

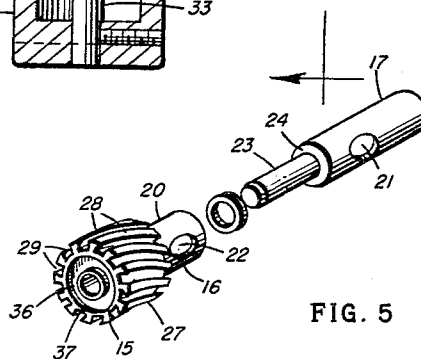
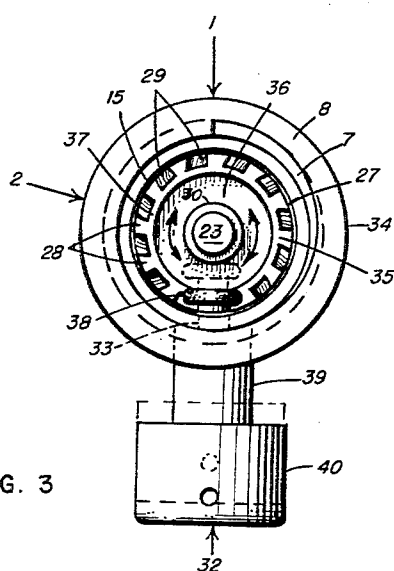
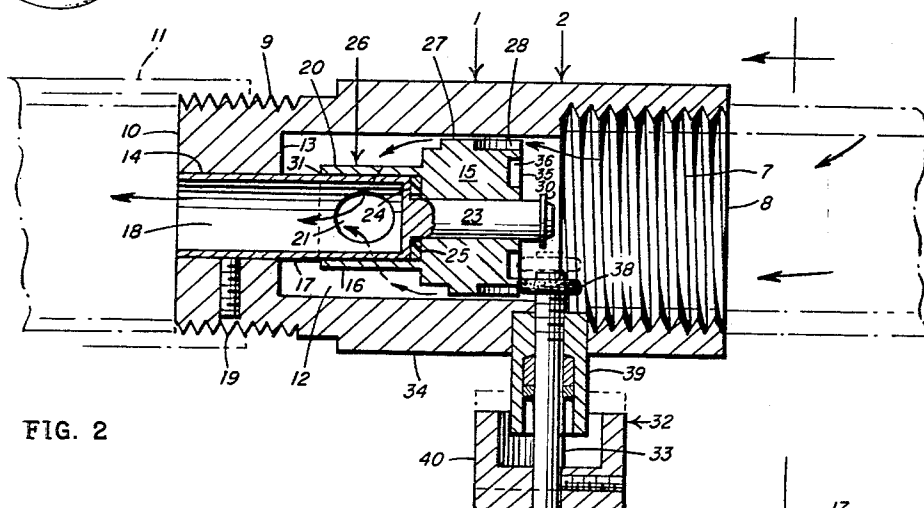
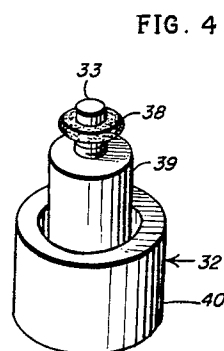
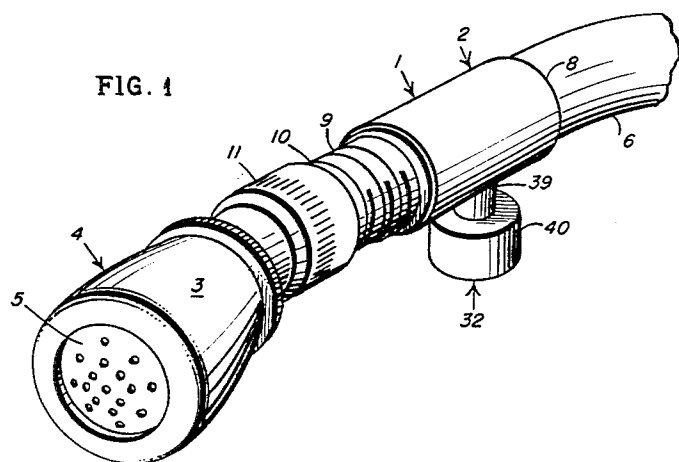
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3,473,736

PULSATING DEVICE FOR WATER OUTLET FIXTURES

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## 3,473,736 PULSATING DEVICE FOR WATER OUTLET FIXTURES

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11 Claims

### ABSTRACT OF THE DISCLOSURE

A water outlet fixture attachment positionable in the supply line in advance of the head, incorporating a radially ported valve having a turbine-driven rotor and a control for alternately permitting the rotor to turn free and regulating the position of the rotor relative to the stator.

