United States Patent

Drapen et al.

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[54] POLISHING DEVICE

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[51] **Int. Cl.** **A61c 3/06**, A46b 13/02

[58] **Field of Search** ..... 15/23, 24, 28, 29, 3.53, 97; 310/50, 68 B; 32/26, 59

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[57] **ABSTRACT**

This invention relates to a polishing device comprising a casing, an electric motor within the casing and movable relative to the walls of the casing. The motor is biased by a spring to move in one direction. A switch, electrically connected to the motor, controls the flow of current thereto. The switch is provided with an actuating, spring-pressed button positioned in the path of movement of the motor. The shaft of the motor extends beyond the casing and carries a polishing element at its outer end. Pressure of the polishing element against the surface to be polished causes the motor to move against the force of the biasing spring and against the spring-pressed button to move the button to close the switch to energize the motor. When the pressure of the polishing element on the surface is relieved, the spring will move the motor away from the button and deenergize the motor to stop the rotation of the element. The type of motor and the voltage of the current supplied thereto are such that the motor will stall if the pressure on the polishing element exceeds a predetermined maximum pressure.

3 Claims, 5 Drawing Figures

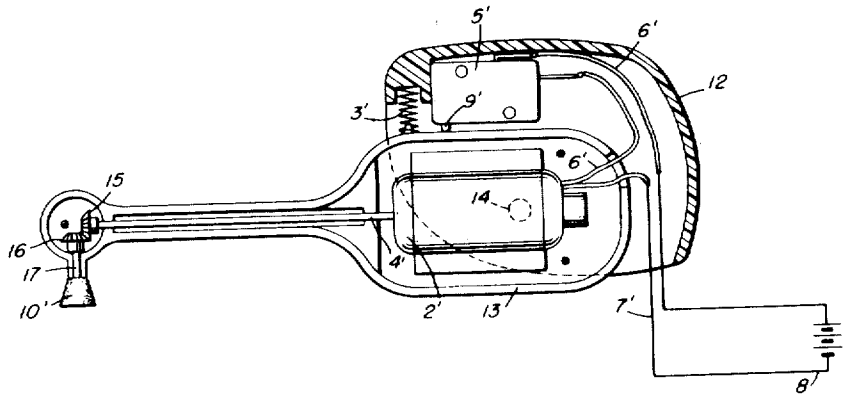


FIG. 1

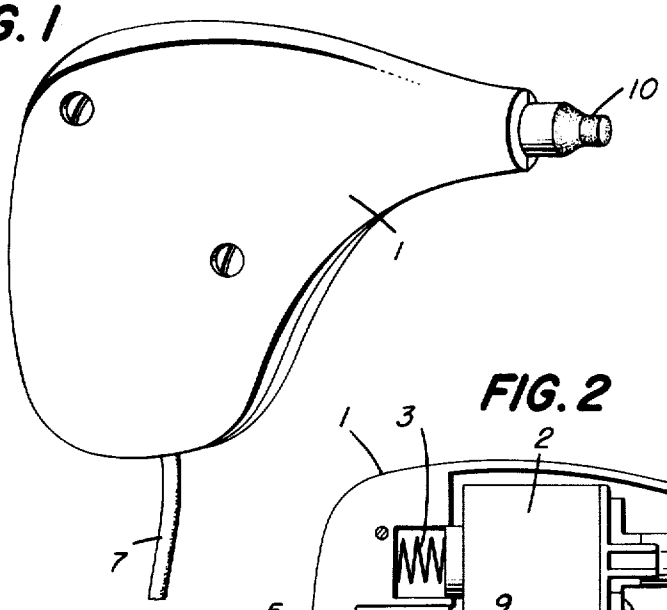


FIG. 2

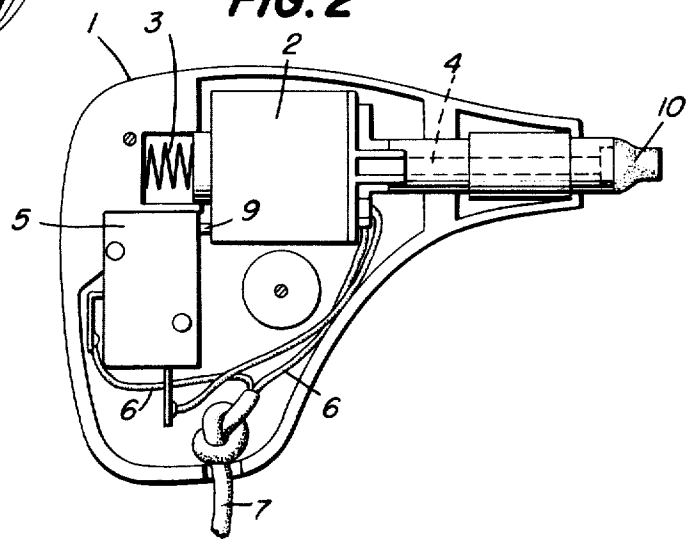
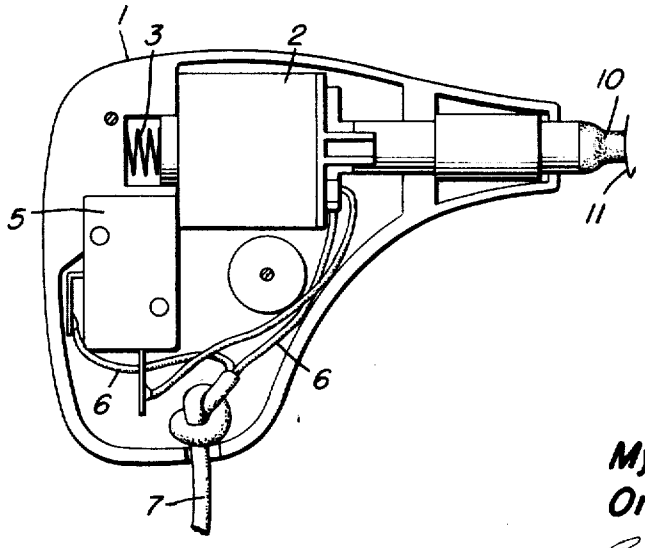


FIG. 3



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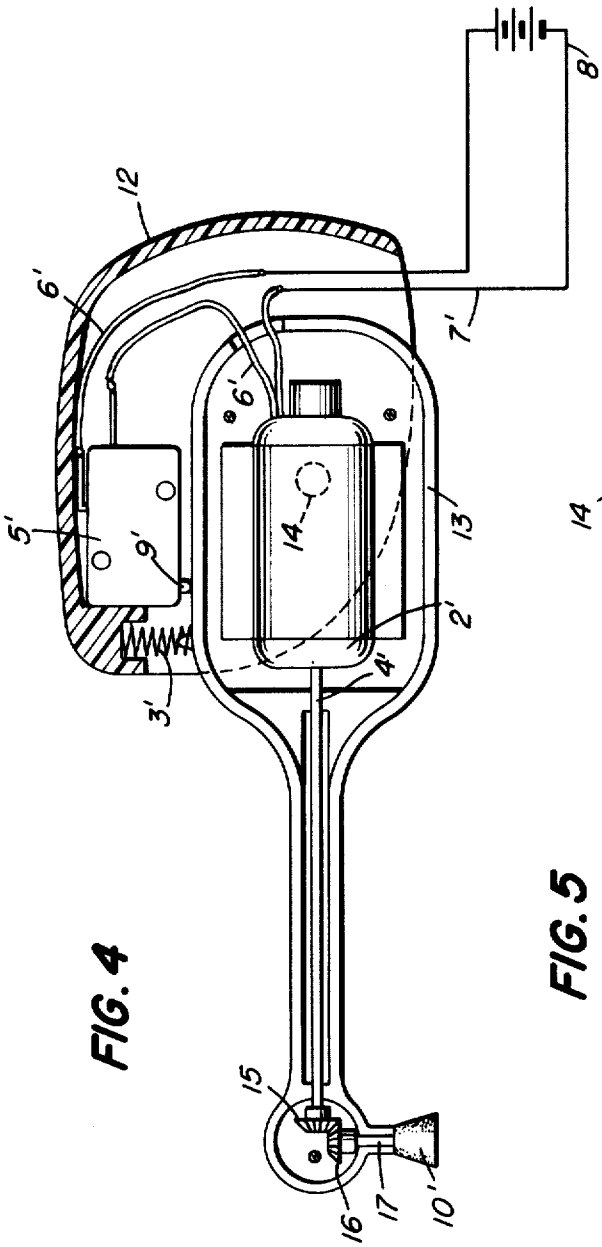


