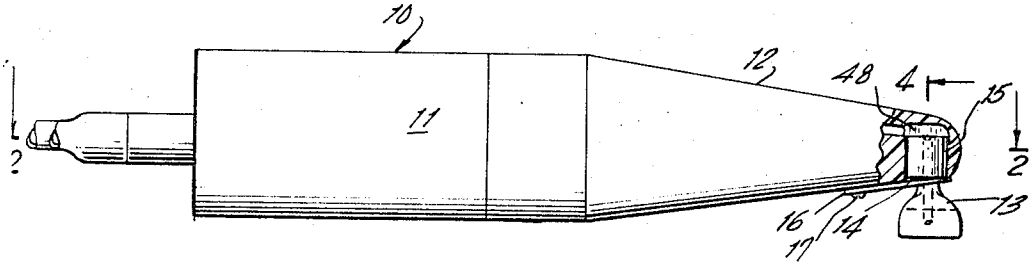
July 1, 1969 W. M. SHANHOUSE 3,452,746

ORAL HYGIENE DEVICE

Filed March 15, 1967 Sheet 1 of 2

FIG. 1



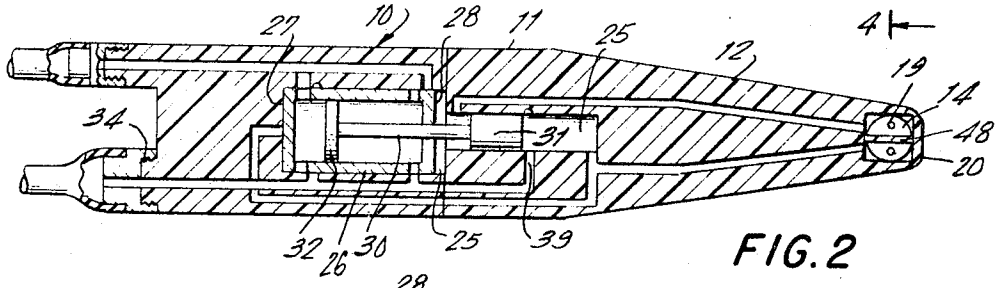


FIG. 2

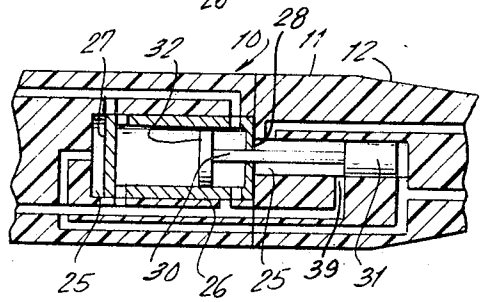


FIG. 3

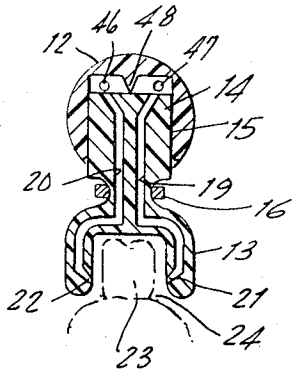


FIG. 4

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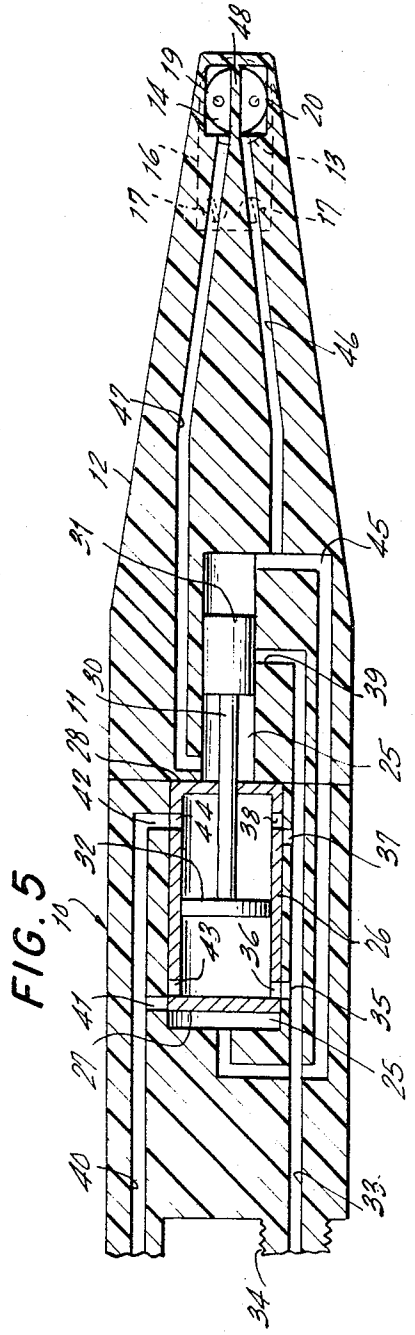


