

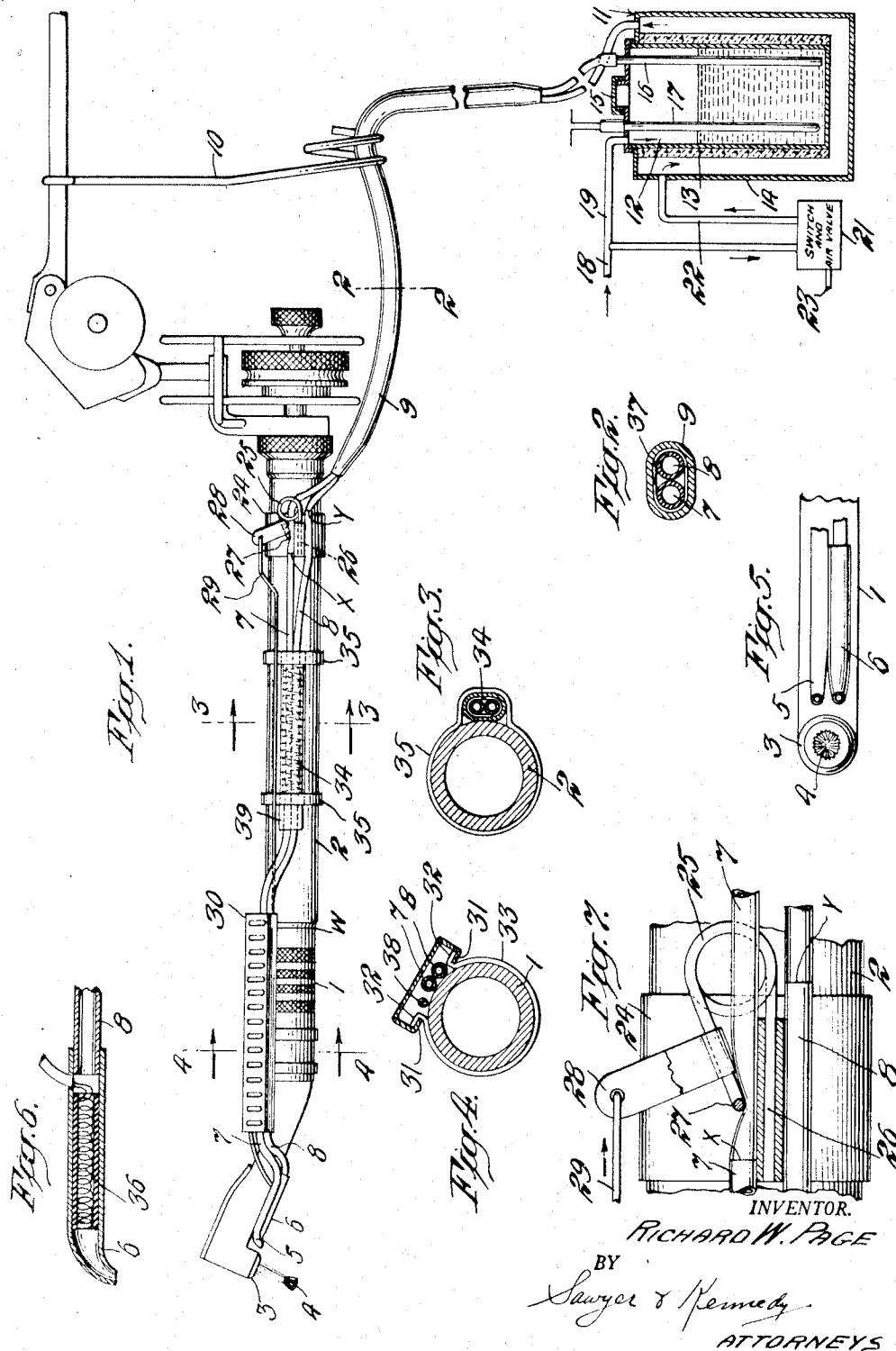
May 13, 1947.

