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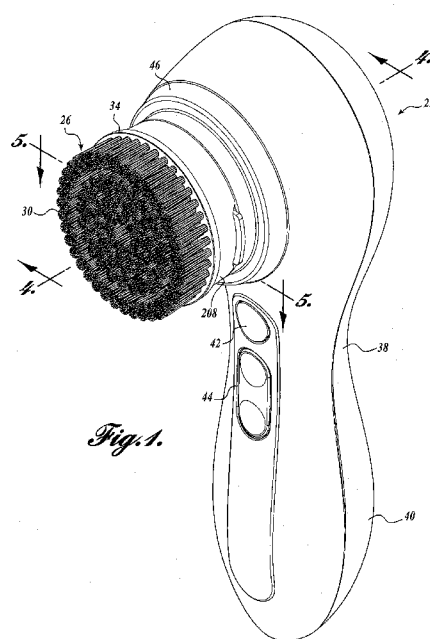
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(54) Title: REMOVABLE HEAD ATTACHMENT STRUCTURE FOR A PERSONAL CARE APPLIANCE



(57) Abstract: The present invention relates to an attachment structure for removably securing a removable head to a personal care appliance, the attachment structure comprising: (a) a base plate securable to a drive shaft of the personal care appliance, the base plate comprising a first latch opening having a latch opening width; and (b) a hand grip plate securable to the removable head, the hand grip plate including a first latch that is selectively engageable within the first latch opening to removably secure the removable head to the personal care appliance, wherein the first latch is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width.



DESCRIPTION

**REMOVABLE HEAD ATTACHMENT STRUCTURE FOR A PERSONAL CARE
APPLIANCE**

TECHNICAL FIELD

The present invention relate to a removable head attachment structure for a personal care appliance.

BACKGROUND ART

In personal care appliances, including those having a relatively large removable head assembly, such as those used for cleaning, exfoliating, or otherwise treating the skin, the head must be readily removable and installable by a user because of regular replacement requirements. Moreover, when installed, the removable head must have a solid, positive connection with a drive member of the appliance, such as a rotating or oscillating shaft, with no or little loss of motion between the drive member and the removable head.

Prior art attachment structures are generally complicated lock-in structures to ensure stability during operation of the appliance as well as to reduce noise cause by vibration. The prior art attachment structures are not only complicated to use, but they are complicated and expensive to manufacture.

Thus, it can be appreciated that a simplified attachment structure for removable securing a head to a personal care appliance that is easy to use and that does not compromise mechanical connection or performance is desired.

DISCLOSURE OF INVENTION

The present invention provides an attachment structure for removably securing a removable head to a personal care appliance, the attachment structure comprising:

(a) a base plate securable to a drive shaft of the personal care appliance, the base plate comprising a first latch opening having a latch opening width; and

(b) a hand grip plate securable to the removable head, the hand grip plate including a first latch that is selectively engageable within the first latch opening to removably secure the removable head to the personal care appliance, wherein the first latch is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width.

In one embodiment, the hand grip plate further includes first and second grip portions extending laterally from the first latch, in which the first and second grip portions are moveable toward and away from one another to move the first latch between the first, non-deformed state and the second, deformed state.

In one embodiment, the base plate includes a first catch extending into the first latch opening that is selectively engageable with a first hook assembly defined on the first latch when the first latch is received within the first latch opening.

In one embodiment, the attachment structure further comprises a support structure extending between the base plate toward the personal care appliance when the base plate is secured to the personal care appliance, and the support structure configured to stabilize and secure the connection between the base plate and the drive shaft. The support structure may include a drive shaft opening that is keyed to receive the drive shaft.

In one embodiment, the removable head includes stabilizing structure defined on an interior surface of the removable head that is engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head. The stabilizing structure may include at least one protrusion that is receivable within an opening in the hand grip plate.

The present invention also provides a removable head for use with a personal care appliance having a drive shaft and a base plate secured to the drive shaft, wherein the base plate comprises a first latch opening having a latch opening width, the removable head comprising:

- (a) a base having an interior surface and an exterior surface;
- (b) a personal care portion secured to the exterior surface of the base; and
- (c) a hand grip plate secured to the interior surface of the base, the hand grip plate including a first latch that is selectively engageable within the first latch opening of the base plate to removably secure the removable head to the personal care appliance, wherein the first latch is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width.

In one embodiment, the hand grip plate further includes first and second grip portions extending laterally from the first latch, and the first and second grip portions are moveable toward and away from one another to move the first latch between the first, non-deformed state and the second, deformed state.

In one embodiment, the hand grip plate includes a first hook assembly defined on the first latch, in which the first hook assembly is selectively engageable with a first catch extending into the first latch opening.

In one embodiment, the removable head further comprises a stabilizing structure defined on the interior surface of the base that is engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head.

In one embodiment, the stabilizing structure includes at least one protrusion that is receivable within an opening in the hand grip plate. In one embodiment, the stabilizing structure includes first and second protrusions that are engageable with first and second opposing outer edges of the hand grip plate.

The present invention also provides a method of securing a removable head to a personal care appliance, the method comprising:

- (a) securing a base plate to a drive shaft of the personal care appliance, the base plate having a first latch opening with a latch opening width;
- (b) securing a hand grip plate to the removable head, the hand grip plate including a first latch that is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width; and
- (c) engaging the first latch with the first latch opening to removably secure the removable head to the personal care appliance.

In one embodiment, the hand grip plate further includes first and second grip portions extending laterally from the first latch, and the method further comprises moving the first and second grip portions away from one another to move the first latch into the first, non-deformed state, and moving the first and second grip portions toward one another to move the first latch into the second, deformed state.

In one embodiment, the base plate includes a first catch extending into the first latch opening that is selectively engageable with a first hook assembly defined on the first latch when the first latch is received within the first latch opening.

