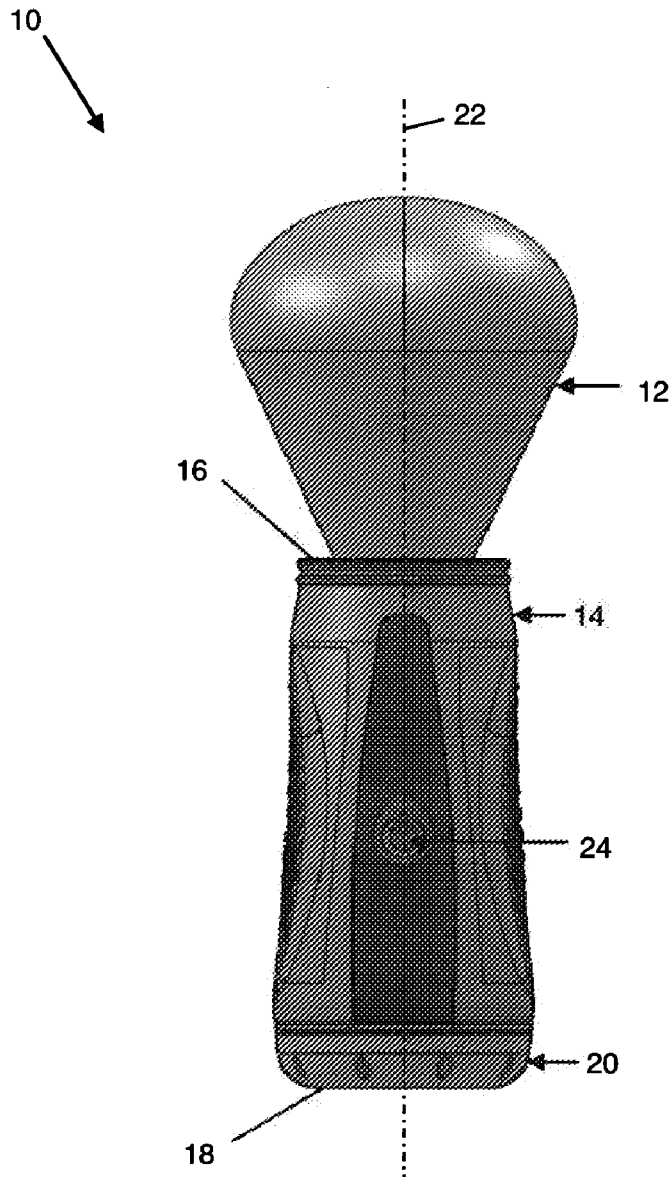




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Sabisch et al.(10) **Pub. No.: US 2012/0124758 A1**(43) **Pub. Date: May 24, 2012**(54) **POWERED BRUSH**(52) **U.S. Cl. 15/21.1**(57) **ABSTRACT**(76) Inventors: **Markus Sabisch**, Waldems (DE);
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Newbury (GB)(21) Appl. No.: **12/950,325**(22) Filed: **Nov. 19, 2010****Publication Classification**(51) **Int. Cl.**
A46B 13/00 (2006.01)

A powered brush is provided comprising a plurality of automated bristles that are driven in order to facilitate application of shave cream to a user's face while raising hairs off the face and stimulating, exfoliating, lubricating and moisturizing the skin. The powered brush comprises a handle having a top end, a bottom end and a longitudinal axis therebetween. A brush head comprises a plurality of bristles projecting away from the top end in a longitudinal direction is attached to a brush cup which is disposed at the top end of the handle and is movable relative thereto. An internal mechanism couples a motor drive shaft to the brush cup. The internal mechanism translates rotational movement of the motor drive shaft to reciprocating motion of the brush cup causing the brush cup and corresponding brush head attached thereto to oscillate linearly in the longitudinal direction.



