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3,235,897

ROTARY TOOTHBRUSH FOR ORAL HYGIENE

Filed April 3, 1964

2 Sheets-Sheet 1

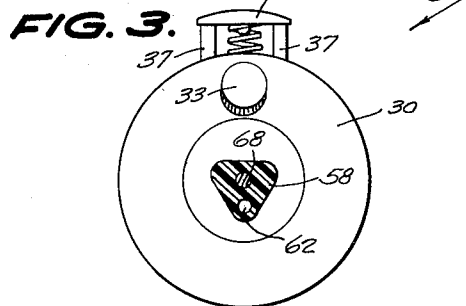
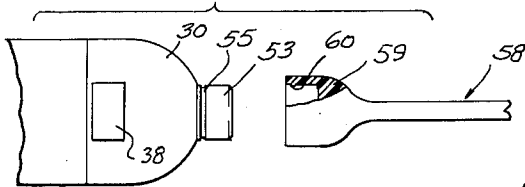
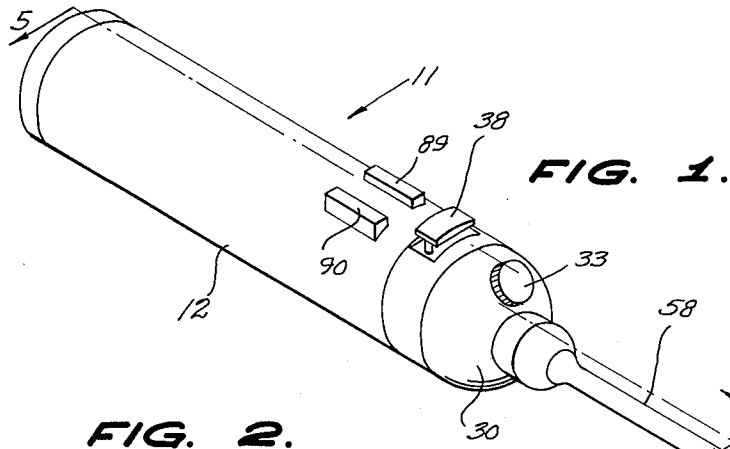


FIG. 8.

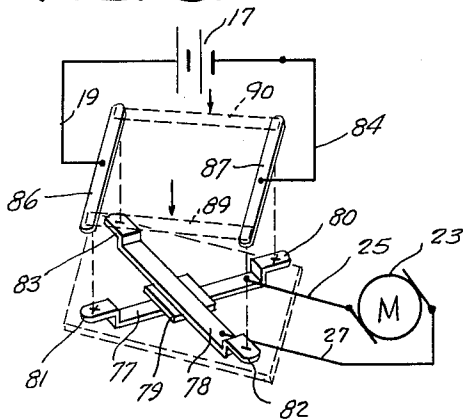
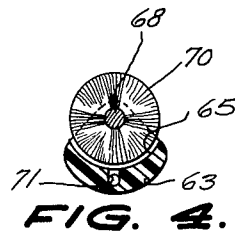
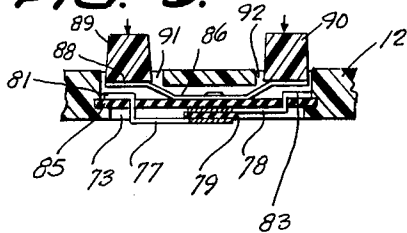


FIG. 9.



