

[72] Inventor **Walton B. Baldwin**
Elmira, N.Y.
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 [73] Assignee **The Bendix Corporation**

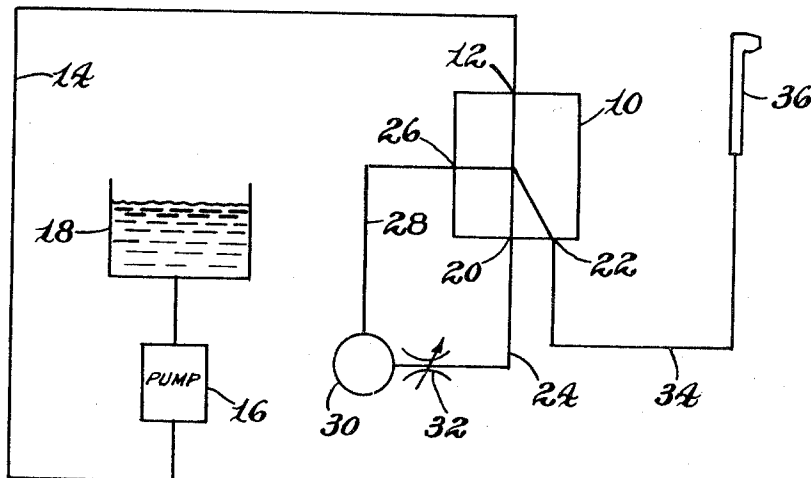
[56] **References Cited**
UNITED STATES PATENTS
 3,111,931 11/1963 Bodine 239/102X
 3,327,728 6/1967 Huling 239/101X
 3,374,789 3/1968 Maurer 239/444X
 3,443,573 5/1969 Posingies 137/81.5
FOREIGN PATENTS
 163,472 12/1964 U.S.S.R. 239/101

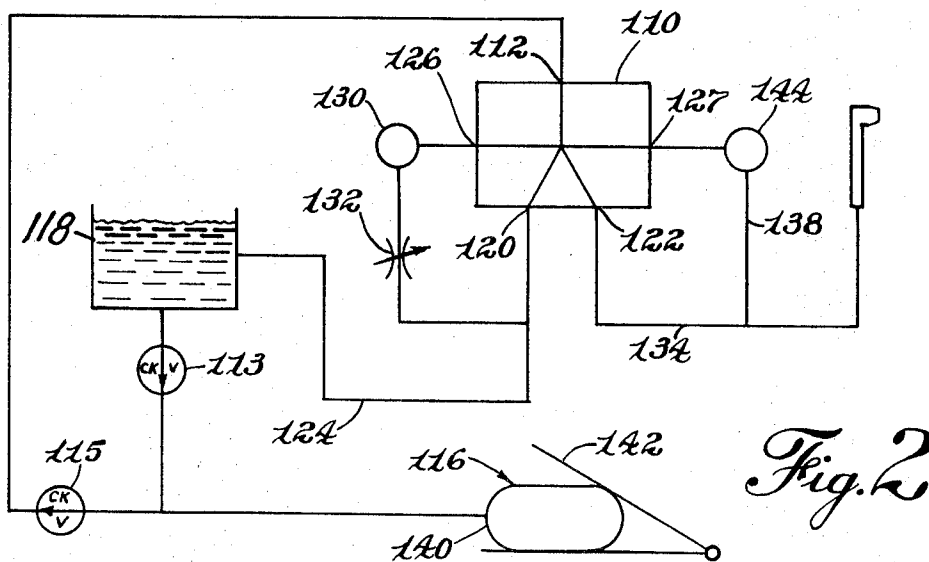
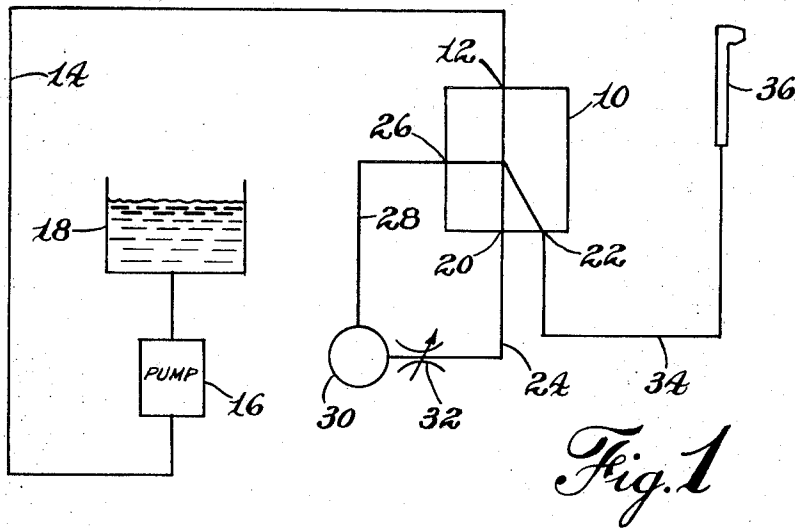
Primary Examiner—Lloyd L. King
Attorneys—Robert A. Benziger and Plante, Arens, Hartz, Hix
 and Smith

