Oct. 16, 1951 H. FREEDMAN 2,571,856

DENTAL APPLIANCE

Filed June 15, 1949

2 SHEETS—SHEET 1

Fig. 1.

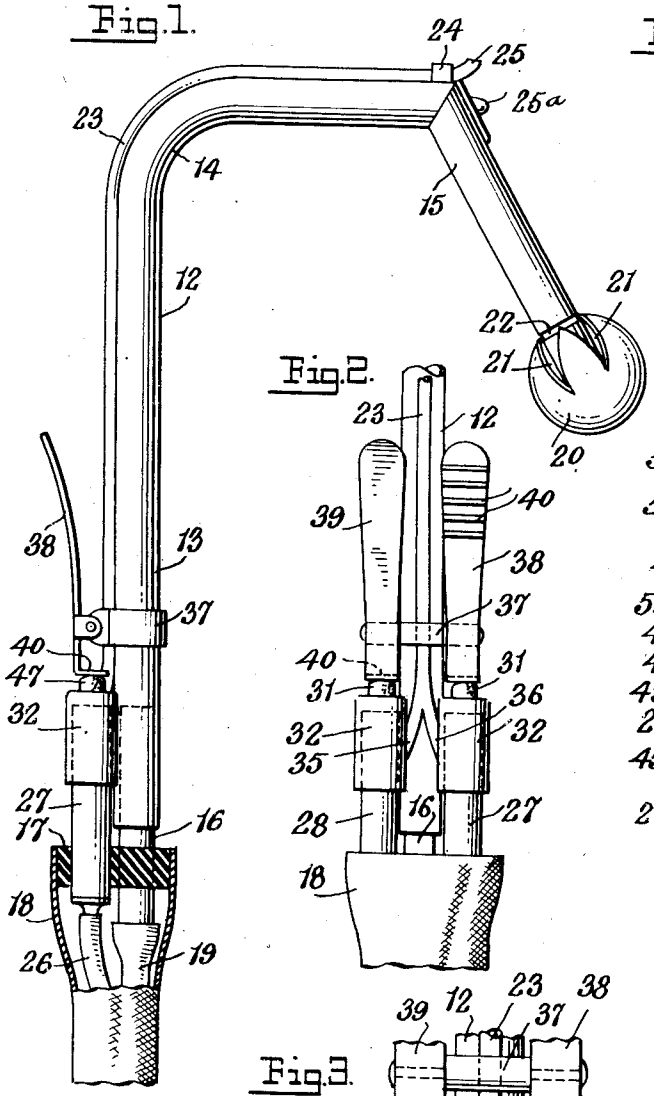


Fig. 2.

Fig. 3.

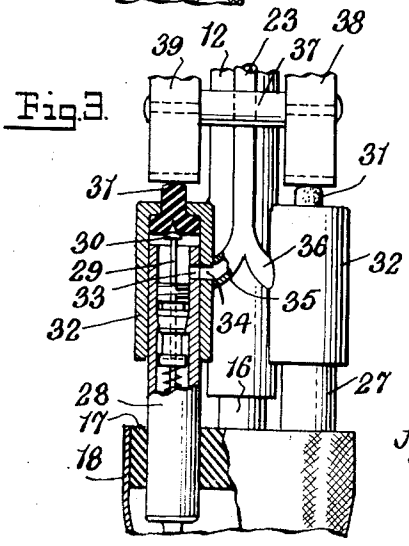
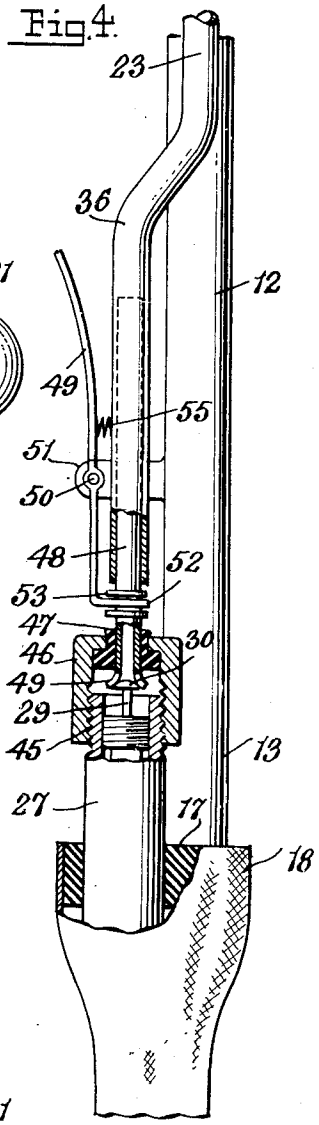


Fig. 4.



