

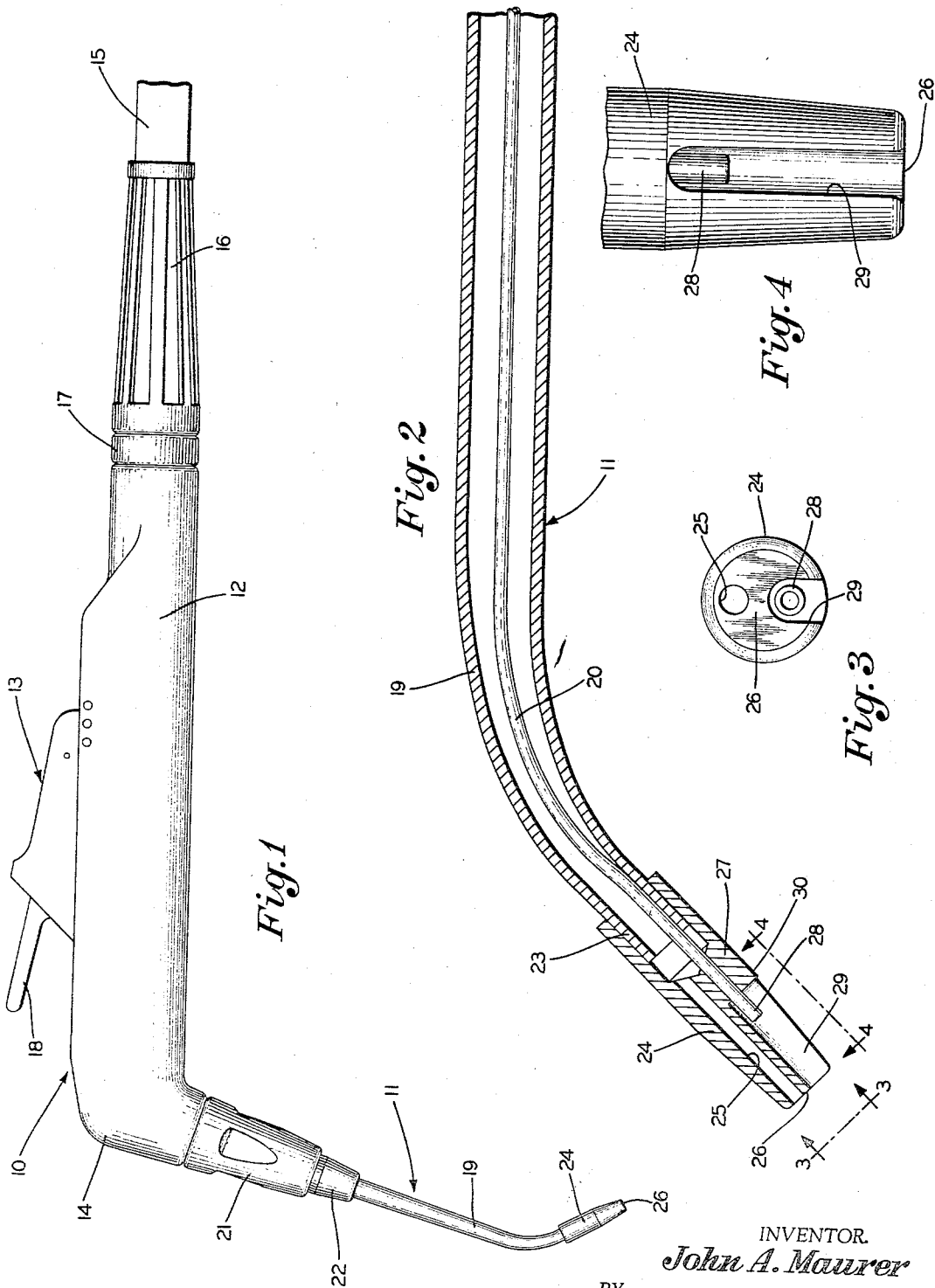
March 26, 1968

J. A. MAURER

3,374,789

DENTAL SYRINGE WITH NOVEL NOZZLE TIP

Filed Sept. 18, 1964



INVENTOR.
John A. Maurer
BY
Freese, Bishop, Johns & Schick
ATTORNEYS

1

3,374,789

DENTAL SYRINGE WITH NOVEL NOZZLE TIP
John A. Maurer, Canton, Ohio, assignor to The Weber
Dental Manufacturing Company, Canton, Ohio, a cor-
poration of Ohio

Filed Sept. 18, 1964, Ser. No. 397,398

6 Claims. (Cl. 128-173.1)

ABSTRACT OF THE DISCLOSURE

A dental syringe nozzle for selectively discharging air or water or an air-water mixture having an air tube terminal at the nozzle tip and a diametrically aligned adjacent water tube terminal spaced from the nozzle tip in a channel open at the side and end of the tip to discharge air alone when desired without aspirating unwanted water.

