June 10, 1941. C. J. HENSCHEL 2,245,036

SPRAY DEVICE FOR DENTAL INSTRUMENTS

Filed Aug. 27, 1940

Fig. 1.

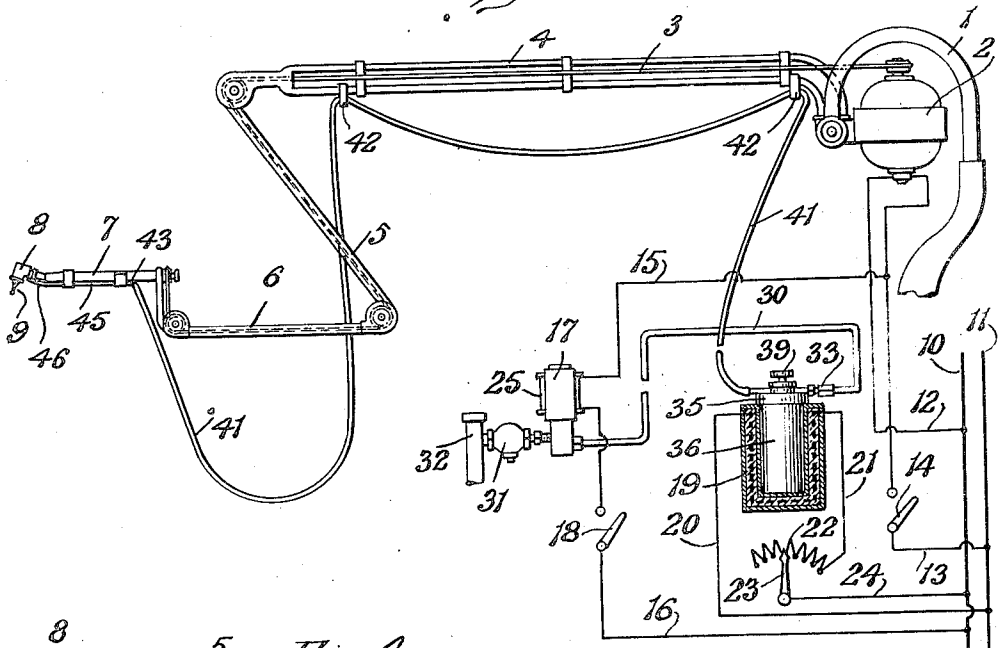


Fig. 4.

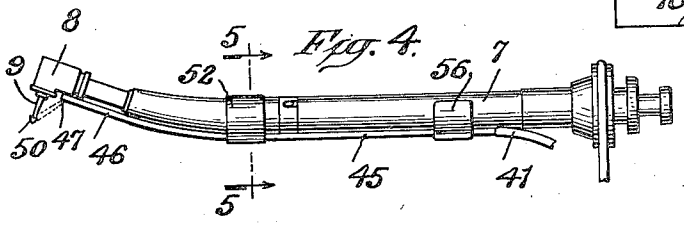


Fig. 2.

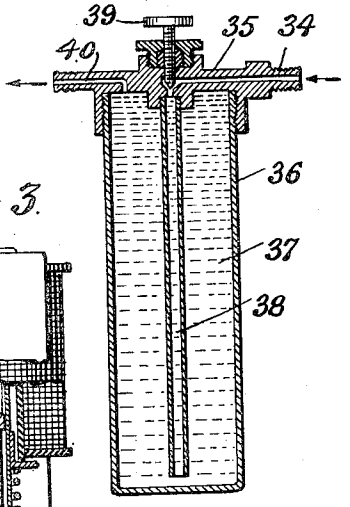


Fig. 6.

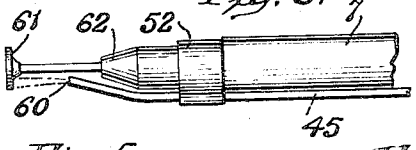


Fig. 3.

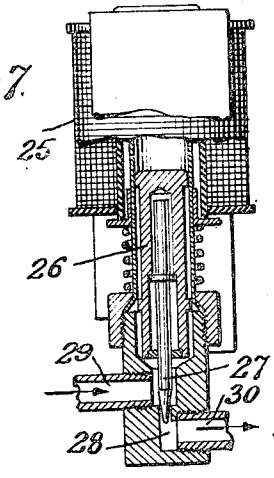


Fig. 5.