INVENTOR
Hyman Freedman
BY
Edward L. Mueller
ATTORNEY

Oct. 16, 1951 H. FREEDMAN 2,571,856

DENTAL APPLIANCE

Filed June 15, 1949

2 SHEETS--SHEET 2

Fig. 5.

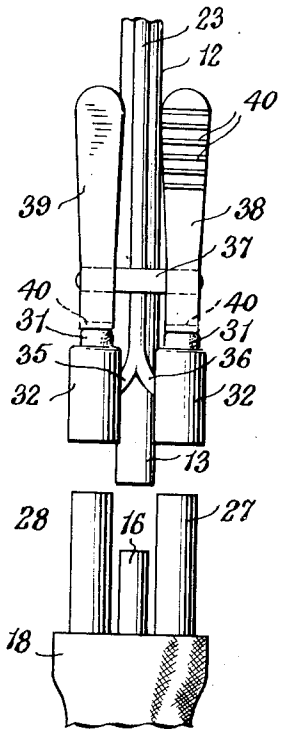


Fig. 6.

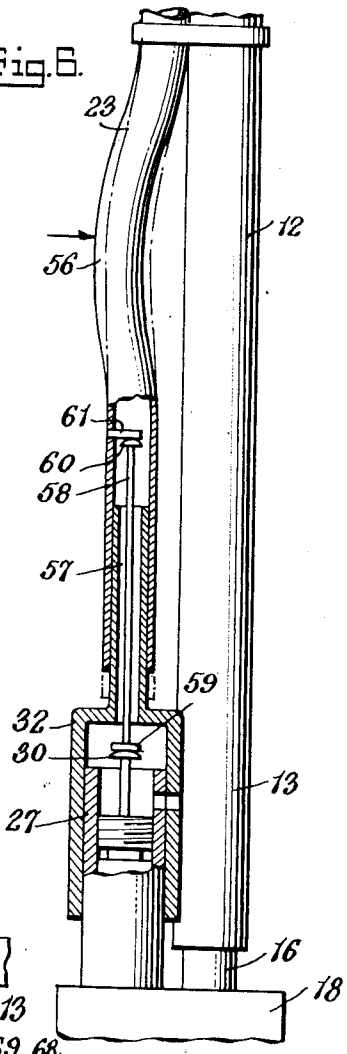


Fig. 7.

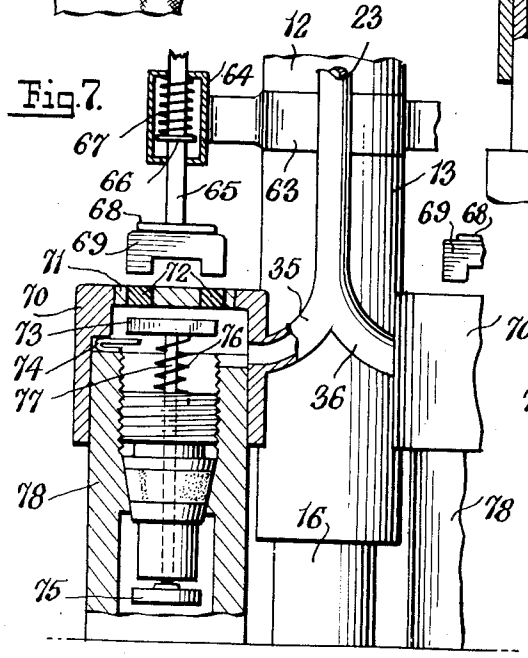
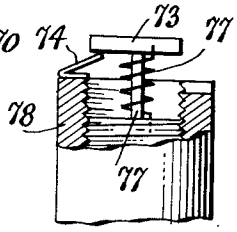


Fig. 8.



INVENTOR
Hyman Freedman
BY
Edward L. Mueller
ATTORNEY

Patented Oct. 16, 1951

2,571,856

UNITED STATES PATENT OFFICE

2,571,856

DENTAL APPLIANCE

Hyman Freedman, New York, N. Y.

Application June 15, 1949, Serial No. 99,247

12 Claims. (Cl. 32—33)

1

This invention relates to improvements in dental appliances of the character shown and described in my Patent No. 2,255,657, dated September 9, 1941, and in my co-pending application for patent, Serial No. 690,977, filed August 16, 1946, now Patent No. 2,522,261.

