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DENTAL DRILL

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Fig 1.

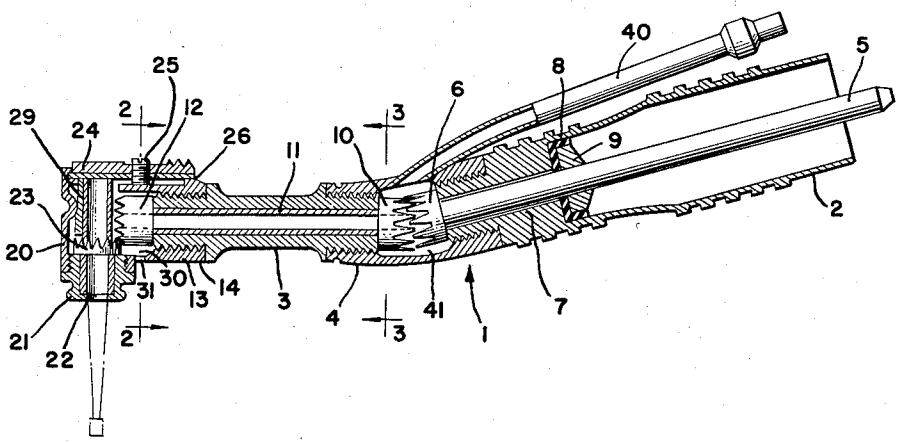


Fig 2

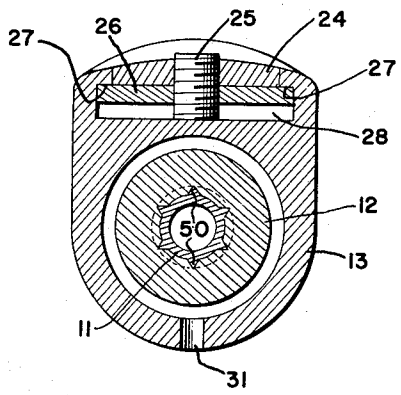
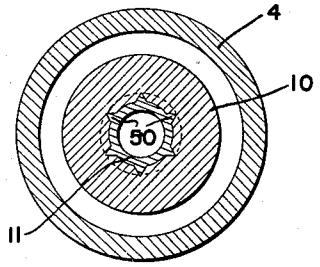


Fig 3.



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DENTAL DRILL

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6 Claims. (Cl. 32—28)

The present invention relates to dental instruments, and more particularly to a power operated rotary tool comprising a handpiece containing a chuck for holding and driving a burr, drill or other workpiece.

A primary object of the invention is to supply water vapor, mist or spray to an instrument of the type indicated in a novel manner capable of accomplishing certain new objects and certain old objects in an improved degree.

A more specific object of the invention is to supply an instrument of the character indicated with a stream of water or other liquid spray, mist or vapor in a manner that will lubricate the bearings, shafts, gears and other rotating parts, which will keep the interior of the instrument clean and free from contamination during long periods of use, which will keep the parts cool, and which will issue as a jet concentrated on the area of tooth structure or the like that is being drilled, ground or otherwise operated on.

With the foregoing and other objects in view the invention comprises, in a preferred embodiment, the parts and features shown in the accompanying drawing in which

Figure 1 is an axial cross sectional view of the handpiece and related parts of a dental instrument comprising the preferred embodiment of the invention;

Fig. 2 is a transverse cross sectional view, on a relatively enlarged scale, taken on the line 2—2 of Fig. 1; and

Fig. 3 is a transverse cross sectional view taken on the line 3—3 of Fig. 1.

Referring now to these figures, the reference numeral 1 designates generally the handpiece of a dental drill instrument which may be conventionally made up of a main section 2 and a terminal section 3, both generally hollow and screwthreaded together by a coupling connection 4. The parts 2 and 3 may be obtuse-angularly related, as shown in Fig. 1, or they may be axially aligned.

A drive shaft 5 extends through the hollow of the main section 2 and terminates at its forward end in a gear 6 which is fast on the shaft. The shaft is solid and is journaled somewhat loosely in a bearing 7 at the forward end portion of the section 2. The rear end of the bearing is closed by a gasket 8 of rubber, neoprene or the equivalent, held in place by a friction-fitting washer 9, thus sealing the rear portion of the handpiece section 2 from the forward portion thereof, for a purpose hereinafter to be explained.

