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3,346,958

FINGER CONTROL FOR DENTAL HANDPIECE

Filed Dec. 6, 1963

4 Sheets-Sheet 1

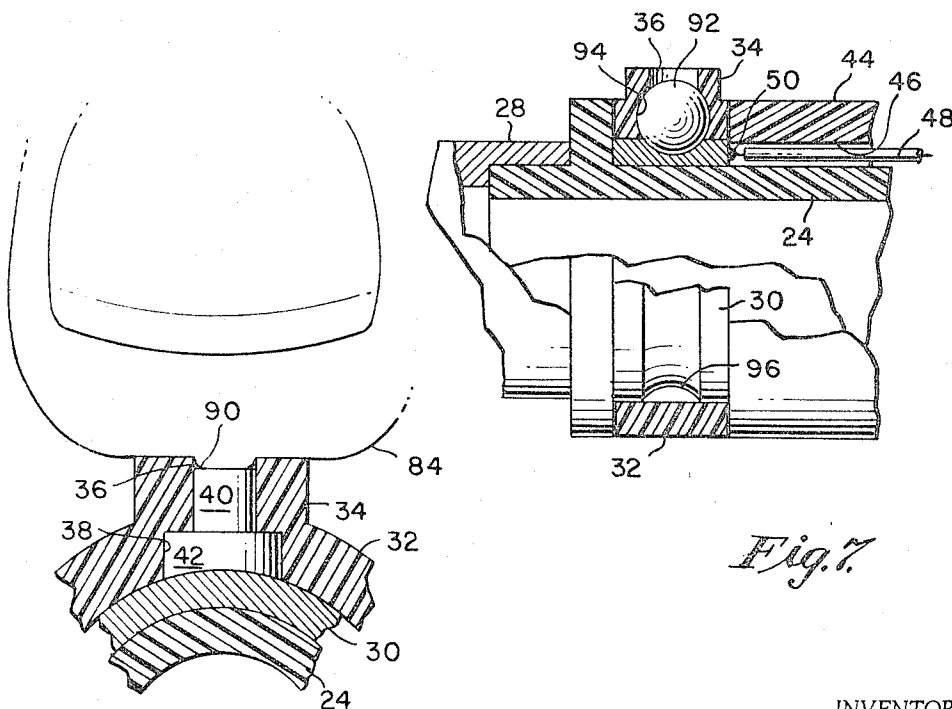
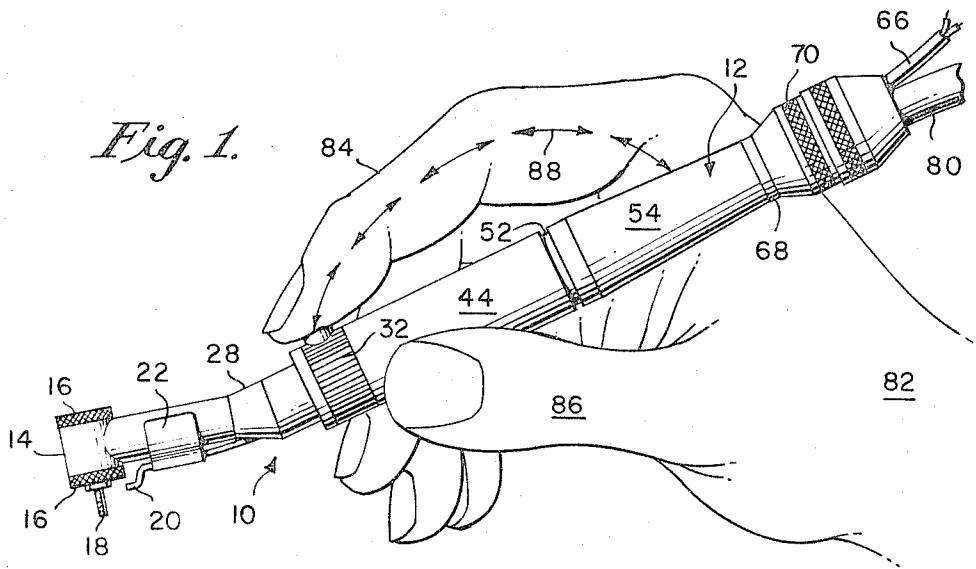


Fig. 4.

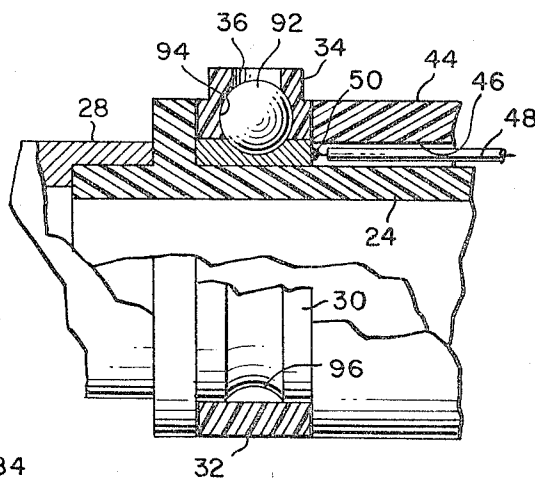


Fig. 7.