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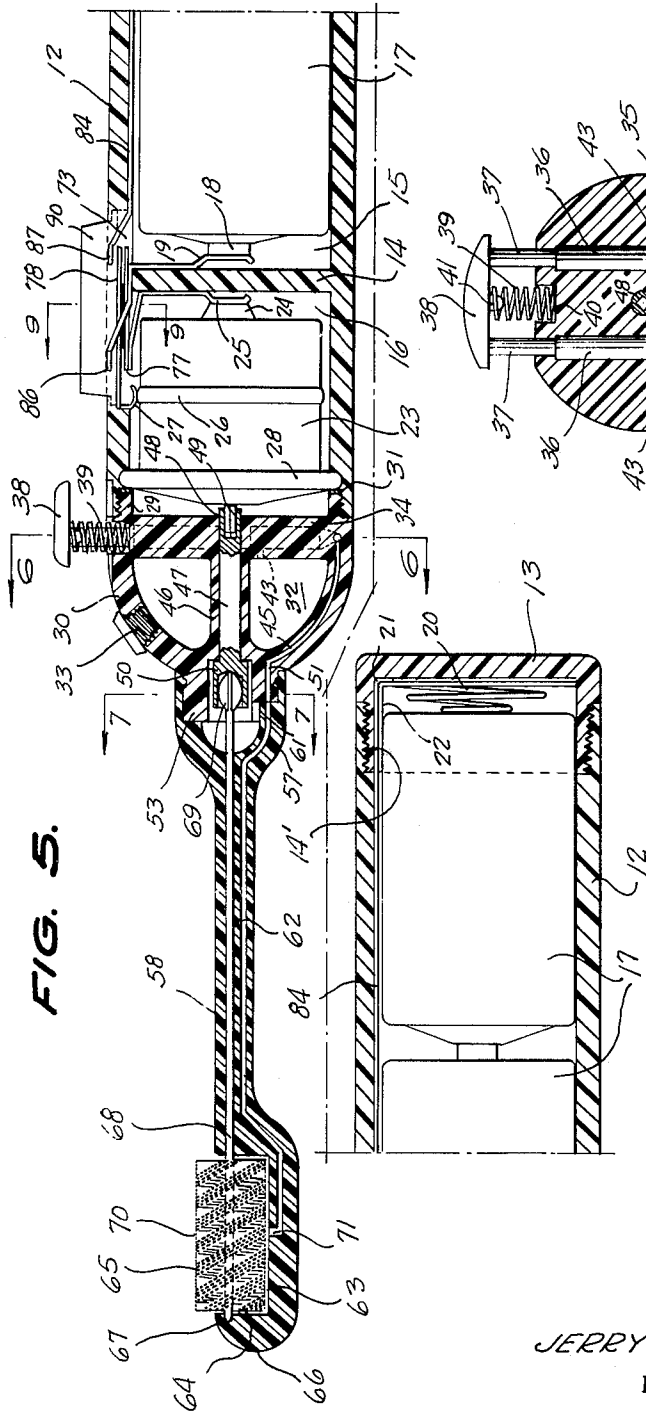
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ROTARY TOOTHBRUSH FOR ORAL HYGIENE

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2 Sheets-Sheet 2



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ROTARY TOOTHBRUSH FOR ORAL HYGIENE

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2 Claims. (Cl. 15-24)

This invention relates to mechanical toothbrushes, and more particularly to a toothbrush having a rotary brush element which is driven by a self-contained motor in the toothbrush and which is supplied with dentifrice also contained in the toothbrush.

A main object of the invention is to provide a novel and improved electrically driven toothbrush which is relatively simple in construction, which is compact in size, and which is provided with means for reversing the direction of rotation of its brush element, as desired.

A further object of the invention is to provide an improved motor-driven toothbrush which is inexpensive to manufacture, which is easy to operate, which is durable in construction, and which is provided with a brush-carrying head portion which is readily removable, so that a number of different brush-carrying head portions, for respective individuals, may be employed with the same basic driving and dentifrice-supplying handle unit.

A still further object of the invention is to provide an improved rotary toothbrush of the type employing a self-contained driving motor and power supply, the rotary toothbrush being provided with highly efficient and easily operated reversing switch means for changing the direction of rotation of its brush element at will, and being likewise provided with easily manipulated dentifrice supply means, so that dentifrice is supplied to the rotary brush element as it is operating, the assembly being easy to handle, being reliable in operation, and providing massage of the gums in the proper direction, since the direction of rotation of the brush element of the assembly may be controlled by the user in any position of operation of the rotary toothbrush assembly.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of an improved motor-driven rotary toothbrush constructed in accordance with the present invention.

FIGURE 2 is a fragmentary side elevational view, partly in cross-section, showing the manner of detachment of the head portion from the main body portion of the toothbrush.

FIGURE 3 is an enlarged transverse vertical cross-sectional view taken substantially on the line 3-3 of FIGURE 1.

FIGURE 4 is an enlarged transverse vertical cross-sectional view taken substantially on the line 4-4 of FIGURE 1.

