United States Patent

[11] 3,577,579

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[45] Patented **May 4, 1971**

[54] **ELECTRIC TOOTHBRUSH**
12 Claims, 14 Drawing Figs.

[52] **U.S. Cl.** **15/22,** 74/23, 310/50, 310/80
[51] **Int. Cl.** **A46b 13/00**
[50] **Field of Search** ..... 15/22, 22 (A), 22 (B), 97; 74/23; 310/47, 50, 80

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Primary Examiner—Edward L. Roberts
Attorney—George R. Clark

ABSTRACT: An electric cordless toothbrushing device having a power handle with a drive shaft extending from one end thereof and a toothbrush attachment which is securable to the remote end of said shaft. The power handle includes a battery-powered motor which by means of a motion-converting mechanism drives the shaft so that the rotary power of the motor is translated to an orbital motion at the toothbrush attachment. An improved electric switch is provided to control the energization of the motor.

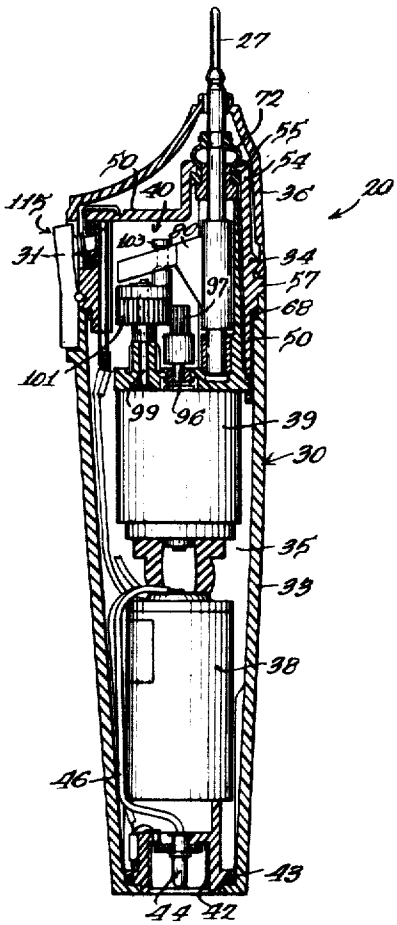

Fig. 1

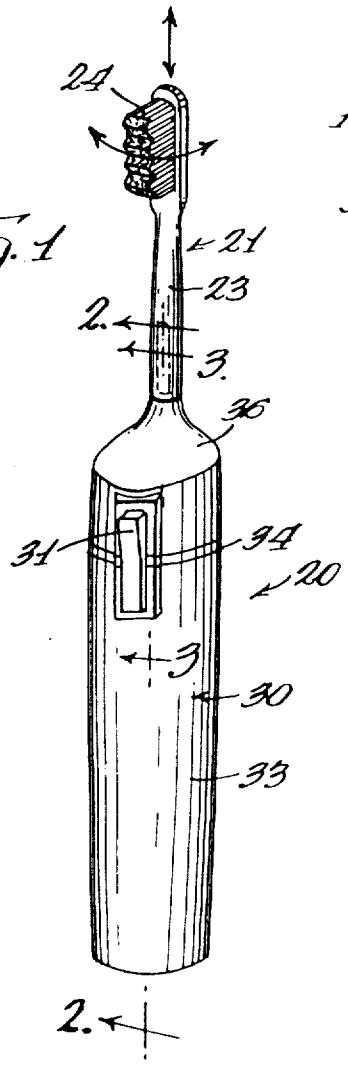

Fig. 2.

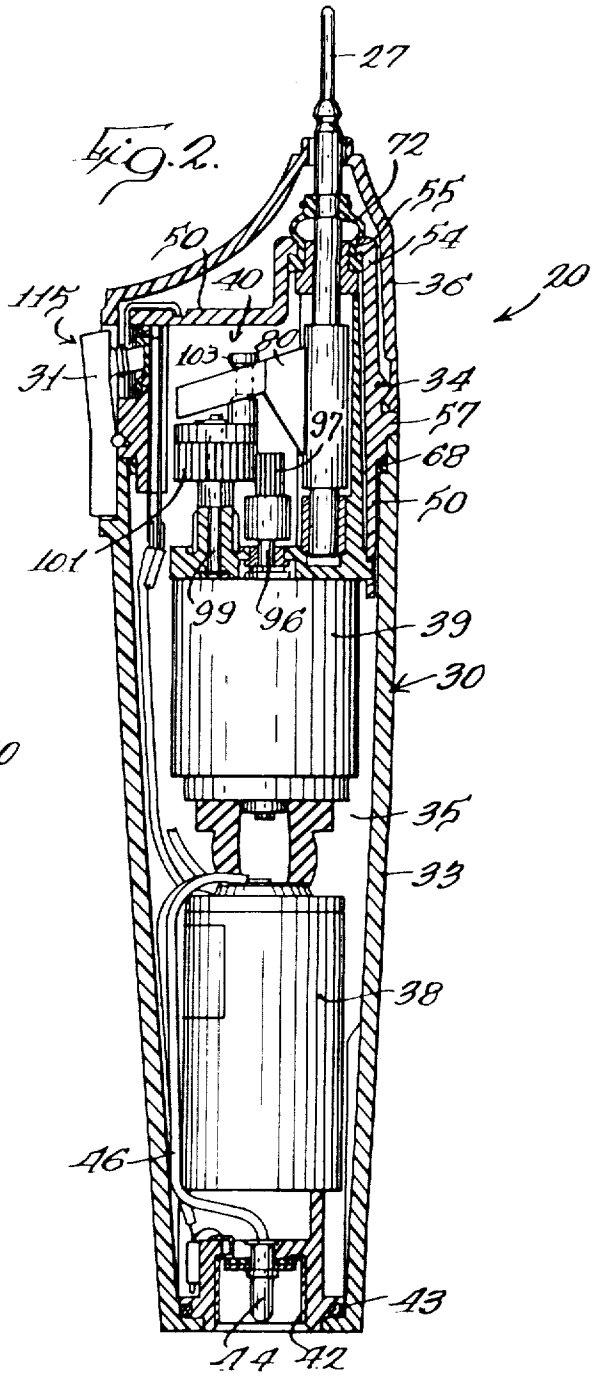

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Fig. 3.

