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MOTOR DRIVEN ROTARY TOOTH BRUSH

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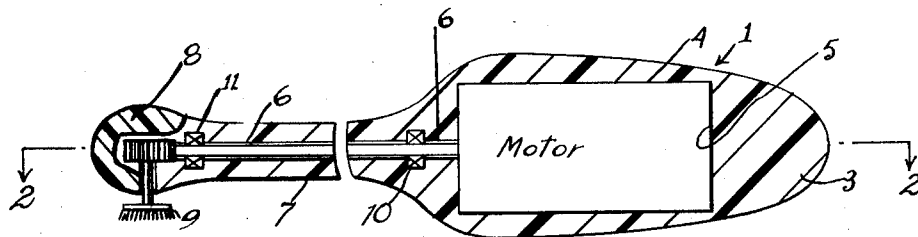


FIG. 1

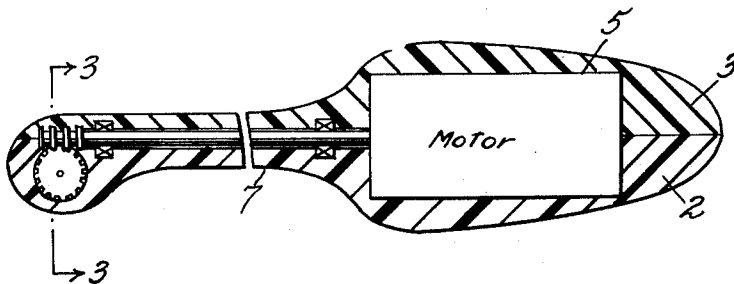
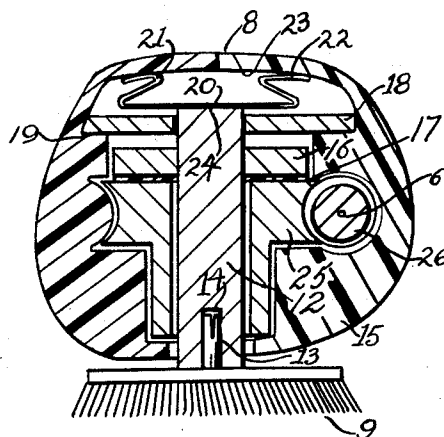


FIG. 2

FIG. 3



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## MOTOR DRIVEN ROTARY TOOTH BRUSH

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2 Claims. (Cl. 15—28)

The present invention relates to a rotary tooth brush and more particularly to a tooth brush in which the brush is driven by electric power such for instance as the ordinary house current line, and is an improvement on the construction shown in my copending patent application which has matured into Patent No. 2,766,470 on October 16, 1956.

In my prior patent application, the driving torque against the brush may be varied inversely with the speed at which the brush rotates so as to provide a greater driving force as the speed of the brush may be slowed down by pressure against the teeth.

I have found on further experiment that even without an increased thrust, a satisfactory drive may be maintained by a frictional engagement in such a manner that the brush speed may be slowed down through the clutch engagement itself. It appears that one of the prime purposes of the ordinary tooth brush of the present type, is that when the pressure on the brush is increased, the speed or drive of the brush is diminished so that no excessive abrasion will occur against the gums or the teeth. I have found that this can be controlled quite satisfactorily in a friction type clutch drive in which pressure is increased against the brush with a range to relieve to some extent the clutch friction, and thereby rotate the brush at a somewhat lower speed. In such conditions possible abrasion by the action of the brush against the teeth or the gums will be substantially eliminated. This will be controlled by the feel or the touch of the person using the brush against the gums and the teeth and will provide the necessary and satisfactory cleansing action in the use of the brush in brushing the teeth.

A further feature of the present invention is the simplicity of construction in the arrangement of the parts making up the brush drive, wherein the brush torque becomes slightly relieved upon pressure against the brush by the operator when pressing the brush to the teeth.

The invention will be further described in connection with the drawings annexed to the specification, in which:

Figure 1 shows a vertical section through the tooth brush.

Figure 2 shows a horizontal section, and taken along the line 2—2 of Fig. 1.

Figure 3 shows an enlargement of the brush end along the line 3—3 of Fig. 2.

