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2,685,737

DENTAL DRILL HAND-PIECE WITH SPRAY ATTACHMENT

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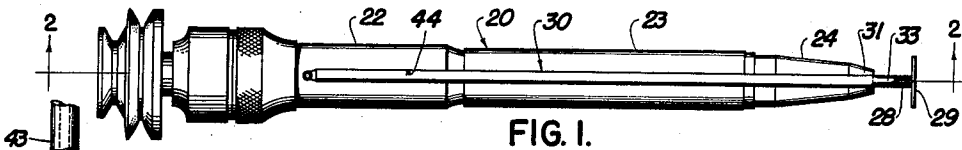


FIG. 1.

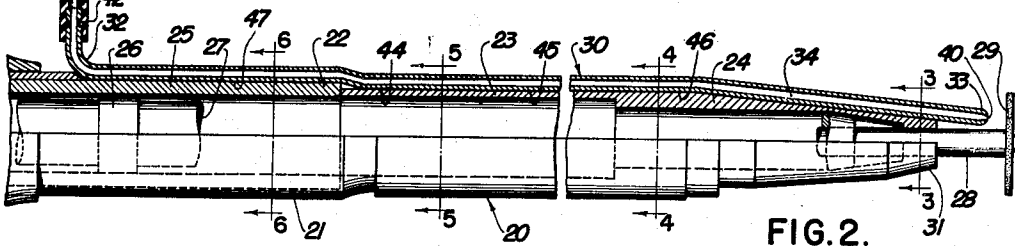


FIG. 2.

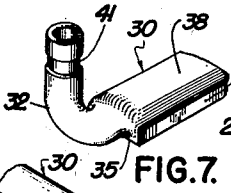


FIG. 7.

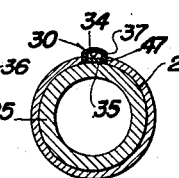


FIG. 6.

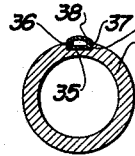


FIG. 5.

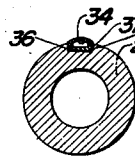


FIG. 4.



FIG. 3.

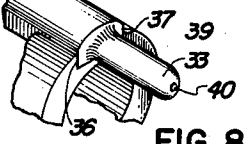


FIG. 8.

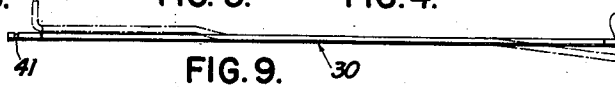


FIG. 9.

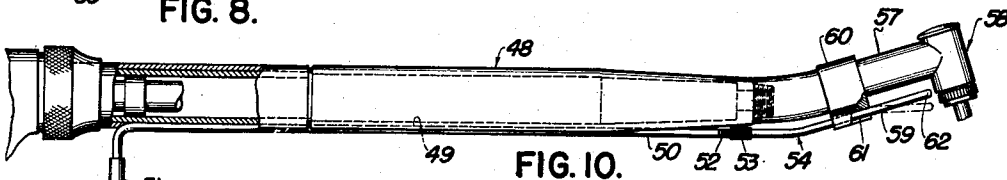


FIG. 10.

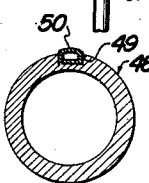


FIG. 12.

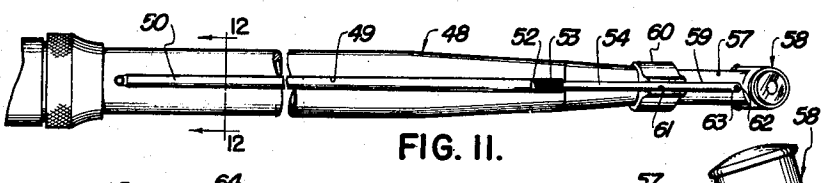


FIG. 11.

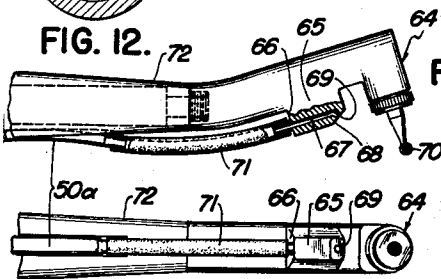


FIG. 14.