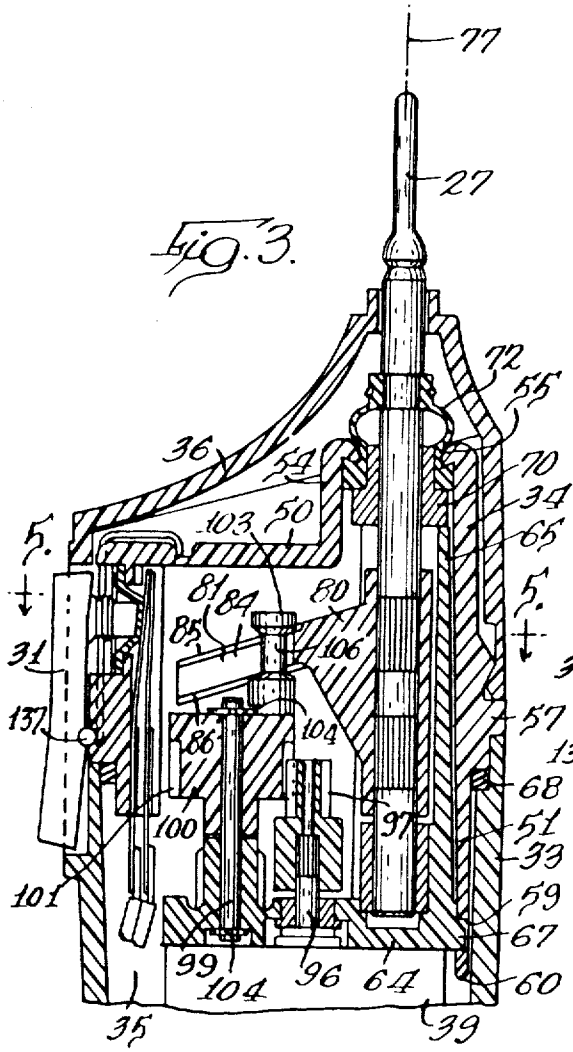

Fig. 4.

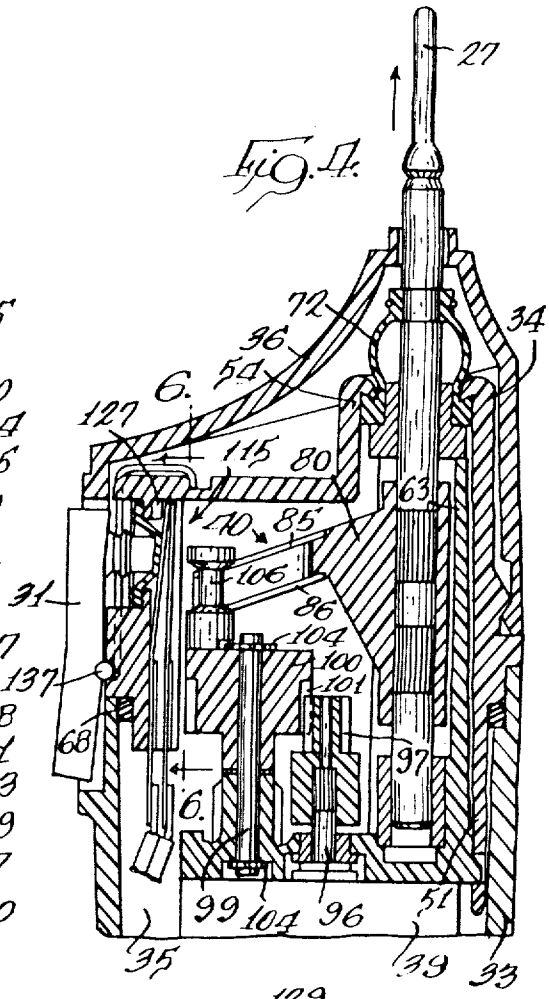

Fig. 5.

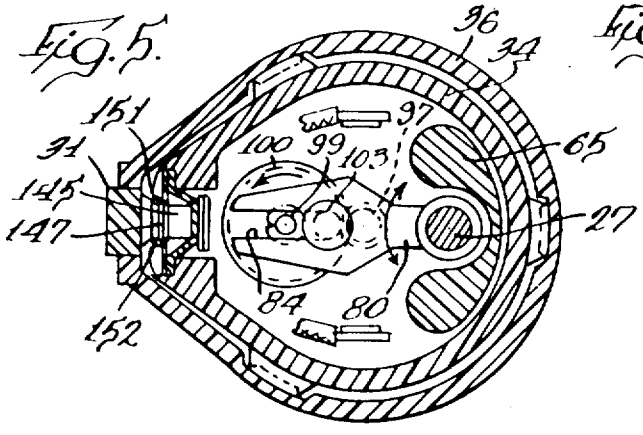

Fig. 6.