FIG. 5

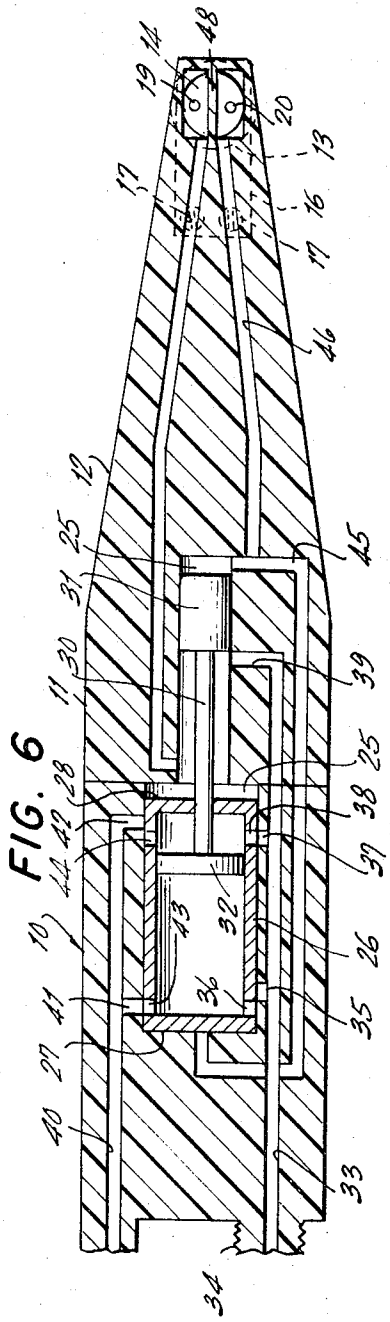


FIG. 6

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ORAL HYGIENE DEVICE

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Int. Cl. A61h 9/00
U.S. Cl. 128—66 6 Claims

ABSTRACT OF THE DISCLOSURE

An oral hygiene device having a fluid driven pump for converting ordinary tap pressure into two substantially higher pressure alternating jets of water which are properly directed at the desired innerside and outerside areas of the user's teeth and gums. A two diameter piston freely carried by a sleeve valve serves to increase the output fluid pressure and insure operation of the pump starting at any position of the pumping cycle.

Background of the invention

This invention relates to an oral hygiene device in which jets of water are directed at the teeth and gums of the user.

Some previously known devices employing jets of water for oral hygiene have employed a small tank for the water and an electrical pump in order to send a stream of water at suitable velocity against the teeth and gums of the user. In other previously known devices not employing a pump, the velocity of the jet of water was not strong enough for a satisfactory operation. After the user cleaned one surface of the teeth and gums with the prior art devices it was necessary for him to shift the position of the jet in order to reach other surfaces.

Also, such devices required skillful manipulation on the part of the user in order to direct the water at the proper places within the mouth which needed cleaning and stimulating.

Summary of the invention

In the preferred embodiment of the present invention, water coming from a supply line such as a domestic household tap, is led into a fluid driven pump in which the line pressure is substantially increased and from which the water emerges as alternating high velocity jets. The pump is driven by the line pressure and the exit pressure of the fluid is increased by means of a sleeve valve and two-diameter piston arrangement.

Accordingly, it is an object of the present invention to provide an oral hygiene device which will be small in size, requiring no accumulating tank, and contain all of the working parts within a handle-like member.

Another object of the present invention is to provide an oral hygiene device which will direct two high pressure, high velocity pulsating jets of water at the predetermined areas of both the inside surfaces and outside surfaces of the user's teeth and gums.

Still another object of the present invention is to provide a fluid driven pump arrangement which will begin operation upon the application of liquid from the tap or faucet starting from any position of the pumping cycle.

A feature of the present invention is its use of a two-diameter piston for increasing the line liquid pressure to a high velocity cleaning jet.

Another feature of the present invention is its use of alternate jets of water which are directed at the inside and outside surfaces of the user's teeth and gums.

Still another feature of the present invention is its novel sleeve valving arrangement which insures trouble-free operation no matter where the pump members are at the beginning of the operating cycle.

