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S. R. SILVER

2,406,113

METHOD OF GRINDING TEETH

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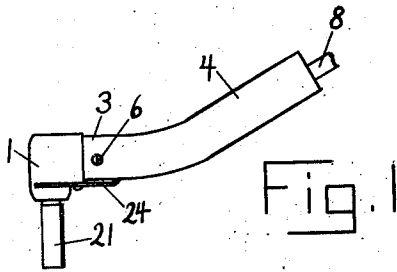


Fig. 1

Fig. 8

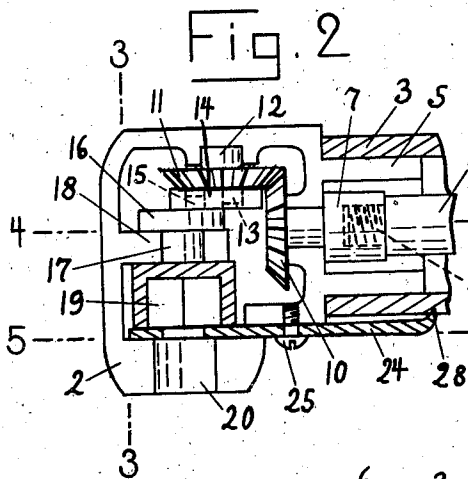
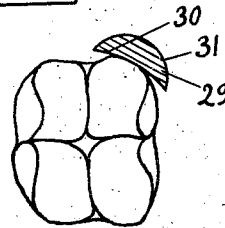


Fig. 2

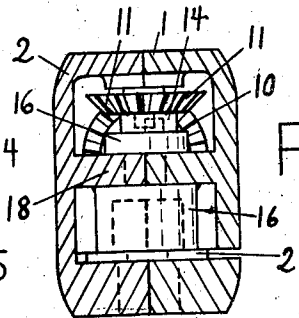


Fig. 3

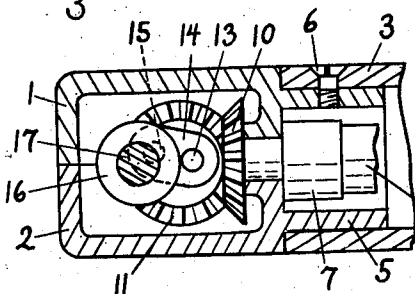


Fig. 4

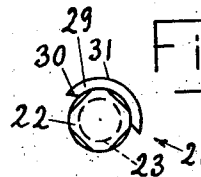


Fig. 7

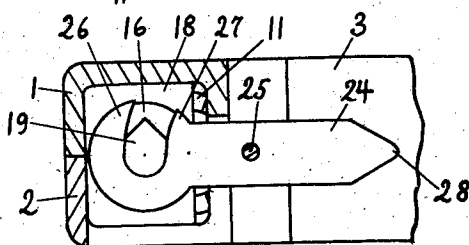
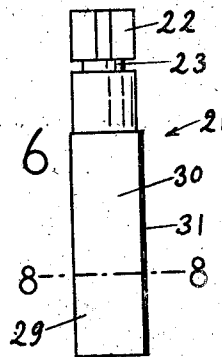


Fig. 5

Fig. 6



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METHOD OF GRINDING TEETH

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3 Claims. (Cl. 32—26)

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My invention relates to dental grinding tools and to their operation.

Objects of my invention are to facilitate and simplify certain operations of dental surgery, and to increase the precision, the speed and the efficiency of these operations, such operations being, for example, the grinding of lingual, buccal, mesial and distal surfaces of teeth, the removal of under-cuts of projections and of rotten or discolored superficial layers, the preparation of teeth for crown and bridge work, the porte polishing and the cleaning of teeth.

Other objects are to facilitate the avoidance of any harm or damage to neighboring teeth or to other parts of the mouth and of any contact between the hands of the dentist and the grinding surface of the tool, and to increase the safety of the patient and of the dentist during these operations.

Further objects are to obtain these results with simple and reliable means, and to provide the tool with a structure which can be easily made, handled and maintained.

Still other objects and advantages will appear from the following description of an exemplifying embodiment of the invention, from the appended claims, and from the accompanying drawing in which:

Fig. 1 shows a vertical side elevation of an illustrative embodiment of my invention.

Fig. 2 shows a vertical, partly sectional elevation of the central vertical plane of the same embodiment, some parts being shown broken off.

Fig. 3 shows a vertical cross-section of the same embodiment, taken along the line 3—3 and seen from the left side in Fig. 2.

Fig. 4 shows a horizontal cross-section of the same embodiment, taken along the line 4—4 and seen from the lower side in Fig. 2.

Fig. 5 shows a horizontal cross-section of the same embodiment, taken along the line 5—5 and seen from the lower side in Fig. 2.