My invention relates generally to improvements in syringe constructions, and more specifically, to the nozzle portion of syringes used in dental and other related work. Even more specifically, my invention relates to a nozzle construction for syringes which, through selective adjustment and manipulation, may be successively used for ejecting mixtures of fluids or a single fluid, such as an air-water mixture or air alone. Furthermore, the present invention is an improvement of the syringe construction disclosed and claimed in the prior U.S. Patent No. 3,137,297, dated June 16, 1964, of which I am a co-inventor.

In said prior U.S. Patent No. 3,137,297, there is disclosed and claimed a syringe construction for dental and other related uses formed such that supplies of different fluids, such as air and water, are directed through a particular valve assembly, and from such valve assembly, through separate passages into the nozzle portion of the syringe. At the nozzle portion of the syringe, the fluids are directed respectively into separate, preferably telescoped tubes for being passed to a discharge tip assembly of the nozzle portion.

At this nozzle tip assembly, both fluids are directed into a mixing chamber, with the mixtures thereof being emitted from the syringe directly from this mixing chamber through a nozzle outlet opening formed through the nozzle tip end surface. Obviously, if at a particular time, the syringe is manipulated so as to provide only one of the fluids into the particular fluid tube within the nozzle portion, this single fluid will pass through the mixing chamber of the nozzle tip and be emitted alone from the outlet opening of this nozzle tip.

In the particular valve assembly of the syringe construction disclosed in said U.S. Patent No. 3,137,297 and the particular valve actuating assembly provided therefor, the valve actuating assembly may be selectively manipulated or adjusted into three positions. In the most common case where the two fluids are air and water, such three positions will selectively provide air alone, water alone, or a mixture of air and water. Thus, upon the selective depressing of an operating lever of the valve actuating assembly, with this assembly adjusted to each of its three positions, air alone, water alone, or a mixture of air and water is emitted from the discharge tip member of the nozzle portion.

In the nozzle portion of the syringe construction of said Patent No. 3,137,297, the tube for directing water from the valve assembly to the nozzle discharge tip member is telescoped within the tube directing air to this tip member, arranged so that the water tube terminates within the tip member opening into the mixing chamber and, therefore, spaced rearwardly within the tip member from the outlet opening. The air tube, since it surrounds the water tube, opens into the mixing chamber within the tip member in substantially an annulus surrounding the ter-

2

mination of the water tube and likewise spaced from the outlet opening of the tip member the length of the mixing chamber.

It has been found with this particular construction of discharge tip member that when water is directed through the water tube simultaneously with air being directed through the surrounding air tube so as to mix within the mixing chamber of the tip member and be ejected through the outlet opening of the tip member as a mixture, and then the supply of water through the water tube is cut off so that air alone passes from the air tube, through the mixing chamber and from the outlet opening, this passage of air alone into the mixing chamber and through the outlet opening creates a vacuum at the open end of the water tube, thereby causing a certain amount of water to be pulled from the water tube into the mixing chamber and providing an air-water mixture when it is not desired. This is particularly troublesome in the case where a dentist is in the final stage of preparing a cavity for a filling, since at this time, it is desired to clean and dry the cavity by use of air alone and the provision of this unwanted air-water mixture completely frustrates this purpose.

It is, therefore, a general object of the present invention to provide a syringe nozzle construction in which the air and water tubes directing air and water, respectively, are arranged such that an air-water mixture may be emitted from the tip member of the nozzle portion, or the water supply may be cut off and air alone emitted, without the danger of unwanted water mixing into the air stream when air alone is desired.

It is still a further object of the present invention to provide a syringe nozzle construction in which the air tube terminates opening through the end surface of the nozzle tip, whereas the water tube terminates spaced from the end surface of the nozzle tip and communicates therewith through a generally U-shaped cross-section channel, which channel opens through the end surface of the nozzle tip as well as through a side surface thereof.