The invention consists of the construction, combination, and arrangement of parts, as herein illustrated, described and claimed.

In the accompanying drawings forming a part hereof, there is illustrated one form of embodiment of the invention in which drawings, similar reference characters designate corresponding parts, and in which:

FIGURE 1 is a view in side elevation partly broken away of a complete embodiment of the present invention.

FIGURE 2 is a view in longitudinal section taken on line 2—2 in FIGURE 1.

FIGURE 3 is a fragmentary longitudinal section showing the valve action.

FIGURE 4 is a cross-sectional view taken on line 4—4 of FIGURE 1, looking in the direction of the arrows.

FIGURE 5 is a view in longitudinal section, somewhat enlarged, of the device shown in FIGURE 1.

FIGURE 6 is a view similar to FIGURE 5, showing the valve in a different position.

Referring to the drawings and particularly to FIGURE 1, **10** indicates an oral hygiene device, having a cylindrical block **11**, tapered at its forward end as indicated at **12**, to form a handle. A nozzle member **13** is swingably carried in the tapered portion **12** by means of a cylindrical member **14**, and a socket **15** within the tapered portion **12**. The cylinder **14** is held in place by means of a slidable plate **16** secured to the tapered portion **12** by two small screws **17**.

The nozzle member **13**, best shown in FIGURE 4, has a channel-shaped configuration at the free end thereof. Two small bores **19**, **20**, are provided in the nozzle member **13** and are adapted to lead fluid from the interior of the socket **15** to the inside of the channel-shaped structure. The bores **19**, **20**, are constricted at their exit ends as shown at **21**, **22**, in order to eject the fluid in a compact stream of high velocity.

As shown in FIGURE 4, the nozzle member **13** is adapted to slip over and around the user's tooth **23**, and direct the stream of water at the interdental spaces and gingival areas **24**, of the mouth. It is these areas which require the cleaning and stimulating necessary for good oral hygiene.

The high velocity of the jets of water coming out of the bores **19**, **20**, in the nozzle member **13**, is the result of the pump structure best shown in FIGURES 2, 3, 5 and 6. The block **11** is provided with a two-diameter central cavity **25**, within the which the moving pump elements are carried. A cylindrical sleeve member **26**, is slidably carried within the larger bore of the cavity **25**. The sleeve member **26** is closed at one end as indicated at **27**, and provided with an end wall **28** at the opposite end thereof. The end wall **28** is centrally bored as shown to permit a rod **30** to slide therethrough. A small cylindrical piston **31** is secured at one end of the rod **30** and is slidably received within the small diameter bore of the cavity **25**. A large disc **32** is secured to the opposite end of the rod **30** and slides with the sleeve member **26**. The disc **32** is of an outside diameter such that it will make a free but substantially fluid retaining contact with the inside surface of the sleeve **26**.

The sleeve **26** is shorter in length than the large diameter bore of the cavity **25** and can therefore move longitudinally within the said cavity. The piston **31** is also shorter in length than the small diameter of the cavity **25** so that it too can slide axially thereof.

An elongated bore **33** is cut in the block **11** as shown in FIGURES 5 and 6, to admit fluid into the oral hygiene device. The bore **33** is connected at one end as by the external threads **34**, to a source of liquid, which may be the household faucet. The bore **33** is provided with a first

port 35 through which water can enter the interior of the sleeve 26, when an opening 36 in the said sleeve is in register with the first port 35, as shown in FIGURE 5. The elongated bore 33 is provided with a second port 37 which permits liquid to enter the sleeve 26 when a second opening 38 is in register with it, as shown in FIGURE 6. The end of the bore 33 communicates with the interior of the smaller diameter portion of the cavity 25, as indicated at 39.

A second elongated bore 40 is provided in the cylindrical block 11 and has two spaced ports 41, 42, which also communicate with the interior of the sleeve member 26 when two small openings 43, 44, in the sleeve member are in register therewith. It will be apparent from the examination of ports 35, 37, 41, 42, and the openings in the sleeves 36, 38, 43, 44, that only one port in each of the elongated bores 33, 40, will be in communication with the interior of the sleeve 26 at any time during a power cycle.

A fluid bearing conduit 45 is formed in the block 11 and interconnects the forward end of the two-diameter cavity 25 with the rear of said cavity. A discharge conduit 46 is connected at one end to the conduit 45 and communicates at its other end with the space above cylinder 14 of the nozzle member 13. A second discharge conduit 47 is provided in the cylindrical block 11 and leads fluid from the opposite end of the small diameter portion of the cavity 25 to the other side of the space above cylinder 14. A small wall 48 is formed in the socket 15 above the cylinder 14 and prevents water from one discharge conduit from reaching the opening in the cylinder 14 adjacent the other discharge conduit. Thus, in view of the alternating pulsing action of the pump, alternate jets of water will emerge from the constricted portions of the bores 19, 20, as hereinafter more fully set forth.