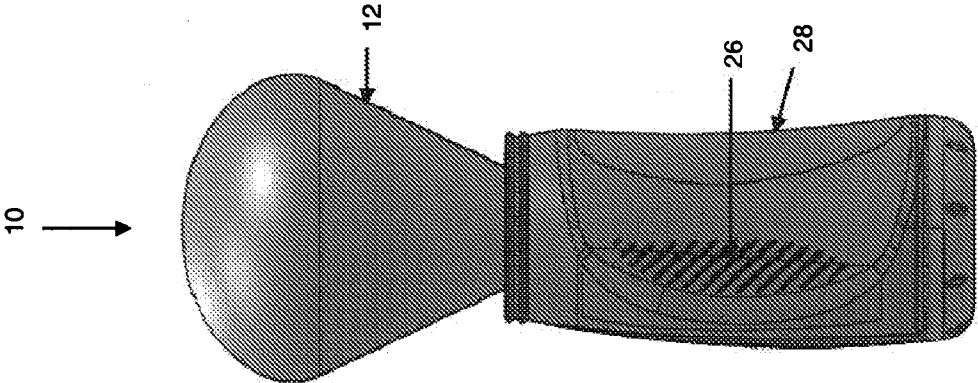


FIG. 1b

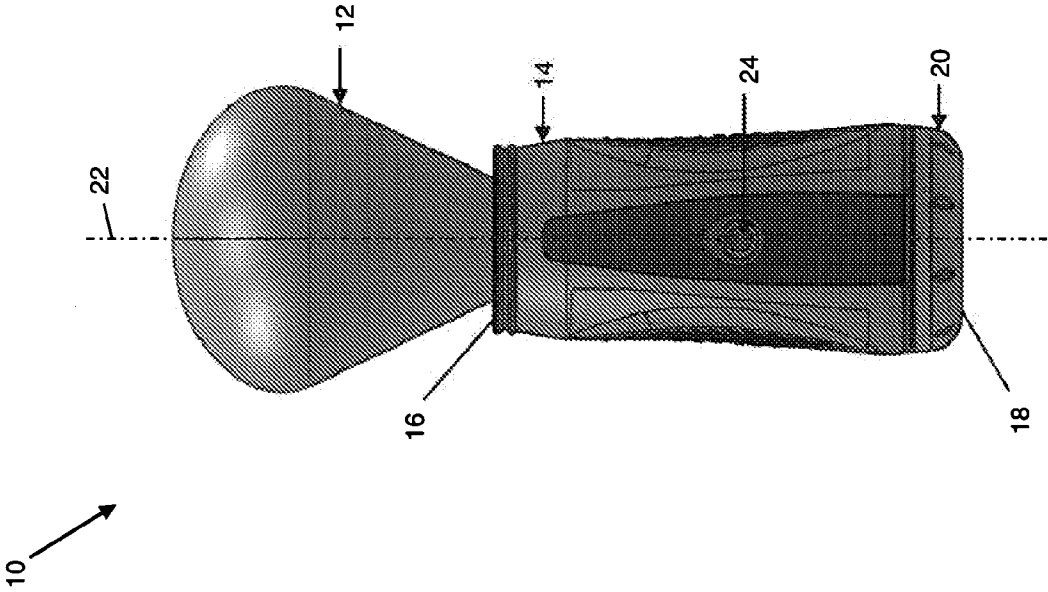


FIG. 1a

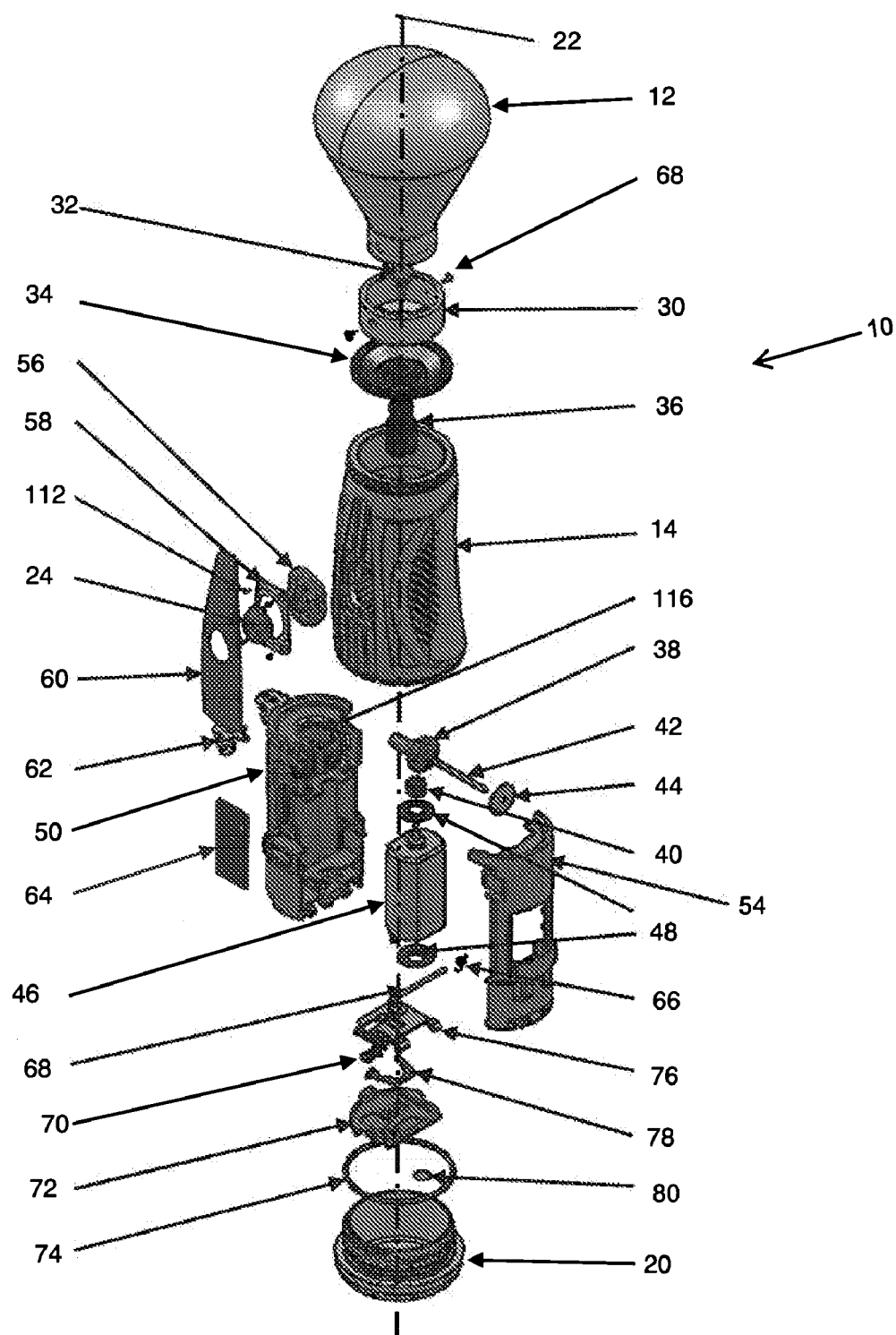


FIG. 2

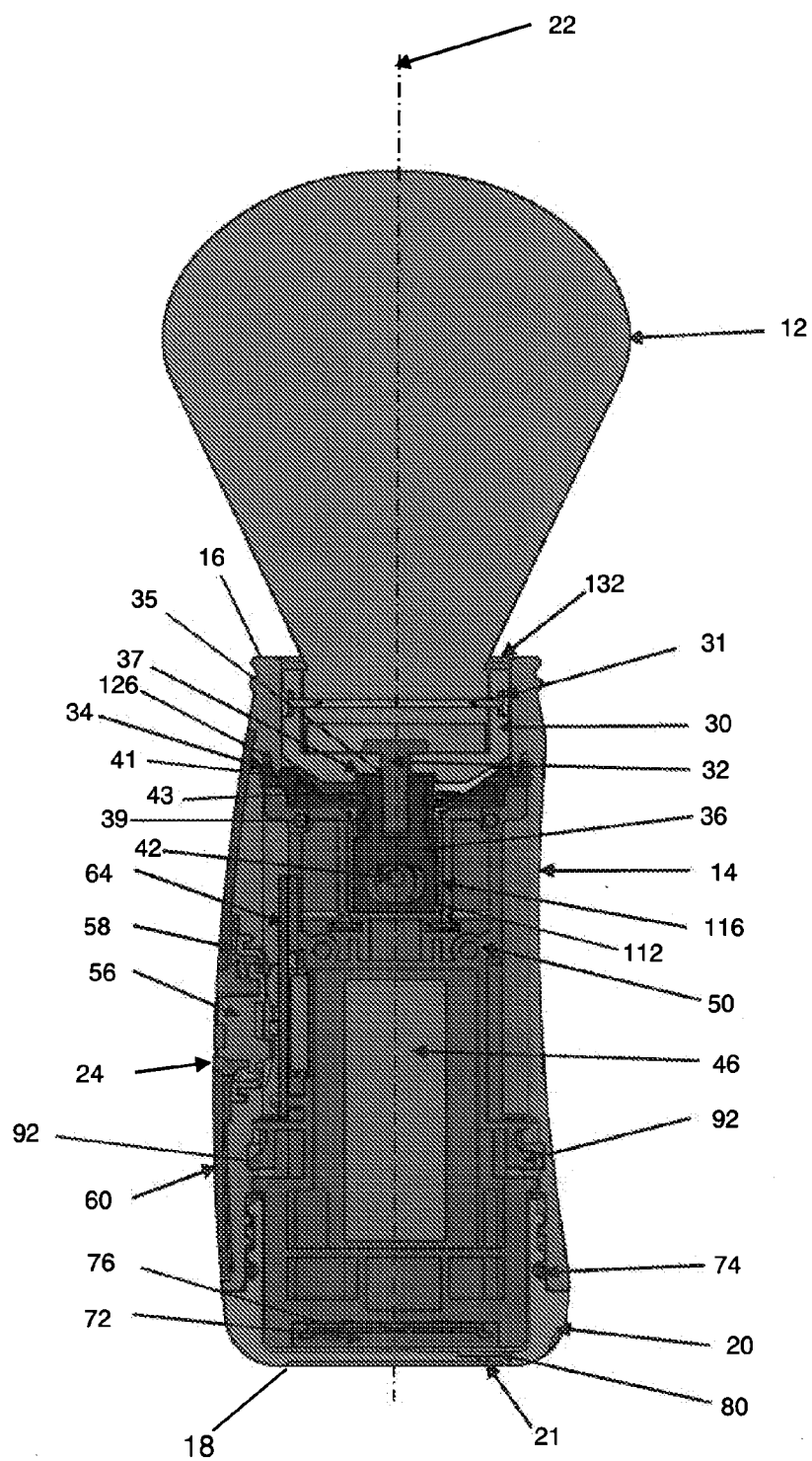


