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TOOTH BRUSH ACTUATING MECHANISM

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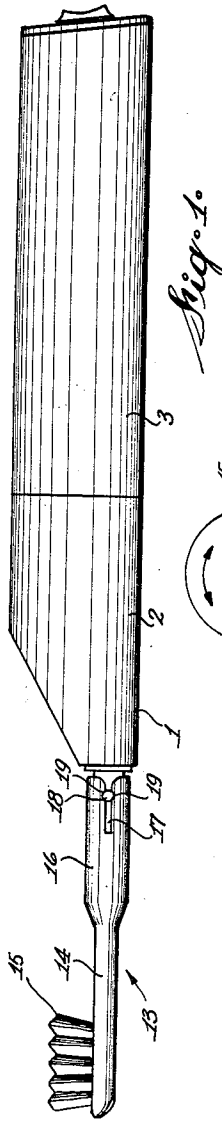


Fig. 1.

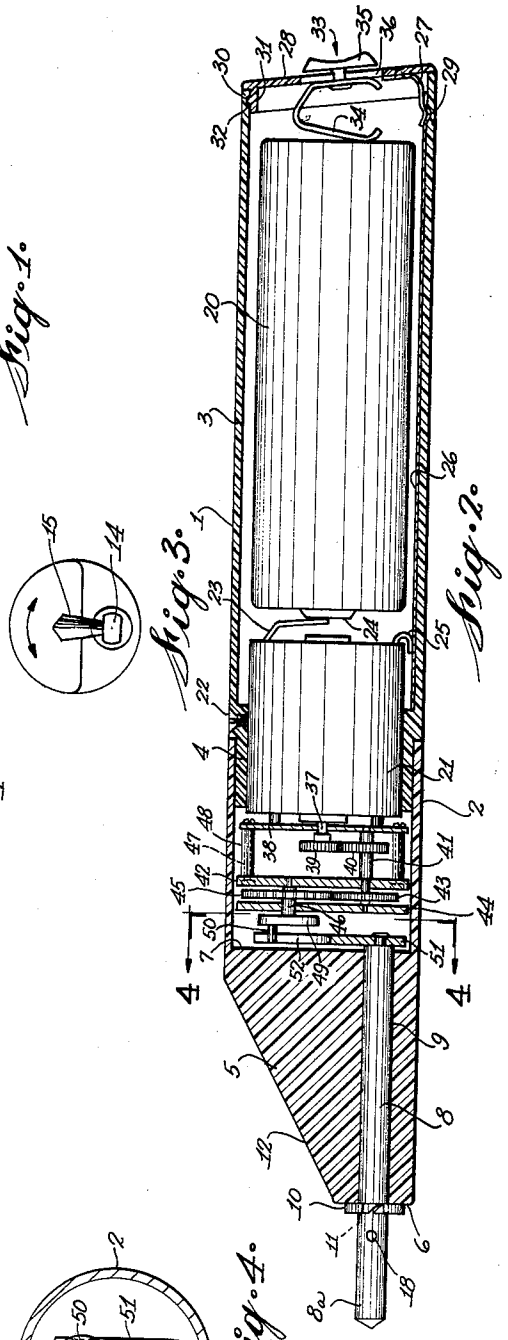


Fig. 2.

Fig. 3.

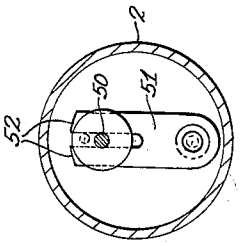


Fig. 4.

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TOOTH BRUSH ACTUATING MECHANISM

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1 Claim. (Cl. 15—22)

This invention relates to oscillatory tooth brushes and more particularly to mechanism for imparting oscillatory motion to tooth brushes.

It has frequently been proposed in the past to provide a tooth brush structure having mechanical means for imparting vibratory or like motion to the brush thereby to effect an improved cleaning action of the brush. However, none of such prior structures have as yet gone into widespread use, probably due to the fact that it is difficult to provide a simple, inexpensive, and operatively satisfactory structure.

It is desirable that the motion of the brush itself be oscillatory rather than rotary in order to achieve proper cleaning action. Thus, it is important that the brush, when applied to the teeth, having a reciprocating or oscillating vertical motion, that is, perpendicular to the jaws, whereby removal of food particles which lodge in the interstices between the teeth may be removed.