The operation of the oral hygiene device will become apparent from the foregoing description and the following:

If the liquid from the faucet is turned on when the pump members are in the position shown in FIGURE 5, water will enter the elongated bore 33 and the interior of the sleeve 26 by way of the first port 35 and the sleeve opening 36, forcing disc 32, rod 30, and piston 31 to the right and exhausting discharge water out of ports 44, 42, through bore 40 to drain. Because of the difference in diameters of disc 32 and piston 31, an increased pressure will be built up ahead of piston 31 which will be communicated via conduits 46 and bore 20 to restricted exist 22 for high pressure high velocity discharge. This high pressure is also communicated via conduit 45 to the outer face of closed end 27 of sleeve 26. This pressure being higher than the line pressure inside sleeve 26 will keep sleeve 26 to the right as shown in FIGURE 5 until piston 31 uncovers port 39, as shown in FIGURE 3. The line pressure in elongated bore 33 now communicates via port 39 to the outside of end wall 28 of sleeve 26. The pressure here plus the pressure on the inside face of the closed end 27 overcomes the pressure on the outside face of closed end 27 and the sleeve 26 moves to the left position as shown in FIGURE 6. This reverses the inlet port from 36 to 38 and the exhaust port from 44 to 43, causing line pressure to build up on the right side of disc 32, moving it, rod 30, and piston 31 to the left. The increased pressure now built up on the left side of piston 31 forces fluid via conduit 47 and bore 19 through restricted exit 21 for high pressure high velocity discharge from this side of nozzle 13. The disc 32 will continue its travel to the left until it reaches the position where right edge of piston 31 uncovers port 39, shown in FIGURE 2, following which, the cycle will be repeated.

The above construction will provide alternating pulsating jets of high pressure, high velocity for tooth and gum cleaning and stimulating purposes even where the pressure of the domestic water supply is relatively low. Since the jets are directed at both the inside and outside surfaces of the teeth and gums it is merely necessary to move the cylindrical block across the teeth along both upper and lower members in order to clean them. The operation of the device is sufficiently simple to enable small children to use it and is free of electrical and bacterial accumulation hazards which are to be found in other prior art devices.

Furthermore, part 13 is easily removable by sliding plate 16 back so that each member of a family can fit his individual head into the handle for sanitary purposes. It can easily be seen that this makes the handle also adaptable to fit a small turbine driven rotary brushing head similar to that used by dentists, should this be desired.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. An oral hygiene device comprising a block, a fluid driven pump within the block, an elongated bore in the block to lead fluid into the pump, a source of fluid connected to the bore on the inlet side of the pump, a first and a second channel connected to the outlet side of the pump within the block, a nozzle member carried by the block, means to lead the fluid from the first and second channels to the nozzle member, spaced jet orifices in the nozzle member, a two-diameter piston in the pump to increase the pressure of the fluid as it traverses the pump and valve means within the pump to deliver the fluid alternately to the first and second channels.

2. A device according to claim 1 in which the nozzle member is formed with a substantially cylindrical portion freely journaled in the block and a channel-shaped portion at the free end thereof.

3. A device according to claim 2 in which the nozzle member is provided with a first bore interconnecting the discharge end of the first channel and the inner surface on one side of the channel shaped portion and a second bore interconnecting the discharge end of the second channel and the inner surface on the opposite side of the channel shaped portion.

4. A device according to claim 3 in which the pump is built within a two-diameter cavity in the block, a sleeve is carried within the larger portion of the cavity, said sleeve being shorter in length than the cavity and adapted to slide longitudinally therein, spaced openings in said sleeve for movement into and out of register with the outlet end of the elongated bore to operate the pump, and the two-diameter piston comprises a rod, a disc shaped piston member on one end of the rod and slidably carried within the sleeve, a smaller cylindrical piston at the opposite end of the rod, slidably carried within the smaller portion of the cavity.

5. A device according to claim 4 in which a fluid conducting bore is provided interconnecting both ends of the two-diameter cavity, said bore being in fluid communication with one of the channels connected to the outlet side of the pump.

6. A device according to claim 2 in which the block is tapered toward its outlet end and formed with a socket at said outlet end to receive the cylindrical portion of the nozzle.

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