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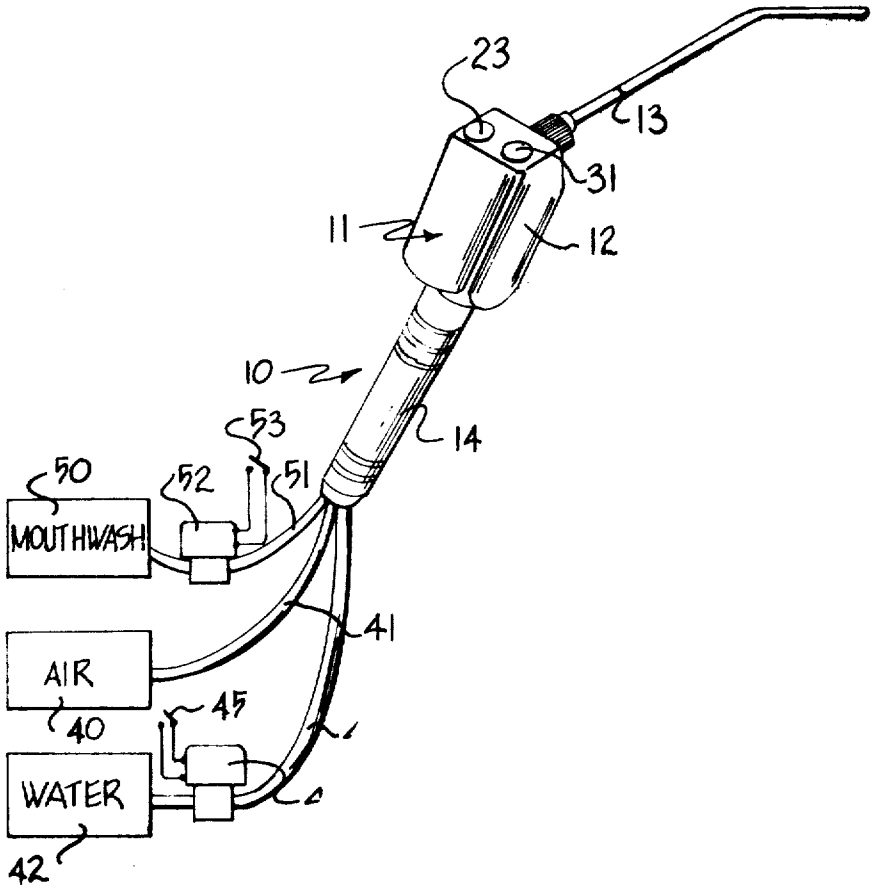
[54] MULTIPURPOSE DENTAL SYRINGE APPARATUS  
12 Claims, 5 Drawing Figs.