FIG. 3

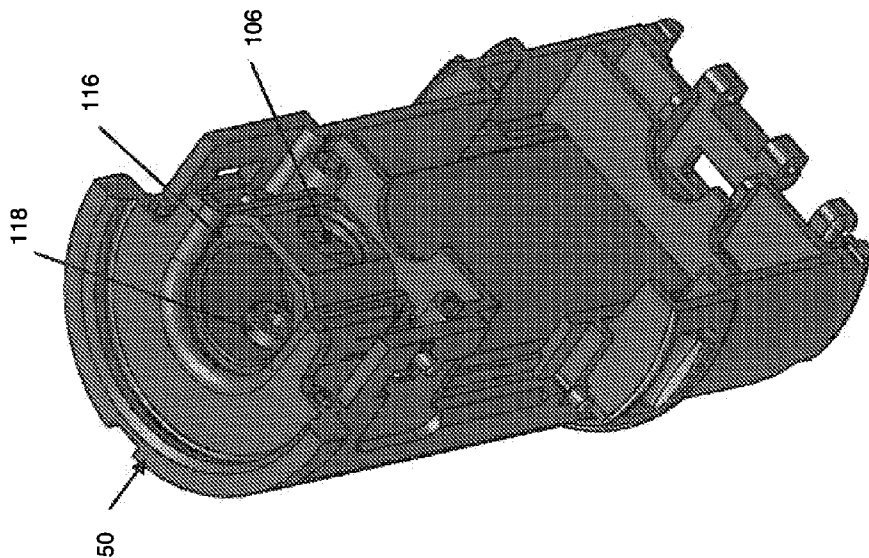


FIG. 5

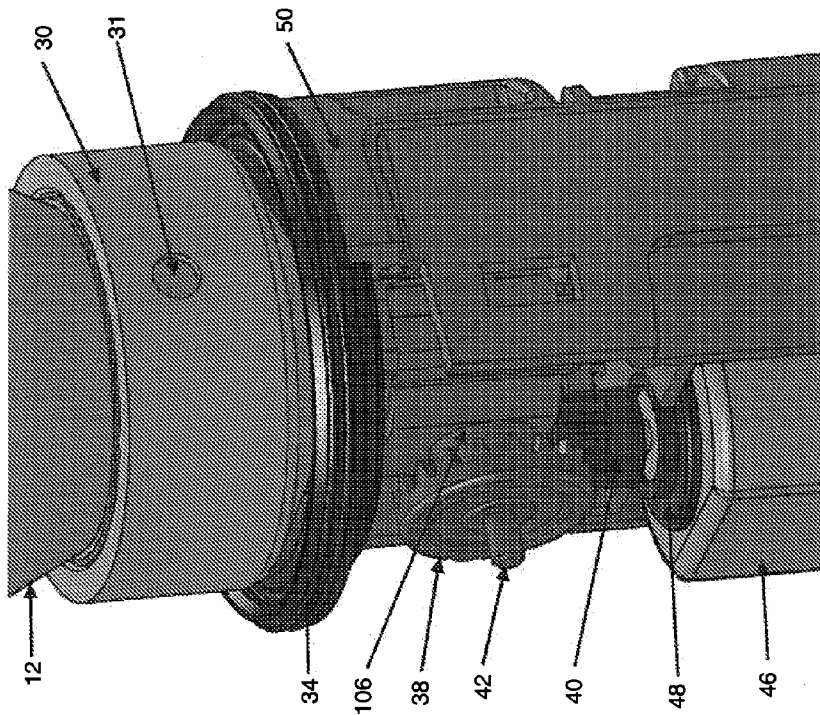


FIG. 4

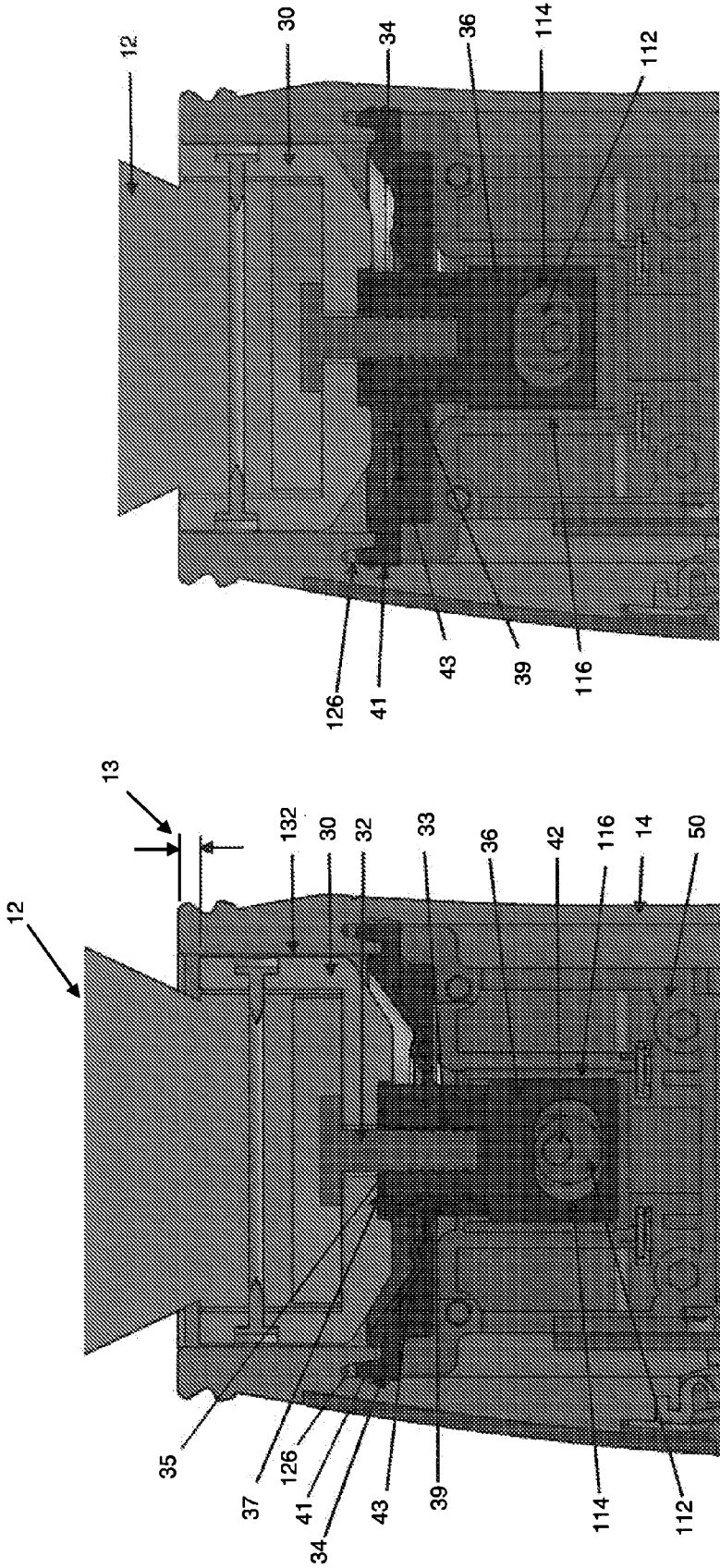


FIG. 6b

FIG. 6a

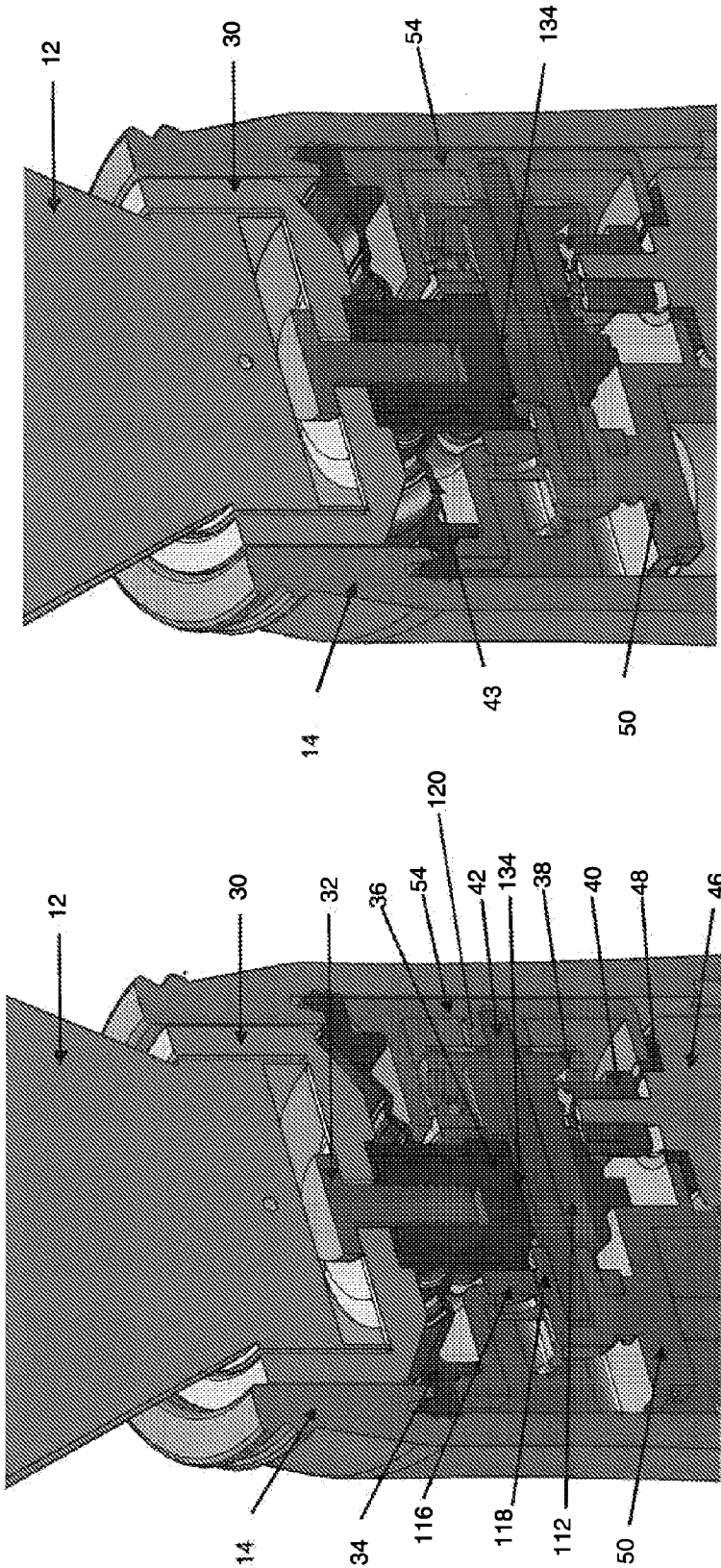