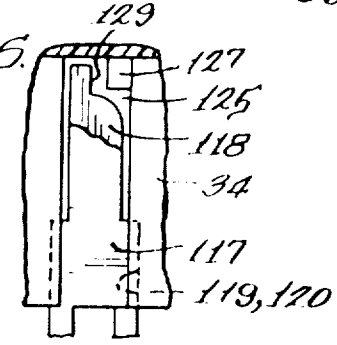

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Fig. 7.

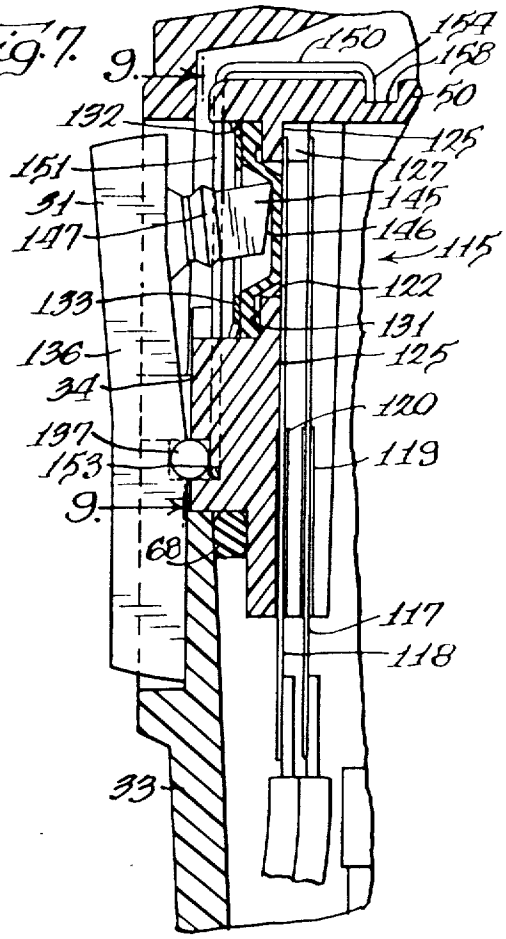

Fig. 8.

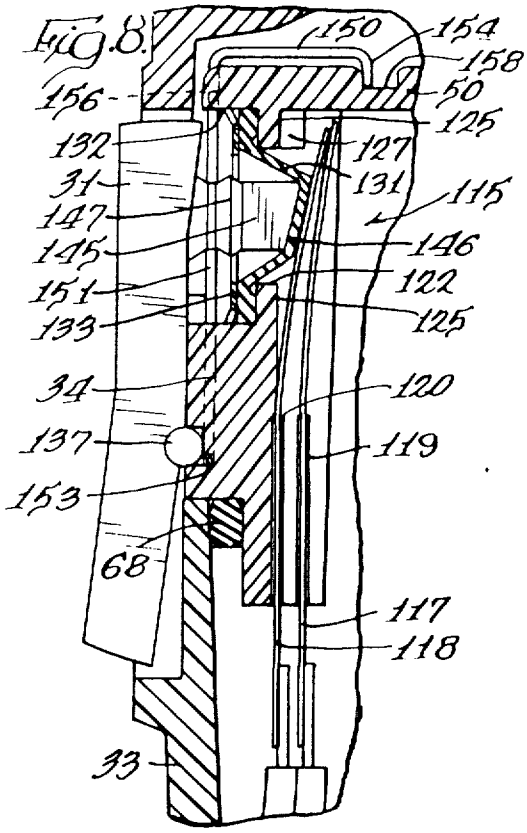

Fig. 9.

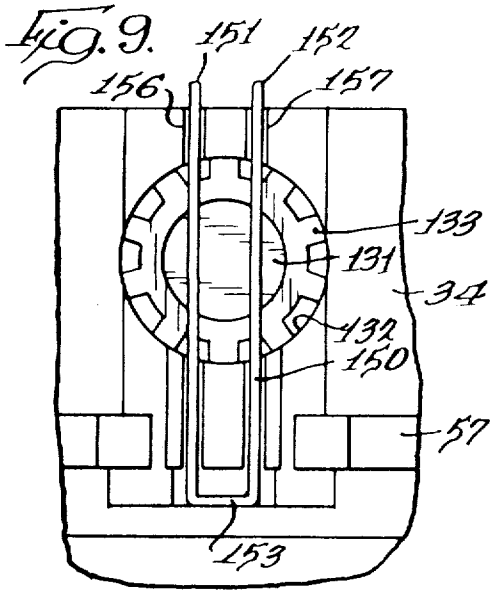

Fig. 10.

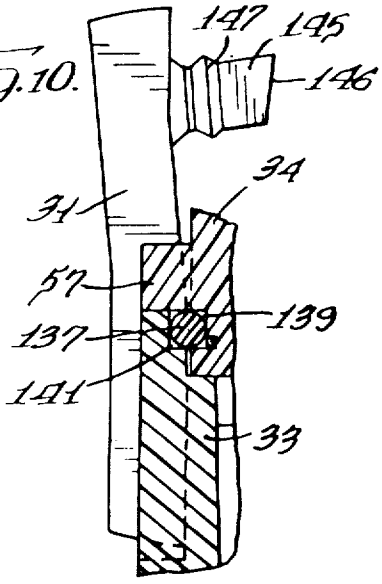

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Fig. 11.

