United States Patent

Morton

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[45] **Aug. 1, 1972**

[54] **AERATOR VALVE AND DENTAL CLEANSER APPLIANCE**

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[52] **U.S. Cl.** **239/428.5,** 239/438, 239/443

[51] **Int. Cl.**.....**E03c 1/08**

[58] **Field of Search** 128/66, 229, 224; 239/25, 26, 239/428.5, 438, 443, 444, 445, 446, 447

[56] **References Cited**

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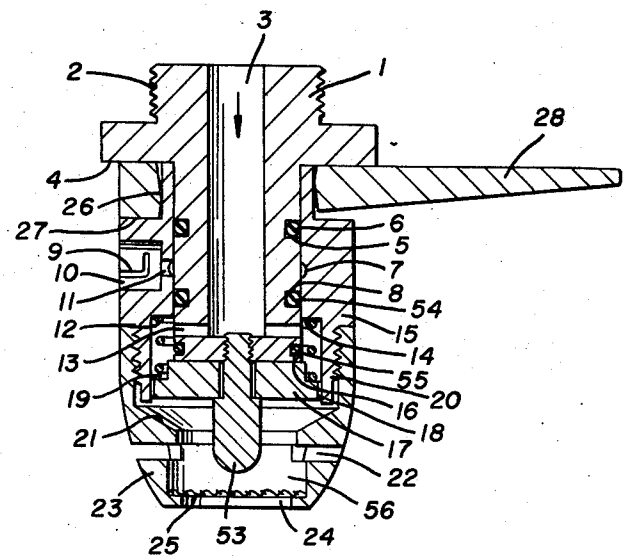
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Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—John J. Love

[57] **ABSTRACT**

A valve with an annular outer body that slides up and down a central tubular column. The movement of the annular outer body relative to the central tubular column is achieved by the movement about a fulcrum of a lever positioned between the annular outer body and a flange on the central tubular column. This lever is free to rotate laterally about the axis of the annular outer body. The central tubular column has orifices around its periphery that allows liquids to pass through and on into one or more exits depending upon the relative position of the annular outer body to this central column. When the lever is actuated, the flow of liquid is diverted through an exit interconnecting with a mixing chamber. The pressure of the liquid entering the valve forces the liquid through the mixing chamber and on through a flexible hose connecting the mixing chamber with a dental appliance for manually directing the jet of liquid.

