Jan. 7, 1941. E. S. KEOGH, JR., ET AL 2,228,169

DENTAL INSTRUMENT

Filed July 7, 1938

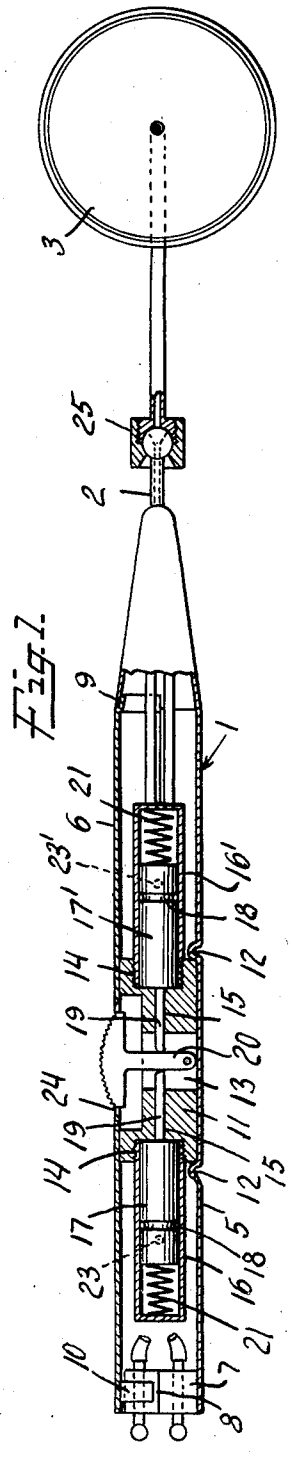

Fig. 1.

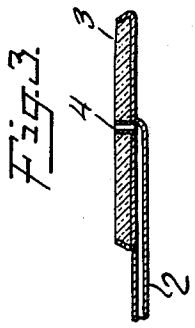

Fig. 3.

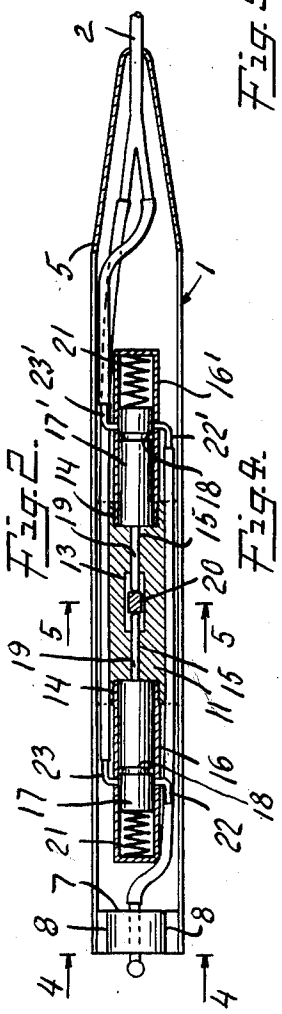

Fig. 2.

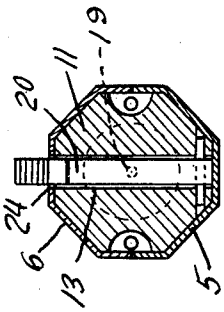

Fig. 5.

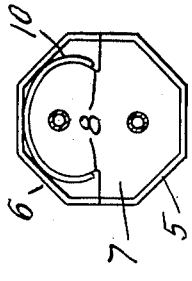

Fig. 4.

INVENTOR
Edward S. Keogh, Jr.
Joseph M. Murphy
BY
Pennie, Davis, Marvin & Edmonds
ATTORNEYS

Patented Jan. 7, 1941 2,228,169

UNITED STATES PATENT OFFICE

2,228,169

DENTAL INSTRUMENT

Edward S. Keogh, Jr., Bayside, Long Island, and
Joseph M. Murphy, Pelham Manor, N. Y.

Application July 7, 1938, Serial No. 217,924

3 Claims. (Cl. 32—69)

This invention relates to an improved dental instrument. More particularly the invention is directed to an improved dental mirror provided with means adapted to discharge a controlled jet of fluid, either liquid or gaseous, from a nozzle extending through the mirror and terminating substantially flush with the face of the mirror, thereby facilitating examination and treatment of the oral cavity.