### BACKGROUND OF THE INVENTION

It heretofore has been recognized that pulsating of the spray from a shower head will have a beneficial massaging effect upon a person taking a shower. Shower heads, such as disclosed in the patents to Donovan No. 1,446,887, Beale No. 1,609,407 and Erwin No. 2,878,066, therefore have been designed in which the spray is pulsed by a turbine-driven, sector-shaped blade sweeping across the inner face of the perforated plate or other outlet of the head through which the spray issues. As interrupting only part of the spray at a given moment, such prior shower heads do not pulsate the spray as a whole, but only in sectors. Nor do they permit the user a choice between pulsating and non-pulsating sprays except by changing the head. It is to these problems that the present invention is particularly directed.

### SUMMARY OF THE INVENTION

An object of the present invention is to provide a device for shower heads or other water outlet fixtures which, whether inbuilt or applied as an attachment, can pulsate as a whole the spray or stream issuing from the fixture, using as its motive power the hydraulic pressure supplied to the fixture.

Another object of the invention is to provide a water outlet fixture device which is controllable for alternately providing a pulsating or steady spray or stream and also for adjusting the force when the spray or stream is steady.

Disposed when applied to a shower head, in the supply line in advance of the outlet of the shower head, the preferred device has a radially ported valve leading to the outlet, the valve having a stator and rotor with the latter driveable hydraulically by the applied pressure by a turbine for pulsating the flow to and from the outlet. A manually operable control permits the turbine to be braked or held against free turning and in the latter condition enables the rotor to be turned relative to the stator to regulate the force of the consequent steady flow.

The above and other objects and features of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims, and be illustrated in the accompanying drawings, in which:

### FIGURE DESCRIPTION

FIGURE 1 is a perspective view of a preferred embodiment of the improved pulsating device applied as an attachment to a shower head;

FIGURE 2 is a longitudinal sectional view on an enlarged scale of the attachment of FIGURE 1;

FIGURE 3 is an end elevational view of the attachment taken along lines 3—3 of FIGURE 2;

FIGURE 4 is a perspective view of the control; and

FIGURE 5 is an exploded perspective view of the valve and turbine on a reduced scale.

### DETAILED DESCRIPTION

Referring now in detail to the drawings in which like reference characters designate like parts, the improved pulsating device of the present invention for shower heads or other water outlet fixtures is adapted to be built into the fixtures or, as illustrated as exemplary of the invention, built or formed as a separate attachment.

The improved device, designated as 1, is comprised of a housing or casing 2, which may be the shell or housing 3 of a shower head or other fixture 4, or a separate housing attachable to an end of the fixture, depending on whether the device is inbuilt into or an attachment for the fixture. In either case the device will be positioned downstream of the main valving (not shown) controlling the water supply to the fixture and upstream or in advance of an outlet for the fixture through which water therefrom is ejected, the outlet for the shower head of the illustrated embodiment suitably being the perforated or foraminous plate or other suitable spray-forming outlet 5 through which water is ejected as a spray from the head 4.

In the illustrated attachment form for a shower head, the housing 2 may be tubular and fitted for mounting between the head 4 and the usual shower or supply pipe 6 jutting from a shower wall (not shown), through which water is delivered to the head, with a female fitting or coupling 7 on or in its upstream end 8 and a male fitting or coupling 9 on its downstream end 10. Ordinarily, the head 4 itself will have a swivel coupling 11 for adjusting the direction of the spray and in such case the fittings 7 and 9 may be integral with and formed by appropriately threading the opposite end portions of the housing 2, so that the housing, in being mounted on the pipe 6 and mounting the head, becomes a rigid extension of the pipe.

In the housing 2, upstream or upwardly of the head 4 or at least the outlet 5, is a longitudinally or axially extending cylindrical chamber 12 opening at its upstream or upper end onto the pipe 6 through the intervening coupling 7 or 11 and partly closed at its downstream or lower end by a transverse or lateral wall or septum 13 of the housing 2 interposed between the chamber and the outlet 5. Extending through the wall 13 and coaxial or concentric with but reduced or restricted in cross-section relative to the chamber 12, is an aperture 14, which may be out-of-round but usually will be cylindrical. In the attachment form, this apertured wall 13 is the lower or downstream wall of the separate housing 2.

Mounted, housed or contained in the chamber 12 and concentric or coaxial therewith, are a turbine or impeller 15 and, downstream or downwardly of the latter, a rotary valve 16. The preferred rotary valve 16 is radially ported and includes an inner stationary element or stator 17 having a central outlet passage 18 closed upwardly or at its upstream end and opening downwardly toward the outlet 5. For mounting it in the housing 2, the stator has its lower portion fitted or received in and projecting or extending partly or entirely through the aperture 14, with the stator held against relative rotation by suitable means, such as a set screw 19, unless the aperture and stator portion received therein are correspondingly out-of-round.

