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Baker

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[54] **FOUR-WAY DENTAL SYRINGE**

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[52] **U.S. Cl.** **32/22,** 128/224

[51] **Int. Cl.** **A61c 19/02**

[58] **Field of Search** 128/276, 224, 173.1; 32/33, 22

[56] **References Cited**

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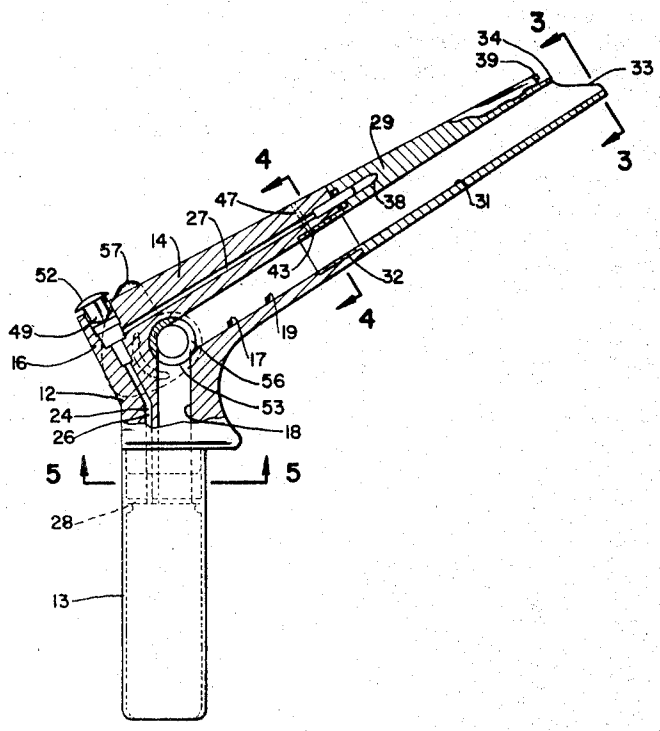
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[57] **ABSTRACT**

A dental syringe arranged for convenient selective discharge of water, air or water-air mixture from a nozzle thereof as well as for convenient selective drawing of vacuum from a vacuum passage of the nozzle to thereby provide a four-way action. The syringe is characterized by a convenient pistol-grip construction which facilitates expiditious thumb manipulation of valves controlling the flows of water, air and vacuum through the nozzle during use of the syringe in normal dental procedures. The nozzle is removable for autoclaving or other sterilizing techniques and the water discharge opening is centered in an annular air discharge opening, the vacuum opening being separate therefrom and positioned below the air-water arrangement.