Dental mirrors provided with means for emitting one or more jets of fluid heretofore have been proposed. However, all of the devices of this general type heretofore proposed have been unsatisfactory for a number of reasons. In general, previously proposed instruments of this type have been too cumbersome for satisfactory use in the oral cavity. In some of the previously proposed devices the mirror mounting has been so bulky as to preclude satisfactory use in the restricted space of the oral cavity. Others have been provided with a nozzle projecting a substantial distance from the face of the mirror. Such nozzles not only make the instrument cumbersome but in addition they create a blind spot in the mirror. Furthermore, such previously proposed instruments have not been provided with means for conveniently and accurately controlling the discharge of fluid.

The improved dental instrument of the present invention is substantially flat and occupies no greater space than does the ordinary dental mirror. It has no nozzle projecting a substantial distance beyond the face of the mirror to restrict freedom of movement or to create blind spots. Moreover, it is provided with means for accurately controlling the discharge of either of two fluids, such control means being conveniently operable by the hand in which the instrument is held, thereby leaving the operator's other hand free to manipulate a drill or other instrument. Other advantages of the invention will be apparent from the following description of the instrument illustrated in the accompanying drawing. The accompanying drawing shows one advantageous form of dental mirror embodying our invention, although it will be understood that various changes and modifications in structure and design may be made without departing from the spirit of the invention.

In the drawing Fig. 1 is an assembly showing the handle in longitudinal elevation and partly in section. Fig. 2 is a sectional plan view of the handle of the instrument shown in Fig. 1. Fig. 3 is a longitudinal sectional view through the mirror proper and through the tubular stem to which the mirror proper is attached. Fig. 4 is a transverse section of the handle along the line 4—4. Fig. 5 is a transverse section of the handle along the line 5—5.

The improved dental instrument illustrated in the drawing consists essentially of a handle 1, a tubular stem 2 and a mirror 3. The mirror 3 may be the conventional silver-backed glass mirror or it may comprise merely a polished metal reflector. The mirror 3 is mounted on the tubular stem 2, one end of which communicates with the nozzle 4 which extends through a small diameter opening in the mirror. The discharge end of the nozzle 4 terminates in a plane substantially flush with the face of the mirror, and advantageously is polished to provide a reflecting surface so that, except for the exceedingly small aperture in the discharge end of the nozzle, the mirror proper and the discharge end of the nozzle will provide a continuous reflecting surface.

The handle 1 comprises a casing 5 and a cover 6. The casing 5 may be of any conventional cross-sectional shape. In the form shown in the drawing, it is octagonal throughout the major portion of its length and tapered at the lower end from which protrudes the tubular stem 2. A relatively thick end-wall 7 is secured in the other end of the casing 5 and the upper half of the end-wall 7 is provided with recesses 8. The cover 6 is attached to the casing 5 by a lip 9, which extends under the edge of the casing 6 at one end, and by the spring-retaining clip 10, the outer ends of which yieldingly engage the recesses 8 in the end-wall 7.

In the central portion of the casing 5 is mounted a valve block 11 which is held in position against longitudinal movement by the indentations 12 in the bottom of casing 5, or in any other suitable manner. The valve block 11 is provided with a transverse channel 13, which is of rectangular cross-section, and also with a longitudinal bore. At opposite ends of the valve block 11 the longitudinal bore is of relatively large diameter and internally threaded. The internally threaded relatively large diameter recesses 14 at the opposite ends of the valve block 11 are relatively shallow in depth and, from the bottom of these recesses, channels 15 of smaller diameter extend into the transverse channel 13. The cylinders 16 and 16' are externally threaded at their open ends and screwed into the recesses 14. Within the cylinders 16 and 16' are the pistons 17 and 17' each of which has an annular groove 18. At one end each piston has an extension 19. These extensions extend through the relatively small diameter longitudinal channels 15 into the transverse channel 13. An actuating element in the form of a lever 20 is pivotally mounted in the transverse channel 13 and the extensions 19 are held against opposite sides of the lever 20 by the springs 21 which are mounted within the cylinders 16 and 16' and are compressed between the cylinder heads and the heads of the pistons 17 and 17'. The cylinders 16 and 16' are provided with inlet conduits 22 and 22' and with outlet

conduits 23 and 23', respectively. The inlet and outlet conduits communicate with the cylinders at points slightly closer to the closed outer ends of the cylinders than the position of the annular grooves 18 when the lever 20 is in the central position and the extensions 19 are being held against the lever 20 by the action of the springs 21 on the heads of the pistons 17.

The inner conduits 22 and 22' extend through the end-wall 7 and may be suitably attached, for example by a duplex flexible hose, to a source of water or other liquid and to a source of compressed air or other gaseous substance, respectively. The outlet connections 23 and 23' communicate with the tubular stem 2 adjacent the juncture of the tubular stem 2 and the casing 5.