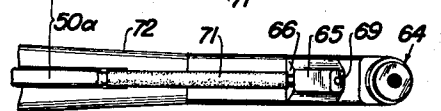


FIG. 15.

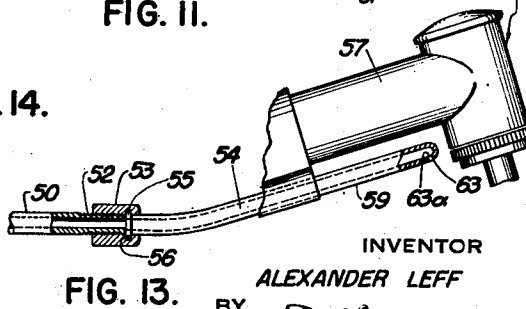


FIG. 13.

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# UNITED STATES PATENT OFFICE

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## DENTAL DRILL HAND-PIECE WITH SPRAY ATTACHMENT

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2 Claims. (Cl. 32—28)

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This invention relates to dental drill devices—more particularly to spray-equipped drill hand-pieces.

Due to the high speeds now employed in dental drilling and grinding, it has become a common practice to employ a spray of water and air in conjunction with dental drill devices to cool the cutting-head and also to prevent a clogging thereof by tooth debris, a condition which often results in a reduction of the cutting action and an undesired burnishing action. In conventional spraying methods, a relatively rigid thin metal pipe is clipped on to the handpiece near the front or operative terminal thereof; and a rubber tube is attached to the rear of said pipe and connected to a source of water supply—the forward portion of the pipe having a small opening to provide an outlet jet. Such conventional clipped-on pipes have been found to be generally unsatisfactory. In straight handpieces, the clips constitute protuberances which interfere with the operator's grasp of the instrument, regardless of the position of the clip or the disposition of the pipe. Even if the position of the clip and its associated parts is located to provide a minimum of obstruction, such position can seldom be maintained due to the fact that the clip generally rotates around the smooth-surfaced handpiece. Furthermore, in such conventional attachments the tube characteristically dangles downwardly from the region of the handpiece containing the clip-supported pipe, thereby constituting an additional impediment to the dentist. And when it is sought to move the rubber tube out of the way, it is often inadvertently compressed and rendered inoperative. It also frequently happens that the clips slip off the smooth tapered terminal portion of the handpiece, causing the front tip of the pipe to come into contact with the rotating stone or tool, whereby the tip becomes abraded or cut.

In the contra-angle type of handpiece, not only does the clip constitute an impediment substantially as with the straight handpieces, but when the clip rotates around the handpiece in the manner above described, it is apt to bring the attached pipe to a position where its spray misses the burr or cutting head.

It is within the contemplation of this invention to eliminate these disadvantages by providing a handpiece with novel water-conveying means supported within the sheath thereof and extending longitudinally therealong, the conveying means constituting a conduit so arranged and positioned as to offer a minimum of interference with the operator.

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And it is my further object to accomplish the above-mentioned objective without the use of clips or other obstructive elements, and with the employment of convenient means for connecting the device to a conventional source of water supply.

It is further within my contemplation to provide both the straight and contra-angle types of handpieces with spray means that will direct a positive jet at a fixed and predetermined point relative to the cutting head.

And it is another object of this invention to provide a simple and readily fabricated device having the features above-mentioned.

Other objects, features and advantages will appear from the drawings and the description hereinafter given.

Referring to the drawings,

Figure 1 is a plan view of a dental drill handpiece, showing the pulley attachment therefor, and containing fluid-conveying means in accordance with one form of my invention.

Figure 2 is an enlarged section of Figure 1, taken substantially along line 2—2, a portion being shown in elevation, fragments being removed for clarity.

Figures 3, 4, 5 and 6 are sections of Figure 2 taken respectively along lines 3—3, 4—4, 5—5 and 6—6 thereof, the internal shaft being removed.

Figure 7 is an enlarged fragmentary perspective of the rear portion of the said fluid-conveying means.

Figure 8 is a fragmentary perspective of the front portion of the structure of Figures 1 and 2, showing the spray tip in the region of the front of the hand-piece, the rotating tool being removed.