3 Claims, 5 Drawing Figures



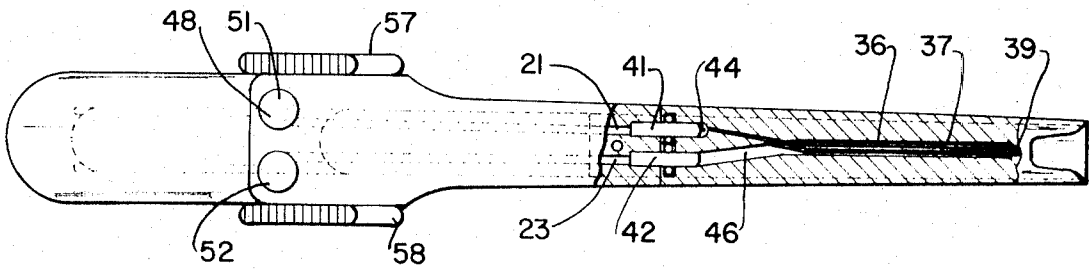


FIG_2

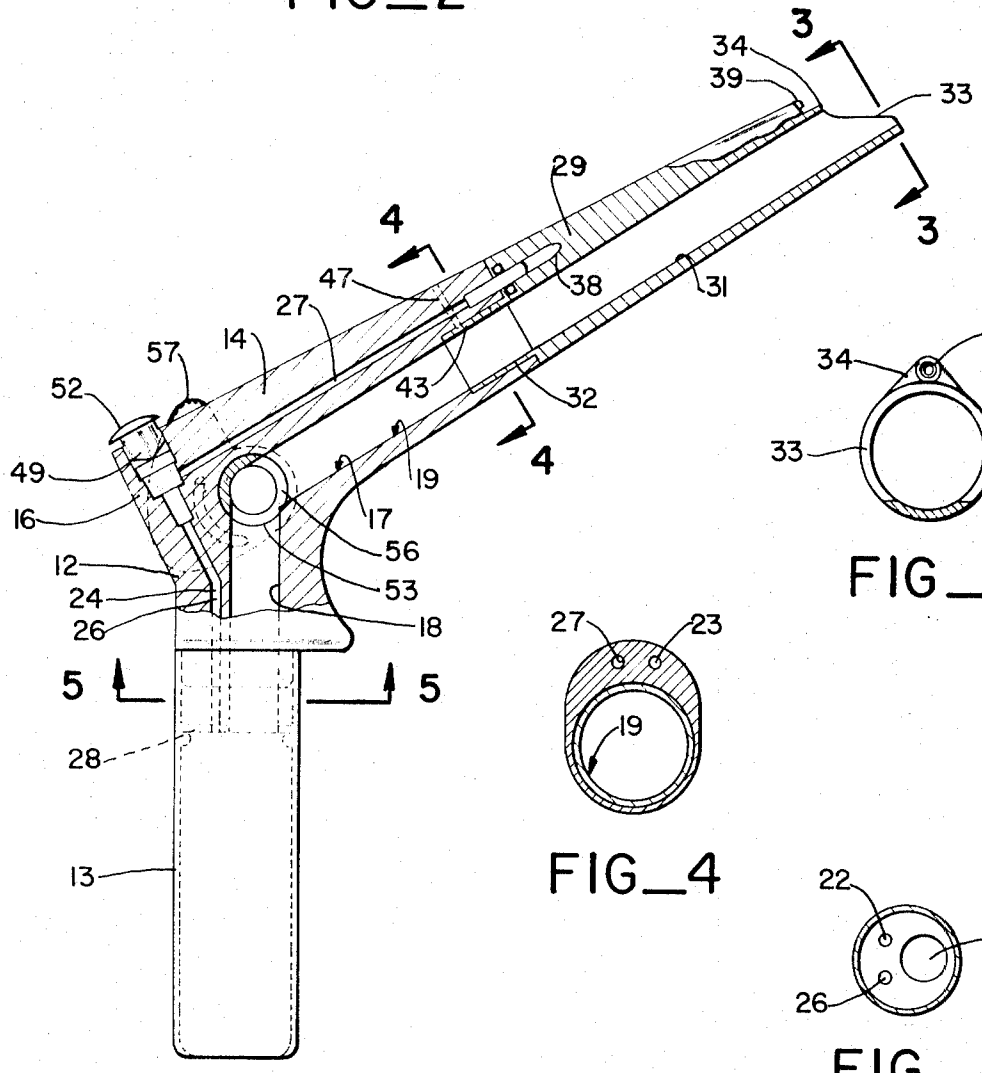


FIG_1

FIG_3

FIG_4

FIG_5

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FOUR-WAY DENTAL SYRINGE

BACKGROUND OF THE INVENTION

Dental syringes of various types having valves arranged to be operated individually or simultaneously to deliver either water or air streams, as desired, or simultaneously to form a spray mixture thereof, are available at present. However, with existing syringes, the valves have been relatively complex and not arranged for particularly convenient manipulation during use in normal dental procedures. In addition such syringes have not included provision for the selective drawing of a vacuum in conjunction with the delivery of water, air or water-air mixture, which feature would manifestly increase the utility of the device. Furthermore, the nozzles of existing syringes of the foregoing type have generally not been removable for separate autoclaving or equivalent sterilization techniques.

SUMMARY OF THE INVENTION

The present invention relates to dental syringes in general, and is more particularly directed to a four-way dental syringe arranged to selectively provide a vacuum, water, air or water-air mixture in a conveniently manipulatable manner.

An object of the present invention is to provide a four-way dental syringe having a convenient pistol-grip construction with valve operating elements located at the juncture of the grip and barrel portions of the syringe to afford ready thumb manipulatable control over the discharge of water and air from a nozzle at the end of the barrel and the pulling of vacuum through the nozzle.

It is another object of the invention to provide a dental syringe of the class described wherein the nozzle is removable from the barrel for ready sterilization.