FIG. 7b

FIG. 7a

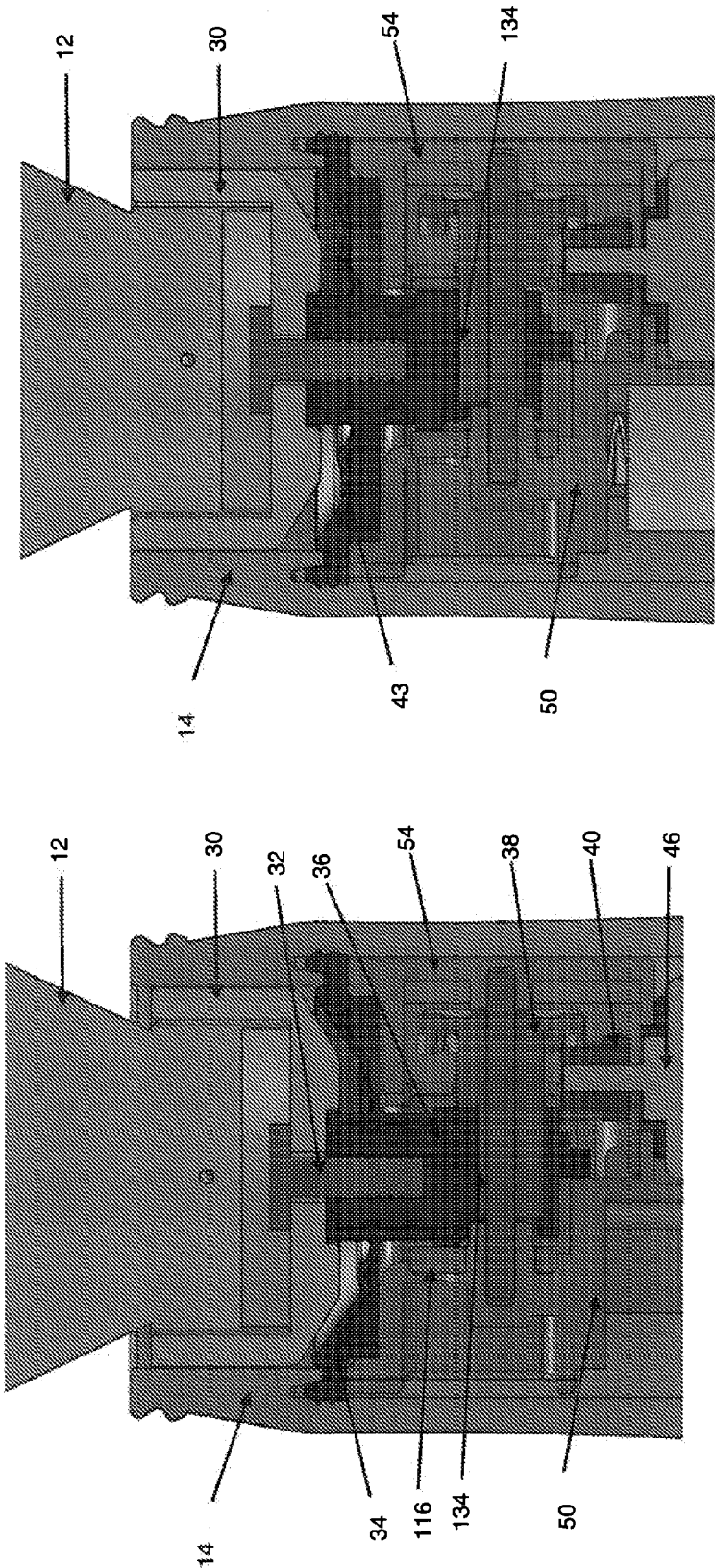
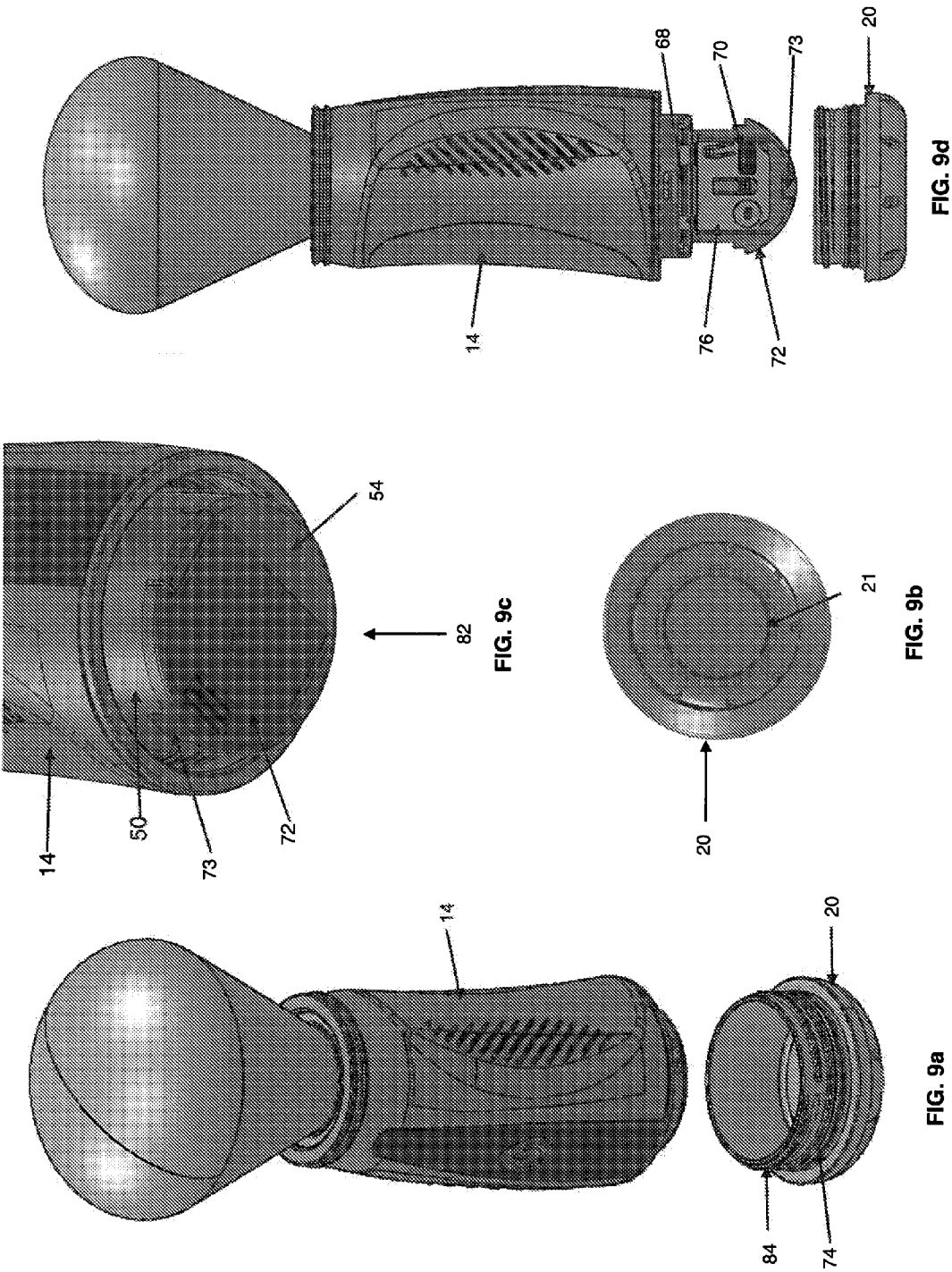
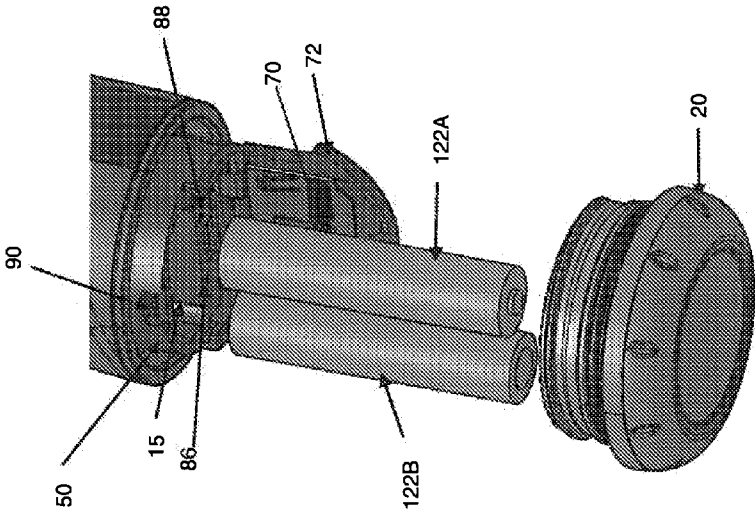
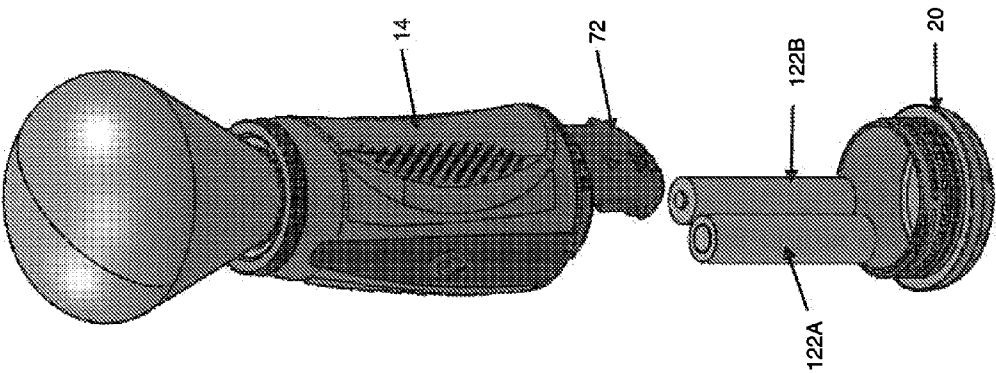


