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CLEANING DEVICE

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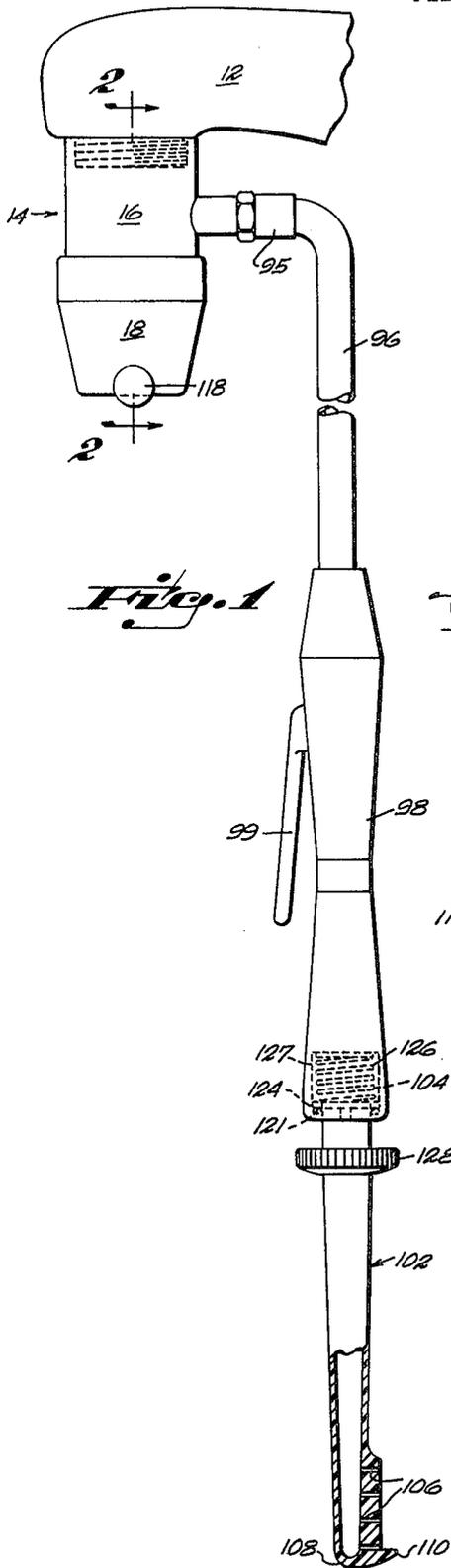


Fig. 1

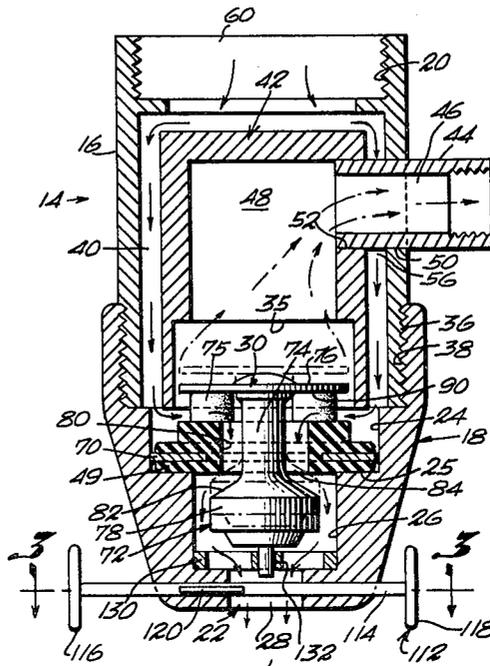


Fig. 2

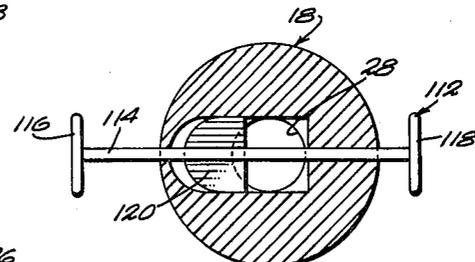


Fig. 3

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CLEANING DEVICE  
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6 Claims

## ABSTRACT OF THE DISCLOSURE

A device especially useful for cleaning operations which includes (a) a unit having an inlet port and two outlet ports, and (b) a spray head, connected to the unit (c) by a hose, which unit is adapted to be connected to a faucet to cause the fluid to flow through the unit which includes a diverter means and a valve effective in response to the flow to open and close and divide the flow into two pulsating components one of which is directed through the hose to the spray head for delivery through jets in a plurality of parallel pulsating fluid components in a spray form.