In one embodiment, the removable head further comprises a support structure extending between the base plate toward the personal care appliance when the base plate is secured to the personal care appliance, the support structure configured to stabilize and secure the connection between the base plate and the drive shaft. The support structure may include a drive shaft opening that is keyed to receive the drive shaft.

In one embodiment, the removable head includes a stabilizing structure defined on an interior surface of the removable head that is engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head. The stabilizing structure may include at least one protrusion that is receivable within an opening in the hand grip plate.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated by reference to the following detailed description, when taken in conjunction with the accompanying drawings.

FIGURE 1 is a perspective view of one example of a personal care appliance on which an exemplary removable head is mounted with an attachment structure;

FIGURE 2 is a front exploded view of an exemplary embodiment of an attachment structure for removably attaching a removable head to an appliance;

FIGURE 3 is a rear exploded view of the attachment structure of FIGURE 2;

FIGURE 4 is a partial cross-sectional view of the attachment structure of FIGURE 2, wherein the removable head is shown mounted to the personal care appliance as in FIGURE 1, and wherein the cross-sectional view is taken substantially across line 4-4;

FIGURE 5 is a partial cross-sectional view of the attachment structure of FIGURE 2, wherein the removable head is shown mounted to the personal care appliance as in FIGURE 1, wherein the attachment structure is shown in a first position, and wherein the cross-sectional view is taken substantially across line 5-5;

FIGURE 6A is a partial cross-sectional view of the attachment structure of FIGURE 5, wherein the attachment structure is shown in a second position;

FIGURE 6B is a partial cross-sectional view of the attachment structure of FIGURE 5, wherein the attachment structure is shown in a second position and wherein a first portion of the attachment structure is detached from a second portion of the attachment structure to detach the removable head from the personal care appliance; and

FIGURE 7 is a functional block diagram of several components of the personal care appliance of FIGURE 1.

PREFERABLE EMBODIMENTS

The detailed description set forth below in connection with the appended drawings is intended as a description of an exemplary embodiment of the disclosed subject matter and is not intended to represent the only embodiment. The representative embodiment described in this disclosure is provided merely as an example or illustration and is not intended to be exhaustive or to limit the claimed subject matter to the precise form disclosed.

In addition, the following discussion provides examples of systems, apparatuses, and/or methods for removably attaching a head to a personal care appliance. The present disclosure provides an attachment structure suitable for use with a personal care appliance. In some examples described herein, the personal care appliance oscillates the removable head to provide treatment to a subject's epidermis. The oscillating action of the removable head may be rotational, translational, etc., or a combination thereof. In use, the personal care appliance oscillates the removable head over a subject's skin in order to clean or otherwise treat the user's skin.

In the following description, numerous specific details are set forth in order to provide a thorough understanding of the exemplary embodiment of the present disclosure. It will be apparent to one skilled in the art, however, that the exemplary embodiment of the present disclosure may be practiced without some or all of the specific details. In some instances, well-known process steps or features have not been described in detail in order not to unnecessarily obscure various aspects of the present disclosure. Further, it will be appreciated that the exemplary embodiment of the present disclosure may employ any combination of features described herein.

Turning now to FIGURE 1, there is shown one example of a removable head, generally designated 20, that is removably attached to a personal care appliance, such as appliance 22. The removable head 20 is removably attached to the personal care appliance 22 through an attachment structure 24 (not visible in FIGURE 1) formed in accordance with an exemplary embodiment of the present disclosure. Prior to describing the attachment structure 24 in more detail, an example of a removable head 20 that may

be used to clean, exfoliate, or otherwise treat a subject's skin and a personal care appliance 22 that may be employed to impart an oscillating motion to the head 20 will be described in some detail.

Although any suitable removable head may be used, in the depicted embodiment, the removable head 20 includes a personal care portion 26 that can be oscillated over a subject's skin in order to clean, exfoliate, or otherwise treat the skin. The personal care portion 26 may be removably or permanently attached to an exterior surface of a base 34. In the depicted embodiment, the personal care portion 26 includes bristles 30 extending from and secured to the exterior surface of the base 34 in a manner well known in the art. Moreover, it should be appreciated that the personal care portion 26 of the removable head 20 may instead include any other suitable structure for cleaning, exfoliating, or otherwise treating the skin, such as an exfoliating disc with one or more abrasive sections. The interior surface of the base 34, opposite the personal care portion 26, is configured to interface indirectly with a drive assembly of the personal care appliance 22 through the attachment structure 24.

The personal care appliance 22 includes a body 38 having a handle portion 42 and a head attachment portion 46. The head attachment portion 46 is configured to selectively attach a head, such as removable head 20, to the appliance 22. The appliance body 38 houses the operating structure of the appliance. As shown in block diagrammatic form in FIGURE 7, the operating structure in one embodiment includes a drive motor assembly 48, a power storage source 50, such as a rechargeable battery, and a drive control 52 that includes an on/off button 40 (See FIGURE 1) configured and arranged to selectively deliver power from the power storage source 50 to the drive motor assembly 48. In some embodiments, the drive control 52 may also include a power adjust or mode control buttons 44 (See FIGURE 1) coupled to control circuitry, such as a programmed microcontroller or processor, which is configured to control the delivery of power to the drive motor assembly 48. The drive motor assembly 48 in some

embodiments includes an electric drive motor 54 that drives an attached head, such as removable head 20, via a drive shaft or armature 60.

When a personal care head, such as removable head 20, is mounted to the head attachment portion 46, the drive motor assembly 48 is configured to impart motion to the head 20. The drive motor assembly 48 may be configured to operate the removable head 20 at sonic frequencies, typically in the range of 20-160 Hz, oscillating the removable head 20 back and forth within a range or amplitude of 3-20 degrees. In some embodiments, the removable head 20 is operated in loaded or unloaded conditions at frequencies between about 80 Hz to 120 Hz with an amplitude or range of about 3-17 degrees. In other embodiments, the removable head 20 is operated in a loaded condition at frequencies of about 94 Hz to 106 Hz, amplitudes of about 8-12 degrees, and a duty cycle of about 38-44%.