The handpiece is of course connected to the conventional driving mechanism of the instrument so that the shaft 5 is rotated in use.

The gear 6 is meshed with a similar gear 10 which is fast on a hollow driven shaft 11 extending through and loosely journaled in the terminal section 3 of the handpiece. This hollow shaft has a gear 12 fast on its forward end which is encased within a head 13 of special shape. The head has a rear portion 14 which is internally

screwthreaded onto the externally screwthreaded reduced end of the terminal section 3 of the handpiece.

The head 13 contains chuck elements which may be and preferably are made substantially as shown in my Patent No. 2,010,421, issued August 6, 1935. This construction comprises a front head portion 20 formed right angularly to the rear portion 14 and threaded at its bottom to receive a nut 21 having a bottom opening providing an upwardly facing shoulder for holding a short hollow shaft 22 on which is affixed a gear 23 that is meshed with the gear 12 of the hollow shaft 11. A top cover 24 secured by a setscrew 25 to a slide detent 26 closes the top of the head and comprises an assembly that is kept captive on the head by reason of the slide 26 fitting under shoulders 27 and the setscrew extending into a recess 28 in the head.

The slide 26 is slotted along its center for engaging similar slots in the side of a burr or other type of tool and holding it against axial displacement, and the hollow shaft 22 is journaled in the head by a sleeve 29, all in the manner fully explained in my patent above identified.

An important difference between the present construction and that of the patent, insofar as the head structure is concerned, comprises the provision of a hollow chamber 30 in the new head, in combination with the hollow bore of the shaft 22, and a jet orifice 31 drilled into the bottom of the head at substantially the juncture of the portions 20 and 14, providing a discharge opening for the chamber 30.

A new feature of the handpiece comprises a tube 40 terminating in a port formed in the wall of the coupling 4 at the point where the gears 6 and 10 are meshed. This port opens into a chamber 41 containing the gears 6 and 10, and of course this chamber communicates with the hollow bore of the shaft 11, which in turn is opened to the chamber 30 and the orifice 31.

In use the shaft 5 is coupled in any conventional manner to an appropriate drive, and the tube 40 is connected by appropriate conduit means to a conventional spray bottle which is supplied with air pressure to produce a fine mist, vapor or spray of water or other liquid. A stream of this spray is conveyed by the tube 40 to the chamber 41, from which it passes into the loose bearing 7 and around the similarly loose bearing in which the shaft 11 is journaled in the handpiece portion 3. In this manner the meshed gears 6 and 10 and the several bearings are kept well lubricated and cooled during rapid rotation of the shafts.

The stream of spray passes through the hollow shaft 11 and enters the chamber 30 in the head 20 where it lubricates and cools the meshed teeth of the gears 12 and 23 as well as the bearing and journal surfaces of the hollow shaft 22. The stream then issues from the orifice 31, which is so formed as to direct the jet onto the area in which the terminal end of the burr or other tool operates in drilling, grinding or otherwise working on a tooth or the like.

The impingement of the jet on the tooth structure serves to keep the area clean and cool without impairing visibility by the dentist. Moreover, the pressure of the spray in the head effectively prevents penetration into the head of foreign matter, such as saliva, grindings and the like.

It will be recalled that the gears 10 and 12 have been described as being mounted fast on the opposite ends of the hollow shaft 12. As shown at 50 in Figs. 2 and 3, it will be noted that these gears are splined on the shaft. This is deemed to be a meritorious feature of the invention, the connection being structurally superior to the customary shaft and gear mounting by means of a rivet or screw standing through an integral collar on the gear and into a radial hole drilled or tapped in the shaft.

Such construction appreciably weakens the gear and shaft connection, which is an undesirable effect avoided by the splined connection to which the hollow shaft of the present invention is well adapted.

The same kind of connection may, if desired, be used for mounting the gear **6** on the solid shaft **5**. Here, however, since the shaft is solid and hence naturally quite strong, the problem of avoiding the weakening effect of drilling for reception of a screw or rivet is not so serious.