[54] **FLUIDIC CLEANSING DEVICE**
6 Claims, 2 Drawing Figs.

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ABSTRACT: A cleansing device is herein disclosed in which the pressurized fluid provides the energy source to power the device and a fluidic element converts a stream of pressurized fluid into a stream of intermittent fluid pulses for the cleansing of the teeth and gums of the user.





WITNESS:

Ester M. Stockton

INVENTOR.
Walton B. Baldwin
 BY
Robert A. Beniger
 ATTORNEY

FLUIDIC CLEANSING DEVICE

SUMMARY OF THE INVENTION

The invention relates to devices which are used to generate a stream of pressurized fluid pulses for the purpose of cleaning an object. Such devices may be used, for instance, to clean the teeth and gums of the user and the like. Prior art devices of this type have used an electrically powered reciprocating plunger pump to generate the fluid pulse streams. These devices are not completely satisfactory for several reasons. They require a relatively expensive electric plunger pump for their source of pressurized fluid pulses and, because the pump used is of the plunger variety, the devices generate substantial vibrations at the plunger frequency which are bothersome and make use of the device in a bathroom difficult since the vibrations tend to complicate mounting of the device. It is, therefore, an object of this invention to provide a cleansing device which does not use a reciprocating plunger pump and which is free of undesirable vibrations when in use. Specifically, it is an object of the present invention to provide a cleansing device such as an oral hygienic device which uses a source of constant pressure to energize a fluidic element and which provides an intermittent flow of pressurized fluid constituting a train of pressurized fluid pulses by means of the fluidic element.

Since the use of electrically powered appliances in a bathroom represents a potential safety hazard, it is a still further object of this invention to provide a device of the character described which may use a nonelectrically powered pressuring means, such as a hand-operated pump or the fluid pressure at a faucet or the like, to provide a source of substantially nontime varying pressurized fluid to power a fluidic element and to provide the fluid for use as an oral hygiene device.

Other objects and advantages of my invention will become apparent from the description which follows and the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows a schematic diagram of the preferred embodiment of my invention utilizing a monostable fluidic element.

FIG. 2 shows in schematic diagram form an alternative embodiment of my invention utilizing a bistable fluidic element and a nonelectrically powered source of pressurized fluid.

DETAILED DESCRIPTION OF THE DRAWING

Referring now to FIG. 1, my invention is shown in schematic diagram form. The monostable fluidic element 10 has its input 12 connected through line 14 and pump 16 to a reservoir 18 into which has been placed a volume of fluid which may be, for example, water and/or a cleansing solution. The fluidic element 10 has two outlets, one of which is the preferred outlet 20, the other of which is the nonpreferred outlet 22. The preferred outlet 20 discharges fluid from the input 12 into a discharge line 24.

The control port 26 of the fluidic element 10 is connected via suitable conduit means 28 to a fluid delay line volume 30, a variable line restriction 32 and to the discharge line 24. The delay line volume 30 and variable line restriction 32 form a variable impedance means which permits the pulse frequency to be varied by the user. This could also be accomplished by using a variable fluidic inertia means.

The nonpreferred outlet 22 is connected via suitable delivery conduit means 34 to a discharge nozzle means 36 for application of a train of pressurized fluid pulses. A fluid pulse is generated each time the input fluid stream is diverted from the preferred to the nonpreferred outlet.