One example of a drive motor assembly 48 that may be employed by the appliance 22 to oscillate the removable head 20 is shown and described in U.S. Patent No. 7,786,626, the disclosure of which is hereby incorporated by reference in its entirety. However, it should be understood that this is merely an example of the structure and operation of one such appliance and that the structure, operation frequency and oscillation amplitude of such an appliance could be varied, depending in part on its intended application and/or characteristics of the exfoliating head, such as its inertial properties, etc. In some embodiments of the present disclosure, the frequency ranges are selected so as to drive the attached head at near resonance. Thus, selected frequency ranges are dependent, in part, on the inertial properties of the attached head. It will be appreciated that driving the attached head at near resonance provides many benefits, including the ability to drive the attached head at suitable amplitudes in loaded conditions (e.g. when contacting the skin). For a more detailed discussion on the design parameters of the appliance, please see U.S. Patent No. 7,786,626.

While the personal care appliance 22 is one type of appliance that can be practiced with the exemplary embodiment of the present disclosure, it will be appreciated that the

removable head 20 is suitable for use with a wide range of oscillatory or vibratory motion generating devices. Likewise, the personal care appliance 22 may be used with any suitable removable head.

Turning now to FIGURES 2-5 and 6a-6b, the exemplary attachment structure 24 suitable for removably attaching the removable head 20 to the head attachment portion 46 of the personal care appliance 22 and defining a solid, positive connection between the removable head 20 and the drive shaft 60 of the appliance 22 will now be described in detail. The attachment structure 24 generally includes a base plate 62 securable to the personal appliance 22 and a hand grip plate 64 securable to the removable head 20. The hand grip plate 64 is removable attachable to the base plate 62 to removably secure the removable head 20 to the personal appliance 22.

Detailed aspects of the base plate 62 will first be described in detail. The base plate 62 is defined by a plate portion 66 that is generally flat and circular in shape for matching the circular shape of the head attachment portion 46. The plate portion 66 is securable to the drive shaft 60 of the personal care appliance 22 through a fastener, bonding, etc., or any combination thereof. In the depicted embodiment, the body of a first fastener 68 is passed through an opening (not labeled) in the plate portion 66 and is secured (by threads or otherwise) within an opening (not labeled) in the drive shaft 60. A cavity 70 may be defined within the outer surface of the plate portion 66 for housing the head of the first fastener 68. In this manner, the head of the first fastener 68 will not interfere with the mating of the base plate 62 to the hand grip plate 64. The cavity 70 may also be sufficiently sized to house any protruding portions of the hand grip plate 64 or fastener heads of fasteners used for securing the hand grip plate 64 to the removable head 20.

In addition to first fastener 68, the base plate 62 includes suitable support structure 72 extending from an inner surface of the base plate 62 that helps stabilize and secure the connection between the base plate 62 and the drive shaft 60 when the drive shaft 60 rotates. It can be appreciated that the first fastener 68 alone may not be able to

sustain a tight, stable connection between the base plate 62 and the drive shaft 60 when the drive shaft oscillates. Accordingly, additional support structure 72 can be used to remove at least a portion of the load from the first fastener 68.

Although any suitable support structure may be used, in the depicted embodiment the support structure 72 is defined by a central cylindrical portion 74 having an axial length and a draft shaft opening 76 extending along at least a portion of the axial length that is keyed to receive the drive shaft 60. In the illustrated embodiment, the drive shaft 60 includes first and second flat sides 76 and 78, respectively, extending along at least a portion of the length of the drive shaft 60. The central cylindrical portion 74 includes first and second corners 80a and 80b extending into the drive shaft opening 76 and axially along at least a portion of the central cylindrical portion 74. The first and second corners 80a and 80b are engageable with the first flat side 76 of the drive shaft 60. Likewise, third and fourth corners 80c and 80d extend into the drive shaft opening 76 and extend axially along at least a portion of the central cylindrical portion 74 opposite the first and second corners 80a and 80b. The third and fourth corners 80c and 80d are engageable with the second flat side 78 of the drive shaft 60.

With all of the corners 80a-80c engaging the first and second flat sides of the drive shaft 60, at least a portion of the rotating force of the drive shaft 60 is transferred to the base plate 62 through the support structure 72 to help the base plate 62 rotate with the drive shaft 60. Moreover, the keyed connection between the base plate 62 and the drive shaft 60 prevents the drive shaft 60 from rotating independently of the base plate 62 even slightly when the drive shaft 60 oscillates. Other shapes, such as a hex shape, may instead be used. Moreover, it can be appreciated that instead of having corners, the central cylindrical portion 74 may instead simply include first and second opposing flat interior surfaces extending axially along at least a portion of the draft shaft opening 76 of the central cylindrical portion 74. In such a configuration, the draft shaft opening 76 would be substantially the same shape as the drive shaft 60 along at least a portion of the central cylindrical portion 74.

The support structure 72 further includes an outer support structure portion 84 extending from and surrounding the central cylindrical portion 74. The outer support structure portion 84 may be any suitable shape, such as substantially X-shaped with closed sides. The outer support structure portion 84 may include one or more cantilevered sections 86 extending substantially from the interior surface of the plate portion 66 of the base plate 62 to help absorb and dissipate any vibrations or other movements transmitted from the personal care appliance 22 to the base plate 62 during use.

The outer support structure portion 84 may also include one or more gusset portions 86 extending from a portion of the support structure 72 to the interior surface of the base plate 62. In the depicted embodiment, first and second opposing gusset portions 86 extend from an outer perimeter of the central cylindrical portion 74 to the interior surface 66 of plate portion 66. The gusset portions 86 help strengthen the connection between the support structure 72 and the base plate 62. It should be appreciated that the support structure 72 shown in the FIGURES is exemplary only, and any suitable support structure may instead be used to help stabilize and secure the connection between the base plate 62 and the drive shaft 60.