FIG. 4

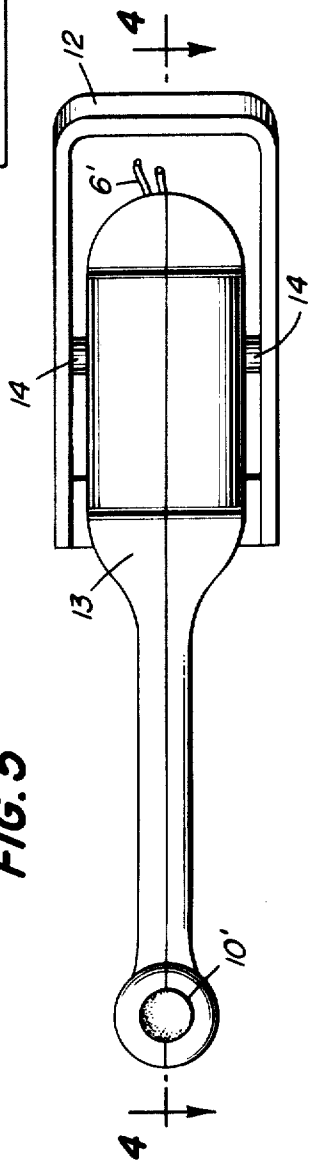


FIG. 5

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POLISHING DEVICE

This invention relates to a portable polishing device for polishing teeth or other surfaces which are sensitive to heat to produce a minimum amount of heat and a minimum amount of abrasion on said surfaces during the polishing operation.

Dental practitioners recommend that a patient visit his dentist twice a year to have his or her teeth cleaned and polished. However, stains or blemishes do form on the teeth, between visits to the dentist, which stains or blemishes cannot be removed by the ordinary tooth brush. While these stains or blemishes may not be injurious to the teeth, they are unsightly and are a source of annoyance to persons who like to have their teeth free of stains and blemishes at all times.

Unduly high temperatures and undue abrasion of the enamel of the teeth will cause injury to the teeth. Dental practitioners take precautions, when polishing a patient's teeth, to prevent an undesirable rise in temperature and undue abrasion of the enamel of the teeth due to the friction between the teeth and polishing tool. The ordinary layman, however, is unaware of the precautions necessary to prevent injury to the teeth and it is impractical, if not dangerous for the ordinary layman to undertake the polishing of his own teeth with any of the devices now known and used by dental practitioners. It is also impractical and costly for the patient to visit his dentist every time a stain or blemish appears on one or more of his teeth. The polishing element ordinarily used by dental practitioners is a rubber cup. A special type of brush may also sometimes be used.

It is an object of this invention to provide a portable and inexpensive device for the polishing of teeth or other heat sensitive surfaces which can be safely used in the home by an ordinary layman without injury to the teeth or other surfaces.

It is a further object of this invention to provide a polishing device having a rotating polishing tool, the rotation of which is initiated by contact of the tool with a tooth or other surface to be polished.

It is a still further object of this invention to provide a polishing device having a rotating polishing tool the rotation of which is initiated by pressing the tool against a tooth or other surface with a predetermined pressure and the rotation of which tool is abruptly stopped automatically should said predetermined pressure be exceeded.