It is an object of this invention to provide an inexpensive highly useful device of particular value in cleaning teeth which includes a flutter valve means disposed within an adapter unit for connection to the spigot or faucet of a water discharge system.

It is another object of this invention to provide an improved unit to be interposed in a closed fluid path and which includes a valve member responsive to current flow such that it will flutter within a certain range of volume flow to cause a component of the flow to assume a diverted pulsating path in response to cyclical opening and closing of the valve.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a partial side view illustrating the instant invention;

FIGURE 2 is a view in cross-section taken along the plane indicated by the line 2—2 of FIGURE 1 and looking in the direction of the arrow;

FIGURE 3 is a plan view in cross-section taken along the plane indicated by the line 3—3 of FIGURE 2 and looking in the direction of the arrow.

Referring now to the drawings wherein like referenced characters designate like or corresponding parts throughout the different views and with particular reference to FIGURE 1, it is seen that there is attached to the faucet 12 a unit generally designated by the numeral 14. The unit 14 includes an adapter 16 threadably mounted on the faucet and having a discharge housing 18 threadably connected to the discharge end of the adapter 16. A throughbore 20 is provided in the adapter and the same communicates with a stepped through channel 22 in the discharge housing in which a plurality of chambers are defined, an innermost chamber 24, an intermediate chamber 26, and an outer chamber 28. A flutter valve assembly generally designated by the numeral 30 is sized to rest on the lower partial floor or shoulder 25 intermediate the inner chamber 24 and the intermediate chamber 26. The flutter valve assembly will be explained more in detail hereinafter; suffice it to say at this point that it is operable within the operating chamber 26 and includes a headed portion which extends into the recess 35 defined by the threaded convolutions 36 and 38 of the adapter and discharge housing. Captivated and suspended within the hollow or column 40 of the adapter 16, an inverted cup shaped member 42 is provided which

is maintained in coaxial relation with respect to the adapter and discharge housing by suitable means, which in the embodiment shown comprises a nipple 44 having an interior passageway 46 in open communication with the interior 48 of the cup shaped member and passing through holes 50 and 52 in the walls of the adapter and cup shaped member respectively with the nipple spanning the space 56 between the confronting walls of the cup shaped member and the adapter.

The operation of the unit will be briefly described at this point which will facilitate a more ready understanding of the description which follows. When the passageway 46 of the nipple is closed, water flows into the unit through the mouth 60 which is adapted as by the interiorly disposed thread to connect to a faucet, and courses through the space 40 between the cup shaped member 42 and the adapter 16 and after passing through the valve assembly exits through the mouth 28 of the outer chamber. On the other hand, if the nipple passageway is partially opened only, the flutter valve assembly will in response cyclically open and close to divert a pulsating component of the water stream up through the interior 48 of the cup shaped member and through the nipple. The structure of the valve assembly will now be described.

The valve assembly includes an annular member 49 preferably of rubbery material which dwells on the shoulder 25 defined between the inner and intermediate chambers 24 and 26 and preferably includes a washer 70 preferably of metal sized to snugly nest without movement within the innermost chamber 24. The valve member 72 includes a stem 74 having a headed upper end 76 and an enlarged lower end 78. The stem 74 is of a reduced diameter relative to that of the opening 80 in the member 49 and is slidable in response to vertical pressures to open and close the valve by bringing the sloped surface 82 of the enlarged lower end into and out of closing relation of the lower opening 84 of the valve unit. The headed end 76 is maintained in spaced relation from the unit so that water may course around and under it by means of a series of vertical pin members 75 which are preferably carried on the headed end 76 in depending relation as indicated by the numeral 90; however, an alternative construction comprising upstanding pin members may be provided on the roof surface of the annular member of the valve. In operation, water will in response to a certain volume of fluid flow through the unit, which can be controlled by suitable control means such as a gate valve in the faucet, cyclically open and close the valve to cause pulses of water to be discharged through the nipple following the path indicated by the dotted arrows of FIGURE 2. While the applicant does not confine this disclosure to any theory of operation, it appears that the water impinging upon the annular member causes an upward force resulting from the rapid change of direction which occurs in the innermost chamber 24, thus, raising and lowering the valve stem.