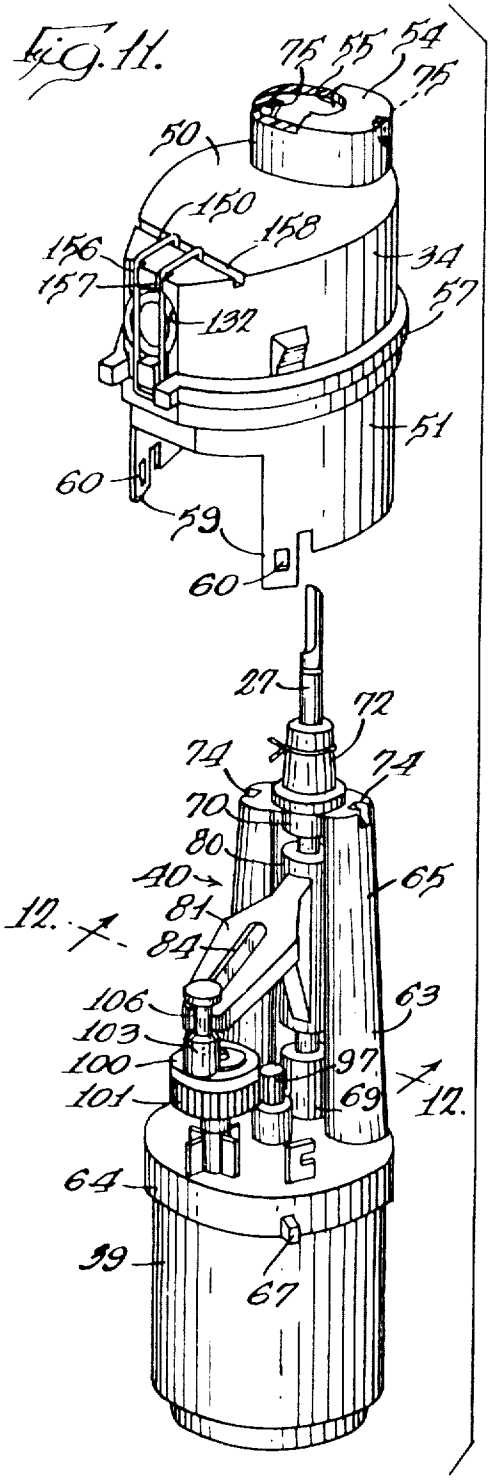


Fig. 12.

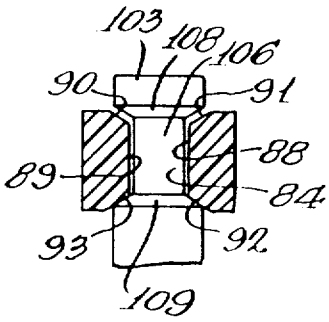


Fig. 13

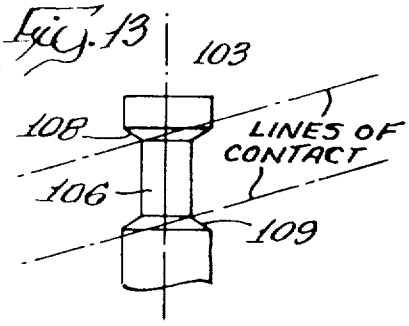
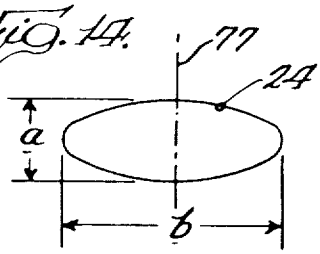


Fig. 14.



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ELECTRIC TOOTHBRUSH

This is a division of application Ser. No. 824,110, filed May 13, 1969, assigned to the same assignee as the instant application.

BACKGROUND OF THE INVENTION

This invention relates to an electric appliance and more particularly to a rechargeable battery-operated electric toothbrushing device having a portable hand-held power handle with a brush attachment at one end.

Power-driven toothbrushes for use in the home customarily include a single power handle and a plurality of individual toothbrush attachments for use by the members of the family. The toothbrush attachment normally consists of a relatively hard plastic shaft portion and a plurality of outwardly extending bristles anchored at their inner ends to the shaft portion. The individual toothbrush attachments, which are stored on a suitable recharging base for the power handle, may be adapted to be attached to and detached from the power handle by the user. The details of one readily releasable mechanical drive connection for connecting a toothbrush attachment to a power handle are disclosed in Spohr U.S. Pat. No. 3,187,360, granted June 8, 1965, and assigned to the same assignee as the present application.

The toothbrush power handle normally includes a battery in electrical connection with a low-voltage direct-current motor which is in driving relationship with a motion-converting means for changing the rotary power of the motor to a desirable motion at the toothbrush attachment bristles. This type of device is disclosed in Spohr U.S. Pat. No. 3,274,631, granted Sept. 27, 1966, assigned to the same assignee as the present application. The motion-converting mechanism in this Spohr patent causes the brush attachment to have a pure oscillatory motion wherein the brush attachment oscillates about its axis with the generally radially extending bristles moving through an angle of about 22°. The resultant oscillatory toothbrush attachment motion was found to perform very well in cleaning the user's teeth. Other toothbrush power handles reciprocated the toothbrush attachment in a direction parallel to the drive shaft, and this motion has been found effective in cleaning teeth. However, it is believed that a better cleaning operation can be accomplished if the tips of the toothbrush attachment bristles move in an orbital path to facilitate the penetration of the bristle tips between the user's teeth. While it is desirable to have the tips of the bristles moving with an orbital motion, it is desirable to have as little movement as possible of the toothbrush attachment shaft portion in order to prevent the relatively rigid shaft portion from striking the user's teeth and gums. The motion-converting means for accomplishing this desired motion should be compact so that it may be conveniently positioned within the relatively small power handle, and it should be simply designed for economical manufacture.