The lever 20 at its upper end extends through an opening 24 in the cover 6. The arrangement is such that when the lever 20 is deflected to the left, in the position shown in Fig. 1, the piston 17 is moved outwardly in the cylinder 16 until the annular groove 18 communicates with the inlet conduit 22 and the outlet conduit 23, thereby providing a free and open passage between the inlet conduit 22 and the outlet conduit 23. The cross-sectional area of this passage is determined by the extent to which the annular groove 18 is brought into registry with the inlet and outlet connections. Similarly when the lever 20 is deflected to the right, the piston 17' is moved outwardly in the cylinder 16' until the annular groove 18 registers to a greater or less degree with the inlet connection 22' and the outlet connection 23'. Thus merely by deflecting the lever 20 in one direction or the other by the finger of the hand in which the instrument is being held, the operator is able accurately to control the discharge either of liquid or of gas from the nozzle 4 in the mirror 3.

When the mirror 3 is mounted rigidly with respect to the handle 1 in a position such that the lever 20 will be conveniently placed when the mirror is held in one given position, operation of the lever 20 will necessarily be inconvenient when the mirror is held in other positions. By providing a universal joint 25 of the ball type in the tubular stem 2, the mirror 3 may be rotated about the longitudinal axis of the handle so as to overcome this inconvenience. This arrangement also permits angular adjustment, within reasonable limits, of that portion of the tubular stem which is attached to the mirror 3 when such adjustment is desired for greater convenience. The ball type universal joint advantageously may be so proportioned that its frictional resistance will preclude movement of the mirror relative to the handle under the pressures encountered in normal usage, but will permit adjustment when a somewhat greater pressure is applied.

The improved dental instrument of the present invention permits the operator to direct a controlled jet of liquid upon a tooth for cooling it while it is being drilled, or into a cavity in a tooth for the purpose of cleansing same. Similarly it permits the operator alternatively to direct a stream of air or other gaseous medium over the surface of a tooth or into a cavity therein for the purpose of blowing away debris, or drying same. All or any of these operations may be controlled entirely by the hand in which the mirror is being held thereby leaving the other hand free to manipulate a drill or other dental instrument.

The ability to direct a stream of liquid on a tooth being drilled so as to absorb the heat generated by the drilling permits more vigorous and rapid drilling with less pain to the patient. We have found that if a dental instrument of the type herein described is to be used in this manner, the aperture of the nozzle through which the stream of liquid is discharged should approximate .005–.010 of an inch in diameter. Such an aperture is very much smaller than the apertures encountered in the ordinary dental syringe usually employed to flush out cavities and it is much smaller than the apertures employed in previously proposed dental instruments of the same general type as that to which the present invention relates. We have found that an aperture of the diameter above described is large enough to provide an adequate supply of water whereas with an aperture of substantially greater diameter an excess of water will be supplied unless the pressure is reduced to a point below that required to provide accurate directional control of the jet.

We claim:

1. In an instrument of the class described, the combination comprising a mirror having a small diameter opening therein, an elongated handle, a plurality of conduits each extending through said handle and each communicating at the reverse side of said mirror with a nozzle extending through the opening in said mirror, a valve in each of said conduits within said handle, and an actuating element extending through an opening in said handle, said actuating element being arranged to open only one of said valves when moved in one direction and only the other valve moved in the other direction.

2. In an instrument of the class described, the combination comprising a mirror having a relatively small diameter opening therein, an elongated handle, a tubular stem connecting one end of said handle with said mirror and communicating at the reverse side of said mirror with a nozzle extending through the opening in said mirror, a plurality of conduits disposed within said handle and communicating at the lower end of said handle with one end of said tubular stem, a valve in each of said conduits, and an actuating element arranged to open only one of said valves when moved in one direction and only the other of said valves when moved in the other direction.

3. In an instrument of the class described, the combination comprising a mirror having a relatively small diameter opening therein, an elongated handle, a tubular stem connecting one end of said handle with said mirror and communicating at the reverse side of said mirror with a nozzle extending through the opening in said mirror, a universal joint in said tubular stem, a plurality of conduits disposed within said handle and communicating at the lower end of said handle with one end of said tubular stem, a valve in each of said conduits and an actuating element arranged to open only one of said valves when moved in one direction and only the other of said valves when moved in the other direction.

EDWARD S. KEOGH, JR.
JOSEPH M. MURPHY.