Other objects and advantages of this invention will become apparent to those skilled in the art from the following detailed description thereof when taken in conjunction with the accompanying drawing illustrating the preferred embodiments of the invention. In the drawing,

FIG. 1 is a perspective view of the assembled device of this invention.

FIG. 2 is a perspective view of the device with one part of the two part casing removed to show the position of the various parts inclosed in the casing and showing the motor and switch button in their inoperative positions.

FIG. 3 is a view similar to FIG. 2, showing the motor and switch button in their operative positions.

FIG. 4 is a perspective, view partly in section, of a modified form of the invention taken on line 4—4 FIG. 5, with one part of the two part second casing removed.

FIG. 5 is a side elevation of the device shown in FIG. 4.

Referring to FIGS. 1, 2 and 3, there is shown a casing 1 formed in two separable parts. The casing 1 houses movable motor 2, biasing spring 3 for biasing the motor in one direction, motor shaft 4, switch 5 and electrical wires 6 for supplying electric current to motor 2 and switch 5. Electric current is conducted to the wires 6 by means of an electric cord 7 connected to any desired source of electrical energy such, for example, as a battery 8, shown in FIG. 4.

The switch 5 is of well known construction and may be purchased in the open market. The switch 5 is closed to energize the motor 2 and opened to deenergize the motor by means of a spring-pressed button 9 which projects to the outside of the switch casing and is positioned in the path of movement of motor 2. The motor 2 is mounted for limited straight line movement between the walls of casing 1, the movement

being of sufficient extent to actuate the button 9 to close the switch 5. The switch 5 is opened by a spring (not shown) within the switch casing acting on button 9 to move the button to open the switch when the motor 2 is moved away from the button by spring 3. The motor 2 is moved toward button 9 to press the button inwardly to close switch 5 to energize the motor by pressing the polishing tool 10, which may be the usual rubber cup or brush mounted on the outer end of shaft 4 against the surface 11 to be polished, thereby compressing spring 3. Movement of the polishing tool 10 away from surface 11 causes spring 3 to move the motor away from button 9 thereby enabling the spring (not shown) within the switch casing to move button 9 to open the switch and to deenergize the motor 2.

In order for the polishing device to function properly in the hands of an unskilled person, it is necessary to predetermine and limit the maximum pressure which the polishing tool will exert on the tooth or other surface during its rotation and to predetermine the speed of rotation, in order to minimize the amount of heat generated by the friction between the tool 10 and the surface 11. According to this invention, the said pressure and speed of rotation are limited by the type of motor used to rotate the polishing tool and the voltage of the electric current supplied to the motor in conjunction with the switch actuating procedure previously described.

Applicants have found that the desired limitation on the pressure and speed of rotation of the polishing tool may best be obtained by using a direct current, permanent magnet motor. The voltage of the electric current supplied to the motor may vary within certain limits depending upon the sensitivity of the surface to be polished. For the polishing of teeth, applicants have found that a direct current of low voltage, such as 6 volts for example, is eminently suitable. The power source to which the cord 7 may be connected to supply current to motor 2 may be a 6-volt battery. The battery may be of either the rechargeable or non-rechargeable type.

It may be more desirable or convenient to utilize the househOld electrical outlet as the power source. In such a case a transformer should be provided for stepping down the household current (usually 110 volts A.C.) to 6 volts, for example, and a rectifier for converting A.C. to D.C.

From the foregoing description it appears clear that the polishing tool can begin to rotate only after it has contacted the tooth with sufficient pressure to move the motor against the force of spring 3 and to move button 9 to close the switch. That is, the motor begins to operate under load. The tool cannot rotate when free of pressure, that is, the motor cannot operate at a no load, high speed setting. The speed of rotation of the polishing tool, therefore, cannot exceed the proper speed of operation. Also, if the tool were engaged with the surface to be polished after rotation of the tool had begun, the speed of rotation of the tool would obviously be higher before the engagement than after the engagement and undesirable heat would be generated due to the slowing down of the motor through the high speed range to the proper operating speed. A major advantage of this invention is that since the rotation of the tool can begin only after engagement thereof with the surface to be polished, not before, the speed of rotation of the tool is the proper speed from the beginning of the engagement to the end of the engagement and the generation of heat due to a slowing down of the motor does not take place.