Whatever the configuration of its lower portion, the stator 17 is externally cylindrical over its upper portion for rotatably mounting an internally cylindrical outer rotary element or rotor 20 of the valve 16. Radial ports 21 and 22, extending through the sides of the stator 17 and rotor 20, respectively, and radially aligned at intervals on rotation of the rotor, causes the valve 16 alternate-

ly to open and close upon such rotation and correspondingly connect and disconnect the chamber 12 and the passage 18 in the stator. While the stator and rotor ports 21 and 22 may differ in number and arrangement for preselection of the rate of opening and closing of the valve 16 for a given rate of rotation of the turbine 15, the illustrated pair of dimetrically opposed ports for each of the elements will ordinarily suffice.

A relatively reduced valve stem 23, integral or rigid and concentric or coaxial with the stator 17 and upstanding or projecting or extending upwardly or upstream from the stator's closed upper or upstream end 24, conveniently serves as a shaft for rotatably mounting the turbine 15, with end thrust taken and friction minimized between the turbine and the stator by an interposed Teflon or other suitable anti-friction thrust washer or bearing 25 encircling the stem. The rotor 20 and turbine 15 are driveably connected so that rotation or turning of the turbine on the stem or shaft 23 will cause the rotor to rotate or turn on the stator 17. This, for the preferred rotation of the turbine and rotor in unison, is accomplished by suitably fixing them against relative rotation, most simply by making the turbine and rotor integral parts of a unitary member 26 of which the turbine forms a head and the rotor a relatively reduced cross-section, socketed throat.

As opposed to the relatively reduced outside diameter of the rotor 20, the preferred diameter of the turbine 15 is substantially that of the chamber 12, with only sufficient radial clearance therebetween to ensure against binding. Vaning of the turbine to enable it to be rotated, turned or impelled by the hydraulic pressure or force of water flowing from the shower pipe 6 to the outlet 5, conveniently is obtained by helically grooving the turbine's cylindrical periphery 27 to form therein longitudinally extending, helical vanes 28, which preferably are equally spaced circumferentially and between which, through the intervening channels 29, water, after imparting a rotative force to the turbine, flows therepast to the valve 16 when the shower head 4 is in operation. The turbine is held against accidental displacement on the stem 23 by suitable means, such as a snap ring 30.

The hydraulic pressure of the water supplied through the supply pipe 6, will supply the rotative force for turning the turbine or turbine wheel 17 so long as the water flows through the channels 29 between the vanes 28 and, once the turbine is rotating, its momentum or fly wheel effect will continue its rotation despite a momentary interruption in its flow. Too, leakage through the unsealed joint 30 between the rotor 20 and the stator 17 will drain off the pressure and part of the water from the chamber 12 in the periods in which the supply of water under pressure to the shower pipe 6 is shut off by suitable conventional valving (not shown). Thus, unless otherwise impeded, the turbine will begin to rotate when the water supply to the shower pipe 6 is first turned on, even though the valve 16 is then closed, and will continue to rotate until the supply is shut off, regardless of momentary blockage of egress from the chamber 12 through the outlet passage 18 in the stator 17 by the intermittent or periodic closing of the valve.

While the turbine is turning, the rotary valve 16, by having its own stator 17 separate from the outlet 5, has the salutary effect from a massaging standpoint of intermittently interrupting the spray as a whole emitted from the head 4, as against a sectoral blade sweeping across the outlet which can only interrupt a sector of the spray at a time. As the rate of pulsation of the spray by the alternate opening and closing of the valve is dependent upon the speed or rate of rotation of the turbine, which will vary with the applied pressure, the pulse rate will be constant for a given pressure but can be varied, if the user chooses, by varying the supplied pressure by the valving in advance of the shower pipe 6.

Despite the beneficial massaging action of the pulsating

spray produceable by the turbine-driven valve, there may be times when it is not wanted by a particular user. For this problem the preferred device 1 makes provision, without requiring itself to be removed. In solving the problem the preferred device includes a manually operable control 32 for selectively or alternately enabling the turbine 15 to run free or be stopped to produce either a pulsating or a steady spray at the choice of the user.

The preferred selective control 32 has an operating shaft or rod 33 projecting or extending radially through the side wall or side 34 of the housing 2 in advance of the turbine 15 and radially overlapping the turbine's upstream or upper end 35. Radially extending, the overlapped end 35 is interrupted by an upwardly opening, annular or circular recess or groove 36 interposed between and concentric with the stem 23 and a juxtaposed outer, generally flat, annular or circular shoulder portion, shoulder or land 37 of or on the end, the outer part of which is formed and interrupted by the adjoining ends of the vanes 28 and channels 29, respectively.