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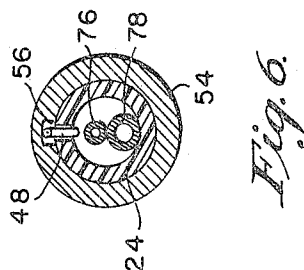
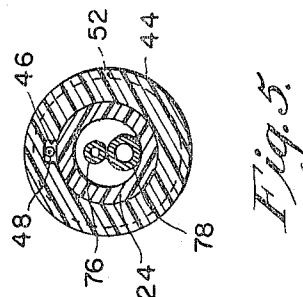
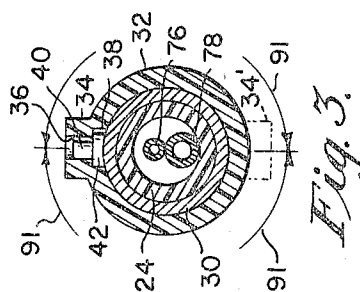
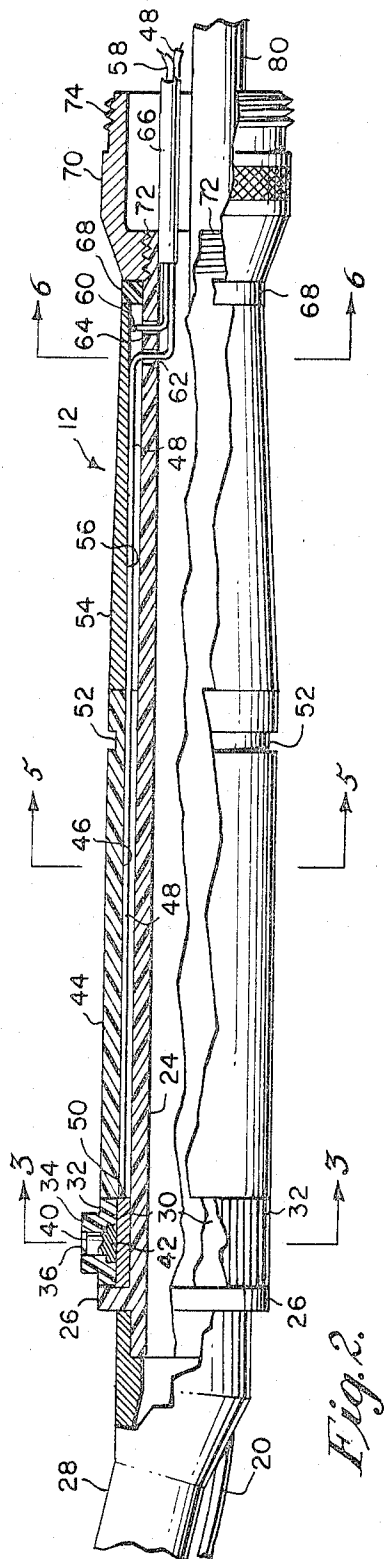
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FINGER CONTROL FOR DENTAL HANDPIECE

