

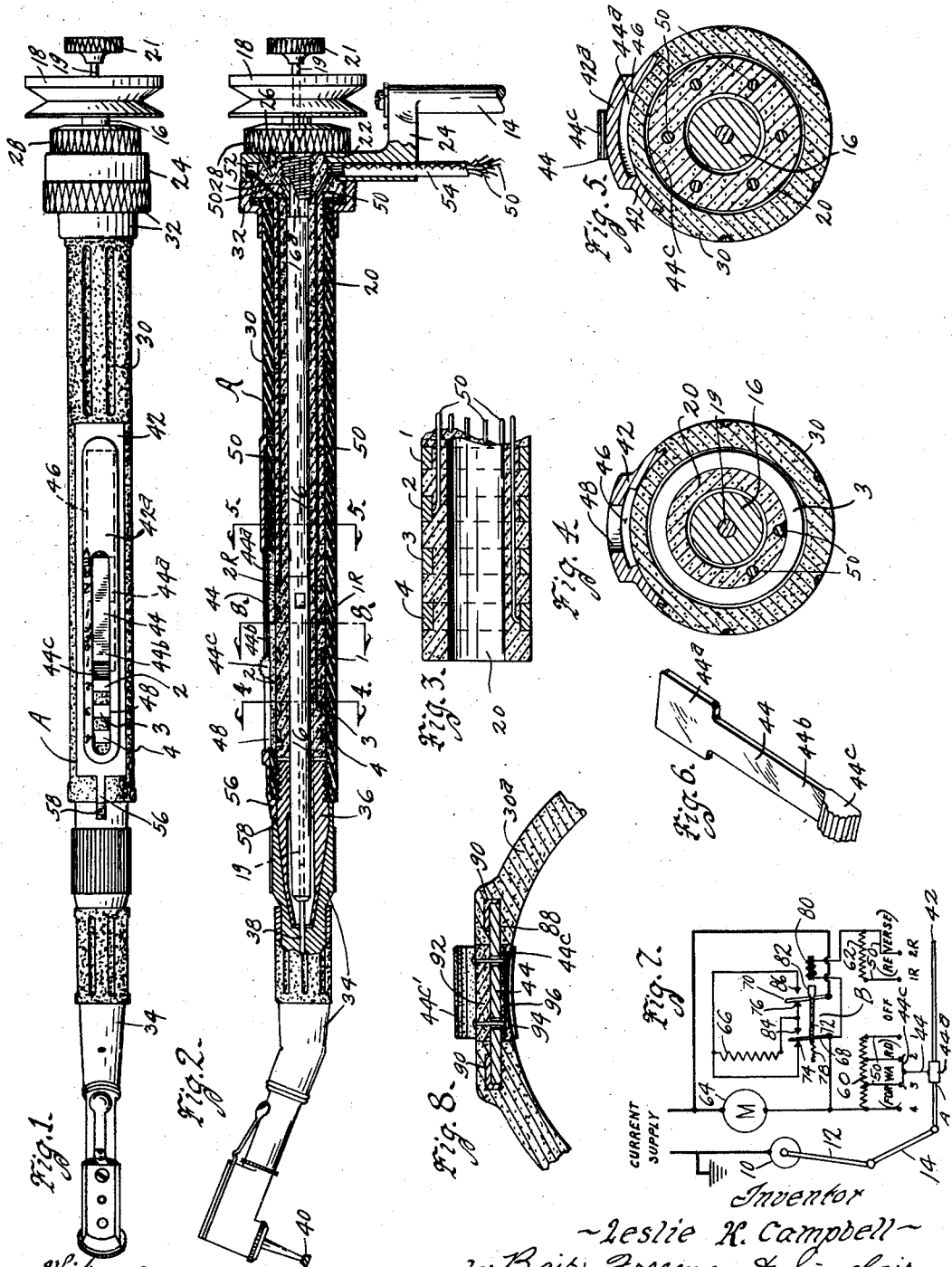
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DENTAL HAND PIECE

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# UNITED STATES PATENT OFFICE

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## DENTAL HAND PIECE

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2 Claims. (Cl. 32-15)

An object of my invention is to provide a dental hand piece with a control switch associated therewith, the device being of simple, durable and comparatively inexpensive construction.

5 A further object is to provide a control switch for the electric tool motor commonly used by dentists, which is built into the dental hand piece so that it can be controlled by hand, thus eliminating the foot switch and rheostat now used for  
10 controlling such motors.