FIG. 8b

FIG. 8a





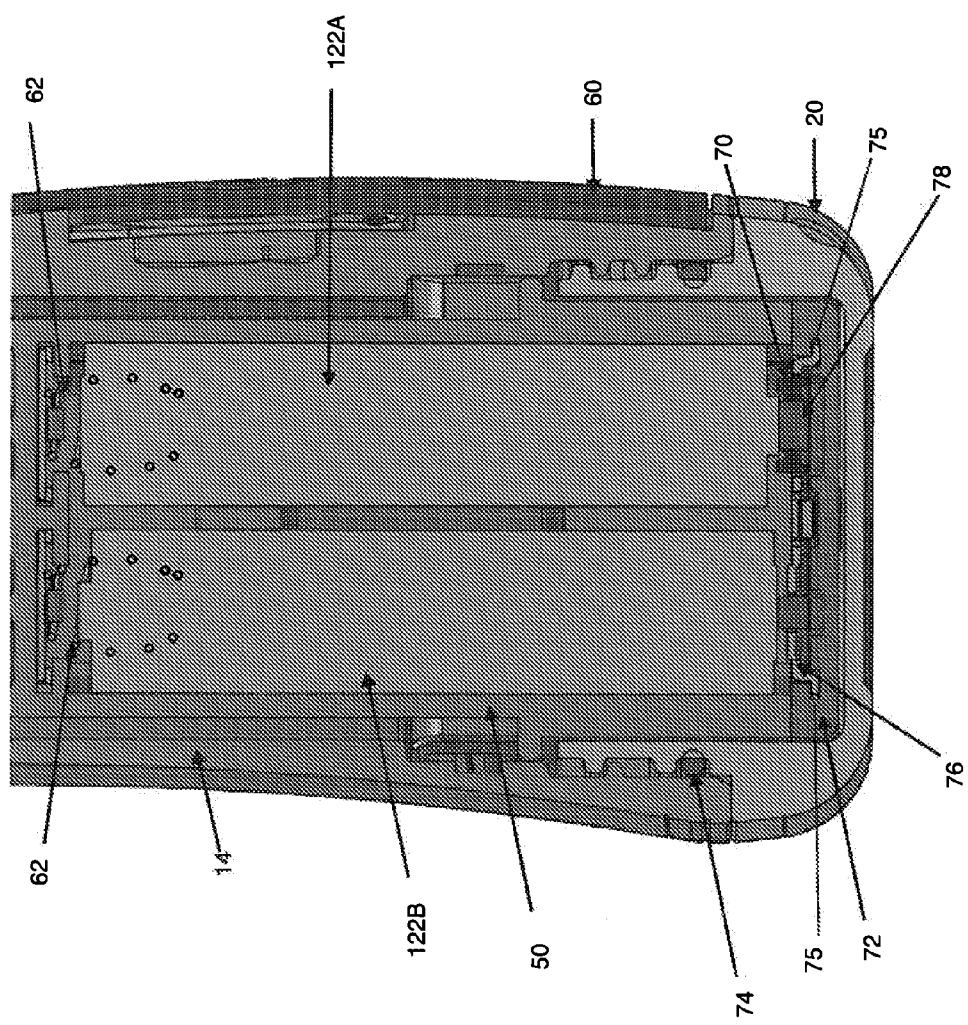


FIG. 11

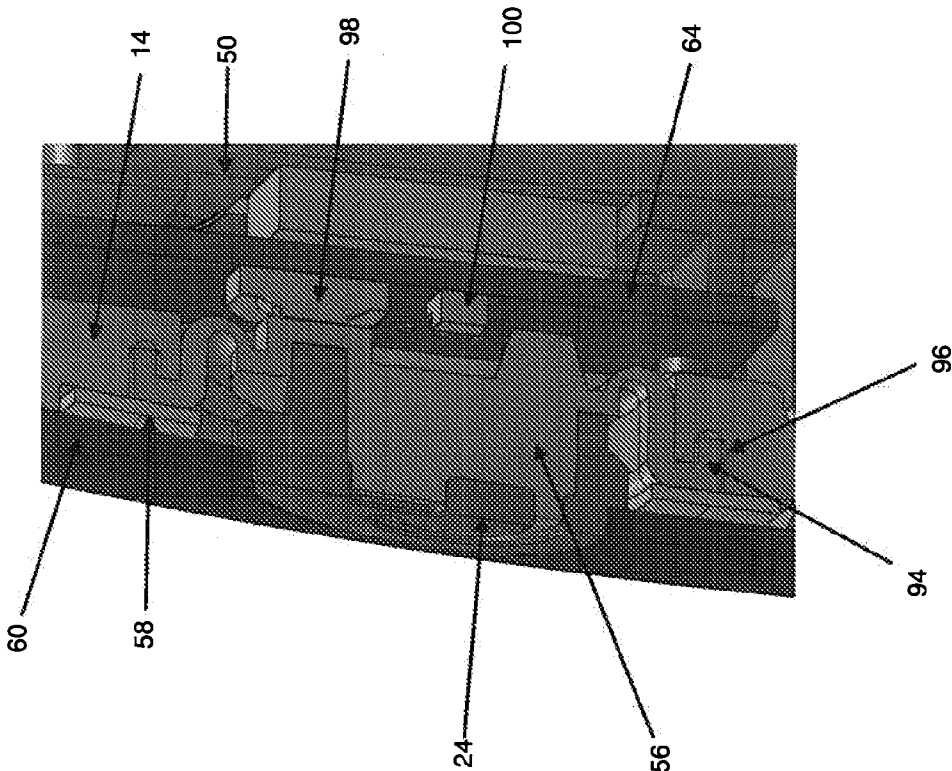


FIG. 12

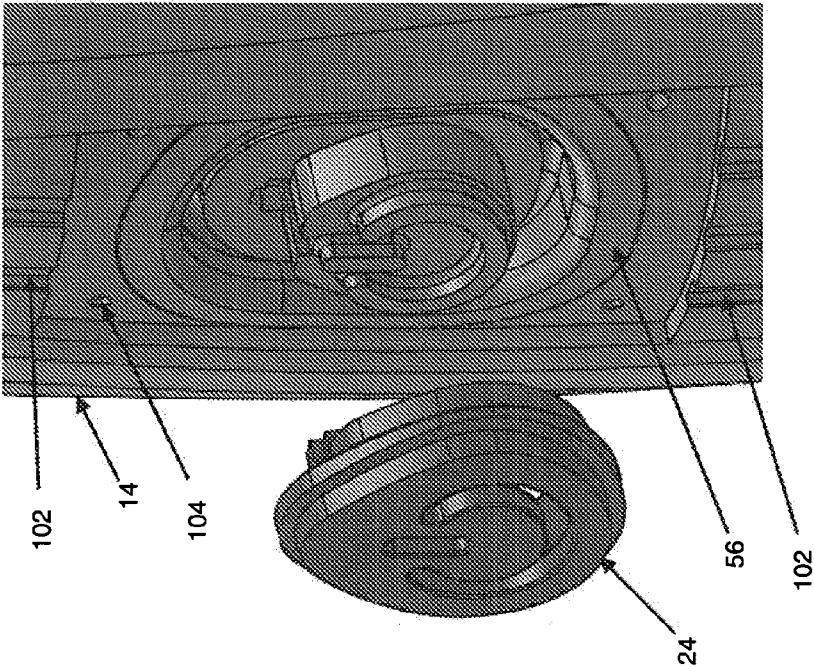


FIG. 13a

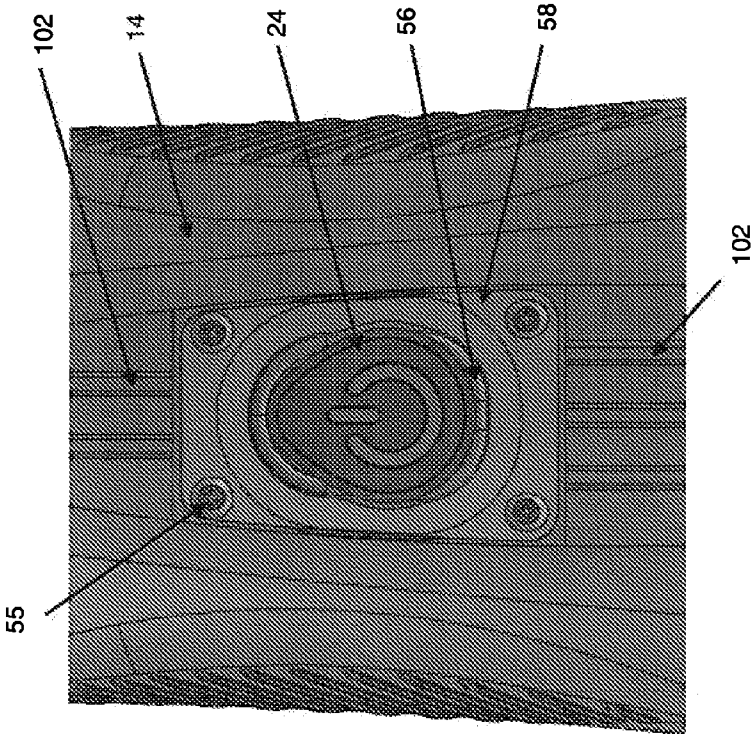


FIG. 13b

POWERED BRUSH

FIELD OF THE INVENTION

[0001] The present invention relates to brushes and particularly to brushes used in applying shave cream and more particularly to powered shave brushes used in applying shave cream.