Fig. 6 shows a vertical side elevation of a cutter which is omitted in Figs. 2, 3, 4 and 5.

Fig. 7 shows a horizontal elevation of the same cutter, seen from the upper side in Fig. 6.

Fig. 8 shows a horizontal cross-section of the same cutter, taken along the line 8—8 and seen from the upper side in Fig. 6, and a tooth being ground by this cutter.

Figs. 2 to 8 are represented on a considerably larger scale than Fig. 1.

Referring to the drawing, numerals 1 and 2 indicate the head or front part of the tool, 1 and 2 forming two parts of this head which are pref-

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erably contacting each other with planes or surfaces positioned in the vertical central plane of the head. The parts 1 and 2 may be substantially symmetrical and may be connected by any suitable means, for example by a ring-shaped end 3 of a tubular holder 4 in which end a tubular extension 5 of the head fits snugly, a half of the extension 5 being an integral part of the part 1, and the other half of the extension being an integral part of the part 2. The parts 1 and 2 are secured against mutual dislocation in the direction of the axis of the extension 5 by inserted parts which will be described later. The extension 5 may be secured to the ring 3 or to the holder 4 in any suitable manner, for example by a screw 6.

A member 7 has a cylindrical neck fitting rotatably into a bore of which one half is positioned in the part 1 and the other half in the part 2. The back end (right side in Figs. 2 and 3) of the member 7 is affixed to a preferably flexible shaft or axle 8 transmitting rotation from any suitable motor to the member 7. The shaft 8 may be connected to the member 7, for example, by screwing a threaded end 9 of the shaft into a threaded bore of the member 7 in the direction of the transmitted rotation so that the rotation of the shaft 8 will not unscrew the end 9.

The head 1—2 contains an inner space in which a gear is positioned. Preferably, this gear comprises two conical toothed wheels 10 and 11 which engage each other. The wheel 10 is affixed to or forms an integral part of the member 7. The wheel 11 has a shaft 12 which is rotatably inserted in a bore of which one half is positioned in the part 1 and the other half in the part 2.

A small pin 13 is excentrically affixed to the lower side of the wheel 11 and has an axis parallel to the axis of the wheel 11. The pin 13 fits a bore of a bar or short rod 14 rotatably. The bar 14 has another bore which a pin 15 fits rotatably. The pin 15 is affixed to a member 16 which has a neck 17 inserted rotatably in a bore of which one half is positioned in the part 1 and the other half in the part 2. This bore has an axis parallel to the axes of the pins 13 and 15, and may be positioned in a wall forming an integral extension 18 of the parts 1 and 2. The lower part of the member 16 has an aperture or hole 19 of not circular, for example square, cross-section.

The pin 15 is excentric with respect to the neck 17, and the radius of this excentricity is larger than the radius of excentricity of the pin 13. Consequently, when the wheel 11 and the pin 13

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rotate, the pin 15 does not turn completely around the axis of the neck 17, but moves to and fro on an arc, and the member 16 oscillates around this axis.

Preferably the excentricities of the pins 13 and 15 are so measured that the oscillating or rocking movement of the member 16 comprises only a small portion of a circle, for example less than sixty degrees. The head or the parts 1 and 2 have an aperture 20 facing the aperture 19 of the member 16 and being co-axial with this member.

A grinding tool or cutter 21 (Figs. 1, 6, 7 and 8) can be exchangeably affixed to the member 16, for example, in the following manner: The cutter 21 has an upper end or head 22 having an unround cross-section which may be formed by a square fitting the aperture 19 of the member 16 and having rounded corners fitting the aperture 20 into the aperture 19, and the cutter is axially locked in this position whereby the cutter participates in the oscillating movement of the member 16. Preferably, the cutter may be introduced in any of several positions. In the shown embodiment, the cutter may be introduced in four different positions which are turned relatively to each other about ninety degrees.

Any suitable means may be employed for securing the cutter in the described position. For example, the cutter may have a neck 23 which is narrower than the remaining parts of the cutter whereby a circular groove is formed into which a locking member 24 can be slipped sidewise. The member 24 may be a flat lever turnable around a pin 25 affixed to the parts 1 and 2, for example by screwing a threaded end of the pin 25 into these parts. One end of the lever 24 is slidable in a slot provided in the parts 1 and 2, at the inner side of the aperture 20, and is so slotted that this end has two prongs or projections 26 and 27 which can slide between the member 16 and the aperture 20. The distance between the prongs 26 and 27 is smaller than the diameter of the aperture 20 and, preferably, as large as the diameter of the cutter neck 23 whereby these prongs enter the groove of the cutter and prevent the same from axial dislocation. The other end of the lever 24 may terminate in an upward bent point or tip 28 which engages a recess in the part 3 of the holder whereby the lever 24 is secured against lateral movement which might unlock the cutter. The tip 28 can be disengaged from the recess by bending the pointed end of the lever 24 down, the lever being sufficiently resilient for this purpose.