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

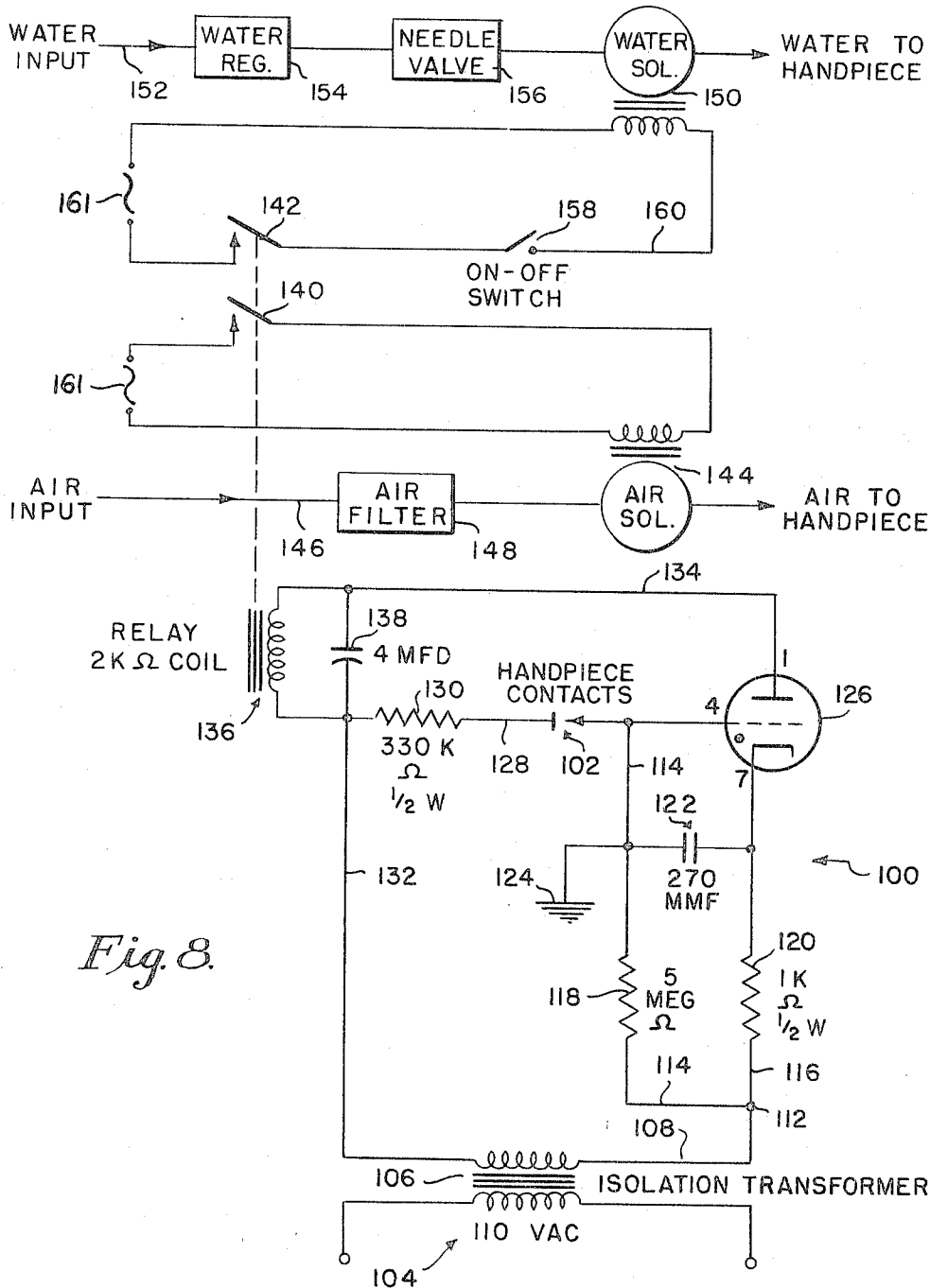


Fig. 8.

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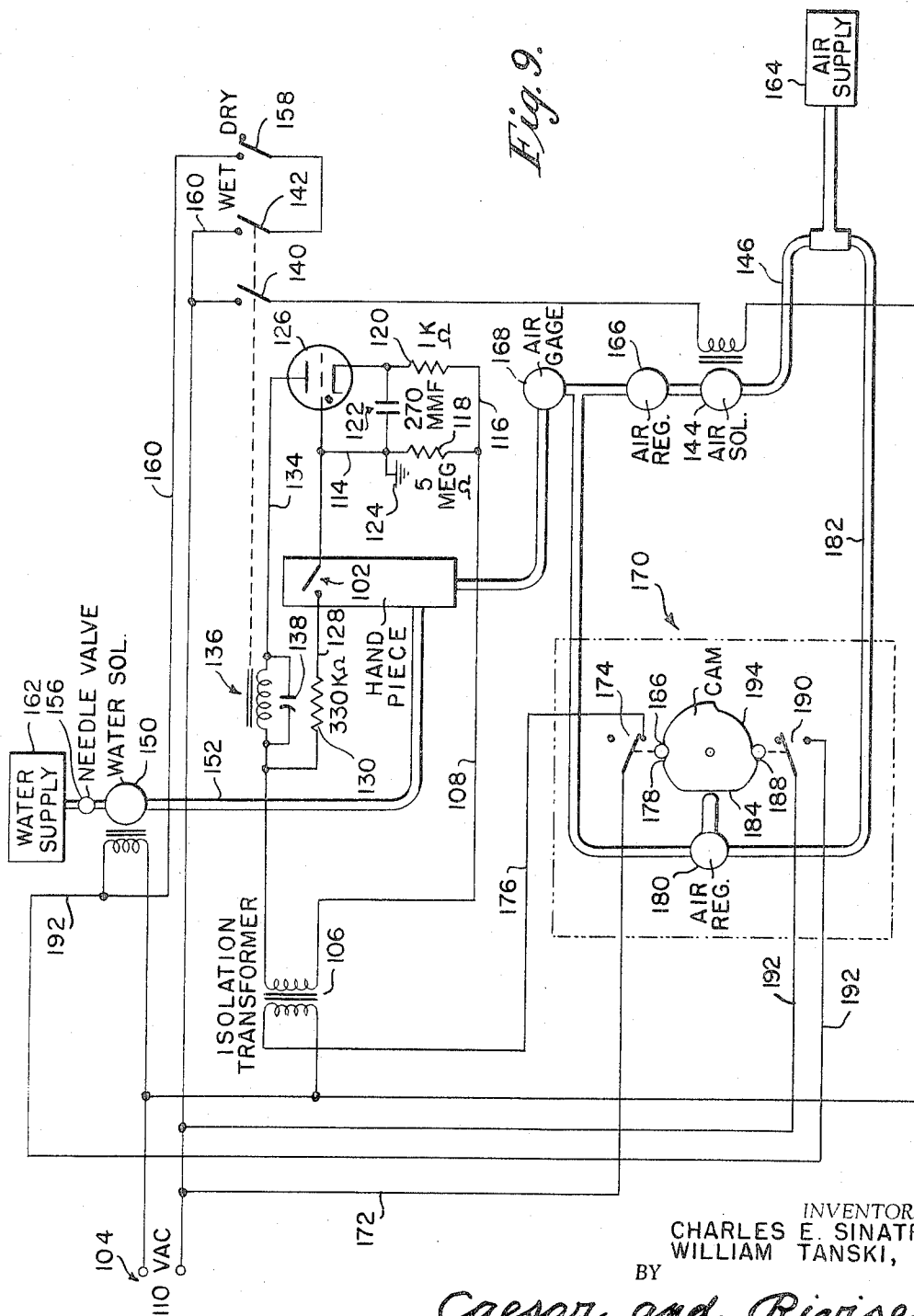
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FINGER CONTROL FOR DENTAL HANDPIECE