For the user to control the operation of the toothbrush, it is necessary to provide actuating means on the outside of the power handle to control an electric switch disposed inside of the power handle. It is appreciated that the power handle must be effectively sealed to prevent the entrance of moisture which would interfere with the operation of the internal power handle components. Since the toothbrush is designed to be used by all members of the family, the actuation of the switch should be simple enough so that a small child can easily understand and manipulate it. Furthermore, the actuating means for the switch should be of such a nature that the user can operate it without studying the orientation of the actuator with respect to the power handle and so that the actuator may be moved easily when covered with water, toothpaste and saliva. To accomplish these objectives, it is necessary that the actuator should be pressed inwardly toward the housing rather than moved in a rectilinear manner along the surface of the housing. The switch itself disposed within the power handle should be designed for economical manufacturing, and the orientation of the switch with respect to the actuator means should be easily controlled.

SUMMARY OF THE INVENTION

Briefly, the electric cordless toothbrush of the present invention includes a compact hand-held power handle having a rechargeable battery and an electric motor adapted to be driven thereby. The power handle is provided with a drive shaft to which the brush attachments may be connected, and the attachments are driven in an orbital manner by means of an improved motion-converting system interconnecting the motor and the drive shaft. The power handle has a generally cylindrical housing of convenient size, and an improved switching mechanism is mounted to the housing for completing the electrical connection between the battery and motor.

Accordingly, it is an object of the present invention to provide a new and improved electric toothbrushing device including a hand-held power handle having improved means for changing the rotary power from the motor to an orbital motion at the toothbrush attachment.

It is another object of the present invention to provide a new and improved electric appliance switching mechanism which is easily operated and economical to produce.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view of a cordless hand-held power handle and toothbrush attachment embodying the present invention;

FIG. 2 is an enlarged sectional view taken substantially along line 2–2 of FIG. 1 with the toothbrush attachment removed;

FIG. 3 is a fragmentary enlarged sectional view taken substantially along line 3–3 of FIG. 1 wherein the switch is disclosed in its closed position and the drive shaft is at its innermost position;

FIG. 4 is a sectional view similar to FIG. 3 except that the drive shaft is at its outermost position;

FIG. 5 is a sectional view taken substantially along line 5–5 of FIG. 3 assuming that FIG. 3 shows the complete structure;

FIG. 6 is a fragmentary sectional view taken substantially along line 6–6 of FIG. 4 assuming that FIG. 4 shows the complete structure;

FIG. 7 is an enlarged fragmentary sectional view revealing the switch in an open condition;

FIG. 8 is similar to FIG. 7 but shows the switch in a closed condition;

FIG. 9 is a fragmentary view taken substantially along line 9–9 of FIG. 7;

FIG. 10 is a fragmentary sectional view of the switch actuator depicting the manner in which it is pivotally mounted to the power handle housing;

FIG. 11 is an exploded assembly view of the upper housing member and the motion-converting mechanism on the motor;

FIG. 12 is a fragmentary sectional view of the engagement between the eccentric and the connector arm;

FIG. 13 is a view illustrating a portion of the eccentric and the lines of contact between the eccentric and the connector arm; and

FIG. 14 is an end view of a single bristle outer tip to show the orbital path it follows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, there is shown a cordless hand-held power handle generally designated by the reference numeral 20 and a toothbrush attachment 21 mounted thereto. Preferably, the toothbrush attachment 21 has a relatively hard shaft 23 and a

plurality of bristles 24 with their inner ends anchored to the remote end of the shaft 23. The outer ends of the bristles 24 are cut in a manner to produce a saw tooth configuration as can be conveniently seen in FIG. 1. The toothbrush attachment 21 is adapted to be releasably attached to a drive shaft 27 extending from one end of the power handle 20. Preferably the releasable coupling between the toothbrush attachment 21 and the drive shaft 27 is the same as disclosed in Spohr U.S. Pat. No. 3,187,360, granted June 8, 1965, and assigned to the same assignee as the present application. Therefore, it should be appreciated that the brush attachment is rigidly securable to the drive shaft 27 whereby any movement of the shaft is transmitted to the attachment.

To facilitate the use of the power handle 20, it is by necessity relatively small and lightweight. The power handle includes an elongated housing 30 on the exterior of which is mounted a switch actuator 31. The housing 30 is made up of a relatively long lower cup-shaped member 33 and a relatively short upper cup-shaped member 34 which are oppositely disposed with their open ends facing each other to define a chamber 35 therebetween. A plastic housing end cap 36 overlies a part of and is in snap engagement with the member 34 for reducing the amount of moisture and toothpaste reaching the drive shaft where it enters into the chamber 35. Positioned within the chamber 35 are a nickel cadmium battery 38, a low-voltage direct-current motor 39, and a motion-converting mechanism 40 which transmits the power from the motor to the drive shaft 27. Inasmuch as the motor 39 is supplied power by the battery 38, it is necessary from time to time to recharge the battery. For this purpose, the lower housing member 33 is molded with an opening at its bottom for receiving a cup-shaped plastic terminal support 42. A suitable O-ring seal 43 is used to establish a watertight connection between the support 42 and the member 33. As can be seen in FIG. 2, the support 42 carries terminal means 44, which is in electrical communication with the battery 38, by means of circuit wiring 46. Thus, when it is desired to recharge the battery 38, the power handle 20 is placed on a suitable charging base (not shown) which may be similar to the base shown in copending application Ser. No. 823,698, filed May 12, 1969, and assigned to the same assignee as the present application.