The base plate 62 and support structure 72 may be formed from any suitable material in any suitable manner. For instance, the base plate 62 and support structure 72 may be integrally formed from plastic through injection molding or another suitable process. Any material suitable for providing a stable, secure attachment to the drive shaft 60 may be used. Moreover, in some embodiments, the base plate 62 and support structure 72 may be integrally formed with the drive shaft 60. Thus, it should be appreciated that the description and illustrations provided herein should not be seen as limiting. Regardless, it can be appreciated that the base plate 62 and support structure 72 (preferably a unitary piece) can be manufactured in a relatively simple, cost-efficient manner.

The base plate 62 is fixedly secured to the drive shaft 60 to provide an attachment structure for removably securing the removable head 20 (through the hand grip plate 64) to the personal appliance 22. In that regard, the base plate 62 includes first and second latch openings 88 and 90 defined in the plate portion 66 that are suitably sized and shaped to accept first and second latches 172 and 174 (described below) of the hand grip plate 64. First and second catches 92 and 94 extend at least partially into the first and second latch openings 88 and 90 along substantially the same plane as the plate portion 66. The first and second latch openings 88 and 90 are of a suitable size and shape to engage a portion of the first and second latches 172 and 174 for selectively retaining the hand grip plate 64 within the base plate 62.

Detailed aspects of the hand grip plate 64 will now be described in detail. The hand grip plate 64 is generally an elongated, rectangular, unitary piece of material having a middle grip plate portion 176 disposed between first and second laterally extending grip portions 178 and 180. A first upwardly bent portion, or a first latch 172, is disposed between the middle grip plate portion 176 and the first grip portion 178, and a second upwardly bent portion, or a second latch 174, is disposed between the middle grip plate portion 176 and the second grip portion 180.

The center portion 176 is substantially flat such that it is mateable with a substantially flat interior surface 184 (currently incorrectly labeled in the FIGURES as 84) of the removable head 20. In that regard, the center portion 176 includes at least one opening for receiving a fastener or other suitable structure to secure the hand grip plate 64 to the removable head 20. For instance, in the depicted embodiment, the center portion 176 includes a central fastener opening 188 suitable for receiving a second fastener 190 that may be secured within a central opening 192 in the removable head 20.

It can be appreciated that in some embodiments, a single fastener may be suitable for securely attaching the hand grip plate 64 to the removable head such that a secure attachment remains even during use of the personal appliance 22. However, in some embodiments, where the removable head is oscillated on the appliance 22 in multiple

directions in both loaded and unloaded conditions, additional stabilizing structure for helping to maintain a fixed position of the hand grip plate 64 on the removable head 20 will be beneficial. In that regard, the hand grip plate 64 further includes first and second protrusion openings 196 and 198 located on each side of the central fastener opening 188 that are mateable with first and second protrusions 200 and 202 defined on and extending from the bottom surface 184 of the removable head 20. The first and second protrusion openings 196 and 198 are spaced substantially evenly on each side of the central fastener opening 188, and together with the second fastener 190, define three points of attachment between the hand grip plate 64 and the removable head 20. In this manner, the hand grip plate 64 is substantially prevented from rotating, vibrating, etc., with respect to the removable head 20 when the personal care appliance 22 is in use.

Additional stabilizing structure may be included to further stabilize the hand grip plate 64 relative to the removable head 20. For instance, upper and lower stabilizers 204 and 206 may be formed on the interior surface 184 of the removable head 20 that are engageable with portions of the hand grip plate 64 to secure the position of the hand grip plate 64 relative to the removable head 20. The upper and lower stabilizers 204 and 206 are substantially T-shaped, with a long flat portion of each stabilizer 204 and 206 positioned to engage upper and lower substantially flat surfaces (not labeled) of the hand grip plate center portion 176 when the hand grip plate 64 is secured to the removable head 20. The upper and lower stabilizers 204 and 206 provide a fixed surface against which the center portion 176 of the hand grip plate 64 may be restrained to help prevent any rotation of the hand grip plate 64 relative to the removable head 20 during use. It should be appreciated that any other suitable stabilizing structure may be used to secure the hand grip plate 64 to the removable head 20 in a secure manner. Moreover, in some embodiments, the hand grip plate 64 may be integrally formed with the removable head 20. Thus, it should be appreciated that the description and illustrations provided herein should not be seen as limiting.

Extending laterally from and substantially coplanar with the center portion 176 are the first and second grip portions 178 and 180. Referring to FIGURES 5, 6a, and 6b, the first and second grip portions 178 and 180 extend beyond the outer perimeter of the removable head 20 such that they are accessible by a user when the removable head 20 is secured to the personal appliance 22. More specifically, the removable head 20 includes annular edge 208 surrounding the base interior surface 184 that helps conceal the attachment structure 24 between the removable head 20 and the personal appliance 22. The first and second grip portions 178 and 180 are receivable within first and second grip depressions 110 and 112 defined in the annular edge 208.

In addition, when the center portion 176 of the hand grip plate 64 is mated with the interior surface 184 of the removable head 20, the first and second grip portions 178 and 180 extend laterally from the perimeter of the removable head 20 at least a predetermined distance such that a user may depress the first and second grip portions 178 and 180 with his or her fingers. Through this single "squeeze" action, the first and second grip portions 178 and 180 may be depressed inwardly along the longitudinal axis (not labeled) of the hand grip plate 64 to compress the first and second latches 172 and 174 for disengaging the hand grip plate 64 from the base plate 62.

As noted above, the first and second latches 172 and 174 are upwardly bent portions of the elongated hand grip plate 64 located between the center portion 176 and the first and second grip portions 178 and 180, respectively. The first and second latches 172 and 174 extend away from the removable head 20 when the hand grip plate 64 is secured thereto. The first and second latches 172 and 174 are substantially identical, and mirror one another, and therefore only the first latch 172 will be described in detail.