A further object is to provide a switch in the dental hand piece arranged to control starting, stopping, speed and reversal of the tool motor from the dental hand piece, which does away  
15 with the placing of the bulk of the dentist's weight upon one foot which is necessary with the foot operated type of control to have rapid and complete control of the regulation of the tool motor with his other foot. Foot operation causes  
20 the dental operator to become fatigued, which is not conducive to health and when standing on one foot, he is off balance, with the result that it is difficult to accurately control the position of the tool in the patients' mouths, especially  
25 when they happen to jerk their heads. When standing in an off balanced position on one foot, the dental operator does not have the optimum control of his hands, which is so necessary for accurate grinding, drilling and polishing of teeth.

30 A further object is to provide a dental hand piece with stationary contacts and a movable contact engageable with any of the stationary ones, with these contacts included in the circuit of the tool motor and a rheostat therefor, where-  
35 by to control starting, stopping and the speed of the tool motor.

Still a further object is to provide additional contacts for controlling the reversal and the reverse speed of the tool motor.

40 Still another object is to provide a reversing switch, which is of the relay type, whereby to make it possible to eliminate the inclusion of a reversing switch and the complication of details attendant therewith if an attempt were made to  
45 build the reversing switch in the dental hand piece and thus I am able to keep the size of the hand piece within reasonable limits and of convenient rather than awkward size.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the  
55 accompanying drawing, in which:

Figure 1 is a plan view of a dental hand piece embodying my invention.

Figure 2 is a vertical longitudinal sectional view through the same.

Figure 3 is an enlarged sectional view of a portion of a sleeve shown in Figure 2.

Figures 4 and 5 are enlarged sectional views on the lines 4-4 and 5-5 respectively of Figure 2.

Figure 6 is a perspective view of a movable contact.

Figure 7 is an electric diagrammatic view of the hand piece and the electric tool motor and associated parts; and

Figure 8 is an enlarged sectional view as taken on the line 8-8 of Figure 2, illustrating a modified form of construction.

On the accompanying drawing, I have used in the diagrammatic Figure 7, the reference numeral 10 to indicate the base of a dental machine. A base of this character supports an electric tool motor M and has extending therefrom, arms 12 and 14, which are jointed. A dental hand piece indicated generally at A, is connected by a joint with the end of the arm 14 and has a tool drive shaft 16, which is operatively connected by a pulley 18 and a belt (not shown) with the motor M. The foregoing parts are of general dental machine construction and form no part of my present invention.

The dental hand piece A includes a foundation sleeve 20, preferably of insulating material, which is connected, as by screw threads 22, with a head 24 on the end of the arm 14. The foundation sleeve 20 may be secured relative to the head 24 by a pin 26, which is held in position by a bearing sleeve 28. The bearing sleeve 28 is screwed into one end of the foundation sleeve 20.

Rotatably mounted on the foundation sleeve 20, I provide a hand hold sleeve 30, which is retained against longitudinal movement by a retainer nut 32. A tool head 34 is connected with a tapered extension 36 of the hand hold sleeve 30 and is non-rotatable relative thereto, as will hereinafter be described.

The drive shaft 16 has a reduced portion 16a journaled in the bearing sleeve 28 and connects with a tool shaft 38 extending through the tool head 34. A tool, such as a burr 40, is operatively connected with the tool shaft 38 in the ordinary manner, the tool head 34 being of standard construction.

The hand hold sleeve 30 is preferably of insulating material and has molded therein, a metal insert 42 which constitutes a guide for a movable contact 44. The insert 42 has a guideway

46 for an enlarged blade 44a of the contact 44 to slide through, a slot 48 being provided for the reduced portion 44b of the contact 44 to extend through.

5 The foundation sleeve 20 is provided with collector rings 1, 2, 3, 4, 1R and 2R. The contact 44 has a contact portion indicated at 44c for selective coaction with the collector rings, which is made possible by the sliding arrangement of the contact 44 with respect to the metal insert 42. 10 The insert 42 has a cover portion 42a for the enlarged part 44a of the contact 44, when the contact portion 44c is adjacent "off", 1R or 2R positions. The contact 44 is made of spring material and normally assumes a position spaced 15 from the collector rings, as shown in Figure 2.

From the foregoing description, it will be obvious that the contact portion 44c of the contact 44 (which has a knurled head) may be engaged by 20 a finger or thumb of the dental operator and the contact can be both slid relative to the insert 42 and pressed to engage the collector rings as desired. This can easily be done with the hand which is holding the hand piece.

25 The collector rings are connected with wires 50, which extend longitudinally through the foundation sleeve 20 and into an annular pocket 52 of the head 24. The wires 50 are insulated where they extend from the foundation sleeve 20 and into the pocket 52 and all extend into a cable 30 54. The metal insert 42 is grounded with relation to the metal of the dental machine 10 by means of a lug 56 which contacts with the bearing sleeve 36, the sleeve being in contact with the shaft 16. The lug 56 also extends into a notch 35 58 of the metal tool head 34. Usually the tool head 34 is not used (except for back teeth), the tool 40 being extended into the sleeve 36 and direct connected with the drive shaft 16 by a clutch rod 19 and clutch knob 21. Electric current is 40 supplied from the frame of the machine 10 through the arms 12 and 14 and the shaft 16 to the lug 56.