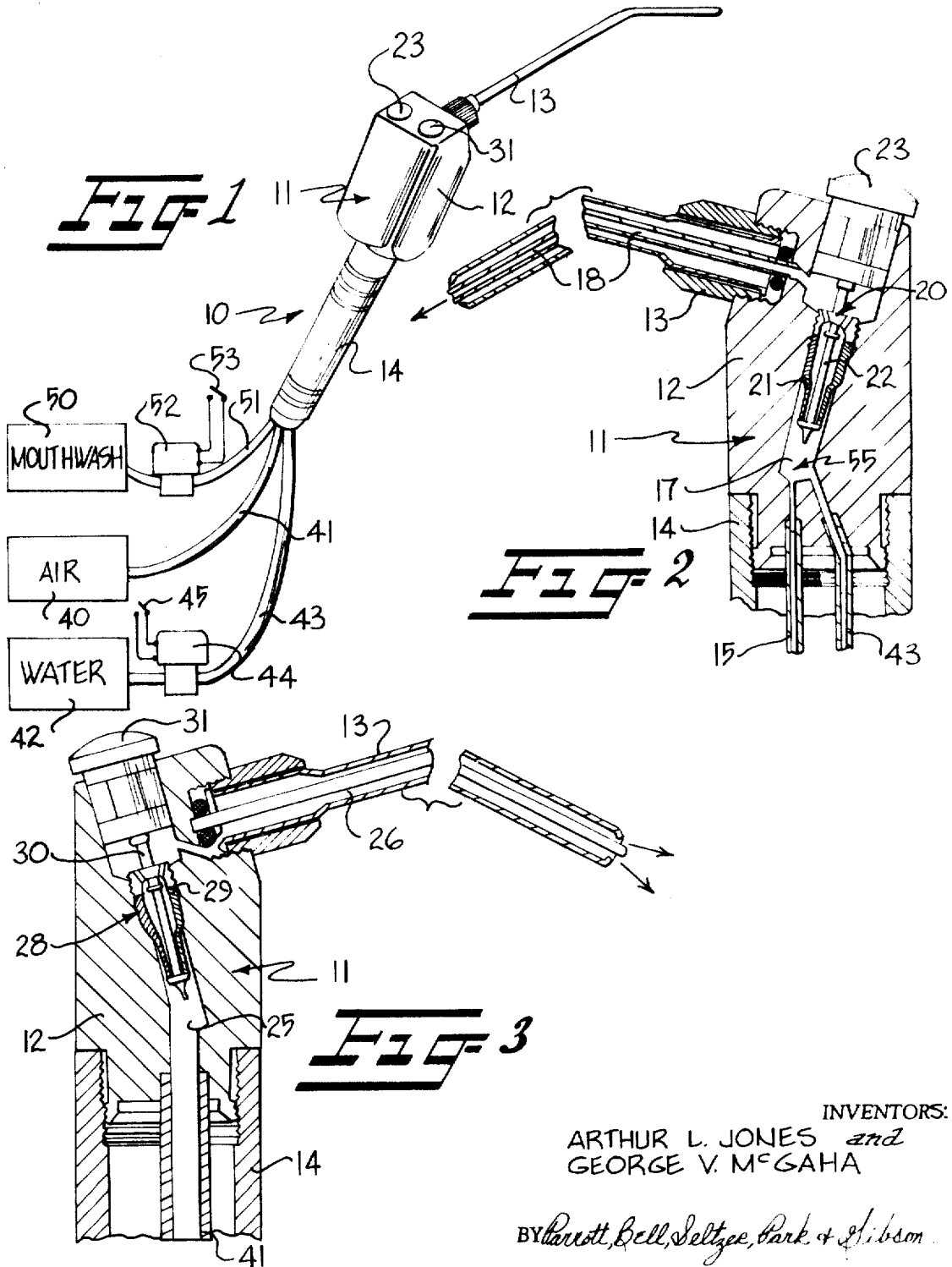
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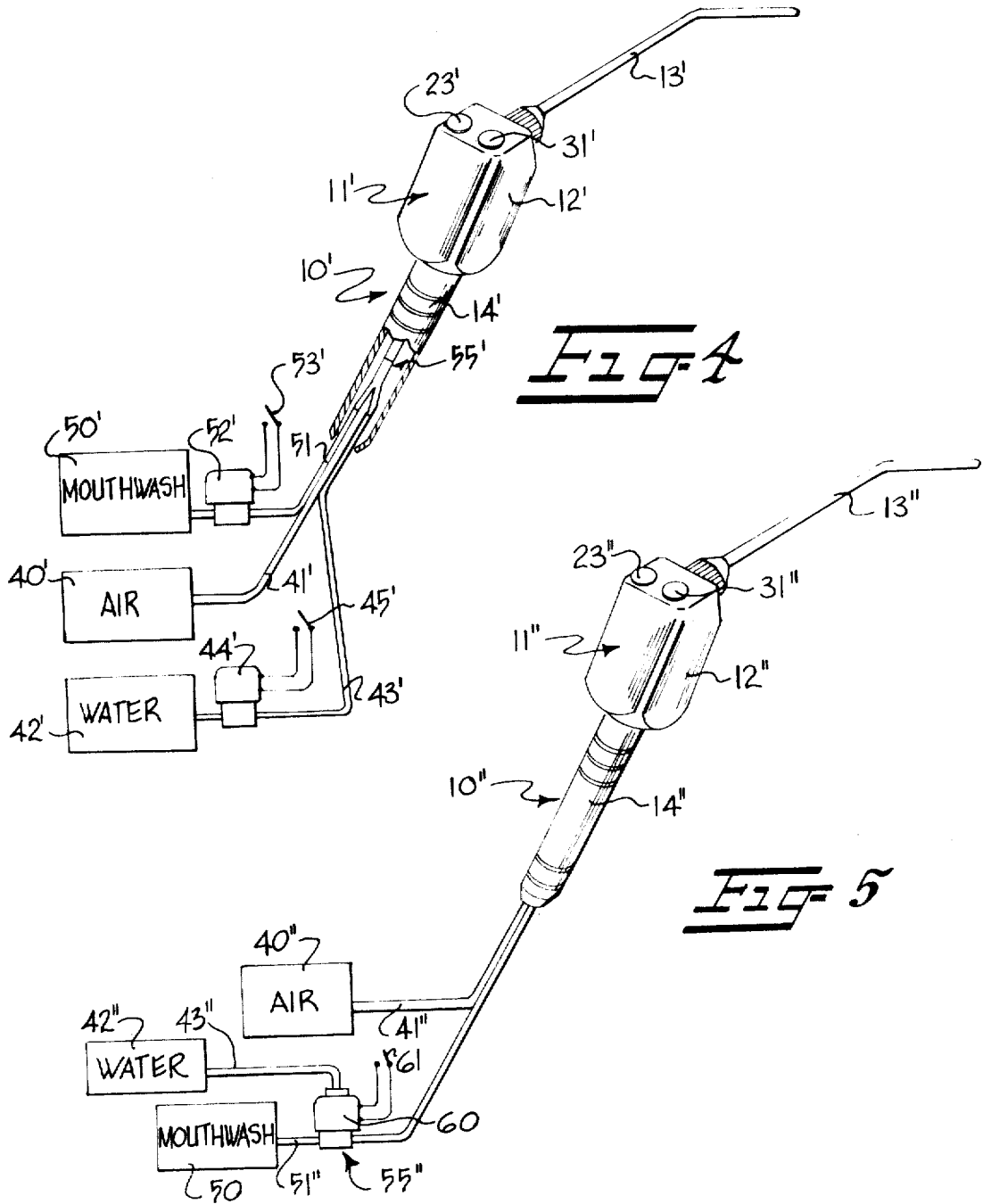
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**ABSTRACT:** Dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash. The apparatus comprises syringe means including a main body portion and a nozzle portion having liquid- and air-conveying conduits therethrough and selectively operable valve means therein for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from the nozzle portion, means for supplying air, water and mouthwash under pressure to the syringe means including separate supply means and separate conduit means, valve means operatively connected with the water and mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to the syringe liquid conduit means, and means operatively connected with the mouthwash, water and syringe liquid conduit means for merging the mouthwash and water conduit means into the syringe liquid conduit means.







