

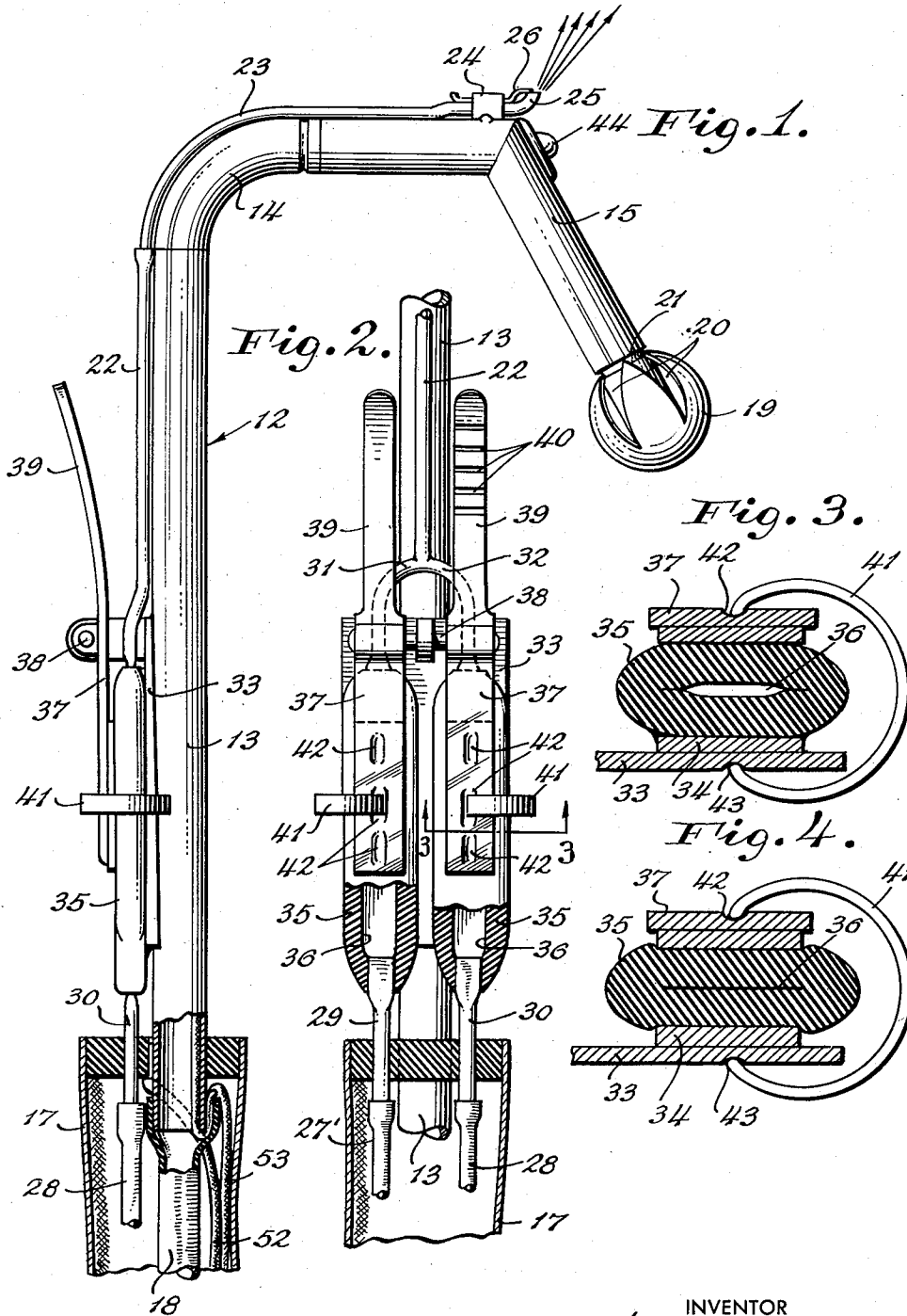
Sept. 12, 1950

H. FREEDMAN
DENTAL APPLIANCE

2,522,261

Filed Aug. 16, 1946

2 Sheets-Sheet 1



INVENTOR
HYMAN FREEDMAN
BY *Edward J. Quella*