The structure shown in said patent and application, and of which the present invention is an improvement, consists in an instrument 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 a dental operation, the reduction of the temperature of the teeth when drill work is being performed, for diagnostic purposes and other uses.

In structures of this character, tubes are employed for conveying water and air into the mouth, the flow of such fluids being controlled by suitable hand-operated valves. In previous constructions, the parts were so arranged that cleansing and sterilizing of the device, and particularly those portions thereof which entered the oral cavity, was had only by dismantling the device, or at least removing the independent parts requiring cleansing or sterilizing.

An object of the present invention is to provide means by which the head or end portion of the device, which may be termed the mouthpiece section, can be unitarily removed from the remainder of the structure and subjected to cleansing or sterilizing, without disturbing the relationship of the other parts of the structure, and while the valves which control the flow of water and air will remain closed.

The invention further contemplates the provision of an improved valve means and controlling elements therefor, including the provision of readily-separable parts embodied in said valve means which enable the valves to remain in closed position while the mouthpiece section of the instrument is separated from the several tubes to which it is normally coupled.

These and other objects are attained by the invention, a more particular description of which will hereinafter appear and be set forth in the claims appended hereto.

In the accompanying drawing, wherein illustrative embodiments of the invention are disclosed, Fig. 1 is a side elevation, partly in section, of one form of the instrument embodying features of the present invention; Fig. 2 is a fragmentary elevation taken at right angles to Fig. 1 and looking at the device from the left of Fig. 1; Fig. 3 is a view similar to Fig. 2, but with a portion of one of the valves and couplings shown in section; Fig. 4 is a side elevation, with parts in section, of a modified structure; Fig. 5 is a view of the structure shown in Figs. 1 to 3 inclusive, showing how the mouthpiece section of the instrument is readily separable from the several tubes; Fig. 6 is a side elevation, partly in section, of another modified structure; Fig. 7 is an elevational view, partly in section, of a portion of another embodiment of the invention, and Fig. 8 is a view of one of the fluid-supply tubes of the structure in Fig. 7, with parts in section, to show how the valve is closed when the mouthpiece section of the instrument is removed.

2

The instrument shown in Figs. 1 to 3 inclusive, includes an ejector tube generally indicated by the numeral 12. Said tube consists of a handle section 13 provided with a curved portion 14, and an angular mouthpiece end 15, the inner portion of which extends at right angles to section 13, while its outer portion is at an oblique angle thereto. The several sections of the tube indicated at 12, 14 and 15 may, if desired, be coupled together in such a manner as to permit of rotative movement relatively to one another, to facilitate the shifting of the outer extremity of the mouthpiece end 15 within the oral cavity to position it as required during dental work, without requiring movement of the handle section 13.

The lower end of the handle section 13 is telescopically fitted over the end of a tube 16 which extends through a closure plug 17 in the end of a tubular sheathing 18. The opposite end of the tube 16 is fitted into the end of an ejector pipe 19 extending through the sheathing 18, as shown in Fig. 1. Said pipe 19 constitutes a suction tube, in which suction is created in any preferred manner to thereby withdraw or discharge saliva and other accumulations from the mouth of the patient during the course of an operation. The free extremity of the mouthpiece end 15 is provided with a removable head 20 of substantially spherical form having slits or openings 21 therein through which fluids or 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 20 on the mouthpiece 15, the latter is provided adjacent to its extremity with an annular groove 22 for receiving the ends of the slit portions of the head.

Associated with the ejector tube 12 and mounted directly thereon is a smaller-diameter fluid injector tube 23 which conforms to the contour

of the ejector tube 12 and is 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 tube 23 extends through a block 24 and terminates in an upwardly directed nozzle 25. Means may be provided, if desired, to regulate the size of the nozzle opening and thus control the volume of the spray emitting from said nozzle. A lamp or similar illuminating means may be housed within the ejector tube with its forward end protruding out of the tube as indicated at 25a in Fig. 1.