It has been found in actual practice that the lubricating and cooling effect of water spray or other aqueous mist makes greasing or oiling completely unnecessary. This eliminates the need for periodic lubrication and cleansing, particularly if the liquid used to produce the spray have an effective proportion of germicide included in it.

The invention is capable of being embodied in other and further modified forms, and not all of the parts and features that have been associated in the illustrated embodiment need be used in combination. Within the broad principles of the invention as defined by the broader of the appended claims different arrangements of parts may be employed, and some of the parts and features may be omitted where less than the full combination is regarded as being satisfactory.

I claim:

1. A dental instrument comprising a generally hollow handpiece terminating in a hollow head provided with a central bore and an orifice at one side only of said bore, a shaft rotatably mounted in the handpiece having an axial bore in communication with the hollow of the head, a chuck mounted in the central bore of the head adapted to hold a burr and operatively connected with the shaft for rotating the burr, and means for conducting a spray to said handpiece for movement through the bore of the shaft and thence into the hollow of the head for discharge through the orifice in the head in a direction generally toward the outer end of the burr.

2. A dental instrument comprising a generally hollow handpiece terminating in a hollow head provided with an orifice, a solid drive shaft and an axially bored driven shaft rotatably mounted in the handpiece, meshed gears coupling adjacent ends of said shafts, the hollow of the head and the bore of the driven shaft being in communication, a chuck mounted in the head adapted to hold a burr and operatively connected with the shaft for rotating the burr, and means for conducting a spray to said meshed gears for movement thence through the bore of the shaft and out of the head through the orifice therein to be discharged in a direction generally toward the outer end of the burr.

3. A dental instrument comprising a generally hollow handpiece terminating in a hollow head provided with an orifice, a solid drive shaft and an axially bored driven shaft in the hollow handpiece, bearing means holding ends of said shafts juxtaposed, gears fast on said shaft ends meshed to each other for coupling said shafts together, and a conduit communicating with the hollow of the handpiece to conduct spray to said meshed gears and bearing means for cooling and lubricating the same and leading said spray through the bored driven shaft for discharge through the orifice in the head.

4. A dental instrument comprising a generally hollow handpiece terminating at its forward end in a hollow head provided with an orifice, a solid drive shaft and an axially bored driven shaft in the hollow handpiece, bearing means holding ends of said shafts juxtaposed, gears fast on said shaft ends meshed to each other for coupling said shafts together, a conduit communicating with the hollow of the handpiece to conduct spray to said meshed gears and bearing means for cooling and lubricating the same and leading said spray through the bore driven shaft for discharge through the orifice in the head, and a gasket engaging said drive shaft and its bearing means spaced rearwardly from said gears for preventing passage of spray into the portion of the handpiece behind said bearing means.

5. A dental instrument comprising a generally hollow handpiece terminating in a hollow head provided with an orifice, a solid drive shaft and an axially bored driven shaft in the hollow handpiece, bearing means holding ends of said shafts juxtaposed, gears fast on said shaft ends meshed to each other for coupling said shafts together, a chuck mounted in the head adapted to hold a burr and operatively connected with the driven shaft for rotating the burr, and a conduit communicating with the hollow of the handpiece to conduct spray to said meshed gears and bearing means for cooling and lubricating the same and leading said spray through the bored driven shaft for discharge through the orifice in the head in a direction generally toward the outer end of the burr.

6. A dental instrument comprising a generally hollow handpiece terminating at its forward end in a hollow head provided with an orifice, a solid drive shaft and an axially bored driven shaft in the hollow handpiece, bearing means holding ends of said shafts juxtaposed, gears fast on said shaft ends meshed to each other for coupling said shafts together, a chuck mounted in the head adapted to hold a burr and operatively connected with the driven shaft for rotating the burr, a conduit communicating with the hollow of the handpiece to conduct spray to said meshed gears and bearing means for cooling and lubricating the same and leading said spray through the bored driven shaft for discharge through the orifice in the head in a direction generally toward the outer end of the burr, and a gasket engaging said drive shaft and its bearing means spaced rearwardly from said gears for preventing passage of spray into the portion of the handpiece behind said bearing means.

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