**MULTIPURPOSE DENTAL SYRINGE APPARATUS**

This invention relates to a multipurpose dental syringe apparatus and more specifically to a dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash.

In normal dental procedures, it is usually necessary for the dentist or dental assistant to have available necessary syringe apparatus for the dispensing of a spray of air and a spray of water or a combination of both into the mouth of the patient for the cleaning of debris and other foreign matter from the teeth. More recently, it has also been found advantageous during these dental procedures to have a syringe available which will dispense a spray of mouthwash into the mouth of the patient which may also be used to clean debris and foreign matter from the teeth and to eliminate objectionable odors, etc. in the mouth of the patient.

Heretofore, in order to obtain the desired dispensing of sprays of air, water and mouthwash or a mixture of air and water and a mixture of air and mouthwash, it has been necessary for the dentist's office to include a plurality of dental syringes inasmuch as dental syringes currently on the market are only adapted for dispensing one liquid alone or in combination with air. Therefore, a syringe would have to be present for dispensing a spray of water, air or a mixture of water and air and a separate syringe would have to be present for dispensing a spray of mouthwash either alone or in combination with air. No multipurpose dental syringe is presently commercially available which will allow the dentist or dental assistant to choose between a spray of more than one liquid alone or in combination with air.

Accordingly, it is the object of this invention to provide a multipurpose dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash.

It is a further more specific object of this invention to provide the above characterized multipurpose dental syringe apparatus which may be easily and conveniently manually operated by a dentist or dental assistant for the alternative selection of the various types of sprays to be dispensed therefrom.

It has been found by this invention that the above objects may be accomplished by providing a dental syringe apparatus comprising syringe means adapted to be held in the hand of a user including a main body portion and a nozzle portion having a liquid-conveying conduit therethrough, an air-conveying conduit therethrough and selectively operable valve means therein for allowing and preventing the passage of liquid and air through the respective syringe liquid and air conduits for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from the nozzle portion.

The apparatus further comprises means for supplying air under pressure to the syringe means including an air supply means and a conduit means connected thereto for receiving air therefrom and conveying the air therethrough and being operatively connected with the syringe air conduit means for supplying air thereto to be dispensed out of the nozzle portion, means for supplying water under pressure to the syringe means including a water supply means and a conduit means connected thereto for receiving water therefrom and conveying the water therethrough, and means for supplying mouthwash under pressure to the syringe means including a mouthwash supply means and a conduit means connected thereto for receiving mouthwash therefrom and conveying the mouthwash therethrough.

The dental syringe apparatus further includes valve means operatively connected with the water conduit means and the mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to the syringe liquid conduit means and means operatively connected with the mouthwash conduit means,

the water conduit means and the syringe liquid conduit means for merging the mouthwash conduit means and the water conduit means into the syringe liquid conduit means.

In a commercially preferred form of the dental syringe apparatus, the valve means operatively connected with the water conduit means and the mouthwash conduit means comprises solenoid valve means including manually operated, electrical switch means for selectively opening and closing the solenoid valve means to allow and prevent the conveying of water and mouthwash therethrough. Also, the means for merging the mouthwash conduit means and the water conduit means into the syringe liquid conduit means preferably comprises a generally Y-shaped connection means connected to all three of the conduit means.

Some of the objects and advantages of the invention having been stated, other objects and advantages will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIG. 1 is a schematic perspective view of one embodiment of the multipurpose dental syringe apparatus of this invention;

FIG. 2 is an enlarged cross-sectional view, partially broken away, of the syringe means of the apparatus of FIG. 1 taken generally from the right-hand side thereof;

FIG. 3 is an enlarged cross-sectional view, partially broken away of the syringe means of the apparatus of FIG. 1 taken generally from the left-hand side thereof;

FIG. 4 is a schematic perspective view of another embodiment of the multipurpose dental syringe apparatus of this invention; and

FIG. 5 is a schematic perspective view of still a further embodiment of the multipurpose dental syringe apparatus of this invention.

Referring now to the drawings and firstly to FIGS. 1-3, there is illustrated a preferred embodiment of the multipurpose dental syringe apparatus of this invention, broadly indicated therein by reference numeral 10.

In the embodiment of FIGS. 1-3 the dental syringe apparatus 10 comprises a syringe means, broadly indicated at 11, which is adapted to be held in the hand of a user. As may be seen in FIGS. 2 and 3, the syringe means 11 comprises a main body portion 12, a detachable nozzle portion 13 removably secured by a suitable threaded portion thereon in a threaded aperture in the body portion 12, and a detachable hollow handle portion 14 removably secured to the body portion 12 by internal threads onto a threaded extension of the body portion 12.

