June 16, 1959 J. J. FILLIUNG 2,890,835

SHOWER HEADS

Original Filed Feb. 17, 1958

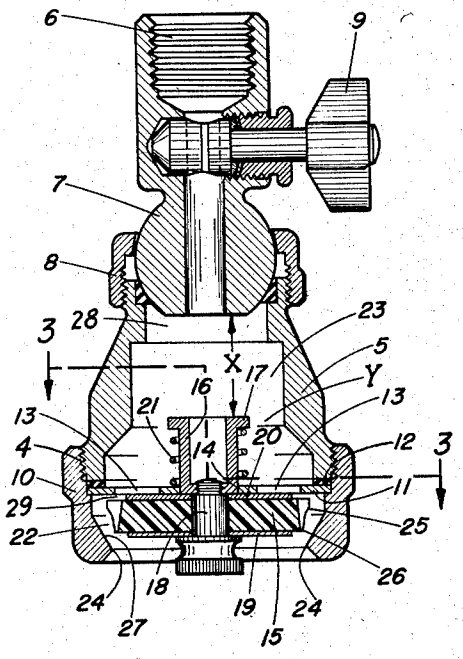

Fig. 1

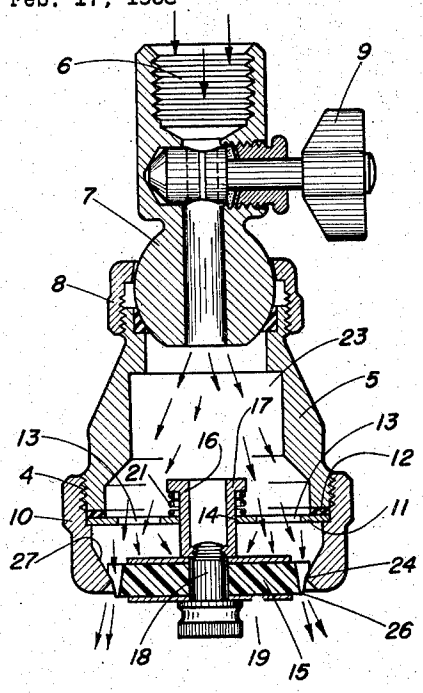

Fig. 2

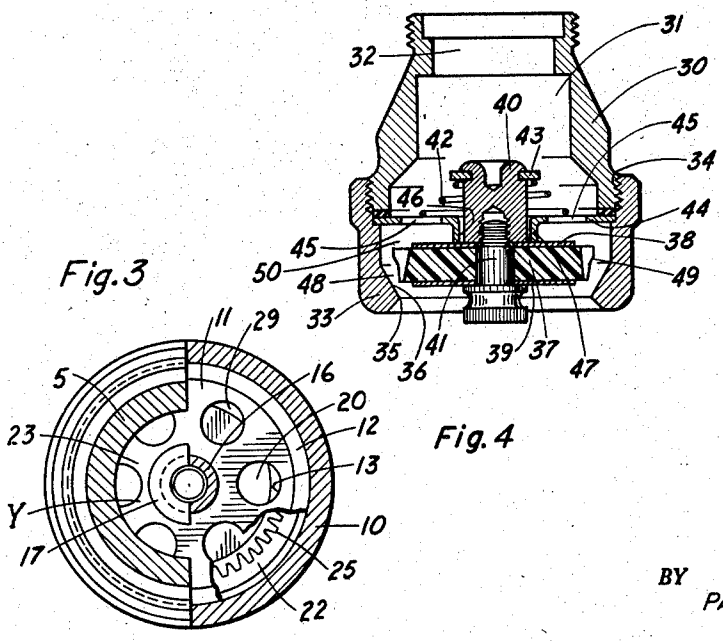

Fig. 3

Fig. 4

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SHOWER HEADS

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3 Claims. (Cl. 239—109)

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

Accordingly, a primary object of the invention is the provision of a shower head having a double flushing action whereby sediment, lime deposits and other debris may be flushed from the head both prior to and after water flow.

Another object is the provision of a shower head which automatically completely discharges all residual water remaining in the shower head and from the inlet line up to the throttle valve so that no subsequent dribble can occur.