A further object of the invention is the provision of a dental syringe of the class described wherein the water discharge opening of the nozzle is centered in an annular air discharge opening to provide proper combinations of air and water and the vacuum opening is separate and positioned below the air-water arrangement.

In the accomplishment of the foregoing and other objects and advantages, a syringe in accordance with the present invention generally comprises a body of piston-grip configuration including a grip and angularly projecting barrel having air and water passages and a vacuum passage extending therethrough, the end of the grip being adapted for connection of the passages to air, water and vacuum conduits, valves disposed in the air and water passages adjacent the juncture between the grip and barrel with flow control elements positioned atop the barrel adjacent its opposite sides, a valve disposed in the vacuum passage adjacent the juncture between the grip and barrel and having vacuum control elements positioned at the sides of the barrel adjacent the upper end of the grip, and a nozzle adapted for removable coaxial securance to the end of the barrel, the nozzle having air, water and vacuum passages sealably communicating with those of the barrel, the air and water passages of the nozzle merging to define a water discharge opening centered in an annular air discharge opening.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view with portions broken away of a dental syringe in accordance with the present invention;

FIG. 2 is a plan view with portions broken away of the syringe of FIG. 1;

FIG. 3 is a sectional view taken at line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken at line 4—4 of FIG. 1; and

FIG. 5 is a sectional view taken at line 5—5 of FIG. 1.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring now to the drawing, FIGS. 1 and 2 in particular, there is shown a dental syringe 11 having a body 12 of pistol-grip configuration including a grip 13 and barrel 14 angularly projecting therefrom, the respective portions merging at a juncture 16. The body is preferably of plastic material such as teflon, nylon, etc. Extending through the body there is provided a vacuum passage 17 defined by a grip passage portion 18 and barrel passage portion 19 angularly merging within the juncture 16. The vacuum passage extends through the grip 13 adjacent the forward wall thereof and through the barrel 14 adjacent the lower wall thereof. In addition, a water passage 21 is provided through the body adjacent one side thereof, such passage being defined by a grip passage portion 22 and barrel passage portion 23 angularly merging within the juncture 16, the portion 22 being disposed rearwardly of the portion 18 of vacuum passage 17 and the portion 23 being disposed upwardly of vacuum passage portion 19. Similarly, an air passage 24 is defined through the body adjacent the opposite side thereof by a grip passage portion 26 rearwardly of vacuum passage portion 18 and a barrel passage portion 27 upwardly of vacuum passage portion 19, air passage portions 24 and 26 angularly merging within juncture 16. The vacuum, water and air passage portions 18, 22 and 26 within the grip 13 preferably terminate in a cylindrical recess 28 formed in the end of the grip to receive a plug connection (not shown) having vacuum, water and air conduits adapted for sealed communication with the respective grip passage portions.

At the forward end of the barrel 14 there is provided a removable nozzle 29 of similar material as body 12 adapted for coaxial securance to define an extension thereof. More particularly, the nozzle 29 is formed with a vacuum passage portion 31 extending therethrough adjacent the lower wall thereof. The rearward lower end of the nozzle is provided with a cylindrical extension 32 circumscribing vacuum passage portion 31. The forward lower end of the nozzle is provided with a cylindrical projection 33 extending forwardly of a crecent shaped shoulder 34 and circumscribing vacuum passage portion 31. The nozzle 29 is also provided with water and air passage portions 36 and 37 disposed upwardly of vacuum passage portion 31. The passage portions 36 and 37 extend into a crescent shaped shoulder 38 at the rearward end of the nozzle defined superjacent the extension 32, adjacent the opposite sides of the nozzle. Thereafter, passage portions 36 and 37 converge forwardly with the air passage portion 37 terminating in a discharge opening centrally of

shoulder 34. A tubular member 39 extends into the discharge end of air passage portion 37 in coaxially inwardly spaced relation thereto and interiorly communicates with the water passage portion 36. In this manner, the tubular member 39 defines a discharge opening for the water passage portion within an annular air discharge opening defined between the tubular member and discharge end of the air passage portion 37.