Figure 9 is an elevational view of the formed conduit of Figures 1 to 8, the full lines showing it in its unbent condition, the dot-dash lines showing the conduit bent in a position to conform with the configuration of the hand-piece substantially as shown in Figure 2.

Figure 10 is a side elevational view of a contra-angle type of hand-piece showing another form of my invention, fragments being broken away for clarity.

Figure 11 is a fragmentary bottom view of Figure 10.

Figure 12 is an enlarged section of Figure 11 taken along line 12—12.

Figure 13 is a somewhat enlarged side elevation of the forward portion of Figure 10, fragments being broken away for clarity.

Figure 14 is a fragmentary side elevation of the

3 forward portion of the contra-angle type of hand-piece embodying another form of my invention.

Figure 15 is a bottom view of Figure 14.

In the form of my invention illustrated in Figures 1 to 9, the hand-piece 20 contains a sheath 21 comprising three sections, the rear section 22, the intermediate section 23, and the front section 24, said sections being of progressively reduced proportions from the rear to the front in accordance with preferred conventional design. Disposed within the rear section 22 is the cylindrical bearing 25 which rotatably supports the enlarged portion 26 of the shaft 27, said shaft being connected, in a manner well known to those skilled in the art, to the spindle 28 to which is attached the rotating tool 29. Details of the shaft and spindle construction are omitted, since a description thereof is not needed for an understanding of the present invention. It will be observed that the said rear section 22 of sheath 21 is relatively thin-walled, so as to enable said section to accommodate said bearing 25 without excessive bulk. Sections 23 and 24 contain heavier walls, since there is no equivalent to bushing 22 therein, the interior of the sheath at said sections being proportioned primarily to accommodate therein said shaft 27 extending therethrough. The said three sections 22, 23 and 24 of the sheath 21 are recessed longitudinally along the sheath, in a manner to be hereinafter described, to accommodate therein the fluid-conveying conduit 30 which extends from the rear portion of section 22 to the front region 31 of section 24, the rearmost portion 32 of said conduit being adapted to receive a supply of water from a suitable source, and the forward spray tip portion 33 of the conduit being provided with an aperture 40 adapted to direct a spray of water towards the rotating tool 29, as will more clearly hereinafter appear.

In this form of my invention, the said conduit 30 consists of an elongated pipe having a longitudinal passageway 34 extending therethrough. This pipe can be made of any suitable material, either metal or plastic, although it is preferred that it be made of ductile material that readily can be extruded into the required form, such as is illustrated in the drawings. The said pipe contains a substantially flat base 35, substantially parallel sides 36 and 37 normal to base 35, and an outer crown 38 preferably convexly curved to substantially conform to the convex curvature of the outer cylindrical surface of sheath 21. The front tip 33 of conduit 30 is formed into an elongated nozzle 39, preferably of circular cross-section of reduced proportions, the foremost portion of said tip 33 containing therein the outlet aperture 40 communicating with the said longitudinal passage 34.

The said rear portion 32 of the conduit 30 is shaped in the form of a cylindrical pipe, having a recessed portion 41 adapted to receive therein a correspondingly proportioned annular ridge 42 of the flexible pipe 43 connected to a source of water supply (not shown), the arrangement being such that said pipe 43 will be in releasable interlocked engagement with said rear terminal 32 of the conduit. In the form illustrated, said rear terminal 32 is bent away from the general longitudinal direction of the conduit 30, so that it will be free to receive the said pipe 43.

The said sheath 21 contains longitudinally therealong a recessed portion 44 proportioned to receive therein, preferably in a tight fit, the said

conduit 30. In sections 23 and 24 the said recessed portions comprise grooves 45 and 46, respectively, the walls in said sections being, as aforesaid, sufficiently thick to be so grooved. Rear section 22, however, is comparatively thin, for the reason hereinabove given. Hence such recessed portion in this section preferably consists of a slit 47 extending through the entire wall of said section. The said conduit can be fixedly mounted within said longitudinal recessed portion 44 by a forced fit, by sweating or other known means. Where the material of the conduit 30 is ductile, it can be pre-formed, prior to the step of applying it to the hand-piece, to conform with the general configuration thereof, the dot-dash lines of Figure 9 indicating the deformed position of portions of conduit 30 to make it correspond with the general configuration of the sheath 21 as shown in Figure 2.

