

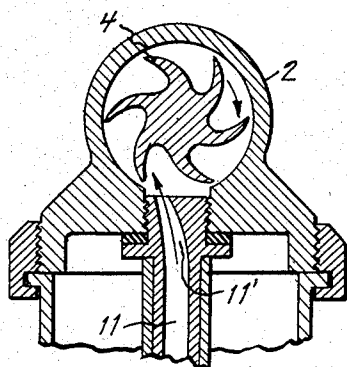
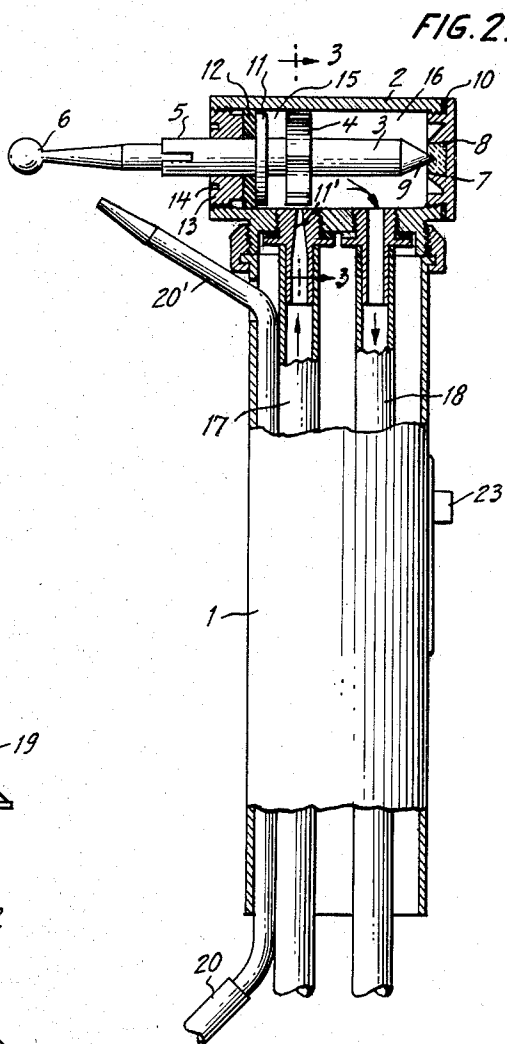
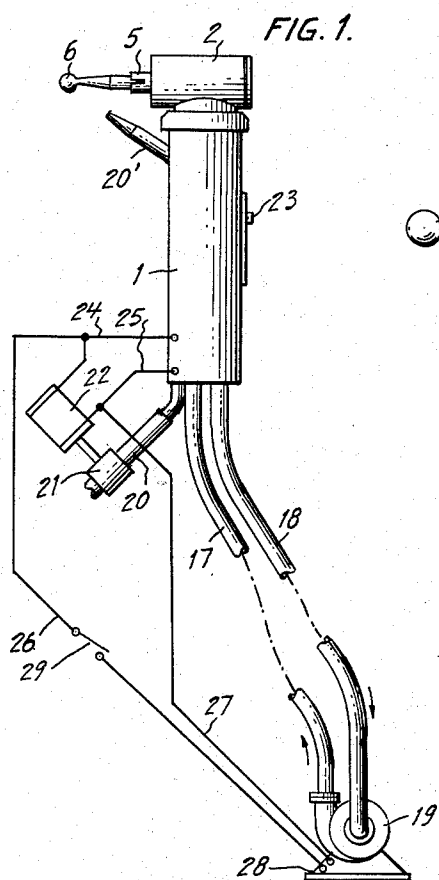
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HIGH SPEED DENTAL DRILL

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HIGH SPEED DENTAL DRILL

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2 Claims. (Cl. 32-27)

The present invention is directed to high speed rotary cutting instruments and more particularly to a chuck or similar apparatus adapted for use in dental drilling and for other purposes.

It has become universal to apply high speed cutting of tooth structure and bone in the dental and allied professions. The drill head or chuck utilizes a turbine which is driven by compressed air or water. The use of air is disadvantageous in that there is a high pitched sound produced by the passage of air through the turbine at high frequency. This is quite annoying to the patient being treated. Also the torque produced by the use of air is subject to loss upon cutting pressure being applied by the dentist. Such a loss greatly diminishes the advantages obtained by high speed cutting.

When water is the source of power, it has been found that it is cumbersome, slows down the turbine and also is subject to loss of torque. Water must be replaced from time to time because of impurities which accumulate in the operation of the device. Also the apparatus is clumsy and cumbersome.

The present invention is intended and adapted to overcome the difficulties and disadvantages inherent in devices of the type described, it being among the objects of the invention to provide a drill head or the like, which is compact, highly efficient and is adapted for fingertip control.

It is also among the objects of the present invention to provide a device which operates with a high torque and wherein the torque may be adjusted to fit the duty being performed by the tool being used.