The cutter 21 has a lower part 29 which, in the affixed condition of the cutter, is positioned outside of the head 1-2 and below the aperture 20. Preferably, the part 29 has a moon-shaped cross-section and has a concave grinding surface 30 which may be covered with emery or an emery mixture or any other suitable grinding agent, or the part 29 may be a mixture of a grinding agent with a binding agent. The outer, preferably convex, surface 31 of the part 29 may form a portion of a cylinder co-axial with the head 22 whereby contact with the outer surface of the cutter will not harm the contacting body.

The shape of the cross-section of the part 29, the curvature of the surface 30 and its position relative to the axis of the cutter may be so chosen as best adapted for the intended operation. A set of similar cutters having identical heads 22 and necks 23 and differently shaped parts 29

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may be kept in store. These cutters may be exchanged with each other when desired. The number of necessary cutters is reduced by the possibility to use each cutter in different positions as mentioned before.

After the dentist has selected a suitable cutter 21, he inserts the same through the aperture 20 into the head of the holder as far as possible while the lever 24 is in a position turned relatively to the shown position sufficiently to free the aperture 20. In the inserted position of the cutter, the neck 23 of the same or the groove surrounding this neck is positioned in the same plane as the lever 24. Then, the lever 24 is turned back into the shown position whereby the cutter is secured to the holder.

Then, the dentist starts the motor or the rotation of the shaft 8 which drives the member 7, the wheels 10 and 11, the bar 14, the member 16 and the cutter 21 while the dentist directs the holder into a position where the grinding surface 30 contacts the surface of the tooth to be ground. The oscillating movement of the cutter guides this grinding surface in an arc having its concave side facing the tooth whereby the grinding surface automatically produces a smoothly ground convex surface of the tooth, in contradistinction from known dental cutters which can produce such a convexly ground surface only by very skillful guidance of the tool by the hand of the dentist and which are apt to grind grooves into the tooth if not handled very carefully. The concave shape of the grinding surface 30 contributes additionally to the favorable grinding conditions described.

I desire it understood that my invention is not confined to the particular embodiment shown and described, the same being merely illustrative, and that my invention may be carried out in other ways without departing from the spirit of my invention as it is obvious that the particular embodiment shown and described is only one of the many that may be employed to attain the objects of my invention.

Having thus described the nature of my invention, what I claim and desire to secure by Letters Patent is:

1. An instrument for dental grinding operations comprising a casing having an entrance opening at its lower end, a tubular neck extending rearwardly from said casing about an opening in the casing, a web in said casing, a tool-receiving socket in said casing aligned with said entrance and having a neck journaled through the web and a disk at the inner end of the neck, a pin projecting from said disk eccentric to the neck, a bevelled gear in said casing rotatably mounted for turning about an axis offset from the axis of the socket and its neck rearwardly of the casing and turning in a plane parallel to the disk, a pin projecting from the gear in eccentric relation thereto, a bar between the gear and the disk extending radially thereof and formed with sockets rotatably receiving the pins and imparting oscillating movement to the socket during rotation of the gear, and a gear in the casing meshing with the first gear and having a neck rotatably mounted through the opening at the rear of the casing and carrying a socket at its outer end located in the neck of the casing for engagement with a terminal of a flexible drive shaft.

2. An instrument for dental grinding operations comprising a casing having a lower end formed with an entrance opening, a coupling for

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connection with a drive shaft journaled through the rear wall of the casing and having a gear at its inner end, a bearing in said casing opposite the entrance opening, a socket in said casing journaled through said bearing in alignment with the entrance opening and having a disk at its inner end carrying a pin eccentric to the axis of the socket, a gear rotatably mounted in said casing in mesh with the first gear, the second gear turning about an axis offset rearwardly of the axis of said socket and carrying an eccentrically located pin, and a bar between the second gear and the disk extending parallel to confronting faces thereof and formed with openings rotatably receiving the pins and imparting oscillating movement to the socket during rotation of the second gear.

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3. An instrument for dental grinding operations comprising a casing open at its lower end, a coupling for connection with a drive shaft journaled through the rear wall of said casing, a socket rotatably mounted in said casing in operative relation to the open lower end thereof and having a member at its inner end carrying a pin eccentric to the socket, a member rotatably mounted in the casing in laterally offset relation to the socket and driven from said coupling and carrying an eccentrically located pin, and a link between the said members extending radially of the pins and formed with openings rotatably receiving the pins and serving to impart oscillating movement to the socket.

SAMUEL R. SILVER.