Should the pressure of the polishing tool against the surface to be polished rise above a predetermined maximum pressure, the motor will stall and the rotation of the tool will stop abruptly. No manual switch is used to either start or stop the rotation of the polishing tool. Obviously the spring 3 is of such strength as to permit operation of the motor at a pressure lower than said predetermined pressure.

In operation, a polishing tool, such as the usual rubber cup used by dental practitioners for polishing teeth, is placed on the end of shaft 4 outside the casing. A polishing compound, such as ordinary tooth paste or a compound especially prepared for polishing teeth, is placed on the cup and the cup

with the compound is pressed against the teeth with sufficient pressure to cause the motor **2** to move against the button **9** and press the button to close the switch **5** to energize the motor and cause the cup to rotate and polish the teeth. The speed and pressure of the cup against the teeth cannot exceed the proper predetermined limits of speed and pressure since, as indicated above, these are built into the device and are not controlled by the operator. Injury to the teeth and gums will not, therefore, result.

It is sometimes more convenient to have the polishing tool at an angle to the motor shaft when polishing the teeth, as when it is desired to polish the back of the teeth. FIGS. **4** and **5** show such a modification.

In FIGS. **4** and **5**, **12** is a cup-shaped outer casing carrying a spring **3'** and a switch **5'** similar to the spring **3** and switch **5** shown in FIGS. **2** and **3**. A second casing **13** made in two separable parts is pivoted at **14** within casing **12**. The casing **13** houses the motor **2'** and shaft **4'** similar to motor **2** and shaft **4** of FIGS. **2** and **3**. The motor **2'** and shaft **4'** are rigidly secured within casing **13** to pivot therewith and the casing **13** may, therefore, be considered as part of the motor.

The outer end of shaft **4'** carries a bevel gear **15** which meshes with a bevel gear **16** mounted on a shaft **17** extending through casing **13** at right angles to shaft **4'**. The shaft **17** carries rubber cup **10'**.

Pressing the rubber cup against the teeth will cause pivotal movement of the casing **13** together with motor **2'** on pivot **14** thereby compressing spring **3'** and actuating button **9'** to close switch **5'** and supply electric current from battery **8**, or other source, through electric cord **7'** and wires **6'** to the switch and motor to energize the motor to rotate the cup **10'**.

The operation of the modification shown in FIGS. **4** and **5** is similar to that described in connection with FIGS. **1** to **3**; the main difference between the two modifications being the positioning of the polishing tool or element at an angle to the motor shaft and the pivotal movement of the motor for actuating the switch in FIGS. **4** and **5**.

While the polishing device of this invention has been described above as applicable primarily to the polishing of teeth, the device and principles embodied therein may be put to other uses such as for example the polishing of other heat sensitive surfaces such as optical lenses.

Applicant's invention is not limited by the specific structure described above, but includes all modifications which fall within the scope of the appended claims.

We claim:

1. A device of the class described comprising a shaft having a free end, an electric motor for rotating said shaft, a casing for housing said electric motor, said motor including a second casing pivotally mounted in the first-mentioned casing, said shaft extending beyond the first-mentioned casing, a polishing tool outside of the first mentioned casing and rotated by said shaft, a spring urging said motor to move in one direction, said motor being moved in the opposite direction by exerting pressure against the tool, means forming a switch positioned in the path of movement of the motor, and an electrical connection between the switch and the motor.

2. A device as recited in claim **1** wherein a second shaft is positioned at an angle to the first mentioned shaft, gearing is provided for connecting the two shafts, and the polishing tool is mounted on the second shaft.

3. A device as recited in claim **2** wherein the second casing extends beyond the first mentioned casing and encloses the first mentioned shaft and the gearing.

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