It is further among the objects of the present invention to reduce the amount and cost of maintenance of the device, to provide adequate lubrication under all conditions of use and to reduce friction and thereby substantially reduce wear on moving parts of the apparatus.

In practicing the invention, there is provided a turbine suitably held in a casing with a chuck attached to the turbine and adapted to hold a cutting tool. A source of lubricating oil is provided and a pump drives the oil through the turbine and returns it to the pump for recirculation. While ordinary bearings may be used, it is an important feature of the invention that at least one of the bearings for the turbine is a jewel, and the other bearing is an O-ring.

The invention is more fully described in the accompanying drawings constituting a part hereof, and in which like reference characters indicate like parts, and in which—

FIG. 1 is an elevational view of the complete apparatus for use in dental work;

FIG. 2 is an enlarged side elevational view of the drill and head, some parts being shown in section for clearness, and

FIG. 3 is a fragmentary cross-sectional view of the turbine and its mounting, taken along line 3—3 of FIG. 2.

Casing 1 has a hollow head 2 within which a chuck 3 is secured within rotor 4 of a turbine. The free end 5 of chuck 3 is adapted to hold a drill or the like 6.

The opposite end of head 2 is provided with a cap 7 within which is held a jewel 8, adapted to accommodate end 9 of chuck 3. Washer 10 provides a seal between end cap 7 and head 2.

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Collar 11 fixed on chuck 3 contacts elastic washer or O-ring 12, which is held in place by cap 13 threaded into the adjacent end of head 2. Recesses 14 provide means for inserting a tool to adjust the position of cap 13.

A space 15 separates turbine 4 from collar 11. This space may be made quite narrow, if desired. A larger space 16 is provided within head 2 on the opposite side of turbine 4. Tube 17 has a nozzle 11' directing the flow of oil of a lubricating grade, and usually of a grade known as "medicinal" oil, against the blades of turbine 4, thus causing free and high speed rotation of chuck 3. The oil then passes through chamber 16 and into tube 18 and pump 19, from which it is recirculated.

A pipe 20 has a nozzle 20' adjacent to drill 6 for the flow of fluid for cooling purposes. Usually such fluid is water. Valve 21 controls the flow of fluid to pipe 20 and this is operated by solenoid 22. Switch 23 on casing 1 is electrically connected to wires 24 and 25 attached to solenoid 22, whereby valve 21 may be operated by a fingertip control. Wires 26 and 27 attached to a source of power and to terminals 28, provide power for operating pump 19. The control of pump 19 may be by switch 29. The latter may be placed in any one of various positions such as on casing 1, or may be attached to a foot pedal to be operated by the user without the necessity of using his hands.

There are a number of advantages inherent in the present invention. A constant lubricant in a bath of oil is provided for the drill head, thereby reducing wear of the turbine. The amount of torque provided by the oil may be adjusted by regulating the power applied to the pump. There is a fingertip control of both the drill and the cooling fluid. The oil may have therein an antiseptic for safety purposes, and the oil may be provided with a suitable taste and odor. The apparatus eliminates the undesirable noise produced by the use of air as a source of power. It eliminates the necessity for changing the water and avoiding the trouble and mess produced in making such changes. Because of the use of oil, the size of the drill head or handpiece may be substantially reduced.

In using mineral oil or the like there is avoided the danger of freezing in cold weather. Whereas the use of air or water placed a limitation on the amount of power that could be applied to the turbine, when oil is used the specific gravity and viscosity may be chosen to give the best results for each type of use. The use of a jewel setting and an O-ring washer eliminates costly bearings which often burn out and also eliminates noise made by other types of bearings.

Although the invention has been described setting forth a single specific embodiment of the invention, it is not limited thereby. For instance, one may provide an accumulator for the oil, thus avoiding back pressures and increasing efficiency. There may be provided separate or simultaneous control switches for the flow of cooling fluid and of oil. A pressure regulator may also be provided on casing 1. While the exact type of oil is a matter of choice, it is preferred to provide an oil having at least twice the viscosity of water at normal room temperatures, and preferably up to four or five times such viscosity.

These and other details may be varied within the spirit of the invention, which is to be broadly construed and not to be limited except by the character of the claims appended hereto. For instance, the oil may be cooled or refrigerated so that it cools the chuck and tool, thus avoiding too high a temperature in the tooth and thus avoid damage to the nerve.

I claim:

1. A high speed dental drill comprising a casing, a turbine mounted therein, a chuck secured to said turbine, a shaft on which said turbine is fixed, bearings in said casing on which the ends of said shaft are rotatably mounted, a pump, a tube leading from said pump to said turbine and a return tube from said turbine to said pump, said pump and tubes and turbine being filled with lubricating oil, one of said bearings is a jewel, the other bearing being an O-ring surrounding said chuck, a collar and an end cap on said chuck, said O-ring being held between said collar and cap.

2. A dental drill according to claim 1 characterized in that there is provided a means in said casing contacting said O-ring for adjusting the pressure thereof against said collar.

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