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3,346,958

FINGER CONTROL FOR DENTAL HANDPIECE
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delphia, Pa., a corporation of Pennsylvania
Filed Dec. 6, 1963, Ser. No. 328,623
19 Claims. (Cl. 32—28)

This invention relates to a finger control for a dental handpiece.

Before this invention the only effective manner of starting and stopping the supply of the necessary rotational power to a dental burr was by means of a foot control. These foot controls are usually spring loaded and act instantaneously. The use of quick stopping switch means for the supply of either the air power for air driven dental drills or electric power for the belt driven dental drills is required because of the inherent danger of the rotating burr within a patient's mouth. Thus, if a patient should realize sudden pain and attempt to pull away from the burr and dentist's hand, there is always the danger that the rotating burr can injure the patient by cutting either the tongue or the gums. For this reason a dentist must be able to stop the rotation of the burr almost instantaneously. The foot controls used to date have been able to furnish the necessary instantaneous cut-off of the supply of power.

One of the problems with the foot control is that in many instances it is extremely difficult for the dentist to be working on one of the teeth in the rear of the mouth while at the same time effectively operating the foot control. This procedure can become quite uncomfortable for the dentist. By using the finger control of this invention on a dental handpiece, the aforementioned problem of using the foot control is obviated. Thus, a dentist can instantaneously stop and start the rotation of a burr in a dental handpiece by the manipulation of his index finger while holding the dental handpiece in its normal operating position. One of the advantages of this finger control is that it can be operated without the necessity of using the other hand. Additionally, since the control is operated while holding the handpiece in its normal position, it is not necessary to move the hand holding the handpiece in order to stop and start the rotation of the burr. This is extremely important when instantaneous stopping is required.

It is therefore an object of this invention to provide a novel finger control for a dental handpiece.

It is another object of this invention to provide a finger control for a dental handpiece that can be utilized while holding the handpiece in its normal operating position.

It is a further object of this invention to provide a finger control for a dental handpiece which can be used to instantaneously stop the rotation of the dental burr during use.

It is a further object of this invention to provide a finger control for a dental handpiece that will not substantially increase the overall dimensions of the handpiece.

It is a further object of this invention to provide a finger control for a dental handpiece that is operable regardless of the position of the handpiece within the mouth of a patient.

It is a further object of this invention to provide an electronic finger control for a dental handpiece which is completely safe both to the patient and to the dentist.

These and other objects of the present invention are accomplished by providing a dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing,

said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, whereby said first and second electrical means can be electrically connected by physical contact with the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a side elevational view of a dental handpiece embodying the present invention and showing a hand holding the handpiece in a position wherein the finger control is being operated;

FIG. 2 is an enlarged fragmentary side elevational view, partly in section, showing a dental handpiece embodying the present invention;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary portion of FIG. 3 showing the position of a finger when used to operate the finger control;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 2;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 2;

FIG. 7 is a fragmentary side elevational view, partly in section, showing a modified form of a finger contact;

FIG. 8 is a diagrammatic view of the electrical circuit for the finger control of this invention and a piping diagram, as controlled by the finger control circuit; and

FIG. 9 is a piping and wiring diagram showing the electrical circuit for the finger control of this invention and an auxiliary foot control circuit, and the connection of each of these circuits with the piping diagram.

Referring now in greater detail to the various figures of the drawings wherein similar reference characters refer to similar parts, a dental handpiece including the finger control of this invention is generally shown at 10 in FIG. 1.

Handpiece 10 includes a tubular housing 12, having a turbine housing 14 at the front thereof. In the embodiment shown, turbine housing 14 includes a pneumatically driven turbine therein which is secured in place by removable end caps 16. A dental burr 18 projects out of the turbine housing 14. It is to be understood that the finger control of this invention can be used on any dental handpiece, whether air driven or belt and pulley driven. By way of a specific embodiment, the turbine assembly can be that shown in United States Patent No. 3,074,167 or that shown in copending application Ser. No. 138,522, filed Sept. 15, 1961, now Patent No. 3,120,706. Also included is a water spray tube 20 and an adjacent air spray tube (not shown). The adjacent tubes are held in place by a resilient slidable clip 22. The water and air spray tubes are described in greater detail in the aforementioned United States patent and United States patent application.

