Feb. 18, 1964 MINORU YOSHIDA 3,121,426

DENTAL SYRINGE ACTUATOR

Filed July 17, 1962 2 Sheets-Sheet 1

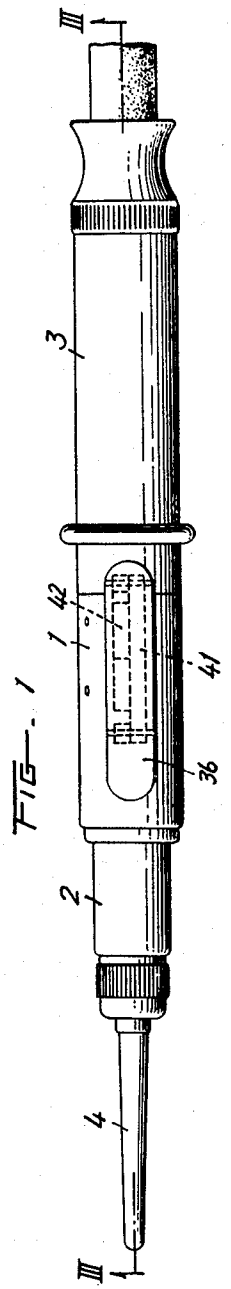


FIG. 1

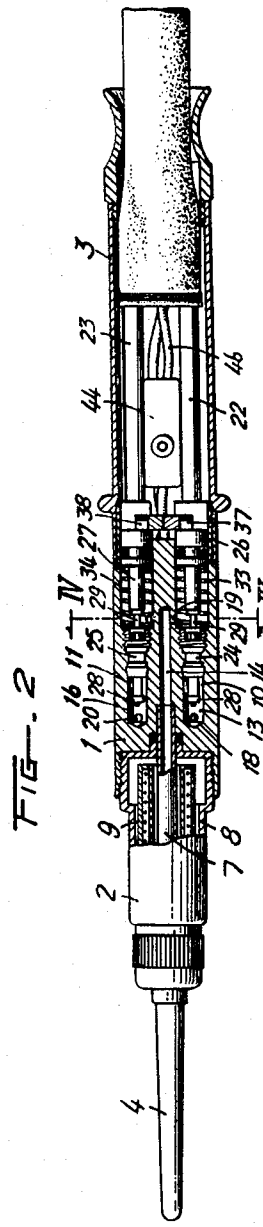


FIG. 2

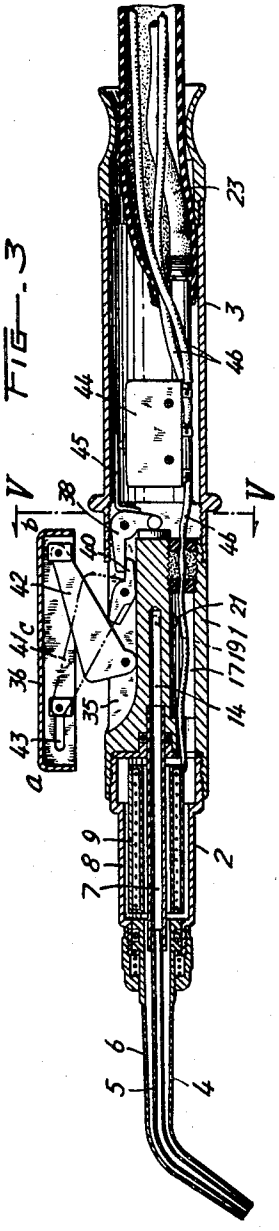


FIG. 3

INVENTOR

MINORU YOSHIDA

BY Linton and Linton

ATTORNEYS

Feb. 18, 1964 MINORU YOSHIDA 3,121,426

DENTAL SYRINGE ACTUATOR

Filed July 17, 1962 2 Sheets-Sheet 2

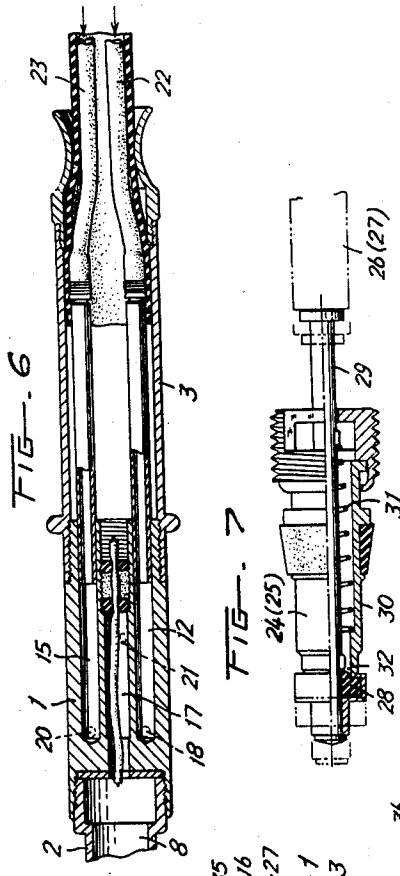


FIG. 6

FIG. 7

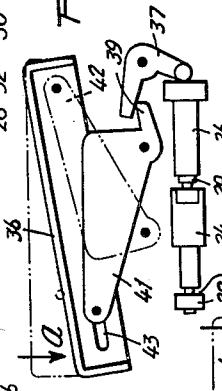


FIG. 8

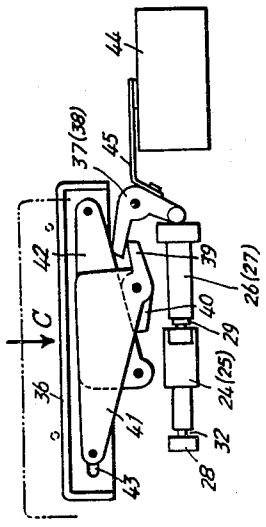


FIG. 10

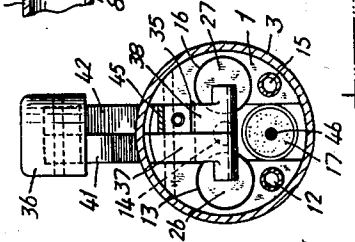


FIG. 5

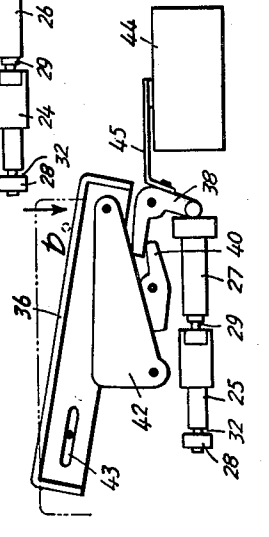


FIG. 9

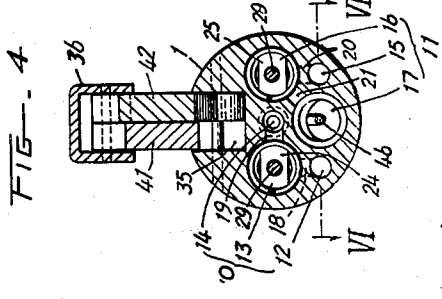


FIG. 4

INVENTOR

MINORU YOSHIDA

BY Linton and Linton

ATTORNEYS

United States Patent Office 3,121,426 Patented Feb. 18, 1964

3,121,426

DENTAL SYRINGE ACTUATOR

Minoru Yoshida, Tokyo, Japan, assignor to Kabushiki Kaisha Yoshida Seisakusho, Kotolashi, Sumida-ku, Tokyo, Japan, a corporation of Japan

Filed July 17, 1962, Ser. No. 210,482
Claims priority, application Japan Feb. 9, 1962
3 Claims. (Cl. 128—224)

The present invention relates to a dental instrument, and is more particularly directed to a dental instrument commonly called a syringe wherein a supply of a liquid such as water or liquid medicine, or a supply of only air, or a supply of both liquid and air may be selectively obtained from one instrument.