FIGURE 5 is an enlarged longitudinal vertical cross-sectional view taken substantially on the line 5-5 of FIGURE 1.

FIGURE 6 is a transverse vertical cross-sectional view taken substantially on the line 6-6 of FIGURE 5.

FIGURE 7 is a transverse vertical cross-sectional view taken substantially on the line 7-7 of FIGURE 5.

FIGURE 8 is a perspective, diagrammatic view showing the various parts of the reversing switch assembly employed in the rotary toothbrush of FIGURE 1 and showing the electrical connections of said switch parts.

FIGURE 9 is an enlarged transverse vertical cross-sectional view taken substantially on the line 9-9 of FIGURE 5.

Referring to the drawings, 11 generally designates an improved motor-driven rotary toothbrush assembly constructed in accordance with the present invention. The

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assembly 11 comprises a hollow handle portion 12 which is generally cylindrical in shape and which is provided with a removable rear end cap 13 which is threadedly engaged in internal threads 14' provided in the rear end portion of said handle 12. The cylindrical handle body 12 is provided with a transverse partition wall 14 defining a battery compartment 15 at the rear side thereof and a motor compartment 16 at the forward side thereof. Two conventional batteries 17 are disposed in the battery compartment 15, the front battery having a forward center contact 18 which engages a resilient terminal 19 mounted adjacent partition wall 14. The casing of the rear battery 17 is engaged by a coiled spring 20, said spring being positioned between the rear end wall of the battery and the cap member 13, as shown in FIGURE 5, and engages a contact terminal 21 secured in the cap 13 and which has a longitudinally extending arm portion 22, as shown in FIGURE 5.

A conventionally battery-operated motor 23 of the miniature type is mounted in the forward compartment 16, the motor having a center terminal 24 which engages a contact spring 25 secured adjacent partition wall 14. The casing of the motor is formed with an intermediate annular rib 26 which engages a spring contact element 27. Motor 23 is provided with the enlarged front annular rib 28 which is clampingly engaged by the rim 29 of a housing member 30 which is threadedly engaged in the forward end of the cylindrical handle member 12, a resilient sealing ring 31 being interposed between the rim 29 and the annular rib 28, as shown in FIGURE 5.

The housing member 30 has a cavity 32 for receiving dentifrice, said cavity being provided with a threaded plug 33 which can be removed when it is desired to pour dentifrice into the cavity 32. The rear wall 34 of the cavity 32 is formed with a pair of cylindrical bores 35, 35 in which are slidably contained the respective parallel piston elements 36, 36, as shown in FIGURE 6, said piston elements having outwardly extending rod portions 37, 37 which are connected by an operating cross bar member 38, the bar member 38 being biased upwardly by a coiled spring 39 having its lower end received in a recess 40 provided in member 30 and bearing upwardly on the cross bar 38, receiving a depending pilot lug 41 provided thereon.

The cylindrical cavities 35, 35 are in communication with the interior of the dentifrice supply cavity 32 through respective apertures 43, 43 connecting cavities 35 with the supply cavity 32, as shown in FIGURES 5 and 6. The lower ends of the cylindrical cavities 35 are connected by passages 44 with an outlet passage 45 formed in the wall of housing 30 and leading to the front end thereof.

The housing 30 is provided with an axially extending bearing sleeve portion 46 in which is rotatably mounted a shaft member 47, the rear end of said shaft member being formed with a squared socket 48 which receives the squared shaft 49 of motor 23. The forward end of shaft 47 is provided with an enlarged coupling socket 50 having a longitudinally extending cruciform-shaped recess.

The forward end of the housing 30 is formed with a longitudinal internal lug or rib 51 containing the forward end portion of the dentifrice dispensing passage 45, as shown in FIGURE 7. Housing 30 is provided with the reduced forward end portion 53 defining a neck. Adjacent the junction of said neck 53 with the main body of housing element 30 said neck is formed with an annular groove 55, as shown in FIGURE 2. The neck member 53 is formed with a notch 57 adjacent the lug element 51. Designated generally at 58 is a removable toothbrush shank portion provided with a bell-shaped rear end 59 fitted over the neck element 53 and adapted to closely engage same, said bell element 59 being provided with an

inwardly projecting locking rib 60 adapted to lockingly engage in the annular groove 55 and being further formed with a lug portion 61 engageable in the notch 57. A dentifrice passage 62 extends longitudinally through the main body of shank member 58, the rear end of said passage extending through the lug element 61 and registering with the forward end of the passage 45, as shown in FIGURE 5.