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2,420,338

DENTAL APPARATUS

Filed Nov. 20, 1943



UNITED STATES PATENT OFFICE

2,420,338

DENTAL APPARATUS

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Application November 20, 1943, Serial No. 511,073

4 Claims. (Cl. 32—28)

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This invention relates to improvements in dental instruments.

It is an object of the invention to provide improved fluid spray means for water or air, or both, in conjunction with a dental drill hand piece or angle attachment therefor.

A further object of the invention is to provide improved temperature regulating and control means in conjunction with air and water supply means.

With these and still other objects which will appear in the following full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now first be fully described in connection with the accompanying drawing and then be more particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a view in side elevation of a hand piece and angle attachment embodying the invention in a preferred form, and showing the associated fluid systems diagrammatically;

Figures 2, 3 and 4 are cross sections taken on the respective lines 2—2; 3—3; and 4—4 of Figure 1;

Figure 5 is a detail view looking toward the tip of the apparatus of Figure 1 and showing the relation of the air and water nozzles to the drill;

Figure 6 is a longitudinal section through the air nozzle of Figures 1 and 5; and,

Figure 7 is an enlarged fragmentary view of a portion of Figure 1, showing the water line valve mechanism.

As shown in Figure 1, the invention contemplates the use of a conventional attachment 1 removably mounted on the usual hand piece 2. Inasmuch as these mechanisms are well known in themselves and the specific form of angle attachment, hand piece and drive means which are employed form no part of the present invention, no further description of such parts is necessary to a full understanding of the invention.

The invention contemplates the provision of air and water nozzles in conjunction with the drilling instrument, this in itself having been previously proposed, but contemplates also a novel arrangement of parts in such an assembly for facilitating the use of the various elements of the complete apparatus and also provides a novel and improved heating and control system therefore, the advantages of which will be pointed out in the course of the following description.

While the invention will be found to be more necessary in connection with an angle attach-

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ment, than with a straight drill (due to the nature of the work customarily done with the two types of instruments), the invention is not limited in its broader aspect to use with an angle attachment, but is also applicable to dental drill instruments generally.

As shown in Figures 1 and 5, there is provided adjacent the chuck or socket 3 for the drill or other tool 4, a water nozzle 5 and an air nozzle 6, these members being fastened to the angle attachment. The nozzles are constructed so as to project a stream of water or air past the drill 4 and closely adjacent thereto but so directed as not to be broken up by the drill but to pass the same as substantially undisturbed jets. The water line 7 and air line 8 are carried back along the contra-angle and hand piece as shown, and are conveniently brought together in a flexible sheath or tubing 9 which is supported, as by means of a hanger 10, adjacent the drive end of the hand piece and connects to an air and water supply unit 11 which is shown diagrammatically in Figure 1 and may be placed in any convenient location. This location will generally be within the dental cabinet or so-called "unit." The air and water supply unit 11 may be constructed in any convenient manner so as to carry out the thermal and control conditions discussed below, but is conveniently made in the form of a double container comprising an inner water container 12 surrounded by an electric heating element 13 which is in turn surrounded by an outer container 14 which forms an air jacket surrounding the water container. Means such as the removable cap 15 is provided for filling the inner container 12 with water and the water is discharged through an outlet tube 16 from a point adjacent the bottom of the container into the water line 7. The heater 13 is controlled by means of a thermostat 17 in the water within the container 12.