According to the present invention, there is provided an improved dental instrument wherein an axis tube having a forwardly projecting double tube type of nozzle is provided therein with a liquid passage system and an air passage system, each of said systems having therein a respective valve means, and a pair of operation arms for operating their respective valve means are disposed between a push button and the axis tube so that one or the other or both of two operation arms may be selectively operated if one end or the other end or middle portion of the push button is depressed.

In order that the invention may be clearly understood and readily carried into effect, the same will now be explained more particularly with reference to and by the aid of the accompanying drawings, wherein:

FIG. 1 is a plan view of the dental instrument of the present invention,

FIG. 2 is a plan view, partly in section, of the same,

FIG. 3 is a sectional view taken along the line III—III in FIG. 1,

FIG. 4 is a sectional view taken along the line IV—IV in FIG. 2,

FIG. 5 is a sectional view taken along the line V—V in FIG. 3,

FIG. 6 is a sectional view taken along the line VI—VI in FIG. 4,

FIG. 7 is a side view, half in section, of a valve means,

FIGS. 8, 9 and 10 are diagrammatical views showing the manner of operation of the instrument.

Referring to the accompanying drawings, numeral 1 denotes an axis tube having a front tube 2 attached to the front end thereof and a rear tube 3 attached to the rear end of the same, and numeral 4 denotes a nozzle of a double tube type extending forwardly from the front end of the front tube 2. The nozzle 4 comprises an inner tube 5 for liquid and an outer tube 6 for air, and similarly the front tube 2 comprises an inner tube 7 for liquid and an outer tube 8 for air, which two tubes 7 and 8 are at their front ends in communication with the inner and outer tubes 5 and 6, respectively, of the nozzle 4. The front tube 2 has within the outer tube 8 an electric heater 9 surrounding the inner tube 7 for heating the air passing through the outer tube 8. Within the axis tube 1, are provided bilaterally a liquid passage system 10 and an air passage system 11. The liquid passage system 10 comprises a series of three successively communicating inlet, intermediate and outlet passage bores 12, 13 and 14, respectively, and similarly the air passage system 11 comprises a series of three successively communicating inlet, intermediate and outlet passage bores 15, 16 and 17 respectively. The intermediate passage bore 13 of the liquid passage system is in communication by passageway 18 with the inlet passage bore 12 and by passageway 19 with the outlet passage bore 14, and similarly the intermediate passage bore 16 of the air passage system 11 is in communication by passageway 20 with the inlet bore 16 and by passageway 21 with the outlet bore 17. The inlet passage bores 12 and 15 are connected at their rear ends with a liquid supply pipe 22 and an air supply pipe 23, respectively, and the outlet passage bores 14 and 17 are at their front ends in communication with the inner tube 7 and the outer tube 8, respectively, of the top tube 2. Though not illustrated in the drawings, the liquid supply pipe 22 is connected with a source of liquid under pressure such as of water or medicine liquid, and the air supply pipe 23 is in communication with a source of pressure air, as in the conventional case of this kind of instrument. The two passage systems 10 and 11 have, within their respective intermediate passage bores 13 and 16, their respective valve means 24 and 25 for opening and closing the passages, and at the rear sides thereof are provided respective push pistons 26 and 27 for operating the valve means 24 and 25. As clearly shown in FIG. 7, each of the valve means 24 and 25 comprises a valve 28 having a valve rod 29 extending rearwardly therefrom, and the rod 29 which slidably extends through a valve casing 30 is urged rearwardly by a spring 31 so that in the usual condition the top opening 32, that is, the valve opening is closed by the valve 28. Numerals 33 and 34 denote springs for urging rearwardly the two push pistons 26 and 27, respectively.