The operation of my invention is as follows. A pressurizing means such as the pump 16, which may be any type of pump operative to produce a substantially constant output pressure, provides the fluidic element 10 with a stream of fluid under

substantially constant pressure. This stream flows through the element and is discharged therefrom through the preferred outlet 20 where the stream enters discharge line 24 and conduit means 28 where it begins to fill the volume 30 at a rate controlled by restriction 32. When the volume is pressurized, the fluid flows to the control port 26 where it is operative to divert the fluid stream from the preferred outlet 20 to the nonpreferred outlet 22. The pressurized fluid stream then flows through conduit means 34 and exits from nozzle 36 as one fluid pulse. Since the flow has been diverted from the preferred outlet 20, the volume 30 is permitted to become depressurized and the fluid stream at control port 26 terminates thereby permitting fluid flow to return to the preferred outlet 20 where the cycle is repeated.

Referring now to FIG. 2, an alternative embodiment of my invention is shown. For convenience, elements in the FIG. 2 embodiment which are the same as those shown in FIG. 1 will be numbered accordingly. In this embodiment, the fluidic element 110 is of the bistable type having two outlets, 120 and 122, into one of which fluid will flow and the flow will remain until switching is effected by a control pulse. The source of pressurized fluid is a fluid pump 116 comprised of a deformable bladder 140 and deforming means 142. Check valve means 113 and 115 control fluid flow out of the reservoir 118 and into the fluidic element 110.

Fluid flow is switched out of the return line means 124 by a variable impedance means comprising the delay line volume 130 and the variable line restriction 132 while fluid flow is switched away from the delivery outlet 122 by means of a delay line volume 144 and suitable conduit means 138 interconnecting the appropriate control port 127 with the delivery conduit means 134. It will, of course, be recognized that the return line switching means and the delivery line switching means could be interchanged to provide variable "off" time or variable "on" time and that both "off" time and "on" time could be varied by providing both the delay line control means and the delivery line control means with a variable impedance means as discussed above.

It will be obvious that the above-described embodiments achieve the stated objectives of providing an inexpensive source of a pulsating fluid stream useful as an oral hygienic appliance. Since the device relies upon a constant pressure source, the most expensive component has been eliminated as have the objectionable vibrations. While the FIG. 1 embodiment shows an electric pump which may be a centrifugal pump, this is a relatively low-cost item.

The FIG. 2 embodiment also eliminates the pump altogether thereby providing an inherently safer appliance for use in a bathroom than was the prior art device. While the two fluidic elements are shown with a specific source of substantially constantly pressurized fluid, it should be evident that the fluidic elements are interchangeable and that other means of constantly pressurized fluid may be used, sources such as a bathroom faucet for instance.

The device, according to my invention, would not necessarily be limited to use as an oral hygienic device but could, with slight modifications within the scope of the invention, be utilized in a multidischarge form for use as a dishwasher or the like or by using a larger version with single or multiple discharge be used as a versatile cleansing device such as a car washer.

I claim:

1. A source of pulses of pressurized fluid comprising: a source of fluid under pressure;

a fluidic element means having at least two outlet passages and at least one control passage, operative to receive said fluid under pressure, said fluidic element means characterized by the fact that fluid flow from said source to at least one of said outlet passages will be stable;

conduit means interconnecting said source and said fluidic element means; nozzle means connected to the first of said outlet passages operative to issue a pressurized fluid stream;

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discharge line means connected to the second of said outlet passages operative to discharge a fluid stream flowing in said second outlet passage;

control means interconnecting said at least one control passage with the outlet passage in which stable fluid flow may be established operative to cause fluid flow in said fluidic element means to switch from one of said outlet passages to the other of said outlet passages.

2. The device as claimed in claim 1 wherein said fluidic element means comprises at least one monostable fluidic element.

3. The device as claimed in claim 1 wherein said fluidic element means comprises at least one bistable fluidic element.

4. The device as claimed in claim 1 wherein said control means comprise passage means interconnecting said control port and one of said nozzle means and said discharge means

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and including variable impedance means to selectively vary the time duration of said pressurized fluid stream.

5. The device as claimed in claim 3 including further:

said bistable fluidic element having a second control passage in opposition to said at least one control passage; and

second control means interconnecting said second control passage and the other of said nozzle means and said discharge line means, operative to controlled switching of fluid flow.

6. The device as claimed in claim 5 including further: a fluid dump; and

return line means interconnecting said discharge line means and said fluid dump to discharge fluid thereinto.

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