Another object is to provide a shower head having a spray dispersing disc which is extended and retracted in direct response to the impact of the flow of water through the head without the necessity of a pressure buildup behind the disc.

Yet another object is the provision of an improved automatic self-cleaning shower head in which the water flows unrestricted through the shower head and acts directly upon the spray disc to project it into spray engagement with the spray outlet.

A further object is the provision of an automatically self-cleaning shower head including a retractable spray dispersing disc having a new mode of hydraulic operation whereby the extension and retraction of the spray disc is responsive to the impact action of the flowing water and not to the pressure buildup behind the disc stem or spray disc.

Another object is the provision of a shower head in which sticking of the internal movable parts due to liming up is eliminated.

A further object is to provide a novel automatically self-cleaning head in which the spray dispersing disc is effectively projected into engagement with the spray outlet at relatively low water pressures and rates of flow.

Another object is to provide a shower head which may be made smaller and neater than existing shower heads with a consequent decrease in manufacturing costs and amount of brass required by the elimination of any pressure chamber structure.

A further object is to provide an automatic self-cleaning shower head having a movable spray disc and stem assembly supported at only two contact points when in an operative position and at only one contact point in an inoperative position to thereby minimize the possibility of misalignment and binding of the assembly.

Another object is the provision of a shower head having a restoring spring for an extensible and retractable spray disc assembly which is only strong enough to overcome gravity and a little more to return the spray disc to an inoperative position when the water is shut off.

Yet another object is the provision of a shower head which eliminates substantially all of the machining required for the relatively movable parts in existing shower heads and requires no back stop or other precision extension limit means for the spray disc.

A further object is the provision of a shower head capable of flushing out larger lumps of debris than has heretofore been possible in existing shower heads.

In the common type of shower head in current usage, the accumulation of water borne lime deposits and sediment in the shower head usually results in the gradual unsatisfactory operation of the head because the user often neglects to screw out the spray dispersing disc to flush the water out of the interior of the head. This necessitates frequent cleaning and maintenance, and often replacement of the entire shower 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 through a large gap around the spray disc, both before and after water flow, thereby flushing sediment out of the head and additionally eliminating the annoying dribble usually encountered with prior shower heads.

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

Figure 1 is a vertical cross-sectional side view through the center of a shower head embodying the invention;

Figure 2 is a view similar to Figure 1 showing the shower head in operative position with water flowing through it;

Figure 3 is a view taken along the line 3—3 of Figure 1; and

Figure 4 is a vertical cross-sectional side view through the center of another form of the invention.

Referring now particularly to Figures 1, 2 and 3, an embodiment of the invention arranged for installation in a shower stall or above a bath tub in the usual manner, is there illustrated. The device comprises a hollow round relatively short body or casing 5 preferably made of brass, provided with the usual inlet water supply connection 6 having a ball joint connection 7 fastened to the casing 5 by the clamp ring 8. A throttle valve 9 is usually included in the connection 6 as shown. A round cap member 10 through which the water spray is discharged is threadably connected to the lower end of the casing as at 4. Clamped between the cap member 10 and the bottom end of casing 5 is a flat circular guide plate 11 serving as a guiding means and a support structure as will be pointed out. A sealing gasket 12 is placed next to the guide plate 11 to prevent outward leakage of water through the threaded connection 4 between the cap member 10 and body 5. Guide plate 11 has a series of water passages 13 formed therein and a centrally disposed opening 14 through which a hollow supporting disc stem 16 is adapted to reciprocate. The passages may be of any expedient regular or irregular shape. In the drawing, six circular holes have been illustrated. A shoulder 17 is formed on the top end of stem 16. The top end of the step terminates substantially below the inlet 28, as indicated by the distance X, and both the stem and shoulder are entirely out of contact and spaced apart from the casing walls as indicated at Y to provide unrestricted flow of water therearound. It will be understood that the stem may or may not be hollow and the invention is not limited to the precise structure shown. The primary purposes of the stem are first, to provide a guiding means in cooperation with the guide plate 11 to ensure that the disc seats properly in its extended position and, secondly, to provide an upper stop shoulder for the restoring spring 21.