BACKGROUND OF THE INVENTION

[0002] This invention relates to a brushes typically used in applying shave cream. Traditional shaving brushes are typically formed of a barrel-shaped handle with a plurality of bristles protruding from one end of the handle. The handles are typically made of wood, metal or plastic while the bristles of lower quality brushes are made of synthetic materials, such as nylon, and the bristles of higher quality brushes are made of natural materials, such as badger hair.

[0003] Shaving brushes have been used historically to prepare hair and skin ahead of wet shaving, for example with a double edged razor blade or with a wet shaving safety razor. A user would work up soap or gel into a lather either against their face, in a shaving mug/bowl, or in the palm of their wet hand. The user would then apply the lather to their skin with the brush, typically using rapid short strokes, and in the process would agitate hairs lying on the skin and enhance the condition of the skin by providing exfoliation. The benefits felt by a user during and after shaving are generally dependent on the quality of the bristles of the brush and the manner in which the lather is applied to the face. The application of lather is dependent on the motion of the user's hand which can limit the benefits of using a brush if not performed correctly.

[0004] In pursuit of an improved shaving product, there is a need for a shaving brush capable of effectively stimulating the skin, raising hairs off the face, exfoliating, and lubricating as well as moisturizing the skin that is not solely dependent on the motion of a user's hand. Thus, there is a need for a powered brush that can produce an automated bristle motion to optimize the effects desired with using a brush.

SUMMARY OF THE INVENTION

[0005] In one aspect, the invention features, in general, a powered brush providing an automated motion to plurality of bristles, thus enhancing the ability to stimulate the skin, raise hairs off the face, exfoliate, and lubricate and moisturize the skin while applying shave cream to a user's face. The powered brush comprises a handle having a top end, a bottom end and a longitudinal axis therebetween. A brush cup which is movable relative to the handle is disposed at the top end of the handle. A brush head is attached to the brush cup. The brush head comprises a plurality of bristles projecting away from the top end in a longitudinal direction. A motor comprising a drive shaft is mounted inside of the handle. The motor is joined to an internal mechanism coupling the motor drive shaft to the brush cup. The internal mechanism translates rotational movement of the motor drive shaft to reciprocating longitudinal motion of the brush cup such that in use, the brush cup and corresponding brush head attached thereto oscillate linearly in the longitudinal direction.

[0006] In one embodiment, the internal mechanism comprises a first gear attached to the motor drive shaft and a second gear meshed with the first gear. The second gear includes an elongated cam feature attached thereto. The elongated cam feature interfaces with a cam follower link con-

nected to the brush cup. The elongated cam feature engages a cam slot in the cam follower link and allows complete rotation of the elongated cam feature as the outer surface of the elongated cam feature contacts the cam slot. As the first gear drives the second gear, the elongated cam feature drives the cam follower link in a linear, up and down motion causing the brush cup and corresponding brush head attached thereto to oscillate linearly in the longitudinal direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description taken in conjunction with the accompanying drawings.

[0008] FIG. 1a is a front view of the powered brush.

[0009] FIG. 1b is a side view of the powered brush showing handle features.

[0010] FIG. 2 is an exploded view of the powered brush showing major components.

[0011] FIG. 3 is an overall sectional side view of the powered brush.

[0012] FIG. 4 is a perspective view of the left inner housing assembly with the brush handle and right inner housing removed highlighting the drive gears of the internal mechanism.

[0013] FIG. 5 is a perspective view of the left inner housing showing the molded insert cylinder.

[0014] FIG. 6a is a section view of the powered brush showing the oscillating brush in the 'in' position.

[0015] FIG. 6b is a section view of the powered brush showing the oscillating brush in the 'out' position.

[0016] FIG. 7a is a sectional perspective view through the internal mechanism of the powered brush showing the oscillating brush in the 'in' position.

[0017] FIG. 7b is a sectional perspective view through the internal mechanism of the powered brush showing the oscillating brush in the 'out' position.

[0018] FIG. 8a is a section view through the internal mechanism of the powered brush showing the oscillating brush in the 'in' position.

[0019] FIG. 8b is a section view through the internal mechanism of the powered brush showing the oscillating brush in the 'out' position.

[0020] FIG. 9a is a perspective view of the powered brush showing the battery cap removed.

[0021] FIG. 9b is a bottom view of the battery cap.

[0022] FIG. 9c is a perspective view of the bottom of the powered brush with the battery cap removed exposing the inner housing assembly.

[0023] FIG. 9d is a perspective view of the powered brush showing the battery cap removed and the battery door in the open position.

[0024] FIG. 10a is a perspective view of the powered brush showing the battery cap removed and battery door open for installation of batteries.

[0025] FIG. 10b is a perspective view of the bottom of the powered brush with the battery cap removed and battery door open exposing the battery cavity for installation of batteries.

[0026] FIG. 11 is a section view of the battery compartment showing the electrical path of the installed batteries.

[0027] FIG. 12 is an enlarged sectional side view of the powered brush at the power button location.

[0028] FIG. 13a is an enlarged front view of the power button with the top plate removed from the handle.

[0029] FIG. 13b is a detail view of the push button seal with the sealing frame removed and push button separated from the seal and handle.

DETAILED DESCRIPTION OF THE INVENTION

[0030] The shaving razor according to the present invention will be described with reference to the following figures which illustrate certain embodiments. It will be apparent to those skilled in the art that these embodiments do not represent the full scope of the invention which is broadly applicable in the form of variations and equivalents as may be embraced by the claims appended hereto. Furthermore, features described or illustrated as part of one embodiment may be used with another embodiment to yield still a further embodiment. It is intended that the scope of the claims extend to all such variations and equivalents.

[0031] The powered brush 10 according to the present invention is shown in FIGS. 1a and 1b. The powered brush 10 includes a handle 14 having a top end 16 including the brush head 12 and a bottom end 18 including a battery cap 20. A longitudinal axis 22 extends between the top end 16 and the bottom end 18. Power button 24 is disposed in the side of the handle 14 between the top end 16 and the bottom end 18.

[0032] The handle 14 and battery cap 20 are preferably chrome plated metal for a high quality look and feel; however, plastics and materials can be used. FIG. 1b is a side view of the powered brush 10 and highlights gripping features of the handle 14. The brush handle 14 has raised line features 26 on both sides of the handle 14 to improve the users grip along with a curved etched section 28. The curved etched section 28 could alternatively be a machined surface, rubber grip insert, or electroformed plate in order to improve the users' grip of the device.

[0033] FIG. 2 is an exploded view of the powered brush 10 according to the present invention showing the major components. Starting from the top, the powered brush 10 includes brush head 12, brush cup 30, attachment pin 32, diaphragm seal 34, cam follower link 36, crown gear 38, motor gear 40, gear shaft 42, gear spacer 44, motor 46, motor cushions 48, left inner housing 50, insert molded cylinder 116, right inner housing 54, button seal 56, button sealing frame 58, power button 24, top plate 60, spring battery contacts 62, PCB assembly 64, battery door torsion spring 66, battery door shaft 68, battery plus protector 70, battery door 72, cap O-ring 74, battery cap 20, battery door plate 76, battery door conductive piece 78, and vent membrane 80. The components and there functions are discussed more fully below.

[0034] FIG. 3 is an overall sectional side view of the powered brush 10. As shown in FIG. 3, the brush head 12 comprises a plurality of bristles attached to a base. The plurality of bristles can comprise badger hair, boar hair, horse hair, and synthetics bristles such as nylon. The base of the brush head 12 is attached to the brush cup 30 by glue and two brush pins 31 that prevent removal.

[0035] The brush cup 30 is moveable in an axial direction relative to the handle 14. The bristles extend longitudinally away from the top end 16 of the handle 14 in a longitudinal direction 22. "Longitudinal direction" is a direction running parallel to the longitudinal axis of the handle and includes directions within $\pm 45^\circ$ of the longitudinal direction. The distance the bristles extend longitudinally away from the top end

16 of the handle ranges from about 0.5 inches to about 3.0 inches, preferably from about 1.0 inches to about 2.5 inches.