As seen in FIG. 2, housing 12 basically comprises an elongated tube 24. An integral annular collar 26 projects outwardly from the tube adjacent the front thereof. Angle portion 28 containing the turbine is secured on the front of tube 24 by means of a pressed fit, and abuts against collar 26. Tube 24 can be made of any non-conductive, electrically insulating material. A preferred material is nylon or Teflon (polytetrafluoroethylene).

A collar 30 is telescoped over tube 24 and abuts annular collar 26. Collar 30 is ring-shaped and extends around the entire circumference of tube 24. Collar 30 is made of a conductive material that is preferably metallic,

such as brass. A ring of insulating material 32 is telescoped over collar 30. Ring 32 is preferably made of smooth plastic which has little frictional resistance to movement, such as nylon or Teflon. As seen in FIG. 2, ring 32 is slightly narrower than collar 30. As seen in FIG. 3, ring 32 includes a nib 34 projecting outwardly therefrom. As seen in FIGS. 2 and 3 nib 34 is unitary with ring 32 and is made of the same insulating material. A central hole 36 is formed in nib 34 and projects downwardly into a recess 38 in ring 32. Recess 38 is slightly wider than the diameter of hole 36.

A metallic pin 40 is positioned within hole 36. Pin 40 includes a lower flange 42 which is positioned within recess 38. The purpose of the enlarged recess and the flange on the pin is to prevent the pin from falling out of place. As seen in FIG. 3, pin 40 is slightly shorter than the height of opening 36 and thus its top is positioned below the top of nib 34. The purpose for this will be explained hereinafter. As further seen in FIG. 3, flange 34 has an arcuate lower surface. This surface is contiguous with the circumference of collar 30 and is slidable thereon.

A sleeve 44 of non-conducting material is telescoped over tube 24 and abuts collar 30. As seen in FIG. 2, since ring 32 is slightly narrower than collar 30, it is spaced from sleeve 44. Sleeve 44 is preferably plastic and may be molded or cut from nylon or Teflon.

As best seen in FIGS. 2 and 5, sleeve 44 is provided with a longitudinal recess 46 which extends along the entire length thereof. Passing through this recess is an insulated wire 48. As seen in FIG. 2, wire 48 has one end thereof electrically connected to collar 30 by any suitable means, such as solder 50. Sleeve 44 is provided with an annular recess 52 around its entire circumference adjacent the end farthest from collar 30. The purpose of this recess will be explained hereinafter.

Positioned rearwardly of sleeve 44 is a second sleeve 54 which is telescoped over tube 24 and has one end abutting sleeve 44. Sleeve 54 is made of an electrically conductive material and is preferably metallic, such as brass. Sleeve 54 is provided with a longitudinal recess 56 (FIGS. 2 and 6) which is in alignment with recess 46 of sleeve 44. Wire 48 extends through recess 56. Sleeve 54 is electrically insulated from collar 30 by sleeve 44.

A second insulated wire 58 is electrically connected to sleeve 54 by a suitably connection such as solder 60. Wires 48 and 58 pass into tube 24 through holes 62 and 64, respectively. Wires 48 and 58 leave housing 12 by passing out the rear thereof and are covered by flexible conduit 66. Wire 58 is electrically in contact only with sleeve 54 and is electrically insulated from wire 48.

A ring of insulating material 68 is telescoped over tube 24 and abuts the rear edge of sleeve 54. Again this insulating material may be a plastic such as nylon or Teflon.

All of the various aforementioned rings and sleeves are secured in place on tube 24 by means of a nut 70 which is threadably secured on the end of tube 24 at 72. Nut 70 is externally threaded at 74 for subsequent attachment to a source of water and a source of air, in a manner well known in the art.

Mounted within tube 24 is a water supply tube 76 and an air supply tube 78 (FIGS. 3, 5 and 6). The air supply tube is used for furnishing the air for rotating the turbine and additionally for atomizing the air from the water supply tube to provide a lubricating and cooling spray. These functions are well known in the art and are described in greater detail in the aforementioned United States Patent No. 3,074,167 and United States application Ser. No. 138,522. As seen in FIG. 2, a flexible conduit 80 covers water tube 76 and air tube 78 at the end of the handpiece.

The dental handpiece 10 is actuated by a dentist grasping the handpiece in the manner shown in FIG. 1. It should be noted that this would be the normal manner of

holding a dental handpiece when working on a patient. Thus, the dentist would hold the handpiece in his hand 82 with the sleeve 54 resting in the crotch formed between the index finger 84 and thumb 86. The tip of index finger 84 rests on nib 34 of ring 32.

As seen in FIG. 2, a wire 48 is electrically connected to electrically conductive collar 30 below ring 32. A second wire 58 is electrically connected to conductive sleeve 54. In this invention sleeve 54 and collar 30 form a pair of contacts in an electrical circuit. When the handpiece is grasped in the manner shown in FIG. 1 by a dentist, the circuit is completed by current passing from sleeve 54 through the index finger of the dentist, as shown by arrows 88, through the tip of the index finger, and to collar 30 by means of contact with metallic pin 40. In this invention, use is made of the normal conductivity of the human body. After the circuit has been completed, the current passing through the circuit is amplified to actuate the handpiece in a manner to be described hereinafter.