Air and water, under pressure, are fed to the injector tube 23 from suitable sources connected to two flexible hoses, one of which is shown at 26 in Fig. 1, said hoses being enclosed in the casing or sheathing 18. One of these supply hoses, or that shown at 26, is connected to the lower end of a valve casing 27 containing a valve controlling the flow of one of the fluids to the injector tube 23. The second supply hose is coupled to a similar valve casing, indicated at 28, which contains a valve for controlling the flow of the second fluid to the injector tube 23. Mounted within each of the valve casings 27 and 28 is a valve of known type, and which may be of the character or construction usually employed in automobile tires. Such valve includes the stem 29 which in valves of this known construction, is normally spring-pressed to maintain the valve in its closed position, the stem, when depressed, opening the valve in the known manner. The head 30 of the stem 29 is adapted to be depressed by the depression of an insert 31 of relatively soft and compressible material, such as "neoprene," fitted in one end of a sleeve 32 that telscopically fits over the valve casing 27 or 28. Each of the valve casings 27 and 28 has an outlet port 33 which communicates with an outlet 34 in the wall of the sleeve 32. One of the sleeves 32 has its outlet 34 joined to a branch 35 of the injector tube 23, while the other sleeve 32 has its outlet coupled to the branch 36 of said injector tube.

Mounted on the handle portion 13 of the ejector tube is a bracket 37 which pivotally carries valve-operating levers indicated respectively at 38 and 39. Each of said levers is provided with a laterally-bent end 40 located over one of the inserts 31, and by inward pivotal movement of the handle part of the lever the insert is depressed, causing depression of the valve stem 29 beneath it and resultant opening of the valve. The lever 38, which controls the flow of water through the right-hand valve (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. It is obvious that when one or the other of the levers 38 and 39 is depressed or manually forced inwardly, the valve controlled by such lever will be opened and will remain open to permit the flow of fluid as long as pressure is maintained upon the lever.

It will be noted from the structure described, that the entire upper portion or so-called "head" of the described structure, consisting of the ejector and injector tubes, the valve levers and their pivotal mounting, and the two sleeves 32, is removable as a unit. This is possible because of the sliding or telescopic fit of the ejector tube 12 over the upper end of the tube 16 and the similar sliding or telescopic fit of the sleeves 32 over their valve casings 27 and 28. When the upper or head portion of the unit is pulled upwardly the sleeves 32 will slide off the valve

casings 27 and 28 while the end of the ejector tube 12 will slide off the tube 16. The separation of the parts as a unit from the base tubes, as above described, will be clearly noted in Fig. 5, and by such separation, the head portion of the unit requiring frequent cleansing or sterilizing is readily separated for such operations upon it. The removal of the head of the unit, as above described, does not affect the operation of the valves, the same remaining closed while the head of the instrument is detached.

In the embodiment of the invention shown in Fig. 4, a slightly different arrangement for operation of the valves is had. Therein, the valve casings 27 and 28 are each provided with screw threads 45 which receive the internal threads on a coupling member 46. The coupling member is in the form of a cup provided with a central opening in which a sleeve or bushing 47 is located. A tubular stem 48 is axially slidable through the bushing 47, said sleeve having a slotted, flared end 49 adapted to engage against the head 30 of the valve stem 29. This arrangement is such that when the tubular stem 48 is axially moved in a direction toward the head 30 of the valve stem, its flared end 49 will depress the valve stem and cause opening of the valve. When this occurs, the fluid passing through the open valve, will be forced upwardly through the slotted end of the tubular stem 48 and through said stem and into the branch 36, or branch 35, as the case may be, of the injector tube 23.

The tubular stem 48 is depressed by pressure imposed upon the lever 49, pivoted at 50 on the lug 51 projecting from the ejector tube 12. Said lever has a forked end 52 which straddles the tubular stem 48 between the spaced collars 53 on the stem. Depression of the lever causes the end 52 to push downwardly upon the lower collar 53 forcing the stem 48 downwardly and causing its flared end 49 to depress the stem 29 and thus open the valve. When manual pressure on the lever is released, the spring 55 behind the lever will force the lever outwardly, causing its end 52 to exert a lifting force on the upper collar 53, thus elevating the stem 48 and permitting the valve stem 29 to raise and close the valve.

In the embodiment of the invention shown in Fig. 6, the branches of the injector tube 23 are normally outwardly distorted as indicated at 56. The sleeve 32 is telescopically fitted over the valve casing 27 or 28 in the manner shown in Fig. 6, and is provided with an upwardly-extending nipple 57 through which a push-rod 58 extends and is axially movable. At the lower end of the rod 58 is provided a head 59 resting against the head 30 of the valve stem 29. The opposite or upper end of the rod 58 is provided with a head 60 maintained against a projection 61 secured to and extending inwardly from the wall of the tube 23. It is obvious that when manual pressure is imposed upon the distorted part 56 of the tube, the tube will tend to straighten, as indicated in the dot-and-dash lines in Fig. 6, and as a result, the projection 61 will impose a downward pressure upon the push-rod 58 causing the same to transmit the thrust to the valve stem 29, thus causing depression of the stem 29 and opening of the valve of which said stem forms a part. Upon release of manual pressure on the portion 56 of the tube 23, the tube will again resume its normal outwardly distorted shape, the valve will close and the stem 29 thereof elevating the push-rod 58.