6 Claims, 22 Drawing Figures



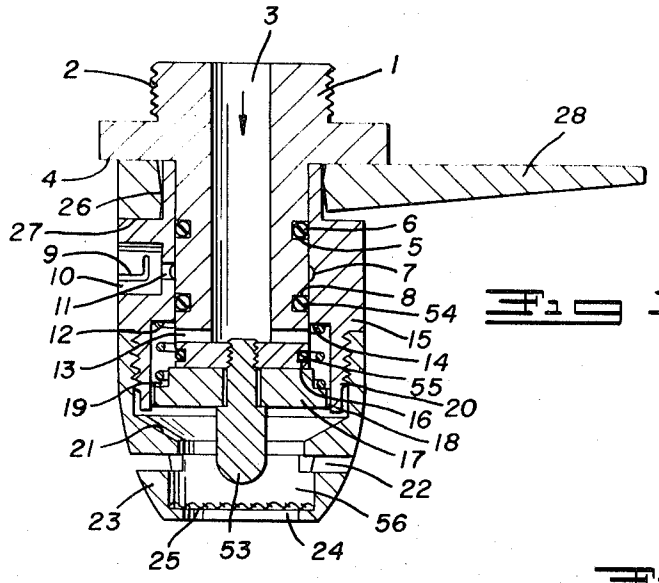


Fig 1

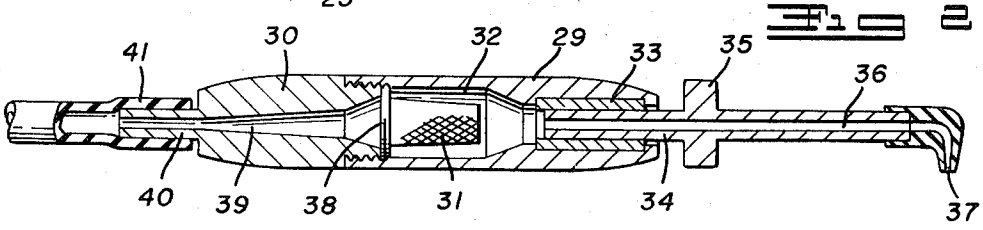


Fig 2

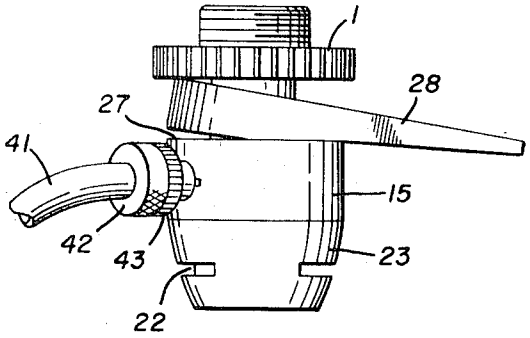


Fig 3

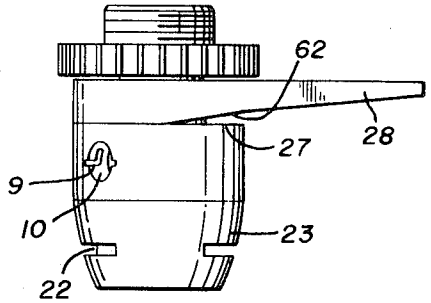


Fig 4

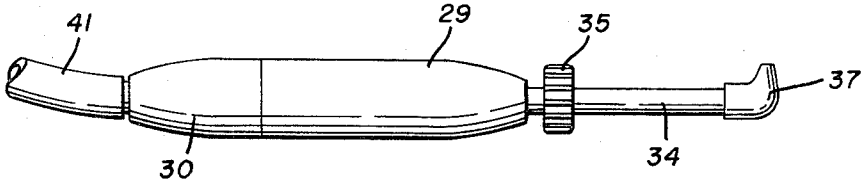


Fig 5

Fig 6

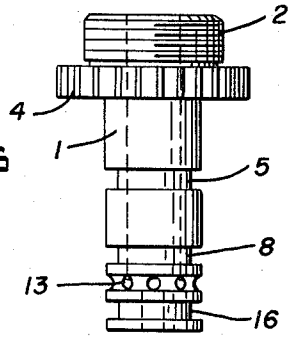


Fig 20

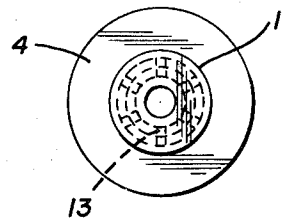


Fig 7

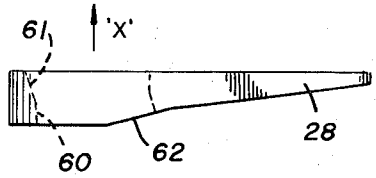


Fig 8

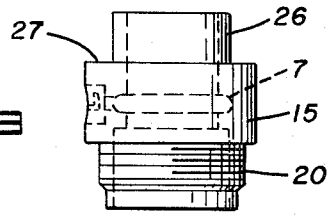


Fig 9

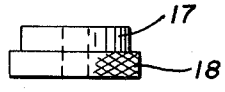


Fig 12

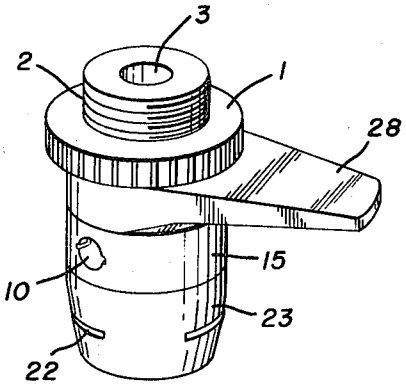


Fig 10

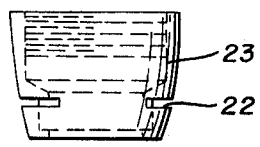


Fig 13

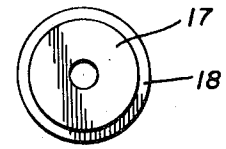


Fig 11

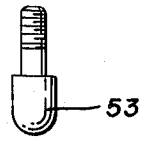


Fig 15

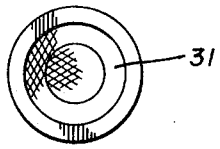
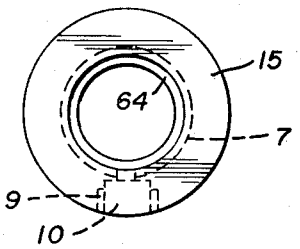


Fig 14



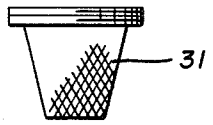


Fig 17

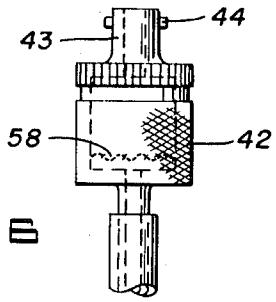


Fig 16

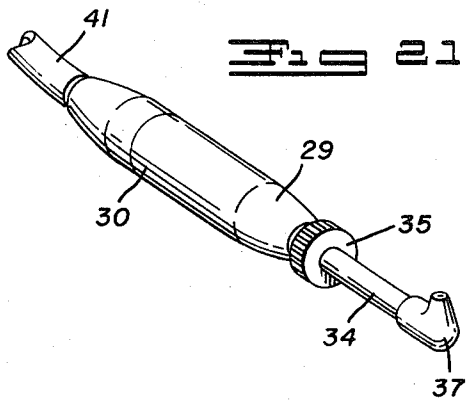


Fig 21

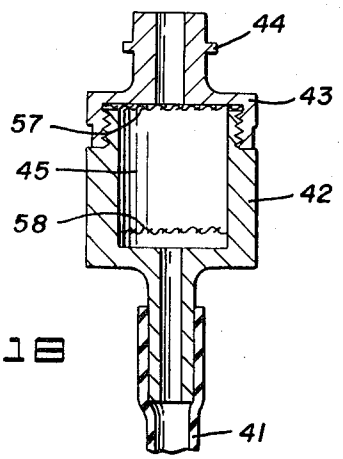


Fig 18

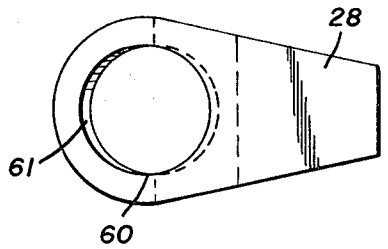


Fig 22

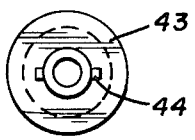


Fig 19

AERATOR VALVE AND DENTAL CLEANSER APPLIANCE

This invention generally relates to dental cleaning applicances for releasing a small jet of washing liquid under pressure, the liquid comprising a mixture of water and cleansing chemicals, such mixing occurring within the appliance while in use, and more particularly to a hollow handled appliance attached to a flexible hose, said flexible hose connecting with a hose adaptor of novel design, said hose adaptor being attached to an aerator valve of novel design which is attached to a spigot or faucet.

A general object of the present invention is to provide such structure in a simplified manner that is readily manufactured and easy to install and use, such use providing effective cleaning of a person's mouth and teeth, particularly between the teeth.

A more specific object of the invention is to provide a novel means of directing a flow of water from either one of the two exits in the aerator valve at the will of the operator.

Another object of the invention is to provide a means of aerating the water flowing out of one of the exits.

Another object of the invention is to provide a small jet of washing liquid under pressure out of a dental appliance jet attachment.

Another object of the invention is to provide a moveable operating lever for directing the flow of water in the aerator valve at the will of the operator, said movement to be a rotational displacement in addition to an inclined displacement in relation to the axis of the valve.

Another object of the invention is to provide a means of easily connecting and disconnecting an adaptor mixing chamber to the aerator valve.