ATTORNEY

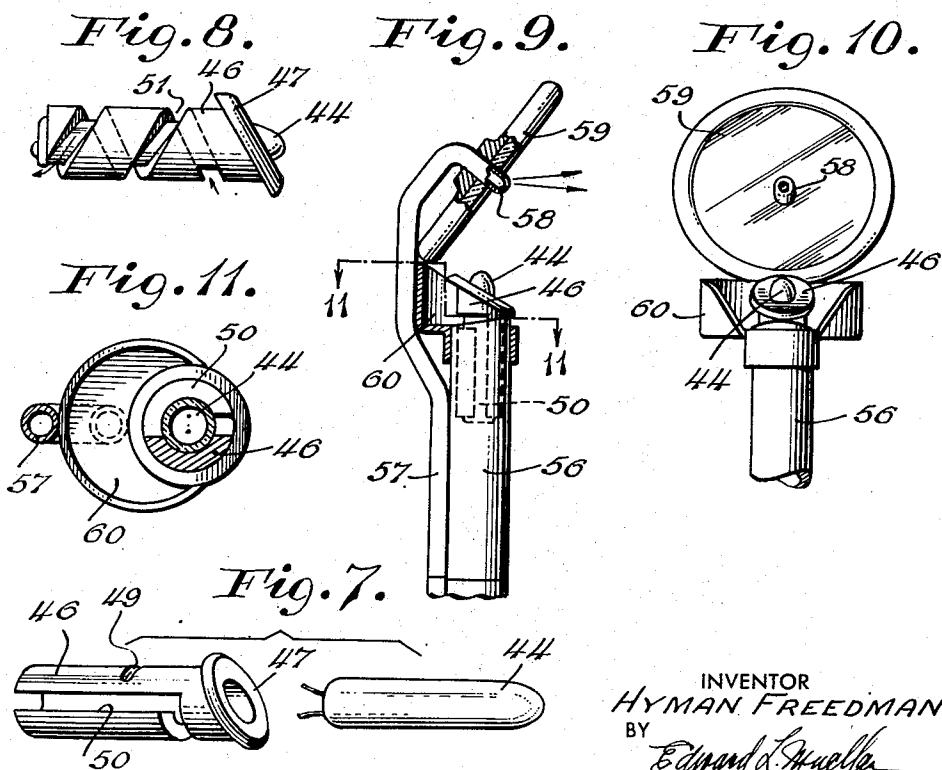
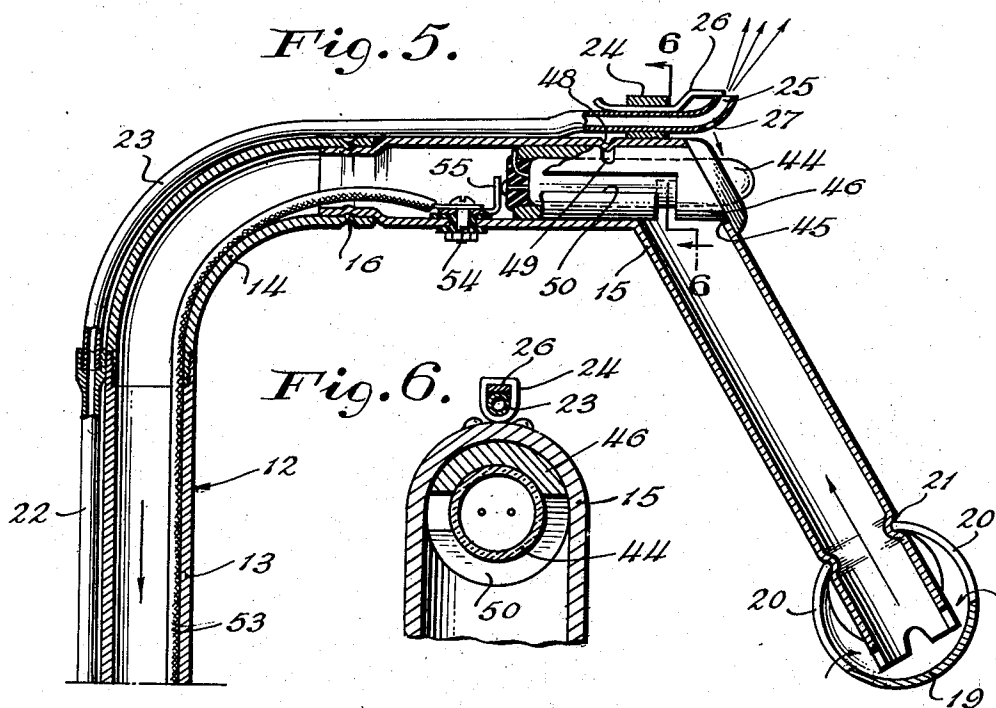
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DENTAL APPLIANCE

Hyman Freedman, New York, N. Y.