As shown in FIGURE 7, because of the provision of the notch 57, the forward end portion of neck member 53 is generally C-shaped, and therefore, is somewhat resilient. This enables the bell-shaped end portion 59 of shank member 58 to be slipped thereover and enables the rib 60 to snap into locking engagement with the groove 55, to secure the shank member 58 to the neck 53. Conversely, said shank member may be readily detached from the neck 53 whenever desired.

The forward end of the shank member 58 is formed with the enlarged, generally arcuately-shaped guard portion 63 having the front end lug 64 extending transversely thereof and defining a longitudinally extending recess 65 having an arcuate longitudinal wall. The front lug 64 has a rounded exterior forward surface 66 and is provided on its transversely extending inside surface with a bearing recess 67 which rotatably receives the forward end of the toothbrush shaft 68. The shaft 68 is rotatably mounted longitudinally in the shank member 58 and is provided at its rear end with a cruciform coupling head 69 which slidably but non-rotatively engages in the cruciform coupling recess of the socket element 50. Secured on the forward end portion of shaft 58 is the generally cylindrically contoured rotary brush member 70 having its bristles arranged in a generally helical configuration, as shown in FIGURE 5. The passage 62 terminates at the intermediate portion of the arcuate brush housing wall 63, as shown at 71, so that dentifrice will be admitted into the intermediate portion of the arcuate recess 65 responsive to inwardly directed squeezing force applied to the cross bar element 38 secured to piston rod members 37, 37.

The dentifrice is of a conventional type and is of liquid form, so that on the outward release stroke of the cross bar 38 suction is developed in the cylindrical cavities 35, 35, as cross bar 38 is urged outwardly by spring 39, after which the liquid dentifrice is forced through passages 44, 45, 62 and 71 into the intermediate portion of the brush cavities 65, being thereby applied to the bristles of the brush member 70.

The forward portion of the wall of the hollow handle member 12 is formed with a recess 73 in which is mounted a plate-like member 85 of insulating material. Designated at 77 and 78 are a pair of crossed strip members which extend transverse to each other and which are separated by a plate-like element 79 of insulating material which is disposed between the intermediate portions of the crossed conductor strips 77 and 78, the strips being disposed substantially at right angles to each other, as shown in FIGURE 8. The respective strips 77 and 78 are provided at their ends with vertically offset end portions which extend through the insulating supporting plate 85, terminating in the respective horizontal end lugs 80, 81, and 82, 83 which overlie the top surface of the insulating plate 85, as viewed in FIGURE 9. This defines a pair of contact lugs 81 and 83 connected respectively to the strips 77 and 78 at the forward side of the cross bars and another pair of contact lugs 80, 82 connected respectively to the strips 77 and 78 at the rearward side of the intersection of the strips.

Secured to the insulating plate 85 is parallel relationship and in positions overlying the respective pairs of lugs 81, 83 and 82, 80, are resilient contact strips 86, 87, said contact strips having upwardly offset end portions 88 overlying but normally spaced from the respective pairs of contact lugs 81, 83, and 82, 80. Secured transversely to the ends of the parallel conductive strips 86 and

87 are respective insulating actuator bars 89 and 90 which project upwardly through slots 91 and 92 formed in the top wall of recess 73 and which are depressible to cause the cross bar end portions 88 on which they are secured to simultaneously engage their subjacent contact lugs. Thus, when the actuating bar 89 is depressed, conductive strip 86 is connected to bar 77 and lug 81 and conductive strip 87 is connected to bar 78 and lug 82. Similarly, when actuator bar 90 is depressed, conductive strip 86 is connected to bar 78 and lug 83 and conductive strip 87 is connected to bar 77 and lug 80.

The center terminal spring contact 19 associated with the front battery 17 is connected to the transverse resilient conductive bar 86, and the casing terminal 22 associated with rear battery 17 is connected to the transverse resilient conductive bar 87 by a connection strip 84 which is secured longitudinally inside the handle 12 and which has an end portion in a position to conductively engage the contact strip 22.