The body portion 12 includes a liquid-conveying conduit 17 therethrough which is operatively connected to a liquid-conveying conduit 18 in the nozzle portion 13, as may be seen in FIG. 2. Disposed in the liquid-conveying conduit 17 in the body portion 12 is a manually operated valve 20 including a valve seat portion 21 and a valve stem 22 connected to a manually depressible button member 23. The valve stem 22 is urged into seating engagement with the valve seat 21 by any suitable means (not shown) such that the liquid-conveying conduit 17 is normally closed to passage of liquid therethrough and into the liquid-conveying conduit 18 in the nozzle portion 13. The button member 23 may be depressed to unseat the valve stem 22 from the seat portion 21 and thus allow the flow of liquid through the valve member 20 and into the liquid-conveying conduit 18 of the nozzle portion 13 to be dispensed out of the front of the nozzle portion, as indicated by the arrow in FIG. 2.

The body portion 12 of the syringe means 11 also includes an air-conveying conduit 25 which interconnects with an air-conveying conduit 26 in the nozzle portion 13, as may be seen in FIG. 3. A valve member 28 is disposed in the air-conveying conduit 25 and includes a valve seat portion 29, a valve stem 30 and a manually depressible button member 31 attached to the valve stem 30. This valve member 28 operates in the same manner as the valve member 20 for allowing and preventing the passage of air through the syringe means 11.

The above defined syringe means 11 may be manually operated by a user, e.g., dentist or dental assistant, either by depressing the button member 23 of the valve member 20 to allow a spray of liquid to be dispensed from the nozzle portion 13, or by depressing the button 31 of the valve member 28 to allow a spray of air to be dispensed from the nozzle portion 13. Also, the buttons 23 and 31 may be depressed simultaneously to dispense a spray containing a mixture of air and liquid from the nozzle portion 13.

Operatively connected to the syringe means 11 is a means for supplying air under pressure thereto. This means comprises any suitable air supply, indicated schematically in FIG. 1 at 40, and a conduit means 41 connected at one end to the air supply and leading through the hollow handle portion 14 of the syringe means 11 to be connected at its other end to the air conduit 25 in the body portion 12 of the syringe means 11, as shown in FIG. 3.

There is further provided a means for supplying water under pressure to the syringe means 11 comprising any suitable water supply, indicated schematically at 42 in FIG. 1. The water supply 42 has a conduit 43 connected at one end thereto and which leads through the hollow handle portion 14 to the body portion 12 of the syringe means 11. Interposed in the water-conveying conduit 43 in any convenient location external of the syringe means 11 is a suitable double-acting solenoid valve 44 which in one position thereof will allow the flow of water from the source 42 through the conduit 43 to the syringe means 11 and in the other position thereof will prevent the flow of water from the source 42 through the conduit 43. The solenoid valve 44 is actuated by a manually operated toggle switch or other suitable switch, as indicated schematically by the numeral 45 in FIG. 1.

The apparatus 10 includes a means for supplying mouthwash under pressure to the syringe means 11 including any suitable mouthwash supply, indicated schematically at 50 in FIG. 1. The mouthwash supply 50 has a conduit 51 connected at one end thereto and which leads through the hollow handle portion 14 to the body portion 12 of the syringe means 11. Interposed in the mouthwash-conveying conduit 51 in any convenient location external of the syringe means 11 is a suitable double-acting solenoid valve 52 which in one position thereof will allow the flow of mouthwash from the source 50 through the conduit 51 to the syringe means 11 and in the other position thereof will prevent the flow of mouthwash from the source 50 through the conduit 51. The solenoid valve 52 is also actuated by a manually operated toggle switch or other suitable switch, as indicated schematically at 53 in FIG. 1.