Removable securance of the nozzle 29 to the forward end of barrel 14 is facilitated by means of the nozzle extension 32 and a pair of tubular pins 41 and 42 projecting forwardly from the front end of the barrel with the bores thereof communicating with and forming extensions of the water and air passage portions 23 and 27. More particularly, the vacuum passage portion 19 terminates in a cylindrical recess 43 at the forward end of barrel 14 for receiving the nozzle extension 32 in retentive tight fitting relationship. In addition, the rearward ends of nozzle passage portions 36 and 37 are formed with enlarged cylindrical recesses 44 and 46 in shoulder 38 for receiving pins 41 and 42 in tight fitting retentive relationship. The nozzle is thereby removably sealably secured to the barrel with the vacuum passage portion 19 in communication with vacuum passage portion 31, water passage portion 23 in communication with water passage portion 36, and air passage portion 27 in communication with air passage portion 37. Retentive securance of the nozzle may be enhanced by means of a ball spring check 47 disposed in the barrel radially of recess 43 to bear against nozzle extension 32 upon insertion thereof in the recess.

In order to facilitate convenient control over the flow of water, air and vacuum through the syringe 11, suitable valve means are provided in the juncture 16 of body 12. More particularly, a pair of conventional normally closed push button valves 48 and 49 are mounted within the juncture 16 at, respectively, the intersection of grip and barrel water passage portions 22 and 23, and the intersection of grip and barrel air passage portions 26 and 27. Valves 48 and 49 include operating push buttons 51 and 52 which project upwardly from the top of barrel 14 adjacent the opposite sides thereof in close proximity to the rear wall portion of grip 13. Upon depression of push button 51, valve 48 is opened to establish the flow of water through water passage 21 for delivery from the discharge opening of nozzle water passage portion 36. Similarly, upon depression of push button 52, valve 49 is opened to establish the flow of air through air passage 24 for delivery from the discharge opening of nozzle air passage portion 37. Of course, upon depression of both push buttons, water-air mixture is delivered from the coaxial discharge arrangement at the end of the nozzle.

The intersection between the grip and barrel vacuum passage portions 18 and 19 is formed with a transverse cylindrical valve seat 53 which rotatably receives a cylindrical valve member 54 formed with a sectorial notch 56. A pair of wing knobs 57 and 58 are disposed on the opposite sides of the barrel 14 adjacent the upper end of the grip 13 to afford rotation of the valve member. In this manner, the valve member may be rotated between a closed position wherein the member blocks communication between passage portions 18 and 19, and open positions of varying degrees wherein communication is established through portions of notch 56. Consequently, various degrees of vacuum may be established through the vacuum passage portion 31 of nozzle 29.

It will be thus appreciated that with the dental syringe 11 provided in the manner hereinbefore described, the pistol-grip body 12 may be conveniently gripped in the hand and the water and air valve push buttons 51 and 52 and vacuum valve wing knobs 57 and 58 readily manipulated by the thumb to selectively discharge water, air and water-air mixture from the nozzle 29, and to pull varying degrees of vacuum therethrough. By virtue of the coaxial water and air discharge opening afforded by tubular member 39, proper combinations of water and air are conveniently and properly arranged for. Moreover, the removable nature of the nozzle 29 facilitates ready sterilization thereof by autoclaving, or the like.

I claim:

1. A four-way dental syringe comprising a body including a barrel member and a grip merging in angular relationship at a juncture, a vacuum passage, a water passage, and an air passage, each of said passages extending upwardly through said grip member and in parallel relation through said barrel, a rotary valve extending transaxially through sad vacuum passage adjacent said juncture, a wing knob on the outer side of the barrel member fixed to said valve and operative to move said valve to control the magnitude of the suction in said vacuum passage, separate valves in the body at said juncture for controlling the flow of fluid through said water and air passages, transversely spaced push buttons on the outer side of the body adjacent said grip member and rearward of said knob for actuating said separate valves, and a nozzle releasably attached to the free end of the barrel member and having passages in the walls thereof communicating with the respective vacuum, water, and air passages in the barrel.

2. A four-way dental syringe in accordance with claim 1, in which the discharge end of the suction passage in the nozzle member extends axially outwardly beyond the discharge ends of the water and air passages therein.

3. A four-way dental syringe in accordance with claim 1, in which means for detachably securing the nozzle member to the barrel member comprises tubular projections forming a portion of the air, water, and suction passages of one of the members and frictionally engaging in the passages of the other members.

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