One of the motor terminal contacts 25 is connected to the lower bar member 77 and the other motor terminal contact element 27 is connected to the upper bar element 78. Thus, when the actuating bar 89 is depressed, as above described, the batteries 17 are connected to the motor 23 by the depression of the subjacent ends of bars 86 and 87 into contact respectively with the lug elements 81 and 82, causing the motor to rotate shaft 68 in one direction and thus rotate brush 70 in that direction. However, when the actuator bar 90 is depressed, the motor connections are reversed, causing the motor shaft 49 to reverse its direction of rotation and thereby reverse the direction of rotation of the brush 70. This enables the user to reverse the direction of rotation of the brush 70 at any desired time, for example, when the orientation of the toothbrush assembly is changed, or for any other reason. It will be noted that for proper massaging action of the gums, the brush element should be rotating away from the gums. Therefore, it is important to be able to control the direction of rotation of the brush in accordance with the manner in which the toothbrush is held while using same.

An important feature of the operation of the device is that the toothbrush element 70 rotates continuously and moves through a complete 360° angle of rotation with each revolution thereof. This provides efficient distribution of the dentifrice as well as the optimum gum massaging action.

As will be readily understood, the same driving unit may be employed with different shank elements 58, so that various members of a family may employ the same driving unit by using their own individual shank elements. This provides economical utilization of the apparatus as well as assuring proper brushing of the teeth for all members of the family.

The batteries 17 may be any conventional type, for example, may be of the rechargeable type, in which case the housing 12 will be provided with a suitable receptacle adapted to be connected to a conventional socket-mounted recharging unit.

In using the device, the handle 12 is grasped in a position to allow the fingers to manipulate the reversing actuator bars 89 and 90, as required, and also to operate the pumping cross bar element 38. By depressing the cross bar element 38 a supply of dentifrice will be furnished to the brush 70, and by then depressing either of the actuating bars 89 and 90 the brush 70 will be caused to rotate in either desired direction. When the actuator bars 89 and 90 are released, the motor 23 becomes deenergized because of the opening of the contacts between the parallel bar elements 86 and 87 at either lugs 81 and 82 or lugs 83 and 80.

While a specific embodiment of an improved electrically operated toothbrush has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those

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skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In an electric toothbrush of the type comprising an elongated hollow handle, a shank member connected to one end of said handle, a brush member rotatably mounted in the outer end of the shank member, an electric motor mounted in said handle, said brush member being provided with a shaft rotatably mounted in said shank member longitudinally thereof, means drivingly coupling said shaft to said motor, and a battery in said handle, the improvement comprising a pair of crossed elongated conductors mounted in the wall of said handle and insulated from each other, means connecting said conductors to the respective terminals of the motor, a pair of spaced parallel resilient elongated conductor bars mounted in said wall overlying and normally disengaged from the respective opposite pairs of end portions of the crossed conductors, means connecting the resilient conductor bars to the opposite terminals of the battery, and a pair of elongated parallel actuator bars of insulating material movably mounted in said wall and overlying the opposite end portions of the resilient bars transverse thereto, whereby to reversibly connect the motor to the battery responsive to selective depression of the actuator bars.

2. In an electric toothbrush of the type comprising an elongated hollow handle, a shank member detachably connected to one end of said handle, a brush member rotatably mounted in the outer end of said shank member, an electric motor mounted in said handle, said brush member being provided with a shaft rotatably mounted in said

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shank member longitudinally thereof, means drivingly coupling said shaft to said motor, and a battery in said handle, the improvement comprising a pair of crossed elongated conductors mounted in the wall of said handle and insulated from each other, means connecting said conductors to the respective terminals of the motor, a pair of spaced parallel elongated resilient conductor bars mounted in said wall overlying and normally disengaged from the respective opposite pairs of end portions of the crossed conductors, means connecting the resilient conductor bars to the opposite terminals of the battery, and a pair of parallel elongated actuator bars of insulating material movably mounted longitudinally in said wall and overlying the opposite end portions of the resilient bars transverse thereto, whereby to reversibly connect the motor to the battery responsive to selective depression of the actuator bars.

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