The apparatus 10 further comprises a means for merging the mouthwash conduit 51 and the water conduit 43 into the syringe liquid conduit 17. In the embodiment of FIGS. 1-3, this is accomplished by providing a generally Y-shaped connection means, indicated generally by the reference numeral 55, wherein a separate leg of the Y-shaped connections means 55 is connected to or forms a part of each of the three conduits 51, 43 and 17. In the embodiment of this invention illustrated in FIGS. 1-3, this generally Y-shaped connection means 55 is disposed or located in the syringe body portion 12, as may be seen in FIG. 2. This location is preferable so that, when it is desired to change from a spray of mouthwash to water or vice versa, the amount of the previously used liquid remaining in the conduit means from the point at which the other liquid conduit means merges therein will be minimal.

For example, if mouthwash has previously been used and it is desired to change to water, the toggle switch 53 will be opened and the toggle switch 45 will be closed to allow water to flow through the water conduit 43 and prevent mouthwash from flowing through the mouthwash conduit 51. However, since mouthwash was previously used, the mouthwash will remain in the mouthwash conduit means 51 and in the liquid conduit means 17 and 18. When the flow of water is begun, the mouthwash in only the liquid conduit means 17 and 18 will have to be dispensed out of the syringe means before water

will begin to flow. By the location of the Y-shaped connection means in the body portion 12 of the syringe means 11, a minimum amount of mouthwash will have to be flushed out.

Thus, the multipurpose dental syringe apparatus illustrated in FIG. 1 may be utilized to dispense a spray of air, water, mouthwash, mixture of air and water, or mixture of air and mouthwash. This may be accomplished by the dentist or dental assistant first actuating one of the toggle switches 53 or 45 to open either the solenoid valve 52 or the solenoid valve 44 to allow the passage of mouthwash or water through conduits 51 or 43 into the syringe means 11. The syringe being held in the hand of a user may be actuated by depressing either the button 23, the button 31, or both to dispense a spray of liquid or air or a mixture of both, as discussed above.

Referring now to the embodiment of the invention shown in FIG. 4, like reference numerals have been utilized with single prime notations where the structure is the same as that of the embodiment of FIGS. 1-3. In this regard, all of the structure of the embodiment of FIG. 4 is the same as that of FIGS. 1-3 except for the location of the means 55' for merging the water conduit 43' and the mouthwash conduit 51' with the syringe liquid conduit in the body portion 12' of the syringe 11'. This merging means 55' is located in the hollow handle portion 14' of the syringe means 11' and includes a separate leg thereof attached to or forming a part of both the mouthwash conduit 51' and the water conduit 43' and the third leg thereof leading into or forming a part of the liquid conduit (not shown) in the syringe body portion 12'. The location of the merging means in the hollow handle allows the use of a commercially available syringe means 11' which may be easily and simply modified by adding thereto the merging means 55' along with the remaining apparatus for alternatively and selectively supplying mouthwash, air and water to a syringe means 11'.

Referring now to FIG. 5, there is shown another embodiment of this invention, referred to therein by the reference numeral 10''. In this embodiment of the multipurpose dental syringe apparatus 10'', like reference numerals with a double prime designation have been used for structure corresponding to the embodiment of FIG. 1.

As may be seen in FIG. 5, the difference in this embodiment over that of FIG. 1 is the location of the means 55'' for merging the mouthwash conduit 51'' and the water conduit 43'' with the liquid conveying conduit in the body portion 12'' of the syringe means 11''. This means 55'' in this embodiment is located externally of the syringe means 11'' and includes a suitable solenoid valve member 60 therein which forms a part thereof. One leg of the merging means 55'' connects with or forms a part of the water conduit 43'', another leg connects with or forms a part of the mouthwash-conveying conduit 51'' and the third leg connects with and/or forms a part of the syringe liquid-conveying conduit (not shown) in the body portion 12'' of the syringe means 11''. The solenoid valve means 60 in the merging means 55'' may be operated by any suitable manually operated toggle switch 61 or other switch to allow the passage of either water from the water conveying conduit 43'' or mouthwash from the mouthwash-conveying conduit 51'' therethrough to the liquid-conveying conduit in the body portion 12'' of the syringe means 11''. Location of the merging means 55'' and the inclusion therein of a single solenoid valve means 60 for allowing or preventing passage of water and mouthwash therethrough for conveying into the syringe means 11'' eliminates the necessity of multiple solenoid valves and provides convenient access thereto for repairs, etc.