Air under pressure is supplied from any convenient source through the air supply line 18. The air line 18 has two branches, one branch 19 connecting with the upper part of the water container, as shown, so as to maintain pressure on the water for the purpose of forcing it up through the outlet tube 16 and water line 7, and the other branch going through a switch and air valve mechanism 21 and thence through the line 22 into the air jacket within the outer container 14 which, in turn, is connected with the air line 2, as shown. The switch and air valve mechanism is designed to be operated by means of a foot pedal 23, depressing which opens a normally

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closed air valve and also closes a switch for controlling a heater in the nozzle of the air line (Figure 6), as later described. Inasmuch as any convenient switch and valve mechanism may be employed, this apparatus is not shown in detail. As just described, the air valve mechanism is controlled by a foot pedal 23 at a point remote from the instrument, this expedient being adopted so as to eliminate the need for hand control of the air. Water line 7 passes through a clamp valve shown in detail in Figure 7, and comprising a strap or collar 24 passing around the barrel of the hand piece and carrying a spring 25, one end 26 of which is fixed to the collar 24, and the other end 27 of which normally compresses the line 7 so as to close the same. An arm 28 mounted on the spring 25 is utilized to open the line 7, this being accomplished through movement in the direction of the arrow in Figure 7, by means of a link 29 which is fastened to a slide member 30. The slide member 30 is slidably carried, as best shown in Figures 1 and 4, by means of flanges 31 passing under and cooperating with flanges 32 formed on a member 33 which passes around and is secured to the angle attachment. Pushing the slide 30 rearwardly accordingly opens the water valve, projecting a jet of water through the nozzle 5.

Lines 7 and 8 are preferably made of metallic tubing up to the collar 24 and are fastened thereto, the continuation of these lines, past the points X and Y respectively, being made of flexible tubing. Toward the middle of the hand piece, there is provided a further electric heater unit 34 which surrounds the lines 7 and 8 as shown in Figure 3 and which is affixed to collars 35 which fit around the barrel of the hand piece. The straps 33 are preferably fastened rigidly to the angle attachment, while the straps 24 and 35 are slidable along the barrel of the hand piece. Accordingly when it is desired to remove the attachment, the entire assembly will be slid off the hand piece, the metallic tubing sections of the lines 7 and 8 serving to hold the various parts together with sufficient rigidity. The point of separation of the angle attachment proper from the hand piece is indicated in Figure 1 by the letter W. The hanger 10 is also conveniently made in such form as to permit the flexible section 9 to be slipped out of the same when the angle attachment and attached assembly are removed.

In addition to the heating units 13 and 34, previously referred to, a heating unit 36 positioned within the air nozzle 6 as shown in Figure 6 is provided and the flexible line 9 includes an electric heater coil 37, which preferably extends throughout its entire length. For clarity, the electrical connections of the various heaters are omitted from the drawing with the exception of a portion of the electric heater line 38 leading to the heater 36 which is positioned in the air nozzle. According to the preferred embodiment, the heater element 13 is controlled by the thermostat 17 reacting to the temperature within the heater tank 12, while the heater elements 34 and 37 are controlled by a smaller thermostat 39 which registers the temperature of the water and air lines adjacent the heater 34. Heater 36, as previously mentioned is not controlled thermostatically but is turned on whenever the air valve is opened.

By the mechanism shown, the water line 7 is maintained at the desired temperature of, say, 100° F. at all times. The air, due to the juxtaposition of the air and water system from supply

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unit 11 to and through the heater 34 upon the hand piece, is likewise maintained at a similar temperature, the effect of the water in this connection being of considerable assistance in maintaining the desired stability within the air system.

Due to the fact that the air is open at the nozzle end, a certain amount of diffusion may take place. The air is also relatively difficult to heat and passes through the system in much greater volume than the water. For these reasons, the booster heater 36, which operates whenever the air is turned on by means of the foot pedal 23 is provided and raises the temperature of the air sufficiently to insure an adequate jet of warm air within the desired temperature range at all times.

