Feb. 9, 1943. J. GOLD 2,310,626

MOTOR DRIVEN TOOTHBRUSH

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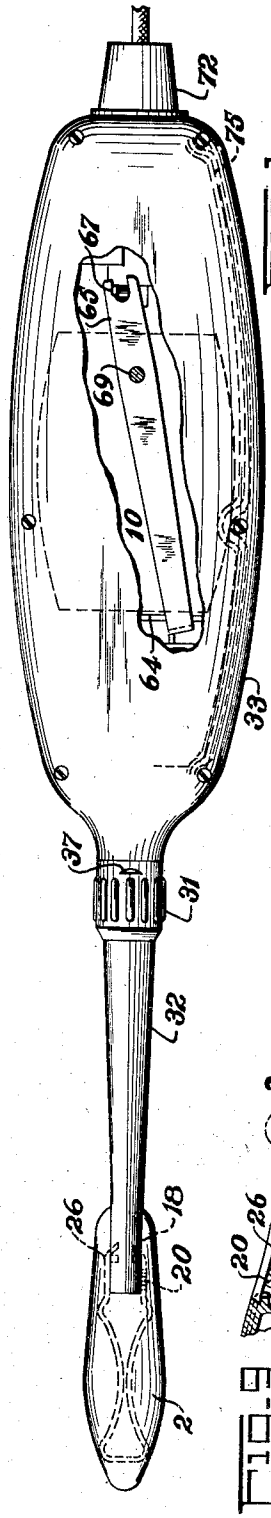


Fig. 1

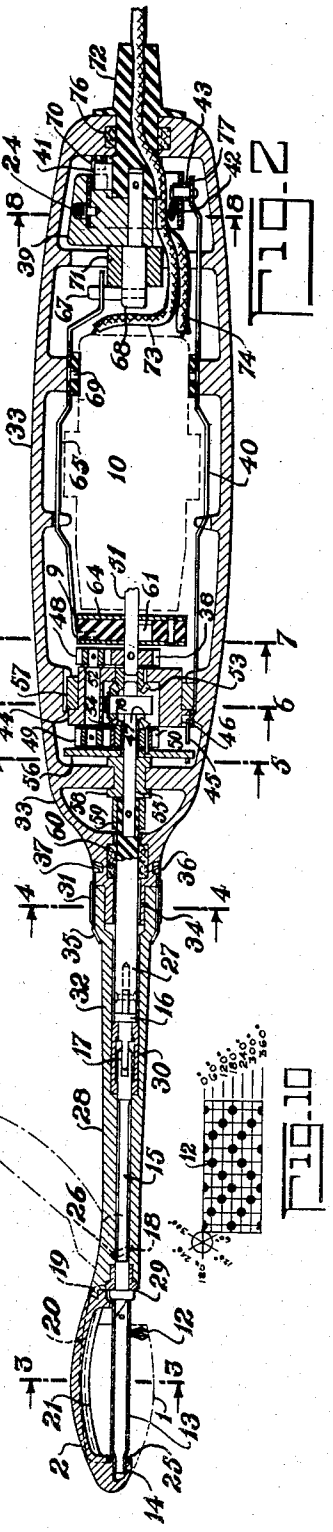


Fig. 2

Fig. 9

Fig. 10

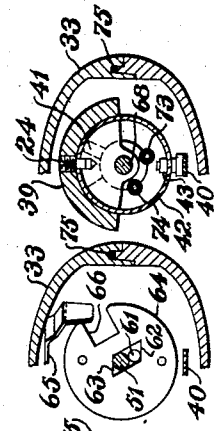


Fig. 8

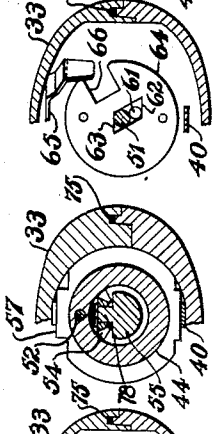


Fig. 7

Fig. 6

Fig. 5

Fig. 4

Fig. 3

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MOTOR DRIVEN TOOTHBRUSH

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Application April 3, 1940, Serial No. 327,605

2 Claims. (Cl. 15—23)

This invention relates to an improvement in motor driven tooth brushes and is a still further improvement over U. S. Patent 2,129,002 granted me on September 6, 1938.