In the arrangement indicated in the figures, the tooth brush may be formed with a cast plastic handle and stem 1, which may snap or fit together along longitudinal half sections 2 and 3. A small driving motor 4 may be mounted and secured in a cavity 5 in the handle sections of the motor and this motor may have extending from it a drive shaft 6 which may be rigid or slightly flexible if desired. The drive shaft 6 extends through the neck 7 forming an extension of the handle of the brush and into the head 8 which holds and supports the driving brush 9. Suitable bearing supports 10 and 11 may be provided in the neck 7 of the brush for supporting

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the shaft to provide a smooth drive of the brush mechanism in the head 8.

As indicated in Figure 3, this brush mechanism comprises a drive shaft 12 to which the brush 9 may be secured in any desired way. It is preferable to have the brush 9 secured with a friction fit, wherein the brush 9 is provided with a stem 13 which fits with a spring friction into a hole 14 within the drive shaft 12.

The drive shaft 12 which is mounted centrally in a casing 15 is provided towards its upper end with a clutch plate 16 which may be fixed on its lower side as shown in Figure 3 with some friction material 17 as for instance a hard friction surface cemented to the lower face of the plate 16. The plate 16 is secured in any suitable way to the shaft 12. The shaft 12 has its upper end fitting in a suitable bearing plate 18 which rests on a shelf 19 within the casing.

The bearing plate 18 should be spaced away from the top end of the casing in which is positioned a spring member 20 which has two S-shaped spring ends 21 and 22 the top edges of which bear against the inside upper wall section 23 of the casing. The cross member 20 of the spring will bear against the end surface 24 of the shaft 12 and will hold the clutch plate 16 with its face 17 in contact with the top surface of the gear 25 through which the worm 26 acts to supply power for driving the clutch plate 16. The worm 26 is driven by the motor shaft 6 extending from the motor 4 at a substantially constant speed. The worm in turn drives the gear 25 which drives the clutch 16 to which the shaft 12 is attached.

In the operation of the brush, the brush 9 will be rotated at approximately full speed of the gear 25 when the brush bears lightly against the teeth surface. If however greater pressure is put on the brush 9, the clutch surface 17 will be slightly relieved of pressure and the velocity of the brush will decrease in proportion to the decrease in friction in the clutch plate.

The action may be made such that the increase in brush pressure will reduce the speed proportionately in accordance with the brush pressure so that as the brush is pressed harder against the surface of the teeth the speed will be progressively decreased over a considerable range of brush pressure.

While the spring 20 is shown as a straight spring with double S-shaped end support, it is possible to use a coil spring or some other type of spring to exert force on the face 24 of the shaft 12. However due to the limitations in space requirements, a large coil spring is not practical and the shape of the spring shown in Figure 3 is highly practical for the purpose of the present invention. It will be noted that upon application of axial pressure on the brush, the clutch, plate and gear may be entirely separated or disengaged.

Having now described my invention, I claim:

1. A rotary driven toothbrush comprising a housing, a motor mounted in one end of the housing, a chamber formed in the other end of the housing, a drive shaft driven by said motor and extending into the chamber, a rotary toothbrush, an axially movable driven shaft connected at one end to said tooth brush extending into the chamber, a bearing plate engaging said shaft at its other end, a clutch plate attached to and concentric with the driven shaft, a gear concentric with and rotatable on said driven shaft and disposed between the clutch plate and the brush operatively connected to said drive shaft, said gear having a clutch face facing the clutch plate, and a leaf spring member positioned transversely across said other end of the driven shaft with its ends engaging the inner wall of said chamber and yieldably forcing the driven shaft in the direction of the brush and urging the clutch plate into engagement with the clutch face of the

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gear, whereby pressure on the brush in the direction of the spring member acts opposite to the spring member to separate the clutch plate and the clutch face.

2. A clutch mechanism for a motor driven rotary toothbrush comprising a worm and a gear, an axially movable driven shaft positioned coaxially and extending through the axis of said gear and adapted to carry a rotary toothbrush at one end, a clutch face formed on the gear and facing away from the one end of the driven shaft, a clutch plate mounted on said driven shaft adjacent its other end and juxtaposed the clutch face of the gear, a leaf spring pressing against the other end of the driven shaft with said spring positioned transversely across said other end yieldably holding the clutch plate in engagement with the clutch face of the gear,

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whereby pressure applied axially to the shaft in the direction of said other end will act against the action of the spring to separate the plate and the clutch face of the gear.

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