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13 Claims. (Cl. 32—33)

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This invention relates to improvements in dental appliances and has for one of its objects the provision of an instrument of simple and practical construction which is employed for the injection of fluids into the oral cavity for various purposes, such as an aid to the cleansing thereof during the course of an operation, the reduction of the temperature of the teeth when drill work is being performed, and for diagnostic purposes.

Another object is to facilitate the control of the flow of air and water through the injector tube and into the oral cavity by the provision of an improved valve means supported directly on the instrument and so arranged thereon that the dentist can manipulate said valve means with the same hand that holds the instrument in position.

Another object is to provide illumination for the oral cavity by mounting a lamp on the instrument in such manner that fluid being withdrawn by the latter from the oral cavity will be circulated around said lamp to reduce its temperature, thereby avoiding possible injury to the tissues of the mouth.

Another object is to utilize the cooling effect of fluid being injected into the mouth to further reduce the temperature of the lamp by so arranging the latter that a portion of said fluid will impinge directly thereon.

The above and other objects will appear more clearly from the following detailed description when taken in connection with the accompanying drawings which illustrate preferred embodiments of the inventive idea.

In the drawings:

Fig. 1 is a side elevation, partly in section, of one form of instrument embodying features of the present invention.

Fig. 2 is a fragmentary elevation, partly in section, taken at right angles to Fig. 1.

Fig. 3 is an enlarged transverse section on the line 3—3 of Fig. 2 taken through a portion of the valve mechanism and showing the valve body in opened position to permit passage of a fluid therethrough.

Fig. 4 is a similar view showing the valve in closed position.

Fig. 5 is an enlarged sectional view through a portion of the instrument shown in Fig. 1.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a perspective view of an incandescent lamp and its jacket.

Fig. 8 is an elevation of another form of jacket with the lamp positioned therein.

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Fig. 9 is a fragmentary elevation, partly in section, of another type of instrument embodying features of the present invention.

Fig. 10 is a similar view taken at right angles to Fig. 9, and

Fig. 11 is an enlarged section on the line 11—11 of Fig. 9.

The instrument illustrated in Figs. 1 to 5 is of the type shown in my United States Patent No. 2,274,893, dated March 3, 1942 and comprises an ejector tube generally indicated by the numeral 12. Said tube consists of a handle section 13, an intermediate curved section 14 threaded at one end onto the section 13, and an angular mouthpiece section 15 the inner portion of which extends at right angles to the section 13 while its outer portion is at an oblique angle thereto. The inner end of said section 15 is reduced to fit into the adjacent end of the section 14 and a bead and groove formation 16 frictionally interconnects the sections in a manner which permits relative rotation of the section 15 with a consequent ability to shift the outer extremity thereof to the right or left of the floor of the mouth so that it may be moved out of range of the field of work, without movement of the handle section 13. The lower end of the latter section extends into a flexible sheathing 17 of any suitable material where it is joined to a pipe 18 in which suction may be created in any preferred manner, such as shown in the above mentioned patent, this suction being utilized to withdraw or discharge saliva and other accumulations from the mouth during the course of an operation. The free extremity of the mouthpiece section 15 is provided with a removable head 19 of substantially spherical form having slits or openings 20 therein through which fluids and other matter will enter the head and be drawn off by the suction in the ejector tube when said head is resting on the floor of the mouth. To removably support the head 19 on the section 15, the latter is provided adjacent its extremity with an annular groove 21 for receiving the ends of the slit portions of the head.