One object of my invention is to furnish a small, portable, rotatable tooth brush of improved design for cleaning teeth, and to provide a mouth guard for such a brush to regulate the distribution of tooth paste over its surface during use and to protect the tissues of the mouth.

Another object is to relate the direction of rotation to the position in which the device is held and to provide for automatic reversal under certain conditions of use.

A still further object is to provide a device of this character with a removable brush unit that may be readily removed and a new one substituted in its stead, with improved means for holding the same in position.

Other objects will appear in the detailed description herein given.

Heretofore motor driven tooth brushes have found little favor with the public because their construction provides for one way rotation of the brush. Thus, while holding the brush in one position one tooth surface will be brushed in a direction away from the gums and another will be brushed toward the gums. Brushing toward the gums acts unfavorably upon them and tends to compact into crevices and gum margins the food particles that brushing is supposed to remove. While certain brushes with awkward changes of position enable control of the direction of brushing, none provides for a simple and semi-automatic control of direction.

Another object to existing rotating brushes is that they are not properly guarded and they tend to come into contact with other parts of the mouth. Many such brushes fail to evenly apply the tooth paste to the teeth and permit it to collect in one spot or throw most of it from the brush.

My improvement overcomes these objections and provides a compact, safe and convenient motor driven tooth brush whose construction promotes the proper method of brushing teeth, i. e., away from the gums.

My invention is illustrated in one form in the accompanying drawing in which:

Figure 1 is a plan view of my device with a section cut away from the upper surface of the body housing.

Figure 2 is a sectional view in elevation of the device.

Figure 3 is a section taken on line 3—3 of Figure 2.

Figure 4 is a section taken along line 4—4 of Figure 2.

Figure 5 is a section along line 5—5 of Figure 2, with a portion of the casing removed.

Figure 6 is a section along line 6—6 of Figure 2, with a portion of the casing removed.

Figure 7 is a section along line 7—7 of Figure 2, with a portion of the casing removed.

Figure 8 is a section along line 8—8 of Figure 2, with a portion of the casing removed.

Figure 9 is a portion of a longitudinal section illustrating the mouth guard rear connection.

Figure 10 is a plan view of the brush only.

Referring to the drawing in which similar numbers identify the same or similar parts thruout the several views, the construction is as follows:

Figure 1 shows the general appearance of the complete unit with body casing 33 having shank 32 extending therefrom. At the other end of shank 32 mouth guard 2 is removably attached. Wires 73 and 74 are the electric power lines entering casing 33 thru switch 72.

By reference to Figure 2 the relation between the various elements of my device is illustrated. Brush 1 is a specially constructed tooth brush mounted on, and permanently fixed to cylindrical core 13. Core 13 forms tip 14 at one extremity and shaft 15 at the other. When core 13 is held in place by mouth guard 2, shaft 15 engages with extension shaft 16 by means of tongue and groove connection 17. Removal of the brush unit is readily accomplished by liberating tip 14 and permitting shaft 15 to be disengaged from extension shaft 16.

Brush 1 (Fig. 10) is composed of bristles 12 set in spaced relationship in a plastic or other suitable material. These bristles are spaced to prevent continuous creeping by tooth paste when in use and to prevent the paste from working off the ends of the brush. The spacing I find most suitable provides for parallel zigzag rows of bristles, that is, an echelon formation of the bristles as shown.

Mouth guard 2, a boat shaped member having a spring 20 lying double along the length of its interior as shown in Fig. 1, is secured to shank case 28 by the turned out ends 26 of spring 20. These ends are seated and by action of spring 20 forced into angular slots 18 of the shank case (Fig. 1). The deformed portions of spring 20 (Fig. 9) by their inclination to contract draw guard 2 in abutment with the end of shank