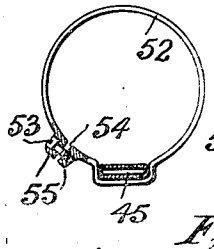


Fig. 7.

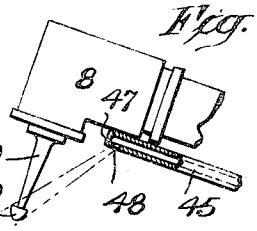
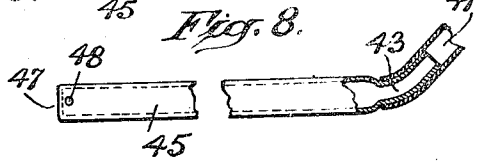


Fig. 8.



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SPRAY DEVICE FOR DENTAL INSTRUMENTS

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3 Claims. (Cl. 32—28)

This invention relates to a device intended for use in connection with dentistry, and more particularly for attachment to a dental drill handpiece for the direction of a fluid stream upon the drilling or grinding surface of the revolving dental instruments.

It is known in the dental profession that it is highly desirable to direct a stream of water or other suitable fluid at the point where the drilling or grinding occurs to prevent overheating of the tooth and thereby materially reduce or wholly eliminate pain to the patient; to cool the revolving instrument; and to wash away loosened particles and thereby permit better and clearer vision for the dentist. Efforts have been made in the past to provide devices intended for the purpose mentioned, but such devices have proved inefficient for various reasons. Primarily, the prior devices were deficient because of improper design of the liquid-conveying tubes and outlet nozzles, the nozzles employed adding bulkiness to the handpiece, rendering the same awkward and uncomfortable to use. Moreover, in a device of this character, other requirements are essential, and such requirements were lacking in prior devices. One of such requirements is that the flow of liquid begin instantly with the beginning of operation of the dental engine or motor and shut off simultaneously with the cessation of operation of the drill. A second consideration is that the temperature of the water or other fluid ejected against the drill or grinding element be maintained at a selected uniform temperature so that the seat of operation be cooled to the right temperature during drilling, grinding or other work.

The primary object therefore, of the present invention, is to provide a device of the character described, wherein the jet or spray nozzle is flattened or "streamlined" so that its detachable affixment to the handpiece will add no material bulk thereto and its presence will be practically unnoticed during use of the device; in which means is provided for effectively controlling the flow of the liquid in synchronism with the operation of the tool, and in which means is provided for controlling the temperature of the liquid.

In the accompanying drawing, wherein several embodiments of the invention are shown, Fig. 1 is a diagrammatic view, showing the improved apparatus; Fig. 2 is a vertical sectional view through the liquid-heating chamber and needle valve therefor; Fig. 3 is a vertical sectional view through the solenoid valve for controlling the flow of liquid; Fig. 4 is a side elevation of a conventional handpiece of a dental drill, showing the manner in which the flat tube, constituting a spray nozzle is unobtrusively attached to the handpiece; Fig. 5 is a view through the clamp for attaching the spray tube to the handpiece, the view being taken substantially on the line 5—5 of Fig. 4, looking in the direction of the arrows; Fig. 6 is a side elevation of the extremity of the handpiece, showing a grinding wheel held in the chuck thereof and disclosing the form of spray tube employed in this arrangement; Fig. 7 is a side elevation, on a slightly enlarged scale, of the end of the contra angle drill of Fig. 4, with the extremity of the spray tube shown in section to disclose the angle of the spray hole, and Fig. 8 is a view of the exposed face of the spray tube, showing the spray hole and the angular end or nipple of the tube for attachment to flexible tubing.

