so that no water can flow past this shoulder until the piston passages 41 are projected opposite the shoulder 42 and the spray plugs 22 have been projected fully into spray openings 26. The spray plugs 22 are supported in a movable supporting disc 20 similar to that of Fig. 1, and in addition are guided and maintained in alignment with their respective spray openings by the long shank portions 45 sliding in openings in a guiding disc 43. This disc 43 has additional openings for passage of water therethrough similar to disc 20, Fig. 4.

The disc 20 is clamped by screw 48 directly to the bottom of stem 19 while disc 43 is held in place in the body walls by the rubber ring 46. The stem 19 has a shoulder 44 constituting a stop engaging the top of disc 43 to hold the downward projection of the unit by the water flow. It is to be noted that this stop position of the movable unit is fixed and not adjustable as in Fig. 1, while the upper limit of travel of the piston 19 and therefore its normal position is defined by the shoulder 49 formed in the top end of the body. The restoring spring 30 extends between the bottom of piston 40 and disc 43.

Since the spray plugs are always projected downward for the same fixed definite distance, it is obvious that by rotating the cap member 6 either up or down, the projected position of the plugs with their respective spray openings, may be varied. Accordingly, any desired spray from a fine needle to a coarse one may be selected without the user of the shower becoming drenched. The cap member 6 is provided with the same guiding pin 35 projecting through disc 20, as shown in Fig. 5, and accordingly as the cap member is rotated to select a desired spray characteristic, the complete unit including the spray plugs 22, discs 20 and 43, and piston 40, are rotated along with the cap member. In order to assist in preventing discharge of water outward between the threads of cap member 6 and body 5, an O ring 47 is inserted in a groove in the body.

As in Fig. 1, this modification automatically provides a wide gap after use of the shower head, to permit drainage, eliminate dribble and clogging of the grooves.

The invention has been described more or less specific as to details, including the modifications of the same, and it is therefore to be understood that the disclosure is not to be limited thereby; as various changes may be made in the arrangement 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 claims.

What is claimed is:

1. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member arranged on the outlet end of said casing and having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, there being one spray plug associated with each of said spray openings, a piston in said casing, means on said piston for supporting said spray plugs in spaced relationship to the associated spray openings, said piston responsive to water flow into said casing for projecting said spray plugs into said spray

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openings to produce a spray discharge therefrom, means in said casing for adjustably limiting the extent to which said spray plugs are projected into said spray openings, means for withdrawing said spray plugs from said spray openings to drain said casing after water flow ceases, and guiding means on said cap member cooperating with said spray plug supporting means on said piston to insure that said spray plugs will be in alignment with their respective spray discharge openings when projected therein.

2. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member arranged on the outlet of said casing and having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, there being one spray plug associated with each of said spray openings, a supporting plate in said casing for supporting said spray plugs in spaced relationship to said spray openings and from one another, a piston member in said casing, said supporting plate being attached to said piston and movable therewith, said piston responsive to water flow into said casing to project said spray plugs into said spray openings to produce a spray discharge therefrom, resilient means in said casing extending between said cap member and said supporting plate for restoring said piston and thereby withdrawing said spray plugs from said spray openings when the water flow into said casing is stopped, and means for adjustably stopping the projection of said spray plugs into said spray openings to produce spray discharges of variable characteristics, said last means comprising a manually adjustable knob threaded into said cap member and having a shank portion variably engageable by said supporting plate to adjustably limit the extent to which said spray plugs are projected.

3. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member on said casing having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, one for each spray opening, said spray plugs being normally positioned out of engagement with the associated spray opening to drain said casing, a piston in said casing for supporting said spray plugs and for projecting them into said spray openings responsive to water flow into said casing to produce a spray discharge from said spray openings, means for restoring said piston and said spray plugs after the water flow has stopped, adjustable means on said cap member engageable with said piston for stopping the projection of said plugs in different positions in said spray openings to produce different spray discharge characteristics, and guiding means in said casing for maintaining said spray plugs in alignment with said spray openings and preventing lateral movement therebetween.

4. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member on said casing having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, one for each spray opening, said spray plugs being normally positioned out of engagement with the associated spray opening to drain said casing, a piston in said casing for supporting said spray plugs and for projecting them into said spray openings responsive to water flow into said casing to produce a spray discharge from said spray openings, means for restoring said piston and said spray plugs after the water flow has stopped, adjustable means on said cap member engageable with said piston for stopping the projection of said plugs in different positions in said spray openings to produce different spray discharge characteristics, and guiding means in said casing for maintaining said spray plugs in alignment with said spray openings and preventing lateral movement therebetween, said guiding means comprising a guiding pin on said cap member cooperating with said piston.

5. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member on said casing having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, one for each spray opening, a piston in said casing,

a supporting plate for said spray plugs, a connecting member between said piston and said supporting plate whereby said supporting plate is movable with said piston, said piston movable responsive to water flow into said casing for projecting said spray plugs into said spray openings to produce a spray discharge therefrom, spring means in said casing extending between said cap member and said supporting plate for normally holding said spray plugs out of engagement with said spray openings and to restore said piston and spray plugs to drain said casing after said shower head has been operated, a guiding pin between said cap member and said supporting plate to insure that said spray plugs will be in alignment with said spray openings when projected therein, and means for manually adjusting the extent to which said spray plugs are projected into said spray openings to produce different spray characteristics, said adjusting means comprising an adjustable knob on said cap member having a shank portion slidable in a recess in said connecting member for variably stopping the movement of said piston and thereby said spray plugs.

6. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member on said casing outlet having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, a piston in said casing for supporting said spray plugs and for projecting said spray plugs into said spray openings responsive to water flow into said casing to produce a spray discharge, means for restoring said piston and said spray plugs when water flow has stopped, and adjustable means for stopping the projection of said spray plugs into different positions in said spray openings to produce different spray discharge characteristics, said adjustable means comprising a manual adjusting knob on said cap member having a shank portion variably engageable with said piston, and means in said casing for preventing the emission of the spray discharge from said spray openings until said spray plugs have been fully projected therein, said last means comprising the casing walls having recesses therein overlapped by said piston near the end of its stroke to permit passage of water around the edge portion of said piston through said recesses and into said spray discharge openings around said spray plugs projected therein.

7. In an automatically self-cleaning shower head, a casing having an inlet and an outlet, a cap member on said casing having a plurality of spray discharge openings therein, a plurality of spray dispersing plugs in said casing, one for each spray opening, a piston in said casing, a supporting plate for said spray plugs, a connecting member between said piston and said supporting plate whereby said supporting plate is movable with said piston, said piston movable responsive to water flow into said casing for projecting said spray plugs into said spray openings to produce a spray discharge therefrom, spring means in said casing extending between said cap member and said supporting plate for normally holding said spray plugs out of engagement with said spray openings and to restore said piston and spray plugs to drain said casing after said shower head has been operated, a guiding pin between said cap member and said supporting plate to insure that said spray plugs will be in alignment with said

spray openings when projected therein, and means for manually adjusting the extent to which said spray plugs are projected into said spray openings to produce different spray characteristics, said adjusting means comprising an adjustable knob on said cap member having a shank portion slidable in a recess in said connecting member for variably stopping the movement of said piston and thereby said spray plugs, and cooperating means between said piston and said casing to prevent the emission of the spray discharge until said piston has been fully operated by the water flow and said spray plugs are in full engagement with said spray openings.

8. In an automatically self-cleaning shower head having a water inlet and a spray discharge outlet, a piston in said casing having a flat piston head on one end and a spray dispersing means on the other end normally spaced from said discharge outlet, said piston responsive to water flow into said casing for causing the circumferential edge portion of said piston head to slide along the walls of said casing to project said spray dispersing means into said spray discharge outlet, said piston head preventing water flow into said discharge outlet during the initial portion of its stroke and until said spray dispersing means is actually in engagement therewith, and means comprising recesses formed in the walls of said casing across which said piston edge portion slides and adjacent the end of its stroke, for permitting water flow around the edge portion of said piston head through said recesses and into said spray discharge outlet.

9. In an automatically self-cleaning shower head having an inlet and an outlet, a cap member on the outlet end of said casing having a spray discharge opening therein, spray dispersing means in said casing normally spaced from but adapted to engage said spray discharge opening, a supporting stem in said casing having a piston head on one end and carrying said spray dispersing means on the other end, said piston head responsive to water flow into said casing for projecting said spray dispersing means into said spray discharge opening to produce a spray discharge therefrom, said piston head being a flat disc, the edge portion of which is slidable along the walls of said casing for a portion of its stroke during which it prevents water flow through said spray discharge opening until said spray discharge means is projected into engagement with said discharge opening, said casing having recesses formed in the walls thereof arranged in the path of the stroke of said piston head edge portion and prior to the end of its stroke, said recesses permitting water flow around the edge portion of said piston head through said recesses when adjacent thereto and after said spray dispersing means is actually in engagement with said discharge opening.

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