Carried on the lower end of supporting stem 16 is a

circular spray dispersing disc 15 preferably molded of some plastic material such as "Bakelite" and having a series of serrations or grooves and teeth generally indicated at 25, around its periphery for producing the spray discharge pattern, as will be pointed out. For further details of the spray disc 15 and its construction, reference may be had to Patent 2,583,234, issued January 22, 1952, to I. H. Russell and W. E. Sloan. Spray disc 15 is supported on stem 16 by the knurl headed screw 18 and preferably clamped between a pair of thin reinforcing washers 19 and 20. A restoring spring 21 encircles supporting stem 16 and extends between the top of guide plate 11 and the retaining shoulder 17 on the top end of stem 16. With no water flowing through the shower head as shown in Figure 1, the spring 21 normally holds the spray disc 15 in spaced relationship from the spray outlet 24 and surface 27, as indicated at 22. The restoring spring 21 is made light enough to present substantially no resistance to water flow at low pressures but still be strong enough to readily restore and hold up the spray disc and stem assembly when water flow ceases. In effect, the spring is just strong enough to overcome gravity and the stem and disc assembly almost floats. The stem 16 is made only large enough to accommodate the spring 21 and presents practically no restriction to the free flow of water through the interior of the casing 5.

The teeth 25 on the spray disc 15 are provided with a flat angular outer portion which is adapted to engage the upper inside surface 27 of the spray outlet 24 and serve as a stop to halt the downward movement of the spray disc 15. When this occurs, the bottom portion 26 of the disc and teeth 25 will protrude a short distance below the lower edge portion of the spray outlet 24 as shown in Figure 2 and thereby confine the spray discharge to the grooves between teeth 25 in the disc and prevent the formation of "sheets" of water from the outlet. As shown best in Figure 1, the grooves between the teeth 25 are preferably arranged at alternate inclinations so as to produce a cone-within-cone type of spray pattern.

In the normal position of the shower head, as seen in Figure 1, when no water flows through the device, there is a large opening or gap, as indicated at 22, between the edge of teeth 25 of the spray disc 15 and the spray outlet portion 27. In this position there is no place around the spray disc including the serrations or teeth 25 in which water can accumulate and eventually dry up to form lime deposits after the water supply has been shut off. The water drains instantly from the area 22 below guide plate 11, as well as the upper chamber 23 above the guide plate; in the latter case the residual water drains through the holes 13 and out into chamber 22. Since the water drains instantly and completely from the entire interior of the shower head, as well as in the ball joint 7 and inlet connection 6, no continual annoying after-drip will occur.

When tempered water is turned on to the shower head, it flows into the inlet connection 6 and downward into chamber 23 of the body 5 as shown by the arrows in Figure 2.

Although the pressure of the water supply may be relatively low, its force in flowing through the head is unrestricted and will be sufficient to act upon the top or rear side of the spray disc 15 through openings 13 to project the spray disc 15 almost instantly downward, compressing restoring spring 21. It is to be particularly noted that the interior chamber 23 of the shower head does not present any restriction to the free unobstructed flow of water from the inlet 6, and the relatively small size of stem 16 presents practically no obstruction. The full force and flow of water can, therefore, exert itself directly upon the rear side of spray disc 15 through the large openings 13, since the effective area of fluid impingement on the disc is so much greater than the effective area of fluid impingement on the stem. Taking into consideration the fact that the spring 21 is made purposely light, the spray disc will be practically immediately projected downwardly into spray position on exceptionally small rates of flow and relatively low pressure. There is no buildup of pressures required before the spray disc is projected downwardly because it is merely carried along with the flowing stream of water. In the position shown in Figure 2, the stem 16 is pushed downward so far that it presents absolutely no obstruction to the free flow of water through the head. It is out of the path of water flow in the operated position and its sole purpose in this position is to support the spring 21.

Another important feature realized with the present structure is that a small quantity of water will flow through openings 13 and around the edge of spray disc 15 slightly ahead of the time the spray disc is stopped in its spray position. This produces a highly desirable initial flushing action enabling the discharge of any large particles or debris before the spray discharge takes place. This pre-flushing action is in addition to the flushing action which takes place when the water flow is shut off and the spray disc is retracted, as will be pointed out. Two separate flushing actions therefore take place, thus insuring that no sticking action of the spray disc can occur. The preliminary flushing action takes out any retained particles to thereby permit the disc to seat evenly so as to produce a uniform spray pattern.