In Fig. 1 of the drawing, the device is shown attached to a conventional drill and grinding device used by dentists, the general structure of the drill per se forming no part of the present invention. The support for the drill includes the conventional goose-neck 1, supporting the motor 2, driving the flexible cord 3 which extends over a pulley system supported in the articulated arms 4, 5 and 6. Pivotally carried by the arm 6 is the handpiece 7, provided with the contra-angle chuck 8 for the reception of the drill 9 or other operating element. In the drawing, the electrical power lines are indicated at 10 and 11. Connection is established between this source of power and the motor 2, by means of the wires or other conductors 12 and 13, the foot-switch 14 being interposed in the lead wire 13 so that by its operation, control of the motor may be had in the known manner. Wires or other conductors 15 and 16 connect the wires 13 and 10 respectively to a solenoid valve 17. A switch 18 is disposed in the conductor 16 so that when the switch is in open position, the solenoid valve will be rendered inoperative when desired and will remain so regardless of the operation of the foot-controlled switch 14.

At 19 is shown a heater cup having a heating coil connected at one end by the lead wire 20 to the power line 11 and its other end connected by lead wire 21 to a combined switch and rheostat 22, the movable contact 23 of which is connected by wire 24 to the power line 10. The heating cup may include a thermostatic control by which the temperature of the liquid heated by it will be constantly controlled, and it may be a conven-

tional spray-bottle heater as employed in dental units.

It will be obvious from the foregoing description that when the switch 18 is closed and remains in that position, the solenoid valve 17 may be opened and will remain in open position, permitting liquid to flow through it, whenever the foot-switch 14 is closed to set motor 2 in operation. In other words, the flow of liquid through the valve 17 will take place co-extensively with the operation of the motor 2.

The solenoid valve is of known construction and consists primarily of the coil 25, and the core 26 carrying a needle valve 27 adapted to normally close the passage 28 interposed between the inlet tube 29 and outlet tube 30. Since the details of the valve are well known, it need not be described further except to state that its operation is such that when the coil 25 is energized the core 26 is elevated and held in such position as long as the current flows through the coil, thereby permitting flow of liquid from inlet tube 29 to outlet tube 30. When switch 14 is opened and thereby current to coil 25 is shut off, the needle valve will descend and close passage 28, as shown in Fig. 3.

Inlet tube 29 is connected to a suitable strainer 31 which connects to the water main 32 or to any other suitable source of water supply. The outlet tube 30 of the solenoid valve attaches at 33 to the inlet nipple 34 on the head 35 of the liquid-heating receptacle 36. Said receptacle 36 is adapted to fit, as illustrated in Fig. 1, within and be surrounded by the heating cup 19 so that the liquid contents 37 of the receptacle 36 will be maintained at constant temperature. The inlet passage extending through the head 35 communicates with the upper end of the vertically disposed tube 38 located centrally in the receptacle 36 and the flow of liquid into the tube from the source of supply may be regulated by means of the manually operable needle valve 39. The outlet passage 40 leading from the heating receptacle 36 connects to the flexible tubing 41 which is supported by the guides 42 on the arm 4 and attaches to the laterally bent nipple 43 formed on one end of the spray tube 45.

The shape of the spray tube is largely dependent upon the tool in conjunction with which it is used. For example in Fig. 4 a contra-angle drill chuck is shown, and there the spray tube 45 has its end portion 46 extended on a gradual curve to cause it to closely conform to the curvature of the contra-angle portion of the hand-piece and having its terminal end 47 closely adjacent to the drill 9, as will be clearly seen in Figs. 4 and 7. As will be more clearly seen in Fig. 7 the tube 45 has a closed end 47 and adjacent to said closed end is provided an angular spray hole or opening 48. The angle of said spray hole is such that it will direct a spray of the liquid on the point 50 of the drill 9 during the drilling operation, thus not only cooling the drill, but also cooling the tooth being operated upon, at the same time clearing away the particles loosened by the drilling operation. It will be observed that the flattened tubing constituting the spray tube is maintained in close contact with the hand-piece and the spraying end of the tube, while located relatively close to the drill, does not encroach upon the operating area required by the drill.

In employing a flattened tube as the spray tube, I have found that a tube of 2.8 mm. wide and 1 mm. thick is highly satisfactory. Such a tube, when fitted to a dental hand-piece, closely follows the normal curvature of the hand-piece and constitutes no appreciable projection from the surface of the same so that with the device attached, the hand-piece can be held and manipulated with the same freedom as though the device were not attached.