Preferably, the housing members 33 and 34 are molded from a suitable plastic material which does not conduct electricity and is not adversely affected by moisture or chemicals found in toothpaste or the like. The upper housing member 34 is molded to define a substantially horizontally extending bight portion 50 and a depending annular sidewall 51. The bight portion 50 includes a raised section 54 defining an opening 55 through which the drive shaft 27 extends. As can best be seen in FIG. 11, the sidewall 51 includes an annular collar 57 and a plurality of downwardly extending resilient fingers 49, each of which defines a square aperture 60. In the embodiment disclosed in the drawings, the housing member 34 has three equally spaced resilient fingers 59.

At the upper end of the motor 39 is a plastic bracket 63 having an integral disc-shaped plate 64 and an upright column 65 extending normal to the plate 64 and having a tapered C-shaped cross section. The plate 64, which is rigidly secured to the motor 39, has a plurality of integral radially extending protuberances 67 which are in alignment with the apertures in resilient fingers 60. As can be seen in FIG. 11, the motion-converting mechanism 40 is carried by the bracket 63. Thus, when the motor 39 and bracket 63 are assembled to the upper housing member 34, the motion-converting means 40 is disposed within the cup-shaped member 34. To assemble the bracket 63 to the member 34, the bracket is inserted within the member so that the shaft 27 passes through the raised section opening 55 until the protuberances 67 engage the resilient fingers 59 deflecting them outwardly and snap into the apertures 60. Thus, the bracket 63 to which the motor 39 is attached can be secured to the upper housing member 34 to form a subassembly without the benefit of screws or other separate fastening means. To insure that the bracket protuberances 67 do not inadvertently become disengaged from the resilient fingers 59, the lower housing member 33, when assembled to the upper housing member 34, is immediately beside the resilient fingers 59 preventing their outward deflection. As a result, it is only possible to remove the bracket 63 from the member 33 when the lower member 33 is not assembled with the upper member 34. It should be appreciated that moisture should not be permitted to enter into the chamber 35, and to this end a suitable O-ring seal 68 is positioned between the members 33 and 34 adjacent to the collar 57.

For transmitting the power from the motor 39 and converting its rotary movement to a desired movement at the toothbrush attachment, the motion-converting mechanism 40 is disposed within the upper cup-shaped housing member 34 and extends between the motor 39 and the drive shaft 27. As can conveniently be seen in FIG. 3, the drive shaft 27 is supported in spaced bushing bearings 69 and 70 which are carried in the bracket column 65. The bearing 70 is positioned near the upper member raised section opening 55, and in order to protect this bearing from the adverse effects of moisture, a suitable flexible gasket 72 is clamped between the bearing and the raised section and secured to the drive shaft 27. To provide support for the shaft 27 at the bearing 70, the column 65 is molded with a pair of oppositely disposed recesses 74 which are aligned to engage with projections 75 molded integrally with the raised section 54 as can be seen in FIG. 11. Thus, when the bracket 63 is assembled to the member 34, the projections 75 enter into the recesses 74 whereby the bracket 63 is securely locked to the member 34 at both the recesses 74 and protuberances 67. Since the drive shaft 27 is mounted in two spaced bushing bearings, it is free to rotate and also free to move along its longitudinal axis 77. Securely attached to the drive shaft 27 between the bearings 69 and 70 is a plastic connector 80 having a fork or arm 81 extending at an angle of less than 90° from the drive shaft longitudinal axis 77. In the present embodiment, the included angle defined between the arm 81 and the drive shaft axis is approximately 73°. The arm 81 is molded with a slot 84 parallel to the drive shaft axis 77 and the slot extends completely through the upper side 85 and lower side 86 of the arm 81. As may be seen in FIG. 12, the slot 84 is defined by parallel spaced side surfaces 88 and 89 and parallel-spaced chambers 90—93.

To interconnect the arm 81 and the motor 39, the motor includes an upwardly extending armature shaft 96 on the end of which is securely mounted a drive pinion 97. Projecting upwardly from the bracket plate 64 and parallel to the armature shaft 96 is pin 99 on which is rotatably mounted member 100 having an integral gear 101 in driven engagement with the drive pinion 97 and an integral eccentric 103 which is offset from the pin 99 and parallel to the drive shaft axis 77. The pin 99 has locking clips 104 at each end to prevent the member 100 from moving in a direction parallel to the drive shaft axis 77. Thus, when the motor 39 is energized, the pinion 97 rotates the member 100 so that the eccentric 103 moves in a circular path. Preferably, the member 100 and the drive pinion 97 are molded from a suitable plastic material. For the eccentric 103 to make a proper connection with the arm 81, the eccentric is formed with a reduced cylindrical surface 106 at the ends of which are opposed spaced annular shoulders or chambers 108 and 109. With this configuration, the eccentric 103 is adapted to cooperate with the arm 81 by the cylindrical surface 106 being disposed within the arm slot side surfaces 88 and 89 and the shoulders 108 and 109 oriented to engage with the arm chamfers 90—93. In order to understand the resultant movement imparted to the drive shaft 27 by the rotation of member 100, it should be first realized that a single rotation of the eccentric causes the connector 80 to oscillate through a given angle which is determined by the diameter of the circular path followed by the eccentric 103 and the distance between the center of the pin 99 and the drive shaft axis 77. In the present embodiment, the rotation of the eccentric 103 causes the drive shaft 27 to oscillate through an angle of approximately 29°. It is important to note that since the eccen-