The first latch 172 includes first and second side portions 220 and 222 that are substantially transverse to the longitudinal axis of the hand grip plate 64 and a curved center portion 224 extending between the first and second side portions 220 and 222. In that regard, the first latch 172 is substantially U-shaped in cross section. The first

latch 172 is sufficiently elastic in nature such that it may be moved between at least a first, non-deformed state having a first latch width (the distance between the first and second side portions 220 and 222) and a second deformed state having a second latch width that is smaller than the first latch width.

The first latch 172 bends at the curved top portion 224 to accommodate the movement of the first side portion 220 toward the second side portion 222 for decreasing or increasing the first latch width. In that regard, a top slit or opening 230 is defined in the curved top portion 224 and extends substantially between the first side portion 220 and the second side portion 222 substantially along the longitudinal axis of the hand grip plate 64. The top slit 230 functions to remove a portion of the material of the curved top portion 224 to allow the curved top portion 224 to bend more easily. In that regard, any suitable opening, slit, etc., may instead be included to accommodate a suitable amount of bending of the curved top portion 224.

The first latch 172 is configured to be selectively received within the first latch opening 88 of the base plate 62 (and the second latch 174 is receivable within the second latch opening 90 in the base plate 62). The first latch opening 88 has a width that is smaller than the first latch width. Accordingly, the first latch 172 must be moved into the second deformed state (having a decreased latch width) to pass the first latch 172 through the first latch opening 88. More specifically, and as shown in FIGURES 6a and 6b, the first latch 172 is reduced in width by moving the first side portion 220 towards the second side portion 222 by squeezing the first and second grip portion 178 and 180 or otherwise moving the first grip portion 178 toward the second grip portion 180.

As can be seen in FIGURES 6a and 6b, in a decreased width configuration (i.e., the second deformed state), the first latch 172 may pass through the first latch opening 88 of the base plate 62. After being passed through the first latch opening 88, the first latch 172 is released back toward its original, first, non-deformed state to retain the first latch 172 within the first latch opening 88, as shown in FIGURE 5. More specifically, the first grip portion 178 (and necessarily the second grip portion 180) is released to

allow the first grip portion 178 to move away from the second grip portion 180 substantially along the longitudinal axis of the hand grip plate 64. When the first grip portion 178 is released, the first and second side portions 220 and 222 move away from one another to increase the width of the first latch 172. However, the first latch 172 remains in at least a partially deformed state to retain the first latch 172 within the base plate 62. More specifically, the elastic properties of the first latch 172 exert a constant force on the base plate 62 at the first latch opening 88 to retain the first latch 172 within the base plate 62.

To help guide the first latch 172 through the first latch opening 88, the first latch 172 may include an angled guide surface 234 defined between the first side portion 220 and the curved top portion 224. The angled guide surface 234 extends upwardly and inwardly from the first side portion 220 toward the curved top portion 224 to define an inclined surface against which the first catch 92 of the base plate 62 may travel as the first latch 172 is being passed through the first latch opening 88. The inclined guide surface 234 also decreases the width of the first latch 172 at its upper end such that the first latch 172 may be more easily passed through the smaller width opening of the first latch opening 88. Furthermore, the inclined guide surface 234 defines a more prominent bending point in the curved top portion 224, which helps reduce the bending stress in the curved top portion 224.

To help secure the first latch 172 within the first latch opening 88, and to provide a tactile sensation and feedback to the user that the first latch 172 is received within the first latch opening 88, the first latch 172 may further include a first hook assembly that is configured to engage the first catch 92. The first catch 92 extends at least partially into the first latch opening 88 such that it catches against or passes beneath a portion of the first hook assembly when the first latch 172 is released back toward its first, non-deformed state, as shown in FIGURE 5. The first hook assembly may be formed within the first side portion 220 in any suitable manner.

In the depicted embodiment, the first hook assembly is defined by an upwardly extending, deformable hook projection 140 that extends from the first grip portion 178 up toward the first curved portion 234 substantially along the same plane as the first side portion 220. The bottom of the hook projection 140 is integrally formed with the hand grip plate 64, and the first and second sides and the top side of the hook projection 140 are surrounded by an opening within the first side portion 220.

The hook projection 140 can deform inwardly (toward the second grip 180) when a force is exerted thereupon by the first catch 92. More specifically, when the first latch 172 is moved into the first latch opening 88, the first catch 92 deforms the hook projection 140 inwardly and the first catch 92 moves into the opening in the first side portion 220. When the first catch 92 is received within the opening in the first side portion 220, the first side portion 220 essentially defines a hook shoulder 144 beneath which the first catch 92 may be retained, as shown in FIGURES 6a and 6b. The deformable properties of the hook projection 140 provide a tactile, snap-fit sensation to the user to indicate that the first catch 92 is received within the opening in the first side portion 220 and positioned beneath the hook shoulder 144. This tactile sensation further indicates to the user that the first latch 172 is fully received and retained within the first latch opening 88.

To move the first catch 92 out of engagement with the first hook assembly, the first and second grip portions 178 and 180 are squeezed and moved inwardly along the longitudinal axis of the hand grip plate 64 to reduce the width of the first latch 172, as shown in FIGURE 6a. With the first latch 172 moved into its second, deformed state (of decreased latch width), the first catch 92 can move out of the opening in the first side portion 220 to pass over the hook shoulder 144. Holding the first and second grip portions 178 and 180 in this position, the first latch 172 is moved out of the first latch opening 88 to disconnect the hand grip plate 64 from the base plate 62.

It should be appreciated that the first hook assembly 140 may instead be formed in any suitable manner. For instance, the first hook assembly 140 may instead be defined by

a protruding portion extending from an exterior surface of the first side portion 220. Thus, the description and illustrations provided herein should not be seen as limiting the claimed subject matter.