Finally, it is an object of the present invention to provide a syringe nozzle construction satisfying the above objects in a relatively simple and efficient manner, and at a minimum of cost.

These and other objects are accomplished by the parts, construction, arrangements combinations and subcombinations comprising the present invention, a preferred embodiment of which—illustrative of the best mode in which applicant has contemplated applying the principles—is set forth in the following description and illustrated in the accompanying drawings, and which is particularly and distinctly pointed out and set forth in the appended claims forming a part hereof.

In general terms, the syringe construction comprising the present invention may be stated as being of the general type in which air and water supplies are received therein and directed through separate air and water tube means to the discharge tip of a nozzle portion thereof, with control means being provided for selectively controlling the supplies of air and water through the respective air and water tube means to the discharge tip so as to provide at least air alone, and simultaneously air and water at the discharge tip. Further, the improvements of the present invention include the air tube means being formed extending through the discharge tip and opening at the discharge tip end surface for receiving air therethrough and discharging the air at the discharge tip end surface.

Still further, the improvements include the water tube means being formed extending into the discharge tip and terminating spaced from the discharge tip end surface, with a generally U-shaped cross-section channel being formed extending generally axially from the termination of the water tube means to and through the discharge tip end surface, and with this channel being formed also open-

ing through the discharge tip side surface and being in communication with the water tube means so as to receive water from the water tube means therethrough and discharge such water at the discharge tip end surface. Finally, according to the present invention it is preferred for maximum results that the air tube means at the discharge tip end surface, the water tube means at its point of termination in the discharge tip, and the channel formed in the discharge tip are all substantially axially aligned, and also that the channel be formed in the discharge tip opening through the discharge tip side surface substantially diametrically opposite from the air tube means at the discharge tip end surface.

By way of example, an embodiment of the improved syringe construction of the present invention is illustrated in the accompanying drawings forming a part hereof, wherein like numerals indicate similar parts throughout the several views, and in which:

FIG. 1 is a side elevation of a syringe construction incorporating the principles of the present invention;

FIG. 2, an enlarged fragmentary vertical sectional view of the nozzle portion of the syringe of FIG. 1;

FIG. 3, an enlarged end view of the discharge tip forming a part of the nozzle portion of FIG. 2 and looking in the direction of the arrows 3—3 in FIG. 2; and

FIG. 4, an enlarged fragmentary bottom plan view of the discharge tip forming a part of the nozzle portion of FIG. 2 and looking in the direction of the arrows 4—4 in FIG. 2.

As shown in FIG. 1, the main part of the syringe construction with the exception of the extreme end of the nozzle portion and the discharge tip thereof, is identical to that shown and described in said prior Patent No. 3,137,297 of which the present invention is an improvement. For this reason, the major part of the syringe construction will only be described generally and reference is made to said Patent No. 3,137,297 for the details thereof.

Basically, the syringe construction illustrated includes a handle portion, generally indicated at 10, and a nozzle portion, generally indicated at 11, with the handle portion 10 having the body 12 enclosing the air and water valve assembly (not shown) and mounting the selectively adjustable and selectively operable valve actuating assembly, generally indicated at 13. Also, the handle portion 10 is formed with the head 14 integrally connected to the body 12 and operably connected to one end of the nozzle portion 11.

Air and water supply tubes (not shown) are directed through a covering tube 15, a tube guard 16 and a supply tube holder 17 into the rearward end of the body 12 of the handle portion 10. These air and supply tubes are operably connected through the body 12 of the handle portion 10 to the valve assembly, and the valve assembly is formed such that by selective adjustment of the valve actuating assembly 13 to any of three positions, and by the subsequent depressing of the operating lever 18, air alone, or separate streams of air and water, or water alone may be directed from the body 12 of handle portion 10 through the head 14 thereof and into the nozzle portion 11, all of which is clearly set forth in said Patent No. 3,137,297.

More specifically according to the improvements of the present invention, the nozzle portion 11 is formed with the outer air tube 19 and the inner water tube 20, which water tube is telescoped within the air tube extending along the length thereof. As set forth in said Patent No. 3,137,297, the air and water tubes 19 and 20 of the nozzle portion 11 are operably connected to the head 14 of the handle portion 10 by means of the nozzle engagement collar 21 and nozzle inlet member 22 both selectively rotatably adjustable relative to head 14 as well as for receiving separate streams of air and water, respectively, from handle portion 10.