tric **103** is being rotated through a circular path that the engagement between the cylindrical surface **106** and the arm surfaces **88** and **89** is a rolling contact thereby lessening the friction between the eccentric and the arm slot **84**. Furthermore, as the eccentric **103** follows a circular path, it moves towards and away from the drive shaft, and, consequently, since the chamfers **90—93** are oriented to engage the shoulders **108** and **109**, the connector **108** is forced to move parallel to the drive shaft as causing the drive shaft to reciprocate. To more clearly understand the manner in which the drive shaft is reciprocated, reference may be had to FIGS. **3** and **4** wherein the eccentric **103** is shown in FIG. **3** at near the inner end of the slot **84** and the drive shaft **27** is at the end of its innermost travel towards the motor **39** whereas in FIG. **4** the eccentric has moved through approximately 180° and is at the outer end of the arm slot **84** with the result that the connector **80** and drive shaft **27** have moved outwardly to the end of its travel away from the motor **39**. As the eccentric moves to force the drive shaft outwardly, the eccentric shoulder **109** slides in rolling engagement against arm chamfers **92** and **93**, and, correspondingly, as the drive shaft moves inwardly the eccentric shoulder **108** slides in rolling engagement against arm chamfers **90** and **91**. Referring to FIG. **13**, it can be seen that the eccentric shoulders are engaging the arm chamfers along parallel lines of contact to accomplish a controlled amplitude of reciprocation of the drive shaft. Therefore, a single revolution of the member **100** causes the drive shaft **27** to simultaneously oscillate and reciprocate to produce an orbital movement at the outer tips of the toothbrush attachment bristles. The resultant movement is depicted in FIG. **4** which shows the path followed by the outer tip of a single bristle **24** wherein the orbital path moves through an arc *b* of approximately 0.280 inches and reciprocates through distance *a* of approximately 0.090 inches. However, even though the outer tips of the bristles are following an orbital path, the toothbrush attachment shaft **23**, which is relatively hard, has a relatively restricted movement of the same degree of oscillation and reciprocation as the drive shaft **27** with the result that the accidental engagement of the hard shaft **23** with the user's gums or teeth is not very noticeable or discomforting. Thus, the motion-converting mechanism **40** causes the tips of the bristles **24** to move vigorously through an orbital path, which is found to be most advantageous in cleaning the user's teeth because the oscillating movement sweeps the bristles along the user's teeth while the reciprocating motion assists the bristle tips to move in between adjacent teeth where food particles tend to lodge. Furthermore, the mechanism **40** consumes very little power because of the small amount of friction between the eccentric and the arm due to the rolling engagement between the contacting surfaces, and friction power losses are a major concern in a battery-operated appliance which is used frequently.

In accordance with the present invention, the power handle **20** is provided with an electric switch which is generally designated by the reference numeral **115**. The purpose of the switch **115** is to control the energization of the motor **39** by permitting the battery **39** to supply power to it through circuit wiring **46**. This is accomplished by the switch **115** being in electrical series with the motor and the battery in a circuit arrangement which is well known in the art but, preferably, is the same as is shown in the hereinbefore mentioned copending Spohr Pat. application Ser. No. 823,698. Referring to FIGS. **6—10**, the switch **115** includes two substantially parallel-spaced contact blades **117** and **118** which are received in spaced slots **119** and **120** respectively defined in upper housing member **34**. Once the blades are locked in the slots **119** and **120**, their lead ends can be considered as being stationary, and the free ends thereof extend adjacent to a circular access opening **122** molded in the housing member **34**. Both blades are bent slightly before being assembled into their respective slots so that their free end tends to move towards the opening **122**. As can be seen in FIG. **7**, the blade **118** lies against inside surface **125** of the housing member sidewall **51**. However, the free end of blade **117** is maintained out of engagement with blade **118** by the free end of blade **117** resting against housing member step **127**. The blade **118** is formed with a notch **129** so that it may pass clear of the step **127** to rest against the inside surface **125**. To prevent moisture from entering into the chamber **35** through opening **122**, a circular diaphragm seal **131** is received within circular counter bore **132** which is concentric with the opening **122**. The diaphragm seal **131** is rigidly clamped in position by a circular stamping fastener **133** which is pressed into the counterbore **132**. Preferably, the diaphragm seal **131** is relatively flexible and can be easily extended through the opening **122** to act upon the contact blades **117** and **118**. Acting upon the seal **131** and the blades **117** and **118** is the switch actuator **31** which is preferably molded from plastic and is formed to define an angular lever **136** and a pair of outwardly extending trunnions **137**. The actuator **31** is pivotally supported to the outside of the housing **30** by the trunnions **137** being received and captured within square-shaped recesses **139** which are formed at the joining of the upper and lower housing members **33** and **34** by the lower member **34** being molded with notches **141** which cooperate with corners **142** in the upper member **34** as can be conveniently seen in FIG. **10**. Thus, the actuator **31** is pivotally supported to the housing **30** when the upper and lower housing members **33** and **34** are connected together by the trunnions **137** being nested within the recesses **141**. Extending inwardly from the lever **136** is an integral finger or projection **145** which has an outer inclined end **146** and intermediate enlarged detent or annular ridge **147**. A resilient metallic wire **150**, formed to have a somewhat L-shaped configuration as seen in FIG. **7**, is bent to have two parallel-spaced legs **151** and **152** with a bight portion **153** at one end and being inwardly bent at free ends **154**. The wire **150** is received within parallel spaced grooves **156** and **157** which extend on both sides of the counter bore **132**. The free ends **154** are hooked behind a groove **158** and the bight end **153** is trapped underneath the trunnions **137** as can be seen in FIG. **7**. With this construction, the wire legs **151** and **152** are retained in their respective grooves **156** and **157** because the ends of the wire **150** are locked to prevent motion away from the opening **122**. Furthermore, it should be appreciated that the legs **151** and **152** being within their respective grooves tend to inhibit the separation of the legs which extends across the counterbore **132**. When it is desired to close the switch **115**, the lever **136** is pressed to force the seal projection **145** into the opening **122** until the projection end **146** faces the seal to deflect the contact **118** into electrical engagement with the blade **117** as depicted in FIG. **8**. As the finger **145** extends through opening **122**, the annular ridge **147** passes between the legs **151** and **152** causing them to spring away from each other and snap toward each other behind the ridge with the result that the finger **145** is locked at an inner position wherein the switch **115** is closed. When it is desired to open the switch, the lever **136** is pressed so that the lever pivots moving the finger **145** outwardly through the opening **122** and causing the ridge **147** to again spring the wire legs **151** and **152** away from each other sufficiently to let the ridge pass therethrough. In the switch-open position shown in FIG. **7**, the wire legs **151** and **152** again hold the lever against movement.