Another object of the invention is to provide means of easily attaching a jet attachment to the dental appliance, said jet attachment connecting to a flexible jet nozzle which provides protection against injury to the soft tissues of the mouth.

Another object of the invention is to provide a thin flexible wall at the exit tip of the flexible jet nozzle, said exit tip restricting the flow of liquid and being caused to vibrate by the velocity of the liquid passing therethrough, said vibration agitating said liquid.

Another object of the invention is to provide a splash wall for directing the flow of water into the aerator chamber.

Another object of the invention is to provide means of entry for air into the aerator chamber.

Another object of the invention is to provide a means of smoothing the flow of water in the aeration chamber, thereby producing a smooth, even flow of water exiting from the aerator valve.

Another object of the invention is to provide a simple means of introducing a chemical cleanser into the flow of water passing through the appliance handle.

Another object of the invention is to provide a means of introducing a chemical cleanser into the flow of water entering the flexible hose communicating with the dental appliance.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts, and in which;

FIG. 1 shows in side elevation a sectional view of an aerator valve constructed in accordance with the invention, said aerator valve being shown with the several parts of the valve in relative position such as to allow water to flow through the aerator chamber and out of the bottom orifice.

FIG. 2 shows in side elevation a sectional view of a dental appliance comprising in combination an appliance handle, together with an appliance head and a jet attachment, said jet attachment being attached to a flexible jet nozzle.

FIG. 3 is a side perspective of the aerator valve shown in FIG. 1, with the operating lever being shown in an inclined position relative to the body of the valve, said lever position reducing the flow of water through the lower part of the valve and directing the flow of water through the outlet port in the wall of the aerator valve and into the adaptor mixing chamber shown attached to the side of said aerator valve.

FIG. 4 shows in side perspective the aerator valve as shown in FIG. 1.

FIG. 5 shows in side perspective the dental appliance as shown in FIG. 2.

FIG. 6 shows in side perspective the center core part of the aerator valve with the gaskets removed to more clearly show the gasket grooves.

FIG. 7 shows in side perspective the operating lever of the aerator valve.

FIG. 8 shows in side perspective the sliding sleeve part of the aerator valve.

FIG. 9 shows in side perspective the spring pressure plate part of the aerator valve.

FIG. 10 shows in side perspective the aerator chamber part of the aerator valve.

FIG. 11 shows the flow smoother part of the aerator valve.

FIG. 12 is a pictorial perspective of the aerator valve.

FIG. 13 shows a plan view of the spring pressure plate part of the aerator valve.

FIG. 14 shows a plan view of the sliding sleeve part of the aerator valve.

FIG. 15 shows a plan view of the appliance head chemical container.

FIG. 16 shows in side perspective an adaptor mixing chamber.

FIG. 17 is a side view of the appliance head chemical container.

FIG. 18 is a side elevation sectional view of the adaptor mixing chamber.

FIG. 19 is plan view of the adaptor mixing chamber.

FIG. 20 is a perspective of the center core part of the aerator valve looking in the direction of the arrow "X" shown in FIG. 6.

FIG. 21 is pictorial perspective of the dental appliance in combination with the jet attachment.

FIG. 22 is a plan view of the operating lever part of the aerator valve.

In carrying out the invention referring now specifically to the drawings and particularly FIG. 1 thereof, there is provided an aerator valve comprising a center core 1 with a sliding sleeve 15 surrounding said center core 1, said sliding sleeve 15 held against a flange 4 by means of a compression spring 12 and a spring pressure plate 17, the spring pressure plate 17 being attached to the center core 1 by a threaded flow smoother 53. Attached to said sliding sleeve 15 by such conventional

means as threaded body 20 is an aerator housing 23, attached thereto, around the interior periphery of said aerator housing 23 is a splash wall 21.

Seated in grooves 5, 8 and 16 around the said center core 1 are gaskets 6,54, 55, gaskets 6 and 54 forming a water-tight seal against the bore 64 part of said sliding sleeve 15. The grooves 5, 8 and 16 are more clearly seen in FIG. 6.