The movement of the projected disc 15 is halted when the teeth 25 come into engagement with the spray discharge surface 27 and opening 24 in cap member 10. When this occurs, the water is discharged through the spray outlet in the form of a multiplicity of jet discharge sprays. With the spray disc in position to form a spray pattern, the continual flow of water against the spray disc and through the teeth 25 will be sufficient to maintain the spray disc in close engagement with the spray outlet. Stem 16 guides the spray disc 15 during its projected movement and holds the restoring spring 21 in position. The spray disc in its downward movement requires no particular guiding means because the water flowing around the edges of the spray grooves 25 tends to center the spray disc in the opening 24 so that the spray disc is virtually self-aligning. Because of the small disc and stem assembly and this self-aligning feature, only a one point contact is needed to support the assembly in an inoperative condition, that is at the guide plate 11, and only a two point contact is required in an operative position, that is at the guide plate and the outlet 24. The opening 14 in the supporting plate 11 may even be made slightly larger than the diameter of the stem 16 so there will be no danger of cocking the assembly or causing it to stick.

When the water flow through the shower head is shut off, the spring 21 exerts its compressed action to move the supporting stem 16 immediately upward, carrying the spray disc 15 along with it until the washer 20 contacts the underside of guiding plate 11 to halt the movement. This action expels and drains all the residual water in the casing through the wide open gap 22 and expels any water borne sediment which may have lodged inside the head or spray grooves. This second flushing action is in addition to the preliminary flushing action above described. The foregoing action is entirely automatic and takes place each time the head is used.

Referring specifically to Figure 3, the area relationships of the cooperating elements are there shown. The area between the casing 5 and stem 16 indicated generally at Y is substantially greater than the area of the top of the disc stem so that water flow will be unobstructed from the inlet to the spray disc. Top washer 20 covers substantially all of the area of the water passages 13 so that a maximum surface area of the disc will be exposed to the impact of the flowing water. In the particular embodiment shown in Figure 3, well over three-fourths of the combined areas of the water passages is covered by

the disc and washer. A passage 29 formed near the outer edges of the water passages between the guide plate 11 and disc 15 permits an initial flow of the water around the periphery of the disc to perform the preliminary flushing action.

In the modification illustrated in Figure 4 the parts are similar to those of Figure 1. A casing 30 forms an interior chamber 31 which has an inlet 32. A cap member 33 is threadably connected to the casing 30 at 34 and includes a spray outlet 35 and a seating surface 36. A spray disc and stem assembly supported within the housing formed by the casing and cap member includes a disc 37, having top and bottom washers 38 and 39, secured to a stem 40 by a knurl headed screw 41. A restoring spring 42 seated under a shoulder 43 supports the stem and disc assembly from a guide plate 44 which has water passages 45 and a central opening 46 within which the stem is received. Central opening 46 is formed by a downwardly depending flange 47 which serves to space the disc out of contact from guide plate 44 in its inoperative position. A relatively large flushing space 48 is formed between seating surface 36 and teeth 49 on the spray disc. A preliminary flushing space is indicated at 50.

As shown, flange 47 is positioned along the central axis of casing 5 but it will be understood that it need not be exactly concentric with the axis. The central opening 46 may be somewhat larger than the diameter of stem 40 to prevent any misalignment of the stem. In addition to serving as a guide for the spray disc, the flange also serves as a stop for the upper position of the spray disc.

In an operative position, the distance between the stem and inlet supply will be even greater than in the embodiment shown in Figure 1, so that there will be substantially no restriction whatsoever to the free flow of water through the casing and cap member.

A greater preliminary flushing action than that which occurs in Figure 1 takes place because of the larger flushing space 50. A greater aligning action is also possible because of the increased flushing action which tends to centrally seat the disc on surface 36. In an inoperative condition the disc and stem assembly will be supported at one contact point and in an operative condition the assembly will be supported at two contact points. The top of supporting stem 40 terminates substantially below the inlet and is spaced inwardly from and completely out of contact with the casing 30.