The second latch 174 is moved into and out of engagement with the second latch opening 90 in a substantially identical manner as that described above with respect to the first latch 172. More specifically, the user moves the first and second latches 172 and 174 into and out of engagement with the first and second latch openings 88 and 90 by squeezing the first and second grip portions 178 and 180 inwardly along the longitudinal axis of the hand grip plate 64 to reduce the width of the first and second latches 172 and 174, as can be appreciated by FIGURES 6a and 6b. In that regard, the second latch 174 includes a second hook assembly 142 substantially identical to the first hook assembly 140 of the first latch 172. As such, when the first and second latches 172 and 174 are moved into engagement with the first and second latch openings 88 and 90, the first and second catches 92 and 94 move into engagement with the first and second hook assemblies 140 and 142.

The hand grip plate 64 may be formed from any suitable material in any suitable manner. For instance, the hand grip plate 64 may be formed from sheet metal and bent, formed, and/or stamped in a manner well known in the art. In the alternative, the hand grip plate 64 may be made from plastic through injection molding or another suitable process. Any material suitable for allowing the first and second grip portions 178 and 180 to move inwardly along the longitudinal axis of the hand grip plate 64 by a small squeezing action with a user's fingers to cause the first and second latches 172 and 174 to move between at least the first, non-deformed state having a first latch width and the second, deformed state having a second latch width may be used. In other words, the hand grip plate 64 can be easily popped into and out of engagement with the base plate 62 through only the small squeezing force of the user's fingers.

Moreover, the hand grip plate 64 includes suitable elastic properties such that the first and second latches 172 and 174 exert a constant force on the base plate 62 at the first

and second latch openings 88 and 90 to retain the first and second latches 172 and 174 within the base plate 62. With the first and second latches 172 and 174 exerting a constant force on the base plate 62 when received therein, the hand grip plate 64 (and therefore, the removable head 20) is securely attached to the base plate 62 (and therefore, the personal appliance 22). Moreover, the elastic connection between the hand grip plate 64 and the base plate 62 helps dampen unwanted vibrations when the personal appliance 22 is in use.

While illustrative embodiments have been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention.

CLAIMS

1. An attachment structure for removably securing a removable head to a personal care appliance, the attachment structure comprising:

(a) a base plate securable to a drive shaft of the personal care appliance, the base plate comprising a first latch opening having a latch opening width; and

(b) a hand grip plate securable to the removable head, the hand grip plate including a first latch that is selectively engageable within the first latch opening to removably secure the removable head to the personal care appliance, wherein the first latch is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width.

2. The attachment structure of Claim 1, wherein the hand grip plate further includes first and second grip portions extending laterally from the first latch, wherein the first and second grip portions are moveable toward and away from one another to move the first latch between the first, non-deformed state and the second, deformed state.

3. The attachment structure of Claim 1, wherein the base plate includes a first catch extending into the first latch opening that is selectively engageable with a first hook assembly defined on the first latch when the first latch is received within the first latch opening.

4. The attachment structure of Claim 1, further comprising a support structure extending between the base plate toward the personal care appliance when the base plate is secured to the personal care appliance, the support structure configured to stabilize and secure the connection between the base plate and the drive shaft.

5. The attachment structure of Claim 4, wherein the support structure includes a drive shaft opening that is keyed to receive the drive shaft.

6. The attachment structure of Claim 1, wherein the removable head includes stabilizing structure defined on an interior surface of the removable head that is

engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head.

7. The attachment structure of Claim 6, wherein the stabilizing structure includes at least one protrusion that is receivable within an opening in the hand grip plate.

8. A removable head for use with a personal care appliance having a drive shaft and a base plate secured to the drive shaft, wherein the base plate comprises a first latch opening having a latch opening width, the removable head comprising:

- (a) a base having an interior surface and an exterior surface;
- (b) a personal care portion secured to the exterior surface of the base; and
- (c) a hand grip plate secured to the interior surface of the base, the hand grip plate including a first latch that is selectively engageable within the first latch opening of the base plate to removably secure the removable head to the personal care appliance, wherein the first latch is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width.

9. The removable head of Claim 8, wherein the hand grip plate further includes first and second grip portions extending laterally from the first latch, wherein the first and second grip portions are moveable toward and away from one another to move the first latch between the first, non-deformed state and the second, deformed state.

10. The removable head of Claim 8, wherein the hand grip plate includes a first hook assembly defined on the first latch, wherein the first hook assembly is selectively engageable with a first catch extending into the first latch opening.

11. The removable head of Claim 8, further comprising a stabilizing structure defined on the interior surface of the base that is engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head.

12. The removable head of Claim 6, wherein the stabilizing structure includes at least one protrusion that is receivable within an opening in the hand grip plate.

13. The removable head of Claim 6, wherein the stabilizing structure includes first and second protrusions that are engageable with first and second opposing outer edges of the hand grip plate.

14. A method of securing a removable head to a personal care appliance, the method comprising:

(a) securing a base plate to a drive shaft of the personal care appliance, the base plate having a first latch opening with a latch opening width;

(b) securing a hand grip plate to the removable head, the hand grip plate including a first latch that is moveable between a first, non-deformed state having a first latch width and a second, deformed state having a second latch width, and wherein the first latch width is wider than the latch opening width; and

(c) engaging the first latch with the first latch opening to removably secure the removable head to the personal care appliance.

15. The method of Claim 14, wherein the hand grip plate further includes first and second grip portions extending laterally from the first latch, wherein the method further comprises moving the first and second grip portions away from one another to move the first latch into the first, non-deformed state, and moving the first and second grip portions toward one another to move the first latch into the second, deformed state.

16. The method of Claim 14, wherein the base plate includes a first catch extending into the first latch opening that is selectively engageable with a first hook assembly defined on the first latch when the first latch is received within the first latch opening.

17. The method of Claim 14, further comprising a support structure extending between the base plate toward the personal care appliance when the base plate is secured to the personal care appliance, the support structure configured to stabilize and secure the connection between the base plate and the drive shaft.

18. The method of Claim 14, wherein the support structure includes a drive shaft opening that is keyed to receive the drive shaft.