The use of a toothbrush involves the employment of a substantial amount of water in direct contact with the brush and related parts. This constitutes a considerable hazard if the source of power of the motion imparting means is the usual domestic electrical power supply.

An object of the present invention is to provide a simple, effective mechanism for imparting oscillatory motion to a tooth brush.

Another object is to provide a self-contained tooth brush structure having a source of electrical power of low voltage whereby hazards of operation are substantially eliminated.

Another object is to provide a tooth brush structure having motion transmitting means which are substantially completely sealed within a casing for effective protection.

The invention will be described with reference to the accompanying drawing, in which

FIGURE 1 is a side elevation of a tooth brush structure in accordance with the invention,

FIGURE 2 is a sectional side elevation,

FIGURE 3 is an end view, and

FIGURE 4 is a section on line 4—4 of FIGURE 2.

In the drawing, 1 is a hollow housing comprising a forward part 2 and a rearward part 3, the latter having a radially inset edge portion 4 for frictional engagement with the edge portion of part 2. The housing may be of any desired shape in cross section but should be of a size and configuration for comfortable holding in the hand of the user. As shown, the housing is generally cylindrical in shape. It may be made of any suitable material such as molded plastic composition. Preferably, its external diameter does not substantially exceed one inch since the housing constitutes a handle for the device.

The front end portion of part 2 is formed as a shaft bearing block 5 having an exterior end surface 6 and an interior end surface 7. The thickness of the block 5 between surfaces 6 and 7 is substantially greater than that of the remaining housing wall to provide adequate bearing support for a driving shaft 8 rotatably mounted in a drilled hole 9 extending through the block from surface 6 to surface 7. Normally, the said thickness of the block will be at least one-half inch.

The shaft 8 is disposed in parallel, offset relation to the longitudinal axis of the housing and is located in close proximity to the adjacent opposed exterior surface of the

housing. The shaft has a section 8*a* projecting exteriorly of the housing and is held in place by means of a split spring ring 10 or the like which seats in an annular groove 11 in the shaft and engages the end surface 6 of the housing.

The exterior portion of the block 5 in remote opposed relation to the shaft may be cut away as indicated by the inclined surface 12 to reduce unnecessary bulk.

A tooth brush proper is indicated at 13 and comprises a shank 14 having bristles 15 mounted in one end in generally conventional manner and a socket portion 16 at the other end. The brush is adapted to be mounted on the projecting shaft section 8*a* by fitting the socket portion 16 over such section as shown in FIGURE 1. The brush is releasably retained thereon in any suitable manner as by means of a slot 17 in the socket portion 16 which is adapted to receive a pin 18 on the shaft. The edge of the slot is provided with opposed notches 19 into which the pin is adapted to fit. It will be apparent that the diameter of the pin 18 is slightly greater than the width of the slot and that the material of the socket portion has sufficient resiliency to permit passage of the pin through the slot and to releasably retain the pin in the notches 19. The arrangement described makes it possible to provide a set of individual brushes for selective and convenient association with the device.

Means for imparting oscillatory motion to the brush comprises a source of electrical power, preferably a battery 20. The battery is of low voltage, say, 3 to 6 volts, whereby the device is completely safe for use. Moreover, use of a self contained power supply makes the device fully portable and renders it immediately available for use at all times and regardless of the presence of a separate supply of electrical power.

An electric motor 21 is arranged to be driven by the battery 20. As shown, the motor and battery are housed within rearward part 3 of the housing in axially aligned relation. The motor may be located in desired position by means of a set screw 22. The motor has a contact member 23 engaging the positive terminal 24 of the battery and a contact member 25 engaging one end of a conductor strip 26 fixed to the interior wall of the housing. The other end of strip 26 is engageable by a contact spring 27 carried by an end closure cap 28 for the housing. The cap may be removably held in place by means of a notch 29 in the strip 26 and into which the spring 27 fits and a protuberance 30 on a tongue 31 carried by the cap, such protuberance fitting into a complementary recess 32 in the housing wall.

A switch 33 is mounted on the cap 28 and springs a spring contact member 34 engaging the negative terminal of battery 20 and carried by a switch button 35 which is slidably mounted in a slot 36 in the cap. It will be apparent that the switch button may be moved as desired to place the contact member 34 into and out of engagement with contact spring 27 to start and stop the motor as desired.