The hand-held power handle **20** hereinbefore described is relatively inexpensive to manufacture. The plastic upper housing member **34** is formed to receive the motor **39**, motion-converting mechanism **40**, bracket **63** and switch **115** without the need of separate fasteners. Furthermore, these members can be conveniently assembled together to form a subassembly which can be easily attached with the remainder of the power handle. The relatively simple motion-converting mechanism transmits the power from the motor to the drive shaft and imparts a very desirable orbital motion to the bristle tips on the toothbrush attachment while at the same time limiting the movement of the toothbrush attachment shaft. The electric switch to energize the motor is basically assembled to the upper housing member **34** and expeditiously interrelates the

various switch components with the actuator which is mounted to the exterior of the housing. All of the parts of the power handle cooperate together in a logical manner to result in a device which is easily manufactured and functions well for its intended use.

While there have been shown and described several embodiments of the present invention, it will be apparent to those skilled in the art that numerous changes and modifications may occur, and it is intended in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the present invention.

We claim:

1. An electric toothbrushing device comprising an elongated housing containing an electric motor, a drive shaft extending from said housing and lying along a given axis, the remote end of said shaft adapted for carrying a toothbrush attachment, bearing means in said housing supporting said shaft for longitudinal movement along said axis and for pivotal movement with respect to said axis, motion-converting means disposed within said housing connecting said motor with said shaft so that the rotary motion from said motor causes said toothbrush attachment to move with an orbital motion wherein said shaft simultaneously moves longitudinally and pivotally with respect to its axis, said motion-converting means including a member supported for rotation on an axis parallel to and spaced from the shaft axis, said member being rotated by said motor and having an eccentric offset from the axis of rotation of said member, a fork attached to said shaft and disposed at an angle less than ninety degrees to the shaft axis, said fork being connected to said eccentric so that the rotation of said member causes said eccentric to both oscillate said fork and to reciprocate said fork for producing an orbital motion at said toothbrush attachment.

2. The electric toothbrushing device of claim 1 wherein said fork is formed with a radially extending longitudinal slot, said eccentric being disposed in said slot, said eccentric formed with means engaging opposite sides of said fork whereby the circular movement of said eccentric forces said fork to simultaneously oscillate and reciprocate.

3. The electric toothbrushing device of claim 2 wherein said eccentric means includes two spaced annular shoulders which engage said fork in rolling contact at opposite sides of said slot.

4. An electric toothbrush comprising a housing from one end of which extends a drive shaft, the remote end of said shaft formed to carry a toothbrush attachment, a motor in said housing rotating an eccentric, a fork rigidly secured to said shaft and connected to said eccentric, means supporting said eccentric and preventing linear movement thereof in a direction parallel to said shaft, said fork including first surface means engaging said eccentric so that the rotation of said eccentric causes said shaft to oscillate, and second surface means angularly engaging said eccentric so that the rotation of said eccentric causes said shaft to reciprocate whereby the rotation of said eccentric causes said toothbrush attachment to have an orbital movement.

5. The electric toothbrush of claim 4 wherein said fork defines a slot into which said eccentric extends, said eccentric formed with opposed spaced chamfers which engage said fork second surface means at opposite sides of said slot, said second surface means lying in planes which are angularly disposed with respect to said eccentric chamfers.

6. The electric toothbrush of claim 5 including bearing means supporting said shaft for oscillation and reciprocation with respect to the longitudinal axis of said shaft.

7. The electric toothbrush of claim 6 wherein said motor includes an end bracket which supports said bearing means and a pin on which said eccentric is rotatably mounted, said pin being parallel to said shaft.

8. An electric toothbrush comprising a housing in which an electric motor is positioned, a drive shaft extending from one end of said housing and on which a toothbrush attachment is mountable, said shaft being supported by spaced aligned bearings for oscillation and longitudinal reciprocation, an arm secured to said shaft between said bearings and extending away from the axis of said shaft, eccentric means mounted in said housing for rotation by said motor, means preventing linear movement of said eccentric means in a direction parallel to the axis of said shaft, said arm having surface means inclined with respect to the direction of the axis of said shaft, said arm engaging said eccentric means so that the rotation thereof causes said shaft to oscillate, and said arm surface means engaging said eccentric in such a manner that the rotation thereof causes said shaft to reciprocate whereby the movement of said shaft imparts an orbital movement to said toothbrush attachment.

9. The electric toothbrush of claim 8 wherein said eccentric means includes a gear portion, a pinion mounted to said motor and engaging said gear portion for rotating said eccentric means.

10. The electric toothbrush of claim 8 wherein said arm surface means includes two flat surfaces which are parallel and spaced in the direction of the shaft axis, said eccentric means having contact means for simultaneously engaging both said surfaces.

11. The electric toothbrush of claim 9 wherein said contact means is in rolling engagement with said flat surfaces.

12. The electric toothbrush of claim 11 wherein said arm has a slot with parallel internal surfaces which engage said eccentric means in a rolling engagement.