With continuing reference to FIG. 1, a threaded boss 2 is used to attach the center core 1 to a water faucet, said attachment allowing the entry of water under pressure into the inlet port 3, the water flows down through the center core 1 and out through the plurality of apertures 13. The apertures are more clearly seen in FIGS. 6 and 20. With said sliding sleeve 15 in a position relative to the center core 1 as shown in FIGS. 1 and 4, the water exiting from said apertures 13, enters the spring pocket 19 and passes by the periphery of the spring pressure plate 17 where the turbulence channels 18 of said spring pressure plate 17 breaks the flow of water into a plurality of separate streams. The separate streams of water are directed to the center of the aeration chamber 56 by the splash wall 21 where aeration of the water is achieved by air entering the plurality of air entries 22. The aerated water is directed to the exit orifice 24 and through the aeration mesh 25 by the flow smoother 53.

With continuing reference to FIG. 1 and also referring to FIG. 4, the compression spring 12 in combination with the spring pressure plate maintains pressure on the sliding sleeve 15 and also the lever 28, holding said sliding sleeve 15 against the flange 4, in which relative position water flows down through the aerator valve and out through the exit orifice 24.

With reference to FIG. 3 and also FIGS. 7 and 1, an operating lever 28 can be depressed downward at the will of the operator, causing said sliding sleeve 15 to move relative to said center core 1, said operating lever 28 can be depressed until angle face 62 comes in contact with shoulder 27 in which relative position the flow of water into the aeration chamber 56 has been shut off by the gasket 55 in the gasket groove 16, forming a water tight seal with the bore 64 part of the sliding sleeve 15. In this relative position, the flow of water through the apertures 13 of the center core 1 enter into the exit channel 7 and thereby enter the outlet port 11 and subsequently the adaptor mixing chamber 45, when the operating lever 28 is released, the compression spring 12 applies pressure to the annular flange 14, forcing said sliding sleeve 15 against said flange 4.

With reference to FIGS. 16 and 18, an adaptor shank 43 is attached by conventional means to a hose adaptor 42, the interior of said hose adaptor 42 comprises a mixing chamber 45, mesh guards 57 and 58 are attached to the interior of said mixing chamber 45 providing means of containing cleanser compound within said mixing chamber, adaptor lugs 44 attached to adaptor shank 43 provide means of temporarily attaching adaptor shank 43 to said sliding sleeve 15 in adaptor orifice 10, said adaptor lugs 44 sliding and locking by turning in lug slots 9, a flexible hose 41 is attached by conventional means to said hose adaptor 42, said flexible hose connecting to an appliance handle 30.

With reference to FIGS. 2, 5 and 21, a dental appliance with an axial bore extending therethrough to provide a through liquid passage, comprising in combination, an appliance handle 30 attached to a flexible hose 41 by conventional means, an appliance head 29, said appliance head 29 having a head mixing chamber 32, in the interior of said head mixing chamber 32 is attached a head chemical container 31, reference being made to FIGS. 15 and 17 to more clearly define said head chemical container 31, said appliance head 29 has in combination a jet attachment 34 held by means of a gasket 33 in said appliance head 29, said jet attachment 33 having a raised flange 35 for ease of removal, attached to said jet attachment 34 by conventional means is a flexible jet nozzle 37, the exit tip 66 of said flexible jet nozzle being of sufficient narrowness, and the said flexible nozzle wall being of sufficient thinness at the exit tip 66 as to cause said exit tip 66 to vibrate with the movement of the cleansing liquid passing therethrough.

With reference to FIGS. 1, 3, 4, 7 and 22, operating lever 28 is free to be rotationally displaced about the sliding sleeve throat 26 while resting on shoulder 27. The operating handle aperture 60 is bevelled 61 to allow said operating lever 28 to be inclined in relation to said sliding sleeve throat 26, the rotational displacement of said operating lever 28 about said sliding sleeve throat 26 provides the means of rotating the said center core 1 during installation of said aerator valve to a spigot or faucet, while said operating lever 28 remains stationary in relation to the faucet.