The shaft 37 driven by the motor is disposed substantially axially with respect to the housing and extends through a support or frame plate or disc 38 fixed to the motor.

A speed-reducing gear train comprises a gear 39 fixed to shaft 37, a gear 40 fixed to a stub shaft 41 journalled in plate 38 and a frame plate 42, a gear 43 fixed to stub shaft 41 and located between plate 42 and a third frame plate 44, and a gear 45 fixed to a second stub shaft 46 journalled in plates 42 and 44, plates 42 and 44 being fixed to plate 38 as by means of pins 47 and spacers 48.

A crank 49 is fixed to shaft 46 between plate 44 and surface 7 of the block 5 and carries a crank pin 50. A yoke or lever 51 is fixed to the end of shaft 8 and the

forked arms 52 of yoke 51 receive the crank pin therebetween.

It will be apparent that rotation of the motor shaft 37 will cause reduced speed rotation of the crank through the gear train and revolution of the crank pin 50 which in turn will cause to and fro oscillation of the yoke 51, brush shaft 8 and consequently a brush attached thereto.

The angle of the reciprocating or oscillating motion of the yoke will be determined by appropriate spacing of the crank pin from the axis of the crank. In the embodiment shown, this angle is approximately 30°. While any desired speed of reciprocation may be chosen, 15 times per second is satisfactory.

A tooth brush structure as described will permit children, who usually have difficulty in correctly cleaning their teeth, to clean all teeth and intervening interstices in a complete, satisfactory and non-injurious manner, merely by moving the brush in the mouth from one end of the jaws to the other. Moreover, adults will also achieve improved cleaning in a rapid manner with little effort. Since the oscillating speed need not exceed 15 movements per second, the bristles will not damage the gums and the brushes employed, although of small size, may be similar to those used by hand.

An example of a suitable brush is one having bristles of a height of about 11 mm. and a diameter of about 0.25 mm. Such a length of bristle makes them sufficiently flexible to avoid gum damage. Furthermore, a small angle of oscillation of, say, 30°, and the number of 15 oscillations per second ensure that no part of the mouth is injured; on the contrary, the mouth may be benefitted by the massage thus imparted.

Use of a low voltage battery, say 3 to 6 volts, makes the brush completely safe for use by children and adults and results in a fully portable instrument which may be used in areas where no external electrical supply is available. Such a battery is inexpensive and has a life of usually two to three months. The battery may be of the dry type or of the rechargeable accumulator type.

I claim:

In a self-contained, motor-driven, battery-powered tooth brush, a hollow tubular casing comprising first and second parts separably interfitting and connected at their contiguous inner ends, in axially aligned relation, said second part having a closed outer end, a cap removably secured to and closing the outer end of said first part, an

electric motor having a housing removably fitting within the inner end of said first part and axially spaced from said cap to define a battery compartment therebetween, a first shaft journaled in the closed outer end of said second casing part and having its outer end projecting therefrom, means carried by the outwardly-projecting end of said shaft to removably mount a tooth brush for oscillation as a unit therewith, a lever fixed with the inner end of said shaft within the compartment of said second part and having a slot radially of said shaft, a frame fixed with said motor housing and extending into said second casing part when said parts are in assembled relation, a reducing gear train journaled in said frame and including an input gear fixed with the armature shaft of said motor and an output member comprising a crank rotatable about an axis parallel with said first shaft and removably fitting the radial slot of said lever when said casing parts are in assembled relation, said crank being automatically withdrawn from said slot and said frame and gear train being exposed by and in response to axial separation of said casing parts, an insulated contact strip fixed with the interior wall of said first casing part and extending from said motor housing to said cap, first and second contacts fixed with said motor housing and in separable electrical contact with said strip and a battery within the compartment of said first part, respectively, a third contact fixed to said cap and in separable electrical contact with the contiguous end of said strip, a switch button movably mounted exteriorly of, and on said cap and a fourth contact adapted to make continuous electrical contact engagement with a battery in the compartment of said first part, and movable with said button from a first position out of contact with said third contact, to a second position engaging the same and thereby completing a circuit through the battery and said motor.

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