It is apparent from the structure above-described that a conventional hand-piece may readily be modified to accommodate the conduit 30, so that when the parts are assembled, in the manner illustrated, a unitary device is provided wherein the fluid-conveying means is rigidly and conveniently disposed on the hand-piece, without any interference with the operator. And because of the said construction, a spray is effectively directed at a desired predetermined point with reference to the rotating tool, without any danger that said spray will be deviated from its intended course. The conduit itself is a readily fabricated element adapted to be joined with a hand-piece of conventional configuration in the novel arrangement hereinabove described.

In the contra-angle type of hand-piece illustrated in Figures 10 to 15, the sheath 48 contains a longitudinal recess 49, substantially like the recess 44 hereinabove described, said recess accommodating therein the conduit 50, shaped substantially along the length thereof like the said conduit 30 first above-described. The rear of said conduit is attached to a flexible pipe 51 connected to a source of water supply, not shown. The front portion 52 of conduit 50 is threaded, the ring 53, mounted over spray pipe section 54, being in releasable threaded engagement therewith. The said spray section 54 contains a rear flange 55 accommodated by the annular recess 56 of said ring 53, to prevent said ring from becoming detached therefrom. The arrangement is hence such that when ring 53 is in operative threaded engagement with front portion 52 of conduit 50, the spray section 54 is rigidly maintained in place, in proximity to the separable head portion 57 of the contra-angle head 58. The said pipe section 54 has a front bent portion 59 extending generally parallel to head 57. If said pipe section 54 is made of ductile material, which is preferred, the angle of the bend may be varied to suit the particular requirements of the operator, as indicated by the dot-dash lines in Figure 10.

The collar 60 of head 57 has at the underside thereof a recessed portion 61 through which the spray pipe section 54 extends, the arrangement being such that said spray section is held against lateral movement by the walls of said recessed portion 61. The front tip portion 62 contains an aperture 63, the sloping walls 63a of which are directed generally forwardly towards tool-holder 52, to provide an angular spray nozzle.

Should it be desired to disconnect the separable head 57 of the contra-angle from the sheath 48, the ring 53 is unscrewed from portion 52 of the

conduit 50, thereby detaching spray pipe section 54 therefrom. In this way, my invention is adapted for convenient use with contra-angle devices of hand-pieces where the said head portion must frequently be separated from the sheath—the fluid-conveying means employed having the same advantages as in the form of my invention employed with the above-described straight form of hand-piece.

In the modification illustrated in Figures 14 and 15, the head portion 64 is provided with an integral fitting 65 having a rear extension 66 containing a passageway 67 therein, the forward portion of said passageway terminating in the bevelled angular wall 68 containing the outlet orifice 69 for directing the spray towards the rotating tool 70. Mounted over the said extension 66 is the flexible pipe 71, the rear terminal of which is mounted over the forward portion of conduit 50a. This form also enables the head 64 to be detached from the sheath 72, since the flexible pipe 71 can readily be detached from extension 66 and conduit 50a, when such a disassembly is to be effected.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obviously many variations and modifications may be made therein. It is to be understood, therefore, that the invention is not limited to any specific form or manner of practicing same, except insofar as such limitations are specified in the appended claims.

I claim:

1. In a contra-angle dental drill hand-piece for a tool-supporting shaft, a hollow sheath proportioned to envelope said shaft, a head portion detachably secured to said sheath, a fluid-conveying conduit extending substantially along the length of the sheath, the front portion of the conduit being threaded, a locking ring in threaded engagement with said front portion and removable therefrom, a spray pipe section connected to said ring, whereby when said ring is operatively connected to said conduit, the said pipe section will be supported by said ring, said pipe section being disposed, when in said supported position, adjacent said head portion of the hand-piece, said pipe section having an orifice disposed in the region of the front of the hand-piece, for directing a spray towards the tool operatively connected to a shaft extending through said sheath.

2. In a contra-angle dental drill hand-piece for a tool-supporting shaft, the combination according to claim 1, the wall forming said orifice being inclined relative to the longitudinal extent of said head portion.

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