19. The method of Claim 14, wherein the removable head includes stabilizing structure defined on an interior surface of the removable head that is engageable with at least a portion of the hand grip plate to provide a stable and secure connection between the hand grip plate and the removable head.

20. The method of Claim 19, wherein the stabilizing structure includes at least one protrusion that is receivable within an opening in the hand grip plate.

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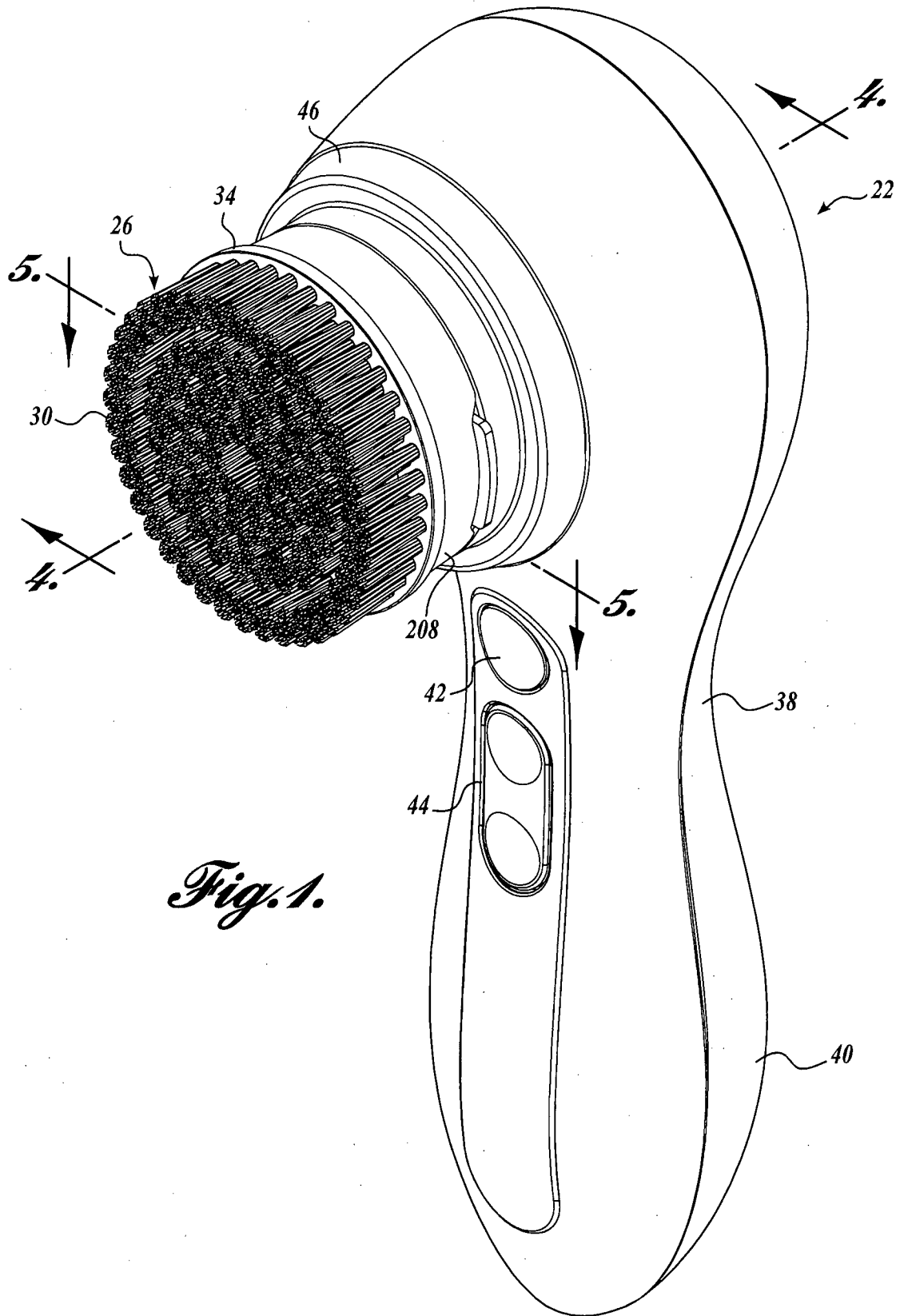
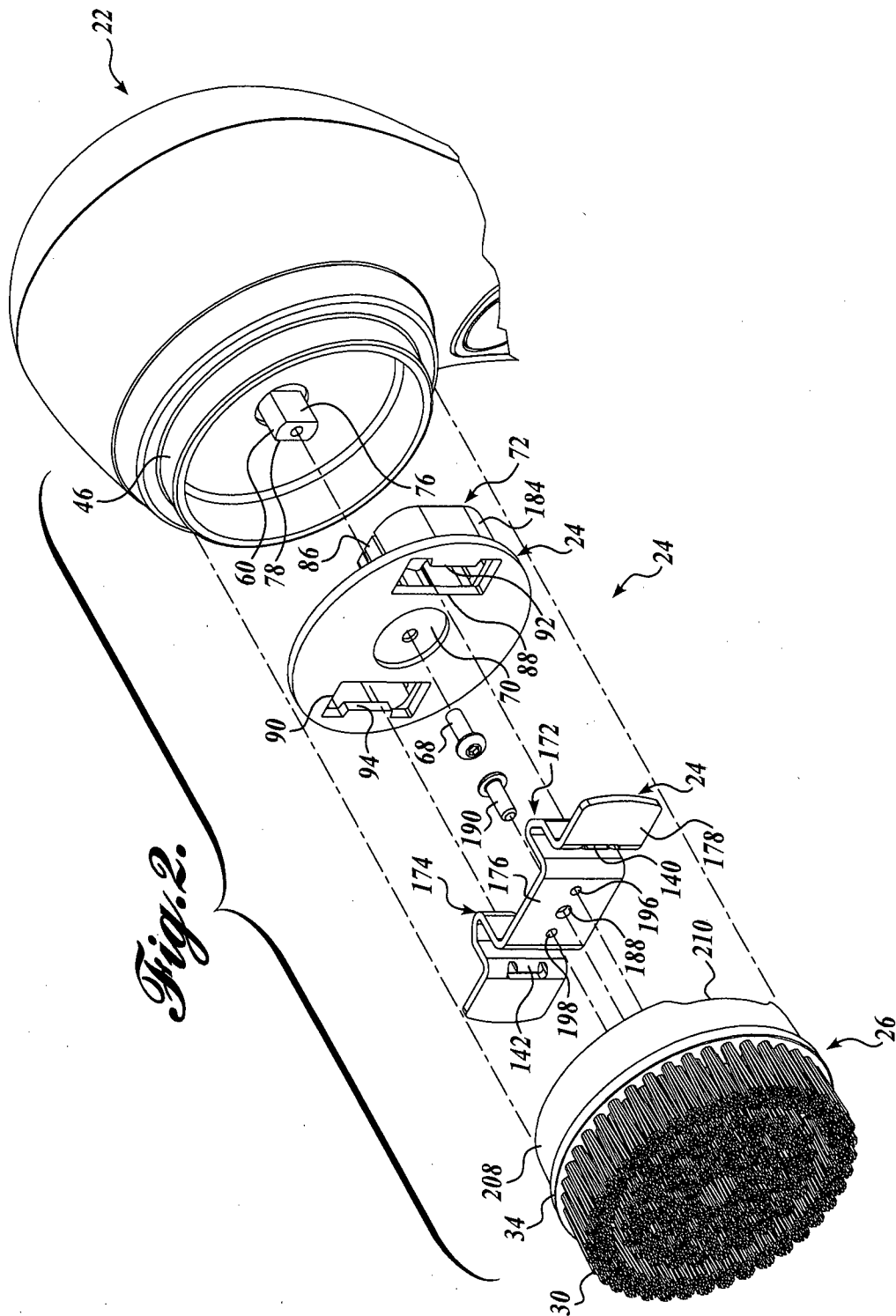
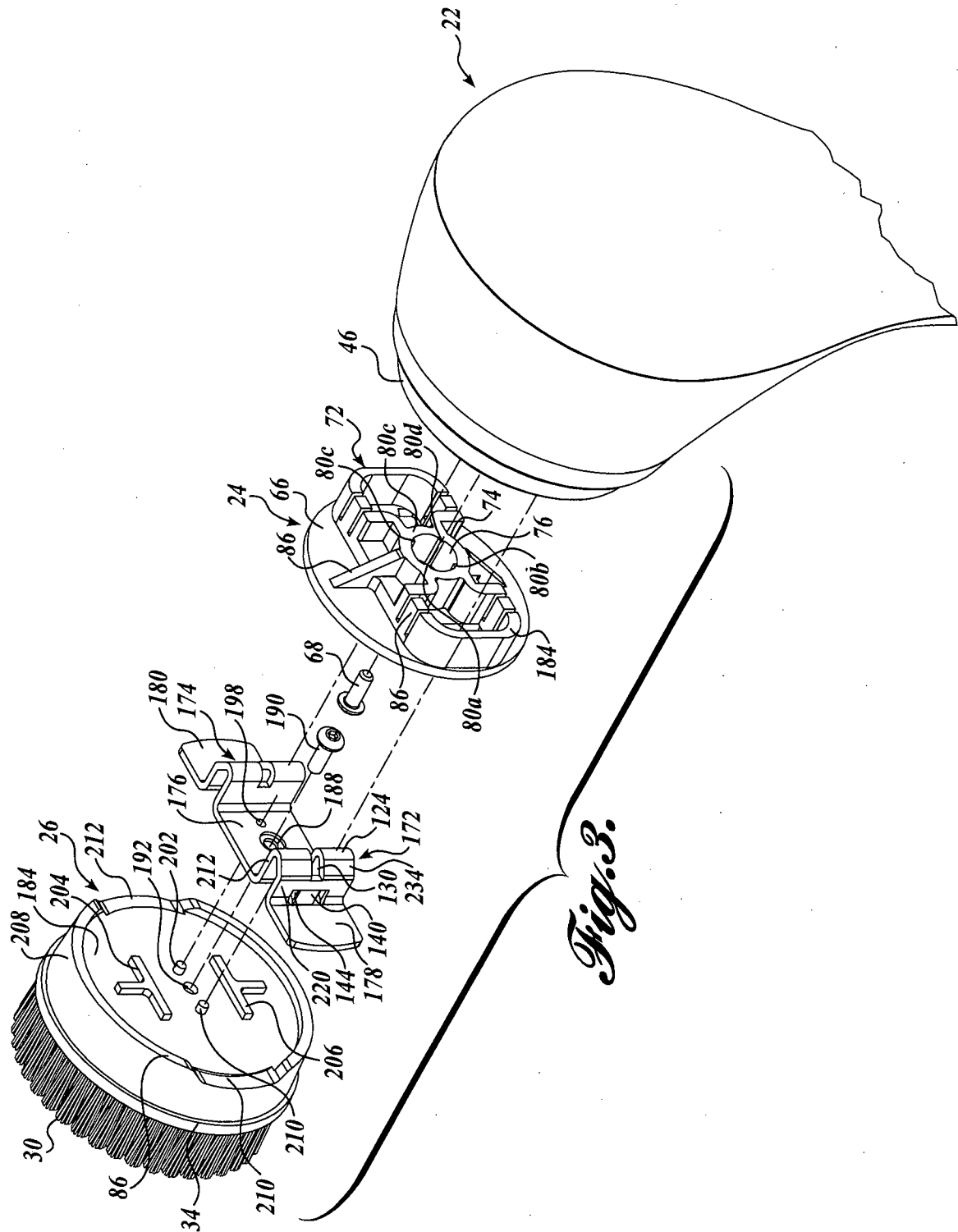


Fig. 1.





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