A particular safety feature of this invention is the use of nib 34 of ring 32. Thus, as seen in greater detail in FIG. 4, merely placing the index finger on the nib 34 will not complete the circuit since contact with metallic pin 40 is not effected automatically. Therefore, it is necessary to actually press the tip of the finger against nib 34 to force a small portion 90 into opening 36. This in turn completes contact of the index finger with pin 40 and its associated flange 42, thereby completing the circuit since the flange is in electrical and physical contact with collar 30. Having the pin 40 recessed within a non-conductive nib insures that the dentist cannot actuate the handpiece inadvertently, thereby causing possible severe damage within the mouth of a patient. The handpiece can only be actuated by the positive intentional act of the dentist in forcing his finger into opening 36.

Another feature of this invention is the fact that ring 32 is freely rotatable on collar 30, while retaining its conductive function, since flange 42 is always in contact with the collar. Thus, as seen in FIG. 3, the ring can be rotated a full 360° as shown by the arrows 91. Another alternate position of nib 34 is shown in phantom at 34'. Regardless of the position of the ring and its nib, the circuit can be completed in any position of the nib and ring. Thus, when a dentist is working in the rear of a patient's mouth it may be necessary to hold the handpiece in a different angle from that shown in FIG. 1. However, since the ring 32 can be rotated to any position while retaining its function, the handpiece can be comfortably held by the dentist regardless of the position of the mouth that is being worked on.

Another feature of this invention is the fact that switching means in the handpiece will not add significantly to the size of the handpiece. Thus, a handpiece embodying this invention will not be significantly larger than the conventional handpiece without the finger control switching means.

Another safety feature of this invention is the provision of groove 52 in non-conductive sleeve 44 (FIGS. 1 and 2). As is apparent, the purpose of sleeve 44 is to insulate the contact formed by sleeve 54 from the contact formed by collar 30 and pin 40. When using the finger control of this invention with an air driven dental drill, in most instances, a water spray will also be used for the purpose of lubrication and the dissipation of any heat formed. When using the water spray water will, on many occasions, run down the handpiece. If the amount of water is substantial, there is the possibility that a film of water will be formed between the contact at 30 and 40 and the contact at 54 thereby completing the circuit because of the conductivity of water. In this case, the drill would be inadvertently actuated. Therefore, in order to prevent the continuous film from forming, groove 52 is placed in sleeve 44. Thus, any water running down the handpiece will collect in the groove and fall off the handpiece before the film of water can reach conductive sleeve 54.

A modified form of one of the contacts is shown in FIG. 7. This embodiment is the same in substantially all respects as the previously described embodiment with the exception that pin 40 and its associated flange 42 are replaced by a metallic ball 92. Ball 92 can be of any electrically conductive material and it is preferably brass. In this embodiment, ring 32 and nib 34 are provided with a socket 94 for retaining the ball. Likewise, collar 30 is provided with a concave recess 96 for receiving the ball.

The embodiment of FIG. 7 functions in an identical manner to that of FIG. 1. Thus, in use, the index finger will be placed on nib 34 and pressed into opening 36 until contact is made with ball 92. The ring 32 is still freely rotatable around collar 30 and contact can be made in any position of the ring.

The electrical circuit for use with the finger control of this invention is generally shown at 100 in FIG. 8. The handpiece contacts are shown at 102. Collar 30 and pin 40 comprise one of the contacts and sleeve 54 the other.

The circuit includes a 110-volt source, generally shown at 104. A transformer 106 is used to isolate the remainder of the circuit from the voltage source. The transformer has a 1:1 ratio and is used solely for isolation purposes in order to prevent any shocks to the user of the handpiece.

The voltage across line 108 is divided at 112 into lines 114 and 116. Line 114 includes a 5 meg-ohm resistor and line 116 includes a 1 kilo-ohm resistor. A 270 micro-micro-farad capacitor 122 is connected to lines 114 and 116. Capacitor 122 is grounded as at 124. The purpose of the capacitor will be explained hereinafter.

Line 114 is connected to the control grid (position 4) of cold-cathode tube 126. A tube which has been found useful for this invention is RCA tube No. 5823. Line 114 terminates at one of the contacts of the handpiece and may be, for instance, wire 58.

The other wire 48 is shown schematically in FIG. 8 as line 128. Line 128 includes a 330 kilo-ohm resistor 130. Line 128 terminates at line 132.

Line 116 is connected to the cathode (position 7) of cold-cathode tube 126. Line 134 is connected to the anode (position 1) of cold-cathode tube 126. Line 134 includes 2 kilo-ohm relay 136, which is in turn connected to line 132. A 4 micro-farad capacitor 138 is connected in parallel with relay 136.

In use, the circuitry of this invention serves as both a switch and an amplifier. The cold-cathode tube 126 will be fired as soon as control grid (position 4) is made positive with respect to the cathode (position 7). This is accomplished by completing the circuit of the control grid. Thus, as soon as a dentist touches the contacts 102, current will flow through the circuit comprising lines 108, 114, 128 and 132. Since the resistance of the circuit is extremely high, the current passing through the dentist's finger will be infinitesimally small and there is no fear of shock to the dentist.