Thus, when the valve actuating assembly 13 of handle

portion 10 is selectively moved to one of its three positions and the operating lever 18 depressed, air alone will be received through the nozzle inlet member 22 into and along the air tube 19 outwardly around the water tube 20 and separate from this water tube. Furthermore, in another selectively adjusted position of the valve actuating assembly 13, depressing the operating lever 18 will cause water alone to be received through water tube 20 within and separate from air tube 19. Finally and still in another position of the valve actuating assembly 13, upon depressing of the operating lever 18, air will be received through the air tube 19 and simultaneously therewith, water will be received through the water tube 20, both streams being maintained separated by the respective tubes.

Also, these separate streams of air and water through the air and water tubes 19 and 20, or air alone through air tube 19, or water alone through water tube 20, dependent on the particular selective adjustment of the valve actuating assembly 13, are maintained despite the rotatable adjustment of the nozzle portion 11 relative to the head 14 of handle portion 10 by virtue of the particular construction of the nozzle inlet member 22 and the manner in which this nozzle inlet member is selectively rotatably secured by the nozzle engagement collar 21 to head 14 of handle portion 10. Again, the details of this construction are clearly set forth in said Patent No. 3,137,297 and need not be described in detail here.

As shown in FIG. 2, the forward end 23 of air tube 19 is telescoped by a discharge tip 24, with this discharge tip in general outward appearance extending co-axially from the air tube forward end 23. Further, this discharge tip 24 is formed with a tube-like air discharge opening 25 communicating rearwardly with the interior of the air tube 19 and opening forwardly through the discharge tip end surface 26.

As best seen in FIGS. 2 and 3, the air discharge opening 25 of discharge tip 24 extends substantially axially of the discharge tip, but is offset from the discharge tip central axis. Thus, air received through the air tube 19 may pass through the air discharge opening 25 of the discharge tip 24 and will be emitted at the discharge tip end surface 26.

The water tube 20 at the forward end 23 of air tube 19 is formed extending to one side of the air tube but still within this air tube, as best seen in FIG. 2. Further, this water tube 20 extends from the air tube forward end 23 and preferably substantially axially through a rearward portion 27 of discharge tip 24, with water tube 20 terminating spaced axially rearwardly from the discharge tip end surface 26. As best seen in FIGS. 2, 3 and 4, the forward end 28 of water tube 20 communicates with or opens forwardly into a generally axially extending, generally U-shaped cross-section, water discharge channel 29, which channel opens transversely through the discharge tip side surface 30 and extends from rearward communication with the water tube forward end 28 forwardly and opening through the discharge tip end surface 26.

As shown, the water tube forward end 28 and channel 29 are spaced transversely from the air discharge opening 25 within the discharge tip 24. Furthermore, it is preferred that the termination of the water tube 20, that is, the forward end 28 thereof, the channel 29, and the air discharge opening 25 will all be substantially axially aligned with the water tube forward end 28 and channel 29, as well as the opening of channel 29 through the discharge tip side surface 30, preferably being diametrically aligned with the air discharge opening 25.

Thus, when air and water are simultaneously flowing through the air tube 19 and water tube 20, respectively, the air will pass through the air discharge opening 25 and be emitted at the discharge tip end surface 26, while the water will be emitted at the water tube forward end 28 spaced rearwardly from the discharge tip end surface 26, will pass through the channel 29 to the discharge tip end

5

surface, and then mix with the air to form an air-water mixture. When, however, it is desired to provide a dry air stream alone so that the flow of water in the water tube 20 is cut off, air alone will be emitted from the air discharge opening 25 at the discharge tip end surface 26. Due to the termination of the water tube 20 rearwardly from this discharge tip end surface 26, and the fact that channel 29 opens through the discharge tip side surface 30, there can be no vacuum build-up around the forward end 28 of water tube 20, so that there can be no accidental discharge of water with the air stream when dry air alone is desired.

Furthermore, even though there might be a slight leakage of water from the water tube forward end 28 during emitting of air alone from the air discharge opening 25, this water leakage will merely enter the channel 29 spaced rearwardly from the discharge tip end surface 26 and still cannot mix with the air stream. In the case where the nozzle portion 11 is positioned extending generally downwardly, the position shown for instance in FIG. 2, this water leakage will pass transversely through the channel 29 and outwardly through the discharge tip side surface 30 in view of the downward opening of the channel through the discharge tip side surface. Even with the nozzle portion in an upward directed position (not shown), this water leakage will still flow transversely from the channel 29 in view of this transverse opening through the discharge tip side surface 30.