case 28, and projecting lug 19 of the shank case at such juncture holds the guard in locked relationship thereto. Mouth guard 2 has two opposed spiral projections 21, (Figs. 3 and 2) extending the length of the internal surface of guard which contact brush 1 to remove excessive tooth paste as the brush passes first projection 21, storing it in its preceding cavity 22, the second cavity 23 returning tooth paste previously stored (Fig. 3). These two cavities 22 and 23 are alternately filled and emptied as the brush changes its direction of rotation. The tooth paste can be applied directly to brush 1 or, after raising mouth guard 2, by filling cavities 22 and 23. Mouth guard 2 is raised by pulling it out over tip 14 thereby stretching springs 20 which are shown in Figure 9, and in dotted outline in both Figures 1 and 2. The guard is then swung backwards to come to rest against shank 32 in the position outlined in broken lines in Figure 2. The mouth guard 2 is raised in the same manner to remove or insert the brush unit. The mouth guard is removed by drawing ends 26 of spring 20 toward each other, when the guard is in raised position, thus unseating them from angular slots 18 of shank case 28.

Mouth guard 2 is so shaped to prevent the brush from contacting cheeks or tongue and positioned to insure the reversal of body casing 33 when cleaning opposite sides of teeth. This reversal of body casing 33 operates an automatic reversing mechanism housed therein and later described. Spring 20 is integral with mouth guard 2 serving as a bearing 25 at tip 14 and as a clamping and holding means at its point of contact with shank 32. Its clamping pressure is obtained thru the two opposite flattened spring sections 20 folded as shown in Fig. 9, and its holding means with its two bent spring ends 26 entering angular slots 18 of shank 32. Electric power is turned off or disconnected before mouth guard 2 is removed.

The removable brush unit and guard permits not only easy replacement of a worn brush but permits each individual in a family to have a personal brush and mouth guard that can be used with a single driving unit.

To completely insulate the portions of the device that enter the mouth from the electrical parts, a non-conducting material is used for extension shaft 16 which connects shafts 15 with drive shaft 55, and a non-conducting shank case 28 is provided for shank 32.

Shank case 28 is fitted with internal bearings 29 and 30 in which shaft 15 and extension 16 rotate. Fastening ring 31 secures it to body casing 33. The shoulder of bearing 29 supports and locates shaft 15; bearing 30 holds ends of shaft 15 and extension shaft 16 at their junction in a fixed relation to each other.

Shank 32 is attached to body casing 33 thru a special male and female shape 34 that can be engaged only in one axial position, as or similar to the section in Fig. 4, and a locking ring 31 bearing on the tapered surface 35 of shank 32 and engaging spiral grooves 36 of the body casing 33 thru the integral lugs 37 of ring 31.

The automatic reversing mechanism consists of the driving gears in the forward compartment of body casing 33 driven by motor gear 38 attached to motor shaft 51, with a switch unit described later and eccentric weight 39 in the rear compartment of body casing 33 inter-connected thru sliding bar 40. If the tooth brush were to operate in a single direction of rotation the bristles 12 would force food or toth paste up into the gum margins on alternate sides of teeth. To prevent this reversing means are used. Eccentric weight 39 gives automatic reversing for brush 1, reversing on the four sides of either the upper or lower teeth. Manual switch 72 is operated when changing from upper to lower teeth, or vice versa, as special markings on body casing 33 can indicate by means of an arrow on switch 72 pointing to the words "Upper" or "Lower". The complete set of teeth requires only one manual switch operation during cleaning, all other operations of gearing being automatic.

Eccentric weight 39 (Figures 2 and 8), freely mounted on switch shaft 68, in rotating under the action of gravity is limited in its rotation when it falls against switch stop 41. Rotating with eccentric weight 39 is weight cam 42 which is partially inset therein and is attached thereto by screw 24. Roller 43, secured to slide 40 protrudes thru cam slot 77 of weight cam 42 as best seen in Figure 2. Rotation of weight cam draws slide 40 forward or rearward depending on the position of switch stop 41. The position of switch stop 41 is charged by means of switch 72 and the slide 40 moved accordingly when eccentric weight 39 rotates. Thus the setting of switch 72 will control the position of slide 40. The switch setting is held by snap spring 70 attached to the body casing 33. The switch shaft 68 is free to rotate in its supports which are bearing 71 and the body casing 33. Pinned to it is switch 72. Electric power wires 73 and 74 are brought thru switch 72 into body casing 33.

Motor shaft 51 and attached motor gear 38 rotate together in one direction at all times. The direction of rotation of drive shaft 55 depends upon the position of slide 40 which may hold stationary either gear arm 44 or plate 56.