Once the control grid has the positive voltage impressed thereon, tube 126 will immediately fire. Since the control grid circuit has an extremely high impedance as compared to the cathode-anode circuit, i.e., lines 108, 116, 134 and 132, the current passing through the latter circuit will be much higher, as compared to the former. This current is sufficient to close relay 136, thereby closing air switch 140 and water switch 142, as will be explained hereinafter. This in turn will immediately actuate the rotation of the dental burr and the water spray in the handpiece. It is thus seen that the circuitry of his invention acts primarily as a switch, since the mere completing of the circuit by touching the contacts on the handpiece serves to start the operation of the handpiece. Likewise, by removing a finger from the contacts, the circuit is opened and the operation of the handpiece is immediately ceased. In this connection it should be pointed out that the starting and stopping of the handpiece are substantially instantaneous.

In a broad sense, the circuitry could also be referred to as an amplifier. This is because the primary circuit including the contacts will only have an extremely small amount of current passing therethrough in view of its high impedance. However, this small amount of current is amplified by tube 126 to provide a sufficiently large amount of current to close relay 136.

The purpose of capacitor 122 is to prevent accidental firing of the circuit by stray radio signals. The capacitor will short out any high frequency pick-ups through ground 124. The purpose of capacitor 138 is to prevent any vibration or chatter in relay 136. The use of capacitors 122 and 138 for their aforementioned purposes is common in the electronics art.

As pointed out above, the closing of relay 136 results in the closing of switches 140 and 142. The closing of switch 140 will in turn open air solenoid 144. This in turn will permit air entering tube 146 to pass through air filter 148 and onto the handpiece where it will eventually enter tube 78.

The closing of switch 142 will in turn open water solenoid 150. This will in turn permit water entering tube 152 to pass through water regulator 154, needle valve 156 and into the handpiece where it will eventually enter water tube 76. The various controls for the water are well known in the art and form no part of this invention. A manually operable switch 158 can be placed in line 160 containing solenoid 150 in order to give a dentist a choice of dry or wet cutting. Thus, when switch 158 is opened, no water will pass to the handpiece regardless of the position of relay 136. A suitable voltage source 161 is impressed across the water and air lines for operating the water and air solenoids.

In FIG. 9 there is shown an alternate embodiment of this invention in which the finger control circuit is tied in with a foot actuated control. The finger control circuit and its use are substantially identical to that of FIG. 8. In FIG. 9, however, the water supply and air supply are shown at 162 and 164, respectively. Additionally, a manually operated air regulator 166 and a gage 168 have been placed in the air line 146. The purpose of the air regulator is to control the amount of air reaching the handpiece, thereby controlling the speed of rotation of the dental burr. It is to be understood, of course, that a similar air regulator can be placed in the air line shown in FIG. 8.

In using the circuitry of FIG. 9, the operation is identical to that of the circuitry of FIG. 8. Thus, whenever a dentist places his hand across contacts 102 of the handpiece, the handpiece will be operated as previously described. However, in the embodiment of FIG. 9, it is possible for a dentist to use a foot control generally shown at 170 in place of the finger control. In this connection, it should be noted, as explained hereinafter, that the foot control will automatically disengage the finger control whenever it is engaged.

Foot control 170 includes a spring loaded cam, and to this extent, it is similar to any other conventional foot control presently used in the dentistry art. However, functionally, it is different from conventional foot controls. Thus, it is seen that one line 172 carrying the incoming current is connected to a switch 174. Switch 174 is normally closed and thus the current will pass through line 176 to transformer 106 thereby giving the same effect as the circuitry of FIG. 8. However, when foot control 170 is rotated clockwise, cam surface 178 will mechanically open switch 174 thereby disengaging the finger control circuit. With the finger control circuit thus disengaged, relay 136 can no longer serve to actuate water solenoid 150 and air solenoid 144. The air will then be controlled by mechanical air regulator 180. This is a plunger type air regulator and is common in the art. Thus, air will enter tube 182 and pass through air regulator 180. The more foot control 170 is rotated clockwise, the more the plunger of the air regulator will be depressed by cam

surface 184 of the foot control. In this manner, the amount of air reaching the handpiece is controlled by the amount of rotation of the foot control. Thus, a dentist can automatically regulate the speed of rotation of the dental burr whereas this was not possible with the finger control. As previously pointed out, the only way the speed could be regulated using the finger control was by the manual regulator 166.

When the foot control is rotated clockwise, the dentist will have dry cutting of the teeth since the water solenoid will remain closed, in view of the fact that the finger control circuit will be disengaged. However, by rotating foot control 170 in a counterclockwise direction, wet cutting of the teeth can be accomplished. Thus, it is seen that by counterclockwise rotation, cam surface 186 will open switch 174, thereby disengaging the finger control. Likewise, cam surface 184 will again regulate the amount of air passing through the handpiece. However, during counterclockwise rotation, cam surface 184 will mechanically close switch 190. Switch 190 is in line 192 which is in parallel with line 160 controlling water solenoid 150. Thus, with switch 190 closed, the circuit formed by line 192 is completed and water solenoid 150 will be opened thereby providing water for a water spray.