The flattened tubing constituting the spray tube may be detachably secured to the hand-piece in numerous ways, and I have found the means disclosed as being particularly desirable since it does not add materially to the bulk of the instrument nor does it produce any protrusions or extensions on the hand-piece likely to render the use of the device uncomfortable. Relatively near to its free end the tube 45 is attached to the hand-piece by means of an annular clamping ring 52, the ring being split at 54 and provided with the laterally extending lugs 55 through which the clamping screw 53 extends to hold the ring tightly on the hand-piece. Co-operating with the ring 53 in holding the spray tube in position, is a U-shaped spring clip 56, located adjacent to the nipple 43 and frictionally engaging the hand-piece. By this simple arrangement the flattened tube is held snugly against the hand-piece and prevented from shifting either laterally or longitudinally during use of the device.

The nipple 43 at the end of the spray tube 45 is bent laterally away from the shaft of the hand-piece to thereby maintain the rubber tubing 41 away from the wrist of the user. This arrangement also keeps the tubing away from the pulley wheel on the hand-piece and it also serves to prevent the rubber tubing from kinking at points close to the nipple 43 when the hand-piece is reversed while working on upper or lower teeth.

In Fig. 6 the spray tube 45 is similar in all respects to that shown in Figs. 4 and 7 except for a slight difference in curvature of the free end portion of the tube and with the additional exception of the fact that the free end 60 of the tube is open to permit the ejection of the liquid therefrom directly against the face of the grinding wheel 61 held in the chuck 62.

Briefly, the operation of the device is as follows:

The heating cup is set in operation by manipulation of the combined switch and rheostat 22, 23 and switch 18 is closed. Upon closing of the switch 14, the motor 2 is set in operation, solenoid valve 17 is opened and water will flow therethrough into the liquid receptacle 36 to become heated and rise out through the outlet 40, pass through tubing 41 and be ejected against the drill or grinding wheel as heretofore described. Upon opening of switch 14, the flow of liquid will immediately cease co-extensively with the stoppage of drill or grinding wheel operation. In the event that it is desired to operate the drill without the use of the liquid flow, it is merely necessary to open switch 18 in which event the foot switch 14 can be opened and closed without affecting the solenoid valve 17, which will remain closed as long as switch 18 is open.

While I have described several embodiments of the invention, it is obvious that the same is not to be restricted to the precise disclosures since various modifications may be readily made without departing from the spirit of the invention as expressed in the annexed claims. For example, the electrical circuit disclosed may be varied considerably; the form of water-heating device may be changed to any other heater available in the open market, the electrically

operated valve may also be altered as to form and disposition, and many other changes may be made as will be apparent to those skilled in this art.

What I claim is:

1. In an apparatus of the character described, a dental drill having a hand-piece, a flattened tube detachably secured to said hand-piece, said tube having a closed end and having a diagonally disposed spray opening in one of its side walls for directing a liquid stream against a drill held by the hand-piece, and a liquid supply means attached to the opposite end of the tube.

2. In an apparatus of the character described, a dental drill including a hand-piece to which a contra-angle chuck is attached, a spray tube detachably secured to the hand-piece, said spray tube comprising a flat hollow member held flatwisely against the face of the hand-piece and having a curved end following the curve of the contra-angle chuck, the spray tube having a closed end and an angular spray opening disposed in its side wall adjacent to the closed end, said opening extending angularly away from the hand-piece and in an angular direction toward the tip of a drill held in the contra-angle chuck, and means connected to the spray tube for forcing water through the same.

3. In a device of the character described, a dental drill having a hand-piece, a drill chuck held by said hand-piece, a drill or other rotating element held by the chuck, a flat tube held flatwisely and in contact with the face of the hand-piece and having a free end portion located adjacent to the drill, said free end portion being provided with a closed end and formed with an angularly disposed spray opening in its side wall adjacent to said closed end, means for attaching the tube to the hand-piece comprising an annular clamp fitting over the tube and holding it flat against the face of the hand-piece, said clamp being located at a distance from the spray opening, and a spring clamp secured to the tube and located near the opposite end of the tube for embracing the hand-piece.

CHESTER J. HENSCHEL.