[0036] The top end 16 of the handle shown in FIG. 3 includes an opening 132 sized for receiving the brush cup 30. The handle 14 includes an inner cavity through the center between the top end 16 and the bottom end 18. An inner housing assembly 82 shown in FIG. 9c is disposed inside the inner cavity. The inner housing 82 includes a left inner housing 50 and a right inner housing 54. As shown in FIG. 3, snap features 92 on either side of the left inner housing 50 fit into a groove on the inner surface of the brush handle 14 and lock the inner housing assembly 82 into position. The inner housing assembly 82 houses a drive mechanism and a battery compartment. The drive mechanism comprises a motor 46 including a drive shaft, and an internal mechanism coupling the drive shaft to the brush cup 30.

[0037] FIG. 4 is a perspective view of the device with the brush handle 14 and right inner housing 54 removed highlighting the drive gears of the internal mechanism. The internal mechanism partially translates rotational movement of the motor drive shaft to reciprocating longitudinal motion of the brush cup 30. The internal mechanism includes a transmission that comprises a motor gear 40 attached to the motor drive shaft. A crown gear 38 meshes with the motor gear 40. The gear ratio (number of teeth of the crown gear 38 divided by the number of teeth of the motor gear 40) of this embodiment is 2.25. However, different gear ratios could be selected to alter the speed or rate of the in and out motion of the power shave brush 10. Further, it should be noted that different gear types could be used. For example, the motor gear can comprise a pinion, and bevel gears could replace the motor gear and crown gear. Further still, a different gear combination or gear train could be used to generate the same motion but at a different rate of linear oscillation.

[0038] The crown gear 38 includes a cam 112 shown in FIG. 3 comprising an outer surface that interfaces with a cam follower link 36. The cam follower link 36 is attached to the brush cup 30 via an attachment pin 32. The brush head 12 is glued and pinned into the brush cup 30 after the attachment pin 32 is attached to the cam follower link 36. The attachment pin 32 has knurled or machined features 33 that prevent removal once the attachment pin 32 is inserted into the cam follower link 36.

[0039] A diaphragm seal 34 (shown in FIG. 3 and in more detail FIG. 6a) assembled between the brush cup 30 and internal mechanism prevents water from entering the device. The diaphragm seal 34 has a center hole 35 and circular seal flange 37. The circular seal flange 37 is under compression between the bottom of the brush cup 30 and the top of the cam follower link 36 after the insertion of the attachment pin 32. The compression of the seal flange 37 prevents water from entering the device at the center attachment location between the brush cup 30 and the cam follower link 36. The diaphragm seal 34 also has a center cylindrical hub 39, which is undersized in order to grip the upper section of the cam follower link 36. This additional compression further helps to reduce the possibility of water leaking into the device. In addition, the outer perimeter of the diaphragm seal 34 has a wedge rib feature 41 that fits into annular groove 126 of the brush handle 14. The wedge rib feature 41 is driven into the annular groove 126 by the insertion of inner housing assembly 82. The top features of the left inner housing 50 and right inner housing 54 supports the bottom of the wedge rib feature 41 of the diaphragm seal 34. As the wedge rib feature 41 is compressed

into the groove 126, radial compression on the sides of the wedge rib feature 41 further prevents water from entering the device. During oscillation of the cam follower link 36 the flexible diaphragm seal 34 can easily deform due to the thin ligament 43, which connects the wedge rib feature 41 with the center cylindrical hub 39.

[0040] FIG. 7a and FIG. 7b are sectional views of the powered brush 10 showing the internal mechanism. As shown, the motor 46 is secured between the left inner housing 50 and the right inner housing 54. In order to stabilize the motor and dampen the noise of the power shave brush 10, flexible motor cushions 48 are inserted at the upper and lower points of attachment. (The flexible motor cushion 48 for the lower point of attachment is shown in FIG. 2.) It is preferred that these motor cushions 48 are soft and flexible and made of a thermoplastic elastomer, silicon, rubber, or similar material.

[0041] Motor gear 40 is attached directly to the motor output shaft. Motor gear 40 drives crown gear 38 which is attached to gear shaft 42. Crown gear 38 also has an elongated cam feature 112, which fits into the molded in hole 106 in the left inner housing 50.

[0042] FIG. 5 is a perspective view of the left inner housing 50 with the molded insert cylinder 116. The molded insert cylinder 116 is preferably a machined metal part, which is inserted directly into the left inner housing 50. The molded insert cylinder 116 acts as a guide that aids in the axial alignment of the cam follower link 36 thereby limiting axial misalignment of the brush head 12 during oscillation. Alignment of the cam follower link 36 and brush cup 30 are important to ensure that the oscillation of the brush head 12 is axial since the cam feature 112 can impart both a radial and axial force on the slot 114. The top opening 132 of brush handle 14 also assists in the axial alignment of the brush cup 30 during the linear oscillation. Therefore, cylindrical gaps between the cam follower link 36 and molded insert cylinder 116 and between the brush cup 30 and top opening 132 are minimized in order to reduce any radial motion of the brush head 12 and the cam follower link 36.

[0043] Hole 106 in the left inner housing 50 shown in FIG. 5 acts as a bearing surface for the elongated cam feature 112 extending axially from the crown gear 38. The left inner housing 50 also includes a boss 118 providing a bearing surface where the end of the gear shaft 42 adjacent the cam feature 112 is mounted. Right inner housing 54 includes a second boss 120 shown in FIG. 7a providing a bearing surface for mounting the other the end of the gear shaft 42 adjacent the crown gear 38. Several additional features of the left inner housing 50 and the right inner housing 54 can be observed like the upper and lower points of the motor attachment, attachment snap features 92, and the battery door hinge to name a few.

[0044] FIGS. 6a, 6b, 7a, 7b, 8a, and 8b demonstrate the basic linear oscillation of the internal mechanism, each showing different views of the brush head 12 in the “in” and “out” state. Cam feature 112 of crown gear 38 engages with the cam slot 114 of the cam follower link 36. In the “in” or down state shown in FIGS. 6a, 7a and 8a, the cam feature 112 is in contact with the bottom surface of the cam slot 114 which drives the cam follower link 36 downward. As the crown gear 38 continues to be driven by the motor gear 40, the cam feature 112 rotates about the axis defined by the gear shaft 42. The slot 114 in the cam follower link 36 allows for the complete rotation of the cam feature 112. The outer surface of the cam feature 112 drives the cam follower link 36 upward as

it rotates at point of contact 134. At half rotation, the cam follower link 36 is at the maximum extension and the brush head 12, which is rigidly attached thereto, has moved a fixed distance upward to the “out” state as shown in FIGS. 6b, 7b, and 8b. As the cam feature 112 continues to rotate in the same direction, cam follower link 36 is driven downward back toward the “in” state.

[0045] When the push button 24 is pressed to activate the basic function of the power shave brush 10, the brush head 12 will move in and out a fixed distance 13 governed by the internal mechanism previously described. FIG. 6a is a section view of the device in the “in” state and FIG. 6b is a section view of the device in the “out” state. The fixed distance 13 for the embodiment shown in FIG. 6a is 1.5 mm. However, the distance of linear axial travel could be adjusted by changing the internal mechanism. In addition, although linear in and out motion of the brush head 12 is preferred, the brush head 12 could have different motions (rotation, nodding, vibrating, etc.) by changing the internal mechanism. Further, the rate at which the brush head 12 moves in and out can also be adjusted and will vary depending on the force applied to the brush head 12 and status of the power supply. However, the rate is preferably in the range of 100-800 Hz and more preferably in the range of 200-400 Hz.

[0046] In addition to housing the motor 46 and internal mechanism previously described, the inner housing assembly 82 includes a battery compartment 15 near the bottom end of the handle 14 as shown in FIGS. 9 through 11. FIG. 9a illustrates the removal of outer battery cap 20 from the handle 14. The outer battery cap 20 is attached to the handle 14 via screw threads 84. Cap O-ring 74 is disposed adjacent the screw threads 84 proximate the bottom end of the cap 20 to prevent water from entering around the threads 84. Although the handle 14 needs to be waterproof to protect the electrical components, motor, and internal mechanism from exposure to water, particularly for shaving cream application, it also needs to allow for venting due to possible internal gas generation from the batteries. For this reason, the battery cap 20 includes a vent hole 21 in the bottom of the outer battery cap 20 as shown in FIG. 9b. The vent hole 21 is covered with a vent membrane 80 shown in FIGS. 2 and 3 which is porous to allow air to flow into and out of the inner cavity of the powered brush 10 and waterproof to protect the device. Material used for the vent membrane 80 can be purchased from W.L. Gore & Associates, Inc.

[0047] FIG. 9c is a view of the bottom of the handle 14 with the outer battery cap 20 removed revealing the bottom of the inner housing assembly 82 which protrudes outward slightly from the bottom of the handle 14. The battery compartment 15 includes a battery door 72. In the embodiment shown in FIGS. 9c and 9d, the battery door 72 first slides in the direction indicated by the arrow molded in the bottom of the door 72. Once a lip 73 on the battery door 72 clears a cavity 90 of the left inner housing 50, the door 72 can freely swing open about the battery door shaft 68.