Associated with the ejector tube 12 and mounted directly thereon is a smaller fluid injector tube comprising the interconnected lower and upper sections 22 and 23, respectively, which conform to the contour of said tube 12 and are utilized to inject water and air into the oral cavity under the control of a valve mechanism presently to be described. The free end of the injector section 23 extends through a block 24 and terminates in an upwardly directed nozzle

25. A small valve 26 is slidable in the block 24 and may be used to regulate the size of the nozzle opening and thus control the volume of the spray emitting from said nozzle. At a point contiguous to the elbow of the section 15 of the ejector tube and adjacent the nozzle 25, the tube section 23 is provided in its underside with a small port or vent 27 through which a limited quantity of the injected fluid will be permitted to escape for a purpose which will appear in the course of the description.

Air and water, under pressure, are fed to the injector tube from suitable sources connected to the flexible hoses 27' and 28, respectively, which are enclosed within the sheathing 17 and joined therein to the pipes 29 and 30 leading to the valve mechanism which controls the feed of the fluids to the injector tube section 22, the lower end of which is provided with the branches 31 and 32 also connected to said mechanism.

Generally, this valve mechanism is mounted directly on the handle section 13 of the ejector tube and is so designed that it may be grasped in the hand and controlled thereby for the admission of air or water from the sources of supply into the injector tube and through the nozzle 25 thereof. Specifically, said mechanism comprises a base plate 33 suitably secured to the tube section 13 and tapered longitudinally, as shown in Fig. 1. Said plate is thickened along its center portion as indicated at 34 (Figs. 3 and 4) and these portions act as a support for the complemental valve bodies 35 which are secured thereto by cement or other suitable means. Each valve body is of an elongated formation and substantially oval in cross-section and is made of a compressible material of any desired nature. The valve is provided therein throughout its length with a slit 36 the width of which may be varied as desired. The lower end of the valve receives the upper end of its associated pipe 29 or 30 to establish communication between the latter and the slit 36 which constitutes a channel through which the fluid flows into the branch 31 or 32 and thence into the injector tube. The pressure under which the fluid enters the pipe 29 or 30 is sufficient to force open the slit 36 when pressure upon the valve body is relieved in a manner to presently appear, and it may be that, under certain conditions in which pressure upon the body is being maintained, a slight amount of fluid may pass through said body when not intended, but this condition is not detrimental to the effective operation of the device.

In order to maintain pressure upon the valve bodies to substantially shut off the flow of fluid therefrom and to relieve such pressure to permit of said flow when desired, each valve 35 has associated therewith a lever 37 which is mounted upon a pivot 38 carried by the base plate 33. The two levers extend longitudinally over the valve bodies 35 and the handle portions 39 of said levers are arranged along and on opposite sides of the handle section 13 of the ejector tube so that they may be conveniently engaged and depressed by the thumb of the hand which is used to grip the instrument. The lever 37, which controls the flow of water through the right hand valve 35 (Fig. 2) is serrated or similarly marked, as indicated at 40, to enable the operator to identify, by touch, the proper lever to be depressed. As best shown in Figs. 3 and 4, each lever 37 is increased in thickness in the portion thereof overlying its valve 35 and said portion rests upon the upper surface of said valve so that it may exert a down-

ward pressure thereon to close the channel 36. This downward pressure is accomplished through the medium of a resilient means in the form of a bowed spring element 41 which is spread so as to engage one extremity thereof with the lever 37 and its other end with the under surface of the base plate 33. When so positioned the spring exerts a downward pressure upon the valve to keep its channel closed until the end 39 of the lever is depressed, whereupon said pressure is relieved and the desired fluid will flow into the injector tube. Provision is made to vary the amount of pressure upon the valve by the spring 41. This is accomplished by adjusting the spring along the lever to different distances from the fulcrum thereof. To designate these different positions and aid in retaining the spring in its adjusted position, the upper surface of each lever 37 is provided with a longitudinal row of spaced recesses 42 and a similar row of recesses 43 is provided for each lever in the bottom surface of the base plate 33, said recesses receiving the ends of the spring 41, as shown in Figs. 3 and 4.