In its overlapping inner end portion the operating shaft 33 non-rotatably but concentrically mounts or carries a rubber O-ring or other suitable elastic friction ring or wheel 38, of such size and so positionable by axial shifting or movement of the shaft as alternately to seat or be received in the groove 36 out of contact with the turbine and to frictionally engage the land 37. The shaft 33 is itself conveniently mounted, water-tight, in a suitable gasketed or packed fitting 39 socketed in or otherwise mounted on the outside of the side wall 34 and, to aid positioning and restraint against turning or rotation of the friction ring 38, is screwed or threaded into rather than slidable in the fitting. Although restrained against accidental turning by its threaded and gasketed fit with the fitting, the shaft 33 is readily turnable or screwable, when desired, by a knob 40 on its outer end.

With the above control 32, the turbine 15 and with it the rotor 20 will be either free to rotate or locked, held or braked against rotation, depending on whether the friction ring 38 is positioned in the groove 36 or on the land 37, and the elasticity of the ring readily enables the ring to shift or ride from one to the other of the groove and land on inward or outward turning or screwing of the shaft 33. Not only does the control 32 make the selection between a pulsating and steady spray simply a matter of manipulating the knob 40, but turning of the knob while the friction ring 38 and land 37 are in frictional contact or engagement will also turn the rotor 20 relative to the stator 17. Consequently, by making the relative widths of the ring and land such as to maintain that contact over a range of the rotative and axial movement of the ring that will turn the rotor through an arc sufficient to fully open and partly or fully close the valve 16, the steady flow from the valve to the outlet 5 and force of the resultant steady spray from the head 4 can be regulated or varied by the control 32 to suit the user without need to resort to the main valving in advance of the shower pipe 6. Also, since in shifting in position from the groove 36 to the land 37, the friction ring 38 necessarily changes in its braking or drag on the turbine 15 from none to full locking, the control 33 can be used to regulate or vary the rate of rotation of the turbine under a given hydraulic pressure and, correspondingly, the pulsation rate produced by the rotary valve 16.

From the above detailed description it will be apparent that there has been provided an improved pulsating device for shower heads or other water outlet fixtures that within itself gives a user the choice of a pulsating or regulatable steady spray. It should be understood that the described and disclosed embodiment is merely exemplary of the invention and that all modifications are intended to be included that do not depart from the spirit of the invention.

Having now described my invention, I claim:

1. A pulsating device for a water outlet fixture, compris-

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ing a housing, a rotary valve in said housing upstream of an outlet from said fixture, said valve including a stator and a rotor radially ported and mounted respectively stationarily and rotatably in said housing, and a turbine in said housing upstream of said valve for driving said rotor.

2. A pulsating device according to claim 1, wherein the stator rotatably mounts both the rotor and the turbine.

3. A pulsating device according to claim 2, wherein the rotor is integral with the turbine.

4. A pulsating device according to claim 1, including control means connected to the housing for selectively freeing said rotor for and holding said rotor against rotation for producing respectively a pulsating and steady stream from the fixture.

5. A pulsating device according to claim 4, wherein the control means is engageable with the turbine and acts therethrough on the rotor.

6. A pulsating device according to claim 4, wherein the control means in rotor-holding position is adapted to regulate flow through the valve by turning the rotor relative to the stator.

7. A pulsating device according to claim 6, wherein the control means intermediate rotor-freeing and holding positions is adapted to regulate the rate of rotation of the rotor and therethrough the rate of pulsation of the spray under a given flow of water to the turbine.

8. A pulsating device according to claim 6, wherein the control means includes an operating shaft extending radially in advance of the turbine through a side of and rotatably and axially movable relative to the housing, and

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an elastic friction ring mounted concentrically and non-rotatably on said shaft and radially overlapping an upstream end of the turbine, and juxtaposed concentric annular recess and land means on said end and alternately presentable to said ring respectively for receiving said ring out of contact with the turbine and for frictionally engaging the ring.

9. A pulsating device according to claim 8, wherein the shaft is threaded through the side wall.

10. A pulsating device according to claim 1, wherein the housing is separate from and upstream of the shower head.

11. A pulsating device for a shower head, comprising a housing, a turbine-driven rotary valve in said housing upstream of an outlet of said head for pulsating flow of water from said outlet, and control means connected to said housing and actable on said valve for holding rotor means thereof against rotation and thereby producing a steady flow from said outlet.

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U.S. Cl. X.R.

128—37; 137—625.31; 239—102, 383; 251—59