[0048] The battery door 72 houses a metal battery door plate 76, battery door conductive piece 78, and battery plus protector 70. The metal battery door plate 76 has formed hinges that attach to the battery door shaft 68. The battery door 72 can slide relative to the battery door plate 76 via molded in slots 75 that engage with the plate. The slots 75 can be seen in more detail in FIG. 11. This allows the battery door to slide in the direction of the molded in arrow and allows for the opening of the battery door 72.

[0049] Once the battery door lip 75 clears the cavity 90, the battery door 72 is forced open by a battery door torsion spring 66. This allows for the easy insertion of batteries 122B and 122A into the battery compartment 15 as illustrated in FIGS. 10a and 10b. The correct orientation of the batteries is communicated by a molded in minus sign 86 and molded in plus sign 88 on the bottom exposed surface of left inner housing 50 shown in FIG. 10b.

[0050] FIG. 11 is a sectional view through the center of the batteries 122B and 122A. It demonstrates the electrical path of correctly installed batteries in the device. Spring battery contacts 62 force both batteries downward against the battery door 72 so that contact is made between the batteries and the battery door conductive piece 78. The battery door conductive piece 78 completes the electrical connection between the batteries to power the device.

[0051] A battery plus protector 70 is also attached to the battery door plate 76 to ensure correct installation of the batteries 122B and 122A into the device. The battery plus protector 70 is non-conductive and ensures that only the positive end of the battery can complete the connection due to molded in features. If the battery is installed with the negative end facing down at this location, the end of the battery door conductive piece 78 cannot contact the battery and no connection can be made.

[0052] The powered brush 10 is activated by the push button 24 on the side of the handle 14 shown in FIG. 1a. When the push button 24 is pressed and the powered brush 10 is oscillating, a blue light shines through the push button 24 indicating that the unit is on. When the push button 24 is pressed again, the powered brush 10 stops oscillating and the blue light is off, indicating that the unit is off. Alternatively, the powered brush 10 can include a multi-speed motor capable of driving the brush head 12 at two or more oscillating speeds. For such applications, the motor speed can be controlled by the PCB activated by the push button 24. For instance, the button 24 can be pushed once to turn the unit on, pushed a second time to increase the oscillating speed and a third time to turn the unit off.

[0053] FIG. 12 and FIGS. 13a and 13b illustrate the push button 24 attachment features. The overall sectional side view of the powered brush 10 shown in FIG. 3 illustrates the orientation of the push button 24 relative to other key components of the device. FIG. 12 is an enlarged sectional side view at the button location. FIGS. 13a and 13b illustrate the basic arrangement of the push button 24.

[0054] Push button 24 sits on a clear flexible button seal 56. The flexible button seal 56 is preferably clear silicon. However, alternatives like TPE could also be considered. The push button 24 is held in place by an attached top plate 60. A flange on the perimeter of the button 24 facilitates the retention. The push button 24 has an extended feature that fits into the button seal 56 and makes contact with a surface mounted switch 98, which is attached to the main PCB 64. The main PCB 64 has an indicator LED 100 mounted below the push button 24 and button seal 56. When the device is activated after the switch 98 is depressed, the LED 100 lights up and shines through the clear flexible button seal 56 indicating that the device is activated. The color of the LED light 100 can be white or colored. For instance, in a preferred embodiment the LED light 100 is blue. The button seal 56 can also incorporate light scattering techniques to disperse the light. Such methods include using a matte finish and/or polymer additive.

[0055] The main PCB 64 is fixed to the left inner housing 50. In the embodiment shown, the PCB 64 is mounted via two heat stake posts, but other methods of attachment are possible (screws, snap fit, etc.). The location of the PCB 64 and surface mounted switch 98 is fixed when the inner housing assembly 82 is attached to the brush handle 14.

[0056] For waterproofing, the button seal 56 has a perimeter rib feature 94 that fits into a groove 96 in the brush handle 14. The seal 56 is compressed and retained by the button sealing frame 58. The button sealing frame 58 is preferably a stamped metal piece to limit deflection and improve the water tight condition. As the button seal 56 is compressed, the rib feature 94 deflects outward against the side walls of the groove 96. Therefore, the sealing surfaces include the inside and outside wall perimeter of the groove and the bottom of the groove channel. In addition, adhesive in the bottom of the groove could be used as a sealing back-up.

[0057] FIG. 13a is an enlarged front view of the push button 24 with the top plate 60 removed. Glue grooves 102 on the side of the handle 14 are used to attach the top plate 60. Glue is applied in the grooves to secure the top plate 60 to the handle 14. Alternative methods for attachment can be used. The button sealing frame 58 is attached to the brush handle 14 using four screws 55. The screws 55 allow for the button sealing frame 58 to apply pressure to the button seal 56 and prevent water leakage into the power shave brush 10.

[0058] FIG. 13b is a detail view of the push button 24 with the sealing frame 58 removed and push button 24 separated from the seal 56 and handle 14. It is clear from this view how the shape of the button seal 56 fits into the push button 24. FIG. 13b also highlights the screw thread locations 104 for screws 55, which are used to attach the button sealing frame 58.

[0059] Regarding all numerical ranges disclosed herein, it should be understood that every maximum numerical limitation given throughout this specification includes every lower numerical limitation, as if such lower numerical limitations were expressly written herein. In addition, every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Further, every numerical range given throughout this specification will include every narrower numerical range that falls within such broader numerical range and will also encompass each individual number within the numerical range, as if such narrower numerical ranges and individual numbers were all expressly written herein.

[0060] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

[0061] Every document cited herein, including any cross referenced or related patent or application is hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a

document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

[0062] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

1. A powered brush comprising:
a handle having a top end, a bottom end and a longitudinal axis therebetween;
a brush cup disposed at the top end and movable relative to the handle;
a brush head attached to the brush cup, the brush head comprising a plurality of bristles projecting away from the top end in a longitudinal direction;
a motor mounted inside of the handle, the motor comprising drive shaft, and
an internal mechanism coupling the motor drive shaft to the brush cup, wherein, in use, the internal mechanism translates rotational movement of the motor drive shaft to reciprocating longitudinal motion of the brush cup wherein the brush cup and brush head attached thereto oscillate linearly in the longitudinal direction.
2. The powered brush of claim 1 wherein the brush head comprises a base wherein the plurality of bristles are attached to the base and the base is attached to the brush cup.
3. The powered brush of claim 1 further comprising a first opening in the top end, wherein the brush cup is disposed in the first opening and the plurality of bristles extend through the first opening.
4. The powered brush of claim 1 wherein the plurality of bristles is selected from the group badger hair, boar hair, horse hair.
5. The powered brush of claim 1 wherein the plurality of bristles comprises synthetic bristles.
6. The powered brush of claim 5 wherein the synthetic bristles comprises nylon.
7. The powered brush of claim 1 wherein brush cup oscillates linearly at a frequency ranging from about 100 Hertz to about 800 Hertz.
8. The powered brush of claim 1 wherein brush cup oscillates linearly at a frequency ranging from about 200 Hertz to about 400 Hertz.

9. The powered brush of claim 1 wherein brush cup oscillates linearly, in and out a distance ranging from about 1.0 mm to about 2.0 mm.

10. The powered brush of claim 1 wherein brush cup oscillates linearly, in and out a distance of 1.5 mm.

11. The powered brush of claim 1 further comprising a battery compartment adjacent to the motor and a battery cap removably attached to the bottom end of the handle providing access to the battery compartment.

12. The powered brush of claim 11 wherein the battery cap is removably attached to the handle via screw threads.

13. The powered brush of claim 1 wherein the internal mechanism comprises:

- a. a first gear attached to the motor drive shaft;
- b. a second gear meshed with the first gear;
- c. an elongated cam feature attached to the second gear, the elongated cam feature including an outer surface; and
- d. a cam follower link connected to the brush cup, the cam follower link including a cam slot wherein the elongated cam feature engages the cam slot allowing complete rotation of the elongated cam feature as the outer surface contacts the cam slot;

wherein as the first gear drives the second gear, the elongated cam feature rotates driving the cam follower link in a linear, up and down motion.

14. The powered brush of claim 13 wherein the second gear and first gear include a gear ratio wherein the gear ratio is 2.25.

15. The powered brush of claim 13 wherein the first gear comprises a pinion and the second gear comprises a crown gear.

16. The powered brush of claim 13 wherein the first gear and the second gear comprise bevel gears.

17. The powered brush of claim 13 wherein the motor and the drive mechanism are linearly aligned along the longitudinal axis.

18. The powered brush of claim 11 where in the handle and battery cap are chrome plated metal.

19. The powered brush of claim 1 including a housing mounted inside of the handle wherein the housing accommodates the motor, drive mechanism, and battery compartment.

20. The powered brush of claim 1 wherein the handle further comprises a power button in the handle between the top end and the bottom end wherein the power button includes an LED which lights when the power button is depressed and the powered brush is activated.

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