Thus, according to the principles of the present invention, an improved syringe construction has been provided which effectively eliminates the danger of unwanted water mixing into an air stream being emitted from the syringe discharge tip when dry air alone is desired.

Although in the present description and claims, the improved syringe construction of the present invention is described and claimed for use with air and water, and mixtures thereof, it should be understood that the principles of the present invention may equally as well be applied for use with other fluids, whether one is gas and one is liquid, or both are either gas or liquid. Thus, it should be understood that these terms are used merely because these are the usual fluids involved in dental work, but that by such use it is not intended to limit the principles of the present invention.

Also, it is clear that the improvements in nozzle discharge tip construction of the present invention have wide application in many forms of syringe construction other than the particular construction illustrated and described. This, it should be likewise understood that it is not intended to limit the principles of the present invention to any one particular syringe construction.

In the foregoing description, certain terms have been used for brevity, clearness and understanding but no unnecessary limitations are to be implied therefrom, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example and the scope of the present invention is not limited to the exact details of construction shown.

Having now described the invention, the construction, operation and use of a preferred embodiment thereof, and the advantageous new and useful results obtained thereby, the new and useful construction and reasonable mechanical equivalents thereof obvious to those skilled in the art is set forth in the appended claims.

I claim:

1. Syringe construction of the type in which supplies of air and water are received therein and directed through separate air and water tube means to the discharge tip of a nozzle portion thereof, in which the discharge tip has side and end surfaces, and in which control means is provided for selectively controlling the supplies of air and water through the respective air and water tube means to the discharge tip for providing at least air alone and

6

simultaneously air and water at the discharge tip; the improvements including the air tube means formed extending through the discharge tip and opening at the discharge tip end surface for receiving air therethrough and discharging the air at the discharge tip end surface, the water tube means formed extending into the discharge tip and terminating spaced from the discharge tip end surface, a generally U-shaped cross-section channel formed in the discharge tip extending generally axially from the termination of the water tube means to and through the discharge tip end surface, and said channel being formed opening through the discharge tip side surface and being in communication with the water tube means for receiving water from the water tube means therethrough and discharging the water at the discharge tip end surface.

2. Syringe construction as defined in claim 1 in which the air tube means at the discharge tip end surface is substantially axially aligned with the water tube means at the termination of the water tube means in the discharge tip.

3. Syringe construction as defined in claim 1 in which the air tube means at the discharge tip end surface, the water tube means at its point of termination in the discharge tip and the channel formed in the discharge tip are all substantially axially aligned.

4. Syringe construction as defined in claim 1 in which the channel formed in the discharge tip opens through the discharge tip side surface substantially diametrically opposite from the air tube means at the discharge tip end surface.

5. Syringe construction as defined in claim 1 in which the air tube means at the discharge tip end surface is substantially axially aligned with the water tube means at the termination of the water tube means in the discharge tip; and in which the channel formed in the discharge tip opens through the discharge tip side surface substantially diametrically opposite from the air tube means at the discharge tip end surface.

6. Syringe construction of the type in which supplies of air and water are received therein and directed through separate air and water tube means through the discharge tip of a nozzle portion thereof, in which the discharge tip has side and end surfaces, and in which control means is provided for selectively controlling the supplies of air and water through the respective air and water tube means to the discharge tip for providing at least air alone and simultaneously air and water at the discharge tip; the improvements including the air tube means formed extending through the discharge tip and opening at the discharge tip end surface for receiving air therethrough and discharging the air at the discharge tip end surface, the water tube means formed extending through the discharge tip and terminating spaced inwardly from the discharge tip end surface, a generally U-shaped cross-section channel formed in the discharge tip extending generally axially from the termination of the water tube means to and through the discharge tip end surface, and said channel being formed opening through the discharge tip side surface and being in communication with the water tube means for receiving water from the water tube means therethrough and discharging the water at the discharge tip end surface.

References Cited

UNITED STATES PATENTS

3,137,297	6/1964	Maurer et al.	128—173.1
3,254,646	6/1966	Staunt	128—224

FOREIGN PATENTS

1,283,519	12/1961	France.
795,283	5/1958	Great Britain.
941,332	11/1963	Great Britain.

RICHARD A. GAUDET, *Primary Examiner.*

75 R. L. FRINKS, *Assistant Examiner.*