#### Circuit arrangement

45 In Figure 7, I have illustrated the circuit arrangement of my dental hand piece in connection with a shunt wound motor. The wires 50 extending from the collector rings 1, 2, 3 and 4 50 are connected with a rheostat winding 60, while the wires 50 from the collector rings 1R and 2R are connected with a rheostat winding 62. The winding 60 is connected with the armature 64 of the motor M and through a reversing switch B 55 with the field coil 66 of the motor.

The reversing switch B comprises switch blades 68 and 70 operatively connected together with a bar 72 and normally engageable with contacts 74 and 76 due to the action of a spring 78.

60 This causes flow of current in one direction through the field coil 66 when the contact portion 44c is in contact with any of the contacts 1, 2, 3 or 4. The contact portion 44c, it will be noted, is of sufficient width to bridge two adjacent 65 contacts (except 1 and 1R) so that a change from one collector ring to another may be made without opening the motor circuit.

When the contact 44 engages either the collector ring 1R or 2R, an electromagnet 80 is 70 energized which acts upon an armature 82 for swinging the switch blades 68 and 70 to engage with contacts 84 and 86 against the action of the spring 78. This causes a reverse flow of the current through the field coil 66, thus reversing 75 the rotation of the motor M.

The collector rings have corresponding indicia along the insert 42 as shown in Figure 1, so that the operator can determine what speed he is operating the motor at and these serve as a guide 80 to indicate the proper positions for various speeds, for stopping and for reverse. In the installation thus far described, the machine 10 is grounded to eliminate any danger of shock to the operator.

In some instances, electrical code requirements do not tolerate exposure of one of the circuit 85 wires, as by grounding it through the machine and I have therefore made provision for insulating the contact 44 as shown in Figure 8. The hand hold sleeve 30, it will be remembered, is of insulating material. It is illustrated in Figure 8 at 90 30a as having slots 88 provided with metal inserts 90 to coact with the contact blade 44.

The inserts 90 are completely concealed in the insulating sleeve 30a and the contact blade 44 is insulated by strips of insulation 92. The insulation 92 may be retained in position by rivets 94, the heads of which are insulated from the blade 44 by insulation 96. It will be noted that the holes in the blade 44 are sufficiently large to prevent contact of the rivets with the blade. In 100 this type of hand piece, an insulated wire extends through the cable 54 and is connected with the inserts 90, so that the current flows through this wire and the inserts rather than through the frame of the machine and thus full insulation is 105 obtained.

From the description of my dental hand piece, it will be obvious that I have provided an efficient control built into a hand piece of normal size, with provision for starting and stopping the tool 110 motor and controlling its speed of rotation as well as its reversal. By the provision of a relay actuated reversing switch, a multiplicity of movable contacts in connection with the hand piece is 115 eliminated.

The collector rings are provided in the form of rings so that flexibility of the hand piece is secured since it is often desirable to rotate the hand hold sleeve 30 relative to the foundation sleeve 20. Thus by having the collector rings of 120 annular construction, contact may be made regardless of the rotatable position of the sleeve 30 relative to the sleeve 20. Any number of collector rings may be used.

Some changes may be made in the construction 125 and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents, which may be 130 reasonably included within their scope.

I claim as my invention:

1. For use with an electric tool motor, a reversing switch therefor having a relay coil and a rheostat winding for said motor, a dental hand 135 piece comprising a foundation sleeve, a plurality of longitudinally spaced collector rings thereon, a hand hold sleeve rotatably mounted on said foundation sleeve, a contact supported on said hand hold sleeve and longitudinally slidable relative thereto, said contact being selectively 140 engageable with said collector rings and included therewith in the circuit of said tool motor, said relay coil and said rheostat winding, whereby to control the speed and direction of 145 rotation of said motor.

2. For use with an electric tool motor, a reversing switch, a relay for the reversing switch, and a rheostat winding for the motor, a dental hand piece comprising a foundation sleeve of in- 150

5 sulating material, a plurality of longitudinally spaced collector rings thereon, a hand hold sleeve rotatably mounted on said foundation sleeve, a contact supported on said hand hold sleeve and longitudinally slidable relative thereto, said contact being selectively engageable with said collector rings and wiring through said foundation sleeve for including said collector rings in the circuit of said motor and said rheostat winding, whereby to control the speed of said motor, said contact being also included in said circuit. 80

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