Moving slide 40 rearward, that is toward switch 72, removes its bent section 45 from the path of circular notched plate 56 (Figure 5). While in the path of plate 56 bent section 45 is in the position shown in dotted outline in Figure 2. When moved rearward to clear plate 56, this bent section 45 enters recess 46 of gear arm 44 (Figures 2 and 5) and prevents it from rotating.

Gear arm 44 is a hollow cylinder with a shoulder on its exterior surface at one end, and is rotatable in bearing 57 (Figures 2 and 6). When gear arms 44 is held stationary, drive shaft 55 rotates in the same direction as motor shaft 51 such movement being transmitted thru motor gear 38, spur gear 48, shaft 52, spur gear 49, spur gear 50, bevel gear 47 and bevel gear 54. Spur gears 48 and 49 are pinned to shaft 52 which passes thru, and is rotatable within the wall of gear arm 44. Spur gear 50, bevel gear 47 and plate 56 are pinned together and freely rotatable as a unit about drive shaft 55. Thus when gear arm 44 is stationary it holds shaft 52 in a fixed position and the rotation of spur gear 48 is transmitted thru the steps previously enumerated, to bevel gear 47. This in turn rotates bevel gear 54 which is freely mounted on spur shaft 78 that projects at right angles from the longitudinal axis of drive shaft 55 at an enlarged portion thereof (Figures 2 and 6). If bevel gear 54 were not otherwise restrained it would freely move about spur shaft 78 and would not impart motion to drive shaft 55. However, it is in mesh with

bevel gear 53 which is pinned to gear arm 44, and the immobility of gear arm 44 forces bevel gear 54 not only to rotate about spur shaft 78 but to move around the longitudinal axis of drive shaft 55. Such additional rotation carries spur shaft 78 and drive shaft 55 with it and completes the transmission of power from motor shaft 51.

When slide 40 disengages gear arm 44 and acts as a stop for plate 56 the rotation of drive shaft 55 is reversed. Spur gear 50 and bevel gear 47 being locked against rotation requires that the part now free to move, namely gear arm 44, rotate in a direction opposite to that formerly taken by bevel gear 47. With gear arm 44 moves bevel gear 53 to which it is pinned, and bevel gear 53 rotates bevel gear 54 opposite to its previous direction. Bevel gear 54 being this time barred from merely freely rotating about spur shaft 78 by stationary bevel gear 47, causes drive shaft 55 to rotate in a reverse direction.

Bearings 57 and 58 keep the rotating parts in a fixed relation to motor gear 38 as well as serving as bearings.

Control ratchet 9 prevents motor shaft 51 from rotating in the opposite direction by the action of roller 61 which will lock shaft 51 between surfaces 62 and 63 (Figure 7). If the motor 10 stops in a non self starting position, ratchet body 64 is rotated thru the lever 65 pivoted at 69 and engaging slots 66 thru pin 67 on switch shaft 68.

By rotating switch 72 from one setting to another the ratchet body 64 is rotated thru the linkage described above, forcing roller 61 to grip motor shaft 51 until the motor starts. These elements are desired to insure the proper rotation of the motor 10.

Drive shaft 55 is connected to a non-conducting extension shaft 16 thru ring 59 and pin. This extension shaft passes thru a packing washer 60, which acts as a seal against water, and into shank 32 with a tongue and groove connection 17 with shaft 15 in bearing 30.

The motor 10 and principal elements are housed in a split non-conducting body casing 33 which is sealed against water by rubber gasket 75 and packing washers 60 and 76.

While the embodiment of my invention herein described is a preferred form, it is evident that many modifications may be made in the structure without departing from the scope of my invention and I do not limit myself to the form shown.

What I claim is:

1. In a motor driven tooth brush, a motor, a rotatable brush, a body casing, a shank extending therefrom, a mouth guard forming a continuation of said shank on one side thereof and a gravity actuated brush rotation reversing means housed in said body casing operable by rotation of said body casing about its longitudinal axis.

2. In a motor driven tooth brush, a driving shaft and brush rotation reversing means attached to the driving shaft comprising a gravity actuated cam wheel, a slidable lever linked to such cam wheel, and a gear system adapted to reverse the driving rotation upon engagement with said slidable lever.

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