It should also be noted that switches 174 and 190 are spring loaded. Thus, when foot control 170 is spring returned to the position shown in FIG. 9, the switches will likewise be returned to the positions shown. In this manner a dentist can easily switch from using the finger control to the foot control without the necessity of making any hand adjustments.

It should also be noted that when foot control 170 is rotated clockwise, surface 194 will remain out of contact with switch 190 during the entire rotation. Thus, there is no possibility of accidentally getting a water spray when none is desired.

This invention has been described as showing a particular switching circuit in connection with the finger control. However, it is to be understood that there are innumerable other circuits known in the electronics art which could be used with equal effectiveness.

This invention has also been described as being used on an air driven dental handpiece. However, the teachings of this invention can be used with respect to any other type of dental handpiece.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed as the invention is:

1. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said first and second electrical means adapted to be electrically connected by electrical contact with the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means.

2. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said first and second electrical means adapted to be electrically connected by the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means, said first electrical means comprising a conductive band in said handpiece,

with insulating means surrounding said band, said insulating means having means therein for forming electrical contact between the hand of the user and said band.

3. The handpiece of claim 2 wherein said band is circular and surrounds said handpiece, said insulating means is circular and is rotatable around said band, said insulating means having an opening formed therein, said opening having electrically conducting means therein in contact with said band, said contact means forming the electrical connection with the hand of said user.

4. The handpiece of claim 3 wherein a nib on said insulating means contains said opening, said contact means being within said nib and spaced below the top thereof.

5. The handpiece of claim 3 wherein said contact means comprises a pin having a flange at the bottom thereof, said flange having an arcuate surface for sliding contact with said band.

6. The handpiece of claim 3 wherein said contact means comprises a metallic ball, said ball being received in a concave groove within said band.

7. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said first and second electrical means adapted to be electrically connected by the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means, said second electrical means comprising an electrically conductive sleeve on the surface of said handpiece.

8. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said first and second electrical means adapted to be electrically connected by the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means, said first electrical means comprising an electrically conductive band on the forward portion of said handpiece, and said second electrical means comprising an electrically conductive sleeve which is spaced from said band by a sleeve of non-conductive material.

9. The handpiece of claim 8 and further including water spray means therein, said non-conductive sleeve having an annular groove formed therein to serve as a trap for any water which may pass along the handpiece, thereby preventing inadvertent electrical connection between said first and second electrical means.

10. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said switch means comprising a cold-cathode tube with a relay controlled by said tube, said first and second electrical means adapted to be electrically connected by the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means.

11. The handpiece of claim 10 and further including a water supply tube therein and an air supply tube therein, said relay serving to actuate the supply of air and water to said tubes.

12. In combination, a dental handpiece and control means therefor, said dental handpiece comprising a housing and rotatable chuck means within said housing, said

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control means comprising a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means being adapted to start and stop the rotation of said chuck means, said first and second electrical means adapted to be electrically connected by a hand of the user of the handpiece thereby closing said switch means and starting the rotation of said chuck means, and foot control means for starting the rotation of said chuck means.

13. The invention of claim 12 wherein said foot control means comprises a plate having at least one cam surface thereon whereby rotation of said plate in one direction will actuate water spray means in said handpiece and rotation in the opposite direction will not actuate said water spray means.

14. The invention of claim 12 wherein said foot control means contains means for disengaging said switch means.

15. The invention of claim 14 wherein said foot control means will actuate said chuck means simultaneously with disengaging said switch means.

16. The invention of claim 15 wherein said chuck means is air driven and said handpiece includes an air conduit, said foot control means including valve means which are operable by said foot control means whereby the speed of rotation of said chuck can be controlled by the foot of a user.

17. A dental handpiece comprising a housing and rotatable chuck means within said housing, said housing including a tube of electrical insulating material, first contact means and second contact means on said tube, said first and second contact means being electrically isolated, said contact means being electrically connected to switch means, said switch means adapted to start and stop the rotation of said chuck means, said first and second contact means adapted to be electrically connected by electrical contact with the hand of the user of the handpiece, thereby closing said switch means and starting the rotation of said chuck means.

18. A dental handpiece comprising a housing, rotatable

chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, completely rotatable actuating means on said housing, said actuating means adapted to electrically connect said first and second electrical means when actuated by the hand of the user of the handpiece when the handpiece is held in an operative position, thereby closing said switch means and starting the rotation of said chuck means whereby starting of the rotation of said chuck means can be accomplished by the hand of the user at any position to which said actuating means is rotated.

19. A dental handpiece comprising a housing, rotatable chuck means within said housing, a first electrical means associated with said housing, a second electrical means associated with said housing, said first and second electrical means being electrically isolated, said electrical means being electrically connected to switch means, said switch means adapted to stop and start the rotation of said chuck means, said first electrical means including a conductive band which passes around said handpiece, said first and second electrical means adapted to be connected by the hand of the user of the handpiece when the handpiece is held in an operative position, whereby actuation can be accomplished by the hand of the user of the handpiece at any point on the circumference of said handpiece in the area of said conductive band, thereby closing said switch means and starting the rotation of said chuck means.

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