The invention further contemplates improved means for illuminating the oral cavity while the instrument is in operation. This illumination is accomplished by a small incandescent lamp 44 which is inserted into the horizontal portion of the mouthpiece section 15 through an opening 45 formed therein at the elbow of said section, and when said lamp is in proper position its outer end will project slightly beyond the adjacent surface of said section so as to afford the proper amount of illumination. Also, the projecting end of the lamp will be positioned directly beneath the port 27 in the injector tube so that any fluid dropping through said port will impinge upon the end of the lamp and thus aid in reducing its temperature.

The major portion of the lamp 44 is enclosed within a cylindrical metal jacket 46 which is removably mounted within the horizontal portion of the section 15 by insertion through the opening 45 and is directly in the path of the fluid being withdrawn from the mouth by suction. A head 47 on the jacket seals the opening 45 to prevent leakage at this point and a detent 48 on the tube engages a recess 49 in the jacket to frictionally maintain the latter in position. By locating the jacket in the path of flow in the tube 15, this flow is employed to further reduce the temperature of the lamp 44 and, to this end, said jacket is provided, as shown in Figs. 5, 6 and 7, with a circulatory channel 50 opening into the under side thereof and extending longitudinally to the rear end of the jacket. The provision of this channel permits the fluid flowing upwardly in the section 15 to come into direct contact with the lamp with the result that the temperature of its casing will be reduced to an extent that possible contact thereof with the tissues of the mouth will not be injurious or painful. The fluid passes through the jacket and thence flows downwardly into the discharge pipe 18.

In the form of jacket shown in Fig. 8, the body thereof is provided with a spiral channel 51 extending the major portion of the length of the jacket and it, like the channel 50, receives the discharge fluid in the section 15 and circulates it about the lamp within the jacket for direct contact therewith.

To supply current to the lamp 44, two conductors 52 and 53 (Fig. 1) are extended upwardly from a suitable source through the sheathing 17 and the lead 52 is grounded on the ejector tube 12,

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while the lead 53 passes upwardly through said tube and is connected to the binding post 54 (Fig. 5) which carries a contact 55 for engagement by one terminal of the lamp 44, the other terminal of which contacts the jacket 46 which engages with the grounded tube 12, thus completing the circuit for the lamp.

In Figs. 9 to 11, the invention is shown in its adaptation to an instrument of the type disclosed in my United States Patent No. 2,393,319, dated January 22, 1946. The part of the instrument shown herein comprises an ejector tube 56 which supports an injector tube 57 the upper end of which terminates in an angularly disposed nozzle 58 upon which a mirror 59 is mounted at an oblique angle so that its reflecting surface faces the inlet end of the ejector tube 56. Said inlet end is made to accommodate a lamp jacket 46 in which a lamp 44 is mounted and supplied with current in the manner previously described. Rays from the lamp 44 are reflected by the mirror 59 so that they will be directed into the oral cavity when the instrument is properly held in position. As water from the nozzle 58 is sprayed upon a surface, a certain amount thereof will rebound outwardly and fall directly or drain from the mirror 59, into a drain pan 60 mounted upon and partially encircling the inlet end of the tube 56, and this pan communicates with the channel 50 in the jacket 46 so that the liquid will be circulated around the lamp 44 to cool the same before flowing down into the tube 56.

What is claimed is:

1. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, a lamp carried by said tube for illuminating said cavity, and a jacket for said lamp insertable into said tube in the path of fluid being conveyed from said cavity, said jacket having a spirally formed circulatory channel therein for the admission of said fluid for direct contact with the portion of said lamp within said jacket.

2. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, a fluid injector tube extending along said ejector tube for a portion of its length and terminating in a spray nozzle and further having a port adjacent said nozzle, and a lamp insertable into said ejector tube adjacent said nozzle and having its outer end positioned in proximity to said port and arranged with respect thereto so that fluid exiting from the latter will impinge on said outer end of the lamp.

3. In a dental appliance, a fluid injector tube having branches for the admission of air and water into said tube, a compressible valve body connected to each branch and having a substantially oval cross sectional configuration to form opposed substantially flat pressure surfaces, each body being provided with a slit therethrough whose width extends in the direction of the transverse elongation of said body, a support for said valve bodies engaging a certain pressure surface of each body, and a control lever for each body and having a pressure portion engaging the surface opposed to the last named surface and being of a width substantially that of said slit.