The axis tube 1 is recessed at the upper surface portion thereof to form a cavity 35, and above the cavity 35 is provided a push button 36. Within the cavity 35, are provided a pair of bell cranks 37 and 38 for pushing the rear ends of the respective pistons 26 and 27, a pair of intermediate levers 39 and 40 for operating the bell cranks 37 and 38, and a pair of upwardly projecting operation arms 41 and 42 for operating the levers 39 and 40, though in the embodiment shown on the drawings the lever 39 and the operation arm 41 are integral one with another. The two operation arms 41 and 42 are so arranged that the lower ends thereof are disposed within the cavity 35 in rear and front relation and are pivotally attached to the front and rear portions of the push button 36. The upper end of the arm 41 is allowed to slide forwardly and backwardly along a guide groove 43 made in the side walls of the push button 36. Numeral 44 denotes a switch for the heater 9, and a lever 45 projecting rearwardly from the bell crank 38 serves to operate the same. Numeral 46 denotes leading wires for connecting the heater 9 with an electric source, not shown.

If, in this instrument, the front end portion *a* of the push button 36 is depressed by an operator by his finger as shown clearly in FIG. 8, the bell crank 37 is inclined in a clockwise direction through the operation arm 41 and the intermediate lever 39 for pushing the piston 26 forwardly to open the valve means 24, whereby the liquid passage system is opened and liquid is allowed to pass therethrough to project from the top of the nozzle 4 through the inner tubes 7 and 5. In this case, the other operation arm 42 is not operated at all. If, then the rear end portion *b* of the push button 36 is depressed as shown clearly in FIG. 9, the bell crank 38 is inclined clockwisely through the arm 42 and the lever 40 for pushing the piston 27 forwardly to open the valve means 25, whereby the air passage system is opened and air is allowed to pass therethrough to project from the front of the nozzle 4 through the outer tubes 8 and 6 while being heated by the heater 9. In this case, the other arm 41 is not operated at all. If, furthermore, the middle portion *c* of the push button is depressed as shown in FIG. 10, the two arms 41 and 42 are simultaneously operated and both liquid and air systems are opened by the same action as described before, whereby liquid and air are both allowed to project at the same time from the front of the nozzle 4 for producing a spray. Advan-

tages are such that, as described above, three different kinds of using effect can not only be accomplished by one instrument but also be selectively obtained at will by one push button by only changing the push position thereof for enabling to handle the same with one hand, such one operation being preferable for a dentist who is forced to always use both his hands during his medical treatment.

What I claim is:

1. In a dental syringe having an air passageway and a water passageway, valve means for said passageways comprising a pair of valves each positioned in and normally closing one of the syringe passageways, a push button, a pair of bell crank levers pivotally connected to the syringe and each positioned for at times engaging and opening one of said valves, a pair of operating arms pivotally connected to the syringe and each having an end pivotally connected to an opposite end portion of said push button, a pair of intermediate levers pivotally connected to the syringe and each being positioned for being selectively pivoted by one of said operating arms and thus pivoting one of said bell crank levers upon the manual pushing of the end of said push button connected to their respective operating arm or both intermediate

arms being pivoted upon the manual pushing of an intermediate portion of said push button.

2. In a dental syringe as claimed in claim 1 wherein an electric heater surrounds the syringe air passage, a source of electric current is connected to said heater, a switch controls the passage of electric current to said heater from said source thereof and means operatively connects the valve for the air passageway to said switch for closing said switch upon the opening of said valve.

3. In a dental syringe as claimed in claim 1 wherein one of said intermediate levers is integral with one of said operating arms and said integral operating arm is slideable as well as pivotally connected to said push button.

References Cited in the file of this patent

UNITED STATES PATENTS

2,678,064	Brown	May 11, 1954
2,871,880	Leuthesser	Feb. 3, 1959
2,980,140	McMillan	Apr. 18, 1961
3,054,402	Franwick et al.	Sept. 18, 1962

FOREIGN PATENTS

795,283	Great Britain	May 21, 1958