To the nipple, a flexible hose means 96 is connected by fitting means 95 and on the terminal end a shutoff or control valve 98 is provided which is preferably of the type which includes a squeeze type operator 99. A spray head 102 is connected by suitable means 104 and through this head the pulsing water component is constrained to travel. At the distal end of the spray head a pattern of through holes 106 are provided which are sized to present an obstruction to the fluid flow and to divide it into parallel components of the pulsating sprayed fluid. Preferably the distalmost end is rounded as at 108 and provided with a laterally protecting tip 110 which serves to guide the spray head in spaced relation

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to the sprayed surface. It will be apparent that this pulsating spray of fluid from the spray head can be especially useful for cleaning teeth. In like manner other spray head shapes may be employed depending upon the use to be made of it. To achieve an improved fluid flow through the unit, a slider valve assembly 112 may be provided, which includes a laterally slidable member 114 captivated within a lateral through hole and provided with end caps 116 and 118 and with an intermediate gate 120 which is sized and adapted to be moved into spanning relation of the outermost chamber 28 to vary the size of the opening and consequently control the fluid flow. The slider valve thus serves as a control means to modify the flow of the pulsating fluid. Guide means 130 comprising an open work with an axial through opening 132 are preferably provided for passage of a projection of the valve stem to maintain that element in coaxial alignment with the other portion of the unit.

In operation, the device is especially useful for cleaning teeth and causing a pulsating flow of water from the spray head. Referring to the spray head, it will be apparent that the provision of jet type openings will be beneficial and that a suitable O-ring 121 should be provided to facilitate the connection indicated in FIGURE 1. Further, any type of quick lock connector means 104 may be provided preferably of the type which includes an enlarged end 124 and spring means 126 captivated in the recess 127 to urge it into fluid type relation with the O-ring 121. Also, the spray head is preferably provided with an indicia ring 128 which can be color coded so that the spray tip or spray head may be used by the particular member of the family to which it has been assigned. It will be seen that once the water flow is permitted through the faucet 12, and the volume of the flow has been adjusted a pulsating current will flow through the unit and nipple as the valve cyclically opens and closes the main path through the discharge housing. The fluid flow may be regulated within the flutter range for the desired characteristics of fluid spray in the teeth area for introduction of the spray head into the mouth.

I claim:

1. A device for attachment to an outlet of a water delivery system comprising,

- (A) a unit including means to attach to the system outlet,
- (B) a spray head having a plurality of openings of an effective cross-sectional area less than that of the outlet of the water delivery system so as to present an obstruction to the water flow, and
- (C) said unit comprising a body having an inlet port, a first and a second outlet port, and a main chamber with a throat leading to said first outlet port,
- (D) a valve assembly including:
  - (a) an annular seat secured in said throat,
  - (b) a gate movable vertically relative to said seat and responsive to upwardly directed forces to engage the seat and to close the gate,
  - (c) said gate comprising a stem at all times in use extending through said seat and toward said main chamber,
  - (d) said stem including an impingement plate on the extending end, and

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(e) means carried in the valve assembly to limit downward movement of the gate with respect to the seat;

(E) a diverter element in said main chamber and defining a passageway to said second outlet, said element comprising means to direct an inflowing stream of water upwardly upon said plate to exert vertical lifting forces to normally close the gate;

(F) conduit means to connect the second outlet port of said unit and spray head; and

(G) control means to regulate current flow through said conduit means between:

(a) a closed position wherein the back pressure of the water in the main chamber exerts a downward force on the gate to open the valve and permit current to flow through the first outlet opening, and

(b) a range of adjustment of current flow effective to vary the vertical forces acting upon said gate until the resultant is such that said gate is in substantial equilibrium with the valve assembly closed under steady current flow and is responsive to small variations in current flow and is responsive to small variations in current flow to flutter and cyclically open and close the gate;

(H) whereby under normally encountered flow conditions pulsating components of current will flow through said first and said second outlet openings as said gate in response to normal flow variations will cyclically open and close.

2. The device as set forth in claim 1 wherein said body includes a first and a second threadably engaged portion.

3. The device as set forth in claim 1 wherein said diverter element comprises an inverted cup-shaped member carried by said first body in said main chamber with an open mouth circumscribed about said impingement plate and an outlet port in fluid communication with said second outlet port of said unit.

4. The device as set forth in claim 1 wherein said control means to regulate current flow through said conduit means comprises an on-off valve arranged on said conduit means to regulate current flow therethrough.

5. The device as set forth in claim 1 wherein said control means comprises a slider valve assembly arranged in spanning relation of the outlet of the outlet port and which is adaptable to regulate current flow therethrough.

6. The device as set forth in claim 1 wherein guide means are provided for the stem of the valve assembly to limit the same to coaxial movement relative to said body.

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L. W. TRAPP, Primary Examiner

U.S. Cl. X.R.

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