The embodiment of the invention shown in Figs. 7 and 8, shows valve casings 78 containing valves of the type previously described, except that the valve stem 77 is surrounded by a retractile spring 76 tending to normally hold the valve head 75 in an open position, or as shown in Fig. 7. The valve is held in closed position by magnetic influence imposed upon the stem head 73 at the upper end of the stem 77, said head 73 being of magnetizable material. Telescopically fitted on the top of the valve casing 78 is a cap 70, which has its upper end closed by a disk 71 of brass or other non-magnetic material. Inserts 72 of magnetic material are inserted in the disk 71. The valve is held in closed position by a permanent magnet 69 which has its magnetic influence imposed through the inserts 72 to attract the head 73 of the valve stem 77 to thereby raise said stem 77 and bring the valve into closed position. It will be apparent that the magnet 69 will only be operative as described to close the valve when said magnet is positioned adjacent to the inserts 72, and it will be obvious that when the magnet is moved away from the inserts 72, spring 76 will then draw the stem 77 downwardly and open the valve.

The magnet 69 may be moved toward and away from the inserts 72 by any suitable means, and in the form shown, the magnet is mounted on a head 68 at the end of a stem 65 slidable through a housing 64 in which a spring 67 surrounding the stem 65 is contained, said housing 64 being supported upon the ejector tube 12 by a clamp or bracket 63. One end of the spring 67 bears against a collar 66 on the stem 65 and the other end is operative against the inner face of the top end wall of the housing 64. The tendency of the spring 67 is to force the stem 65 downwardly and hence hold the magnet 69 against the inserts 72. This will cause the head 73 to be magnetically attracted against the pull of the spring 76 and the valve thus held in its closed position. When it is desired to open the valve, the stem 65 is moved upwardly, and this can be done by lever means or other suitable mechanism connected to the upper end of the stem 65, this raising movement of the stem moving the magnet away from the inserts 72, thus releasing the head 73 and allowing the stem 77 to be moved downwardly and open the valve.

When it is desired to remove the head of the device, the caps 70 are drawn off the tops of the valve casings 78 and when this is done, a spring 74, that is normally held inoperative by the fitment of the cap 70 on the valve casing 78, is permitted to spring upwardly and lift the valve stem 77 by impingement under the head 73 of the valve as clearly seen in Fig. 8. It will thus be seen that when the head of the device is removed for cleansing, sterilizing or other purposes, the valves in the casings 78 will be automatically closed by operation of the springs 74 in the manner described.

By means of the several embodiments shown, an arrangement is provided in which the head of the apparatus is quickly separable as a unit from the several base tubes to which it is normally connected and from the valve means in such tubes, thus permitting facility in the use of the device and the ready cleansing and sterilizing of the same without requiring dismantling.

Having described several embodiments of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In a dental appliance, an ejector tube, a fluid injector tube connected to and extending along said ejector tube, supply pipes for the injector tube, a suction pipe for connection to the ejector tube, valves interposed between the supply pipes and the injector tube, and coupling means comprising separable members telescopically fitted together and enclosing said valves, said coupling means attaching the injector tube to the supply pipes and coupling the ejector tube to the suction pipe, such coupling means further permitting separation of the injector tube from the supply pipes and separation of the ejector tube from the suction pipe while retaining the ejector and injection tubes together as a unit and means coacting with said valves to maintain the same closed while said unit is separated from the supply and suction pipes.

2. A dental appliance of the character described, comprising, a head including an injector tube and an ejector tube, pipes for connection thereto, means for telescopically attaching the ends of the injector and ejector tubes to the pipes, a valve controlling the flow of fluid in at least one of the pipes, and valve-operating means carried by the injector tube and removable therewith when the head is detached from the pipes, the said valve operating means being constructed to allow closing of the valve when the head is detached, and the ejector tube having a coupling at its end for telescopic fitment over said valve.

3. In a dental appliance of the character described, a head including an injector tube for conveying a fluid into the oral cavity, a supply pipe adapted to be coupled to said injector tube, a normally-closed valve controlling the flow of fluid from the supply pipe into said tube, a coupling member carried by the injector tube and fitted over the valve when the injector tube is coupled to the supply pipe, and valve-operating means carried by the injector tube and removable therewith when the injector tube is detached from the supply pipe.