In the application of the invention to a contra-angle attachment, the positioning of the parts fastened to the attachment proper is of considerable importance, due to the fact that certain surfaces of the attachment must be left free for the fingers and undue bulk cannot be tolerated. With this in mind, the slide 30 is positioned on the top of the contra-angle attachment and slightly to one side as shown in Figures 1 and 4. Assuming the unit is designed for right handed operation, as is the case in the drawing, the slide will be somewhat to the left. With this construction, interference with the normal and necessary operations of the mechanism is avoided. As normally used, the thumb of the operator will be placed on the contra-angle shank adjacent to and below the slide 30. The first finger is utilized to work the slide and will rest upon the same or upon the contra-angle shank close thereto, while the first joint of the second finger will be pressed under the contra-angle. In this way, the valve control means is placed in position for ready operation while the normal grip upon the contra-angle attachment is not interfered with.

The instrument of the invention, as will be apparent to those skilled in the art, very greatly expedites drilling operations, as it eliminates the need for successively laying down and picking up two or three instruments according to the present practice. The drilling may, therefore, be accomplished at greater speed and with less discomfort to the patient, as the syringing of a cavity which is being drilled requires merely turning on the water jet with a slight movement of the finger. Drying out of the cavity is accomplished with the instrument in the same position by merely depressing the foot pedal. The drill or other instrument may be removed from the cavity, or not as desired. Inasmuch as the water valve is located upon the hand piece and the whole water system is kept at the desired warmth thermostatically, accurate temperature control of the water is provided for. Location of the air valve at a remote point for foot operation makes possible the operation of either the air or water syringe, as desired, without shifting the fingers or requiring too bulky an instrument.

What is claimed is:

1. Dental apparatus comprising, in combination, a contra-angle attachment, air and water syringe nozzles mounted upon the head of said contra-angle attachment in position to direct air and water jets past a drill held thereon, a collar attached to said contra-angle attachment in position to slide over a hand piece when the attachment is placed thereon, air and water lines extending from said nozzles to said collar, so as to be positioned along the side of a hand piece when

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the attachment is placed thereon, the said lines comprising a first section extending from the nozzles and continuing around one side of the neck of the contra-angle attachment to a second section along the top and toward the same side of the contra-angle attachment and being continued by a third section running along the same side of the hand piece, and a finger-operated water valve control member mounted on the top of the same side of the shank of the contra-angle attachment as the said second section of the air and water lines.

2. Dental apparatus comprising, in combination, a contra-angle attachment, air and water syringe nozzles mounted upon the head of said contra-angle attachment in position to direct air and water jets past a drill held thereon, a collar attached to said contra-angle attachment in position to slide over a hand piece when the attachment is placed thereon, air and water lines extending from said nozzles to said collar, so as to be positioned along the side of a hand piece when the attachment is placed thereon, the said lines comprising passages connecting the nozzles to lines running along the side of the hand piece, and a finger operated water valve control member mounted on the top and to one side of the shank of the contra-angle attachment for controlling flow through the water line.

3. Dental apparatus according to claim 2, comprising also an air valve for controlling flow through the air line, foot operated means for said air valve operable independently of the drill motor.

4. Dental apparatus including, in combination a driven dental device having a freely movable manipulative device which includes a hand piece and a contra-angle drill holder, an air discharge nozzle and a water discharge nozzle mounted upon the contra-angle drill holder and located

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adjacent a drill supported in the drill holder to direct an air jet and a water jet past the drill in undisturbed jets and closely adjacent thereto, an air conduit communicating the air discharge nozzle with a source of air supply, a water conduit communicating the water discharge nozzle with a source of water supply, a valve for controlling the passage of water through the water conduit, a valve-operating member movably supported by the manipulative device, and operably connected to the water valve and located at the top and to one side of the hand piece and contra-angle drill holder and out of the way of the grip of the finger but in position for convenient manipulation by a finger of the same hand which manipulates the drill holder, the air and water conduits extending generally inwardly from the said discharge nozzles to and immediately adjacent and parallel with the valve-operating member through its length and then downwardly and then along a side of the manipulative device in parallel relation thereto, and a remotely-located foot-operated valve for controlling the passage of air through the air conduit and discharge nozzle.

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