4. In a dental appliance, an ejector tube having an angular mouthpiece forming two sections and having an opening contiguous to the inner adjacent ends of said sections, a lamp jacket insertable in said opening and extending into one of said sections and provided therein with a circulatory channel, and a lamp mounted within

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said jacket and having its illuminating end projecting outwardly from the other of said mouthpiece sections.

5. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, a lamp carried by said tube, and a jacket fitted within said tube and having circumferential engagement with the interior wall thereof and in which said lamp snugly fits, said jacket having a circulatory channel cut through the wall thereof to expose the lamp surface to the fluid from said cavity, the lamp being only partly enclosed by the jacket and having its forward end exposed out of the jacket and also extending out of the ejector tube.

6. In a dental appliance, a fluid ejector tube having branches for the admission of air and water into the same, a compressible valve body connected to each of said branches and having a fluid channel therethrough, a lever for each valve body operable to control the opening and closing of the fluid channel therein, said levers being pivotally mounted at points adjacent to one end of the valve bodies, and a spring element engaging each lever and exerting pressure thereon, said spring element being adjustable toward and away from the pivot for the lever to thereby locate said spring element at various positions on the lever to exert varying pressure thereon and against the associated valve body.

7. In a dental appliance of the character described, a handle portion, a fluid ejector tube extending from said handle portion and having branches for the admission of air and water into said tube, a mounting plate secured to said handle portion, a compressible valve body for each of said branches carried by said plate and having a fluid passage therethrough, a lever for each body pivoted on said plate and having a pressure-applying portion bearing on its associated valve body, and a spring element of substantially C-shape straddling the pressure-applying portion of the lever, the associated valve body and the plate, said spring element having its opposite ends respectively engaging against the plate and against the pressure-applying part of the lever.

8. In a dental appliance as provided for in claim 7, wherein the pressure-applying portion of each lever is provided with a plurality of longitudinally-spaced recesses adapted to selectively receive one end of the C-shaped spring.

9. In a dental appliance of the character described, a handle portion, a fluid ejector tube extending from said handle portion and having branches for the admission of air and water into said tube, a compressible valve body for each of the branches, a plate carried by the handle and interposed between the valve bodies and said handle, a lever for each valve body pivoted on said plate and having a pressure-imposing part disposed against the outer side of the valve body, means for imposing spring pressure on each of the pressure-imposing parts of the levers comprising a spring having one part operative against the rear of the plate and another part operative against the front face of the pressure-imposing part, and spaced seats on the face of the pressure-imposing part for selective engagement by the part of said spring.

10. In a dental appliance, an ejector tube having an inlet, an injector tube having an end thereof extending beyond said inlet and terminating in a nozzle, a mirror through which the nozzle extends and carried by said injector tube

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at an oblique angle thereto with the face of said mirror adjacent said inlet, a lamp mounted in the inlet, a jacket disposed around the lamp and provided with a channel, a drain pan carried by the inlet end of said ejector tube and communicating with the channel to thereby receive liquid sprayed from the injector tube and direct it into said channel and into the ejector tube.

11. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, a fluid injector tube extending along said ejector tube for a portion of its length and terminating in an outlet end, and a lamp received in said ejector tube, said lamp having its outer end positioned in proximity to the outlet end and located to receive at least some portion of the fluid emanating from the outlet end of the injector tube.

12. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, a lamp carried by said tube for illuminating said cavity, a jacket for said lamp insertable into said tube in the path of fluid being conveyed from the cavity, the lamp being housed in said jacket with the end of the lamp extending out of and forwardly of the tube and the jacket therein, said jacket being formed with a circulatory channel for the admission of said fluid for direct contact with the portion of the lamp that is located within said jacket.

13. In a dental appliance, an ejector tube for conveying fluid from the oral cavity, an injector tube extending along said ejector tube for a portion of its length and terminating in an outlet

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end, a lamp fitted in the ejector tube and having an end protruding out of said tube and positioned in proximity to the outlet end of the injector tube and in position to receive at least some of the fluid sprayed from said injector tube, a jacket arranged within the ejector tube and surrounding that portion of the lamp which is located within said ejector tube, the jacket being provided with a circulatory channel for the admission of fluid entering said ejector tube and permitting direct contact of said fluid with that portion of the lamp that is located within the jacket.

HYMAN FREEDMAN.

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