In using the invention the adaptor shank 43 is disconnected from the hose adaptor 42 and a quantity of chemical cleanser is inserted in the mixing chamber 45. The hose adaptor 42 is attached to the adaptor shank 43 and said adaptor shank 43 is inserted into the adaptor orifice 10. The appliance head 29 is disconnected from the appliance handle 30 and a quantity of chemical cleanser is placed in the head chemical container 31. A jet attachment 34 is inserted into gasket 33 forming a water-tight seal.

The water faucet is turned on and water allowed to flow out of the aerator orifice 24. With combination hot and cold water mixing valves, the water temperature can be adjusted to personal preference by touch testing the flow of water out of the aerator orifice 24.

The dental appliance is held in one hand and the jet attachment 34 is inserted into the user's mouth. When the lever 28 is inclined at an angle relative to the center core 1, said movement being at the will of the operator, the leverage action of the lever 28 against the flange 4 moves the sliding sleeve 15 down the center core 1, this brings the exit channel 7 into alignment with the apertures 13 while at the same time allowing the gasket 55 in groove 16 to form a water-tight seal with the sliding sleeve 15, thus shutting off the flow of water into the spring pocket 19. The full pressure of water in the exit channel 7 escapes through the outlet port 11 which connects directly to the adaptor orifice 10.

In this position water flows under pressure through the hose adaptor 42, swirling about the mixing chamber 45, dissolving the chemical cleanser contained therein. The water and chemical mixture flows through the flexible hose 41 to the appliance handle 30 which is in combination with the appliance head 29. In the appliance head 29 is a chemical container 31 about which

the liquid swirls, further mixing with the chemical cleansers contained in said chemical container **31**. The mixture passes longitudinally through the jet attachment **34** by means of the channel **36** and out through the jet attachment flexible nozzle **37** as a small high pressure jet of cleansing liquid, said liquid being agitated by the vibration of the exit tip **66** caused by the velocity of the liquid passing through the restricted opening.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation as shown and described, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

Having thus completely and fully described the invention, what is now claimed as new is as follows:

1. A water aerator valve comprising in combination a center core with a conventional mounting means at one end, a sliding sleeve surrounding said center core, an operating lever provided for moving said sliding sleeve in relation to said center core, said movement providing means of opening and closing an outlet port and likewise alternately opening and closing water entry into an aeration chamber, said outlet port extending through the wall of said sliding sleeve and connecting with an adaptor orifice, an inlet port for the reception of water under pressure, a spring pressure plate which retains a compression spring, said spring pressure plate being attached by conventional means to the end of said center core, said compression spring applying pressure against an anular flange within said sliding sleeve, thus, said sliding sleeve maintaining pressure against said operating lever, said operating lever likewise being held by the said spring pressure against a flange extending from said center core, a splash wall for directing the flow of water into an aeration chamber, said splash wall being attached to the inside perimeter of said aeration chamber and surrounding a flow smoother which is positioned in the center of said aeration chamber, said flow smoother being attached by conventional means to said spring pressure plate, a plurality of air entry apertures in the outer wall of said aeration chamber, a mesh protector across an exit orifice.

2. The water aerator valve as defined in claim **1** characterized in that said operating lever can be rotationally displaced about the axis of said sliding sleeve throat while also moveable in an inclined position relative to said sliding sleeve.

3. The water aerator valve as defined in claim **2** characterized in that provision of said gaskets of a suitable material provides a water-tight seal between said center core and said sliding sleeve shaft.

4. The water aerator valve as defined in claim **3** characterized in that provision of a plurality of channels around the periphery of said spring pressure plate causes turbulence in the flow of water passing between the periphery of said spring pressure plate and wall of said sliding sleeve.

5. The water aerator valve as defined in claim **4** characterized in that provision of said splash wall extending around the interior of said aeration chamber directs the flow of turbulent water away from the air entry apertures and towards the center of the aeration chamber.

6. The water aeration valve as defined in claim **5** characterized in that provision of said flow smoother in the center of the aeration chamber provides a means of reducing the turbulence of the aerated water prior to exiting from the aerator valve.

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