4. In a dental appliance as provided for in claim 3, wherein the valve includes a casing, a valve-operating stem protruding out of the casing, the coupling member consisting of a sleeve fitted over said casing, and the valve-operating means including an element operative through the sleeve to depress the stem.

5. In a dental appliance of the character described, a head consisting of a plurality of fluid-conveying tubes, a base portion consisting of a plurality of fluid supply pipes, said supply pipes being adapted to be detachably coupled to the fluid-conveying tubes of the head, the coupling means consisting of telescopic elements at the ends of the several tubes, valves mounted at the ends of the supply pipes and enclosed within said coupling means, means for retaining said valves closed when the supply pipes are detached from the conveying tubes, and valve-operating means carried by the fluid-conveying tubes for opening the valves when the tubes and pipes are placed in coupled relation.

6. In a dental appliance of the character described, a head composed of a plurality of fluid-conveying tubes, a base including a plurality of pipes for coupling to the tubes, valves mounted in said base and coupled to the pipes, couplings carried by the tubes and enclosing the valves, means for normally holding the valves in closed position, valve-operating devices carried by the

tubes and placed in operative position by the coupling of the tubes to the pipes, said valve-operating devices being removable with the tubes when the tubes are detached from the pipes.

7. In a dental appliance of the character described, a head composed of a plurality of fluid-conveying tubes, a base including a plurality of pipes for coupling to the tubes, valves mounted in the base and coupled to the pipes, the tubes having means at one end for telescopically coupling them to the valves, the valves including cylindrical housings over which said coupling means extend, valve-operating devices carried by the tubes and manually operative to open the valves when the tubes are placed in coupled relation to the valves, said valve-operating devices being removable with the tubes when the tubes are detached from the pipes, and means for retaining the valves in closed condition during the detachment of the tubes from the pipes.

8. In a dental appliance of the character described, a head including a plurality of liquid-conveying tubes, a supply pipe for connection to at least one of the tubes, a valve attached to said supply pipe, said valve having a stem, a coupling on the tube for connection to the valve, said coupling including a depressible element operative to depress the stem when said element is depressed, and a hand-operated lever carried by the head for depressing the element.

9. In a dental appliance of the character described, a head including a liquid-conveying tube, a supply pipe for connection to said tube, a valve attached to said supply pipe, a coupling carried by the tube and adapted to be attached to the valve, a tubular stem slidable through the coupling and axially slidable in the tube, the valve having a stem operable to open the valve, the tubular stem being operative against the valve stem by movement of the tubular stem through the coupling, and manually-operated lever means for sliding the tubular stem through the coupling to cause the same to depress the valve stem.

10. In a dental appliance, a liquid-conveying tube, a supply pipe for connection to the tube, a valve connected to the supply pipe, a coupling carried by the tube and adapted to be connected to the valve, a valve-operating stem extending through the coupling and adapted to be axially moved therethrough, the tube being normally

distorted, and a projection within the tube operative against one end of the stem to move the stem axially of the tube and open the valve when the tube is manually straightened.

11. In a dental appliance, a pipe for conveying fluid, a head carrying a tube adapted to be coupled to the pipe, a valve mounted at the end of the pipe, means for holding said valve in open position, a coupling at the end of the tube for connecting the tube to the pipe, said coupling including a magnetic device for holding the valve closed, means for operating the magnetic device to permit the valve-opening means to become effective to open the valve, said operating device being carried by the head and being separable from the valve when the tube is uncoupled therefrom, and valve-closing means operative to close the valve when the coupling is disconnected from the valve.

12. In a dental appliance, injector and ejector tubes for conveying fluid, a valve structure co-operating with said injector tube for controlling the flow of fluid therethrough and comprising a body, a valve therein movable between open and closed positions and provided with a valve stem having a head of magnetic material, spring means to maintain said valve in normally open position, a member mounted on said body in juxtaposition to said valve head and having flux-conveying elements embedded therein for cooperation with said head to form a magnetic field, a permanent magnet movable into and out of cooperative relation with respect to said flux-conveying elements for co-acting with said head to control the closing and opening of said valve, and means to movably support said magnet on said ejector tube and exteriorly of said body.

HYMAN FREEDMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
525,816	Osborne	Sept. 11, 1894
2,231,158	Davis	Feb. 11, 1941
2,232,502	Wittmann	Feb. 18, 1941
2,255,657	Freedman	Sept. 9, 1941
2,310,562	Whittington	Feb. 9, 1943