Thus, it may be seen that this invention has provided a dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash and which provides several embodiments which have independent advantages, but which all operate in the desired manner.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

What we claim is:

1. Dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash, said dental syringe apparatus comprising:

- a. syringe means adapted to be held in the hand of a user including a main body portion and a nozzle portion having a liquid-conveying conduit therethrough, an air-conveying conduit therethrough and selectively operable valve means therein for allowing and preventing the passage of liquid and air through said respective syringe liquid and air conduits for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from said nozzle portion;
- b. means for supplying air under pressure to said syringe means including an air supply means and a conduit means connected to said supply means for receiving air therefrom and for conveying the air through said conduit means and being operatively connected with said syringe air conduit means for supplying air thereto to be dispensed out of said nozzle portion;
- c. means for supplying water under pressure to said syringe means including a water supply means and a conduit means connected to said supply means for receiving water therefrom and for conveying the water through said conduit means;
- d. means for supplying mouthwash under pressure to said syringe means including a mouthwash supply means and a conduit means connected to said supply means for receiving mouthwash therefrom and for conveying the mouthwash through said conduit means;
- e. valve means operatively connected with said water conduit means and said mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to said syringe liquid conduit means; and
- f. means operatively connected with said mouthwash conduit means, said water conduit means and said syringe liquid conduit means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means, said merging means being located in said syringe body portion at the lower end of said syringe liquid conduit means.

2. Dental syringe apparatus, as set forth in claim 1, in which said valve means operatively connected with said water conduit means and said mouthwash conduit means comprises solenoid valve means including manually operated, electrical switch means for selectively actuating said solenoid valve means to allow and prevent the conveying of water and mouthwash therethrough.

3. Dental syringe apparatus, as set forth in claim 1, in which said means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means comprises a generally Y-shaped connection means connected to all three of said conduit means.

4. Dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash, said dental syringe apparatus comprising:

- a. syringe means adapted to be held in the hand of a user including a main body portion and a nozzle portion having a liquid-conveying conduit therethrough, an air-conveying conduit therethrough and selectively operable valve means therein for allowing and preventing the passage of liquid and air through said respective syringe liquid and air conduits for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from said nozzle portion;
- b. means for supplying air under pressure to said syringe means including an air supply means and a conduit means connected to said supply means for receiving air therefrom and for conveying the air through said conduit means and being operatively connected with said syringe air conduit means for supplying air thereto to be dispensed out of said nozzle portion;

c. means for supplying water under pressure to said syringe means including a water supply means and a conduit means connected to said supply means for receiving water therefrom and for conveying the water through said conduit means;

d. means for supplying mouthwash under pressure to said syringe means including a mouthwash supply means and a conduit means connected to said supply means for receiving mouthwash therefrom and for conveying the mouthwash through said conduit means;

e. valve means operatively connected with said water conduit means and said mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to said syringe liquid conduit means; and

f. means operatively connected with said mouthwash conduit means, said water conduit means and said syringe liquid conduit means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means, said merging means being located in said syringe body portion at the lower end of said syringe liquid conduit means.

5. Dental syringe apparatus, as set forth in claim 4, in which said valve means operatively connected with said water conduit means and said mouthwash conduit means comprises separate solenoid valves operatively connected in each of said water conduit means and said mouthwash conduit means and each of which includes manually operated, electrical switch means for selectively opening and closing each of said solenoid valve means to allow and prevent the conveying of water and mouthwash therethrough.

6. Dental syringe apparatus, as set forth in claim 4, in which said means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means comprises a generally Y-shaped connection means connected to all three of said conduits and forming a part of each of said conduits.

7. Dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash, said dental syringe apparatus comprising:

a. syringe means adapted to be held in the hand of a user including a main body portion and a nozzle portion having a liquid-conveying conduit therethrough, an air-conveying conduit therethrough and selectively operable valve means therein for allowing and preventing the passage of liquid and air through said respective syringe liquid and air conduits for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from said nozzle portion, said syringe means also including a hollow handle portion for the holding of the syringe in the hand of the user;

b. means for supplying air under pressure to said syringe means including an air supply means and a conduit means connected to said supply means for receiving air therefrom and for conveying the air through said conduit means and being operatively connected with said syringe air conduit means for supplying air thereto to be dispensed out of said nozzle portion;

c. means for supplying water under pressure to said syringe means including a water supply means and a conduit means connected to said supply means for receiving water therefrom and for conveying the water through said conduit means;

d. means for supplying mouthwash under pressure to said syringe means including a mouthwash supply means and a conduit means connected to said supply means for receiving mouthwash therefrom and for conveying the mouthwash through said conduit means;

e. valve means operatively connected with said water conduit means and said mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to said syringe liquid conduit means; and

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- f. means operatively connected with said mouthwash conduit means, said water conduit means and said syringe liquid conduit means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means, said merging means being located in said hollow handle portion of said syringe means. 5
8. Dental syringe apparatus, as set forth in claim 7, in which said valve means operatively connected with said water conduit means and said mouthwash conduit means comprises separate solenoid valves operatively connected in each of said water conduit means and said mouthwash conduit means and each of which includes manually operated, electrical switch means for selectively opening and closing each of said solenoid valve means to allow and prevent the conveying of water and mouthwash therethrough. 10
9. Dental syringe apparatus, as set forth in claim 7, in which said means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means comprises a generally Y-shaped connection means connected to all three of said conduits and forming a part of each of said conduits. 15
10. Dental syringe apparatus characterized by being so constructed as to alternatively and selectively dispense a spray of air, water, mouthwash, mixture of air and water, and mixture of air and mouthwash, said dental syringe apparatus comprising: 20
- a. syringe means adapted to be held in the hand of a user including a main body portion and a nozzle portion having a liquid-conveying conduit therethrough, an air-conveying conduit therethrough and selectively operable valve means therein for allowing and preventing the passage of liquid and air through said respective syringe liquid and air conduits for alternatively and selectively dispensing a spray of air, liquid and a mixture of air and liquid from said nozzle portion; 25
- b. means for supplying air under pressure to said syringe means including an air supply means and a conduit means connected to said supply means for receiving air therefrom and for conveying the air through said conduit 40

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- means and being operatively connected with said syringe air conduit means for supplying air thereto to be dispensed out of said nozzle portion;
- c. means for supplying water under pressure to said syringe means including a water supply means and a conduit means connected to said supply means for receiving water therefrom and for conveying the water through said conduit means;
- d. means for supplying mouthwash under pressure to said syringe means including a mouthwash supply means and a conduit means connected to said supply means for receiving mouthwash therefrom and for conveying the mouthwash through said conduit means;
- e. valve means operatively connected with said water conduit means and said mouthwash conduit means for selectively and alternatively allowing and preventing the conveying of water and mouthwash therethrough to said syringe liquid conduit means; and
- f. means operatively connected with said mouthwash conduit means, said water conduit means and said syringe liquid conduit means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means, said merging means being disposed externally of said syringe means.
11. Dental syringe apparatus, as set forth in claim 10, in which said valve means operatively connected with said water conduit means and said mouthwash conduit means comprises a single solenoid valve operatively connected in each of said water conduit means and said mouthwash conduit means and including a manually operated, electrical switch means for selectively actuating said solenoid valve means to allow and prevent the conveying of water and mouthwash therethrough.
12. Dental syringe apparatus, as set forth in claim 11, in which said means for merging said mouthwash conduit means and said water conduit means into said syringe liquid conduit means comprises a generally Y-shaped connection means connected to all three of said conduit means and forming part of said valve means which is operatively connected with said water conduit means and said mouthwash conduit means.