This modification it is seen, has all the desirable advantages of the automatically self-cleaning shower head of Figure 1 with the added feature of providing additional insurance that the interior of the head will be drained much faster because the rear of the spray disc is positioned away from the guiding plate 44 allowing full flow through the drain holes 45. In addition spacing the spray disc away from the guide plate permits the stream of water to impinge directly with increased force against the rear of the spray disc with the least possible resistance and the increased spacing 50 aids the preliminary flushing action.

The various forms of the invention described all have the common feature that the spray disc is projected downward into the spray outlet almost instantly by the action of the flowing water passing into the shower head and impinging directly upon the spray disc. The action therefore does not rely upon pistons, restriction rings or restricted openings to build up pressure in a separate chamber upstream from the spray disc, before the spray disc can be moved. Downward movement of the disc will occur substantially at the same time as the preliminary flushing action takes place, although there may be a very slight delay. The present invention has the advantage that the spray disc is readily projected downward even on extremely low water pressures and low rates of flow.

From the foregoing it will be apparent that a novel automatically self-cleaning shower head has been provided which can be manufactured more economically because the body can be made much smaller, the guiding stem greatly reduced, and, because of reduction of weight, a much lighter and cheaper restoring spring can be used. Furthermore, with this construction improved operation is attained since there is no restriction anywhere in the shower head to the unimpeded free flow of water so that on water pressures which are considered low, the spray disc is satisfactorily projected downward by the flow of water. Without the restriction required in former automatically self-cleaning shower heads, there is no possibility of the mechanism becoming stuck. The present spray disc is self-aligning with the spray opening and, therefore, does not require extensive guidance in a number of places to insure proper line up as formerly.

One of the most important features resulting from the elimination of any restriction in the head and consequent shortening of the long stem for the spray disc, is that complete drainage of the entire interior of the head is achieved. This includes the area above the head, including the ball joint and supply connection. Formerly water was trapped in this section, due to the restriction and blockage necessary to build up pressure to project the spray disc downward as shown in the aforementioned Russell et al. patent. Although the Russell et al. structure has yielded excellent results, particularly in localities having a water supply with a relatively low mineral content and a least 35 p.s.i. if the shower head is not used for an extended period of time and the water carries large quantities of minerals, the trapped water would gradually dry up forming lime deposits which cause sticking. The present construction provides a further important advantage over the Russell et al. patent in that a flushing and cleansing action is produced twice for each use of the shower head, providing double insurance that no water bourne sediment can be trapped in the head to prevent proper operation. The first flushing action occurs when water is initially admitted into the head and before the spray disc is fully seated into spray position. The second flushing action occurs after the water is turned off and the spray disc is retracted to permit the complete drainage of the head. This desirable action is produced without effecting the reliable movement of the spray disc and is the result of eliminating the blocking actions and restrictions previously required. Whereas the former type of shower head required a build up of water pressures in a chamber blocking the free flow of water to project the spray disc downward, the present structure relies substantially solely upon the action of the stream of water flowing unrestricted through the shower head to impinge directly upon the rear side of the spray disc and carry it along into spray position. This difference in hydraulic action to cause movement of the spray disc is important because it enables the spray disc to be satisfactorily operated upon relatively low pressures and rates of flow, a performance impossible in shower heads employing the principle of blocking and restriction.

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

For example, the exact position of the water passages 13 and 45 may be varied somewhat. On low water pressures, the spray disc and stem assembly are more responsive to the impact of the flowing water when the passages are located as far away from the stem as possible. If a substantial area of the water passages does not overlie the rear of the disc, the effective area of the disc upon which the water can impinge, is reduced.

This application is a continuation of application Serial Number 715,779, filed February 17, 1958.

What is claimed is:

1. A double flushing automatically self-cleaning shower head assembly including a casing having a water supply inlet connection and a spray outlet, a guide plate arranged across said casing and having a series of water passages therethrough, a movable spray dispersing disc arranged in said casing below said guide plate and normally in contact with a portion only of the bottom side thereof leaving portions of said passages open, a supporting stem for said spray disc extending through to the top side of said guide plate, and a restoring spring on said stem above said guide plate for normally holding said spray disc upwardly against the bottom of said guide plate, said restoring spring normally holding said spray disc in upwardly spaced relationship to said spray outlet to provide a wide gap therebetween whereby the water within the interior of said casing including said supply inlet connection may drain through the spray outlet, said supporting stem being dimensioned and arranged so as to provide, in all portions of the disc, an open annular flow passage about the stem for the free flow of water through said casing, said water passages in the guide plate being arranged normally to overlie the spray disc and to be partially blocked thereby, whereby when water initially flows through said casing and through said water passages, the water will impinge directly against the rear side of said spray disc and project the same downwardly into spray discharge engagement with the casing at said spray outlet, the cessation of water flow causing said restoring spring to retract said spray disc upwardly against said guide plate to enable said casing to be completely drained, the interior of said casing being thereby flushed out initially upon the commencement of water flow as the water passes around the edge of said spray disc as it is being projected downwardly, and secondly, when the water flow is shut off and the spray disc is retracted to drain the interior of said casing.

2. In an automatic self-cleaning shower head, a casing having an inlet at one end thereof and an outlet at the other end thereof, said casing defining a chamber for the flow of water between the inlet end and the outlet end, a guide plate fixed in the interior of said casing transversely thereof, a spray dispersing disc supported within the casing below the guide plate for movement toward and away from the outlet end of said casing, said disc normally contacting a portion only of the bottom of the plate and having a stem slidably supported in the central portion of said guide plate and entirely out of contact with the casing walls in all positions of the disc thereby to provide for full flow of water therearound from said inlet, said disc being normally spaced substantially inwardly from the inlet, whereby said casing is completely drained from said supply inlet when water flow ceases, said disc cooperating with the outlet end when in engagement therewith to produce a spray of water in a defined pattern, said guide plate having apertures therein which in all positions of the disc are at least partially open adapted to direct the full flow of water against the rearward surface of said disc, said apertures being in free communication with the inlet end of said casing so that water may pass directly from said inlet end, through said apertures, and force said disc outwardly by direct impingement thereagainst into engagement with the outlet end of said casing, resilient means on said stem for restoring said spray dispersing disc to normal position when water flow ceases, and cooperating stop means on said spray disc and said guide plate for limiting the restoring movement of said spray disc by said resilient means, and for thereby maintaining the guide plate apertures at all times at least partially open.

3. An automatically self-cleaning shower head assembly including a casing having a water inlet at its upper end and a spray discharge outlet at its lower end, a guide plate structure positioned transversely across the casing between the upper and lower ends thereof, the guide plate structure having a series of water passages therein to provide a free flow path for water between the inlet and outlet, a spray dispersing disc assembly including a movable spray dispersing disc mounted within the casing below the guide plate and normally in contact with a portion only of the bottom side thereof adapted for seating engagement with the spray outlet and carrying an upwardly extending disc-supporting stem projecting through the guide plate structure, the top of the disc-supporting stem being spaced a substantial distance downwardly from the upper inlet end of the casing and inwardly from the casing wall in its normal, retraced position, and restoring means on said guide plate structure for normally holding the spray disc out of seating engagement with the spray outlet, the disc stem and restoring means having a substantially smaller cross-sectional area than the interior of the casing so as to provide an annular passage for the free flow of water around the stem and through the casing and to provide for complete drainage of the casing interior and water supply line when the water supply is shut off, the water passages in the guide plate being generally aligned in the direction of flow with the top surface of the spray disc so as to direct water flow directly against the top of the spray disc, said passages being, at all positions of the spray disc, at least partially open.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,890,835 June 16, 1959

Jacques J. Filliung

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 56, strike out "disc"; line 57, after "passages" insert -- 13 --; line 62, after "shoulder" insert -- 17 --; line 69, after "disc" insert -- 15 --; column 4, line 68, after "top" insert -- 17 --; column 5, line 2, after "passages" insert -- 13 --; line 5, after "flushing action", and before the period, insert -- , and permits complete drainage of the unit --; column 7, line 20, for "portions" read -- positions --; line 51, for "disc" read -- stem --; column 8, line 30, for "retraced" read -- retracted --.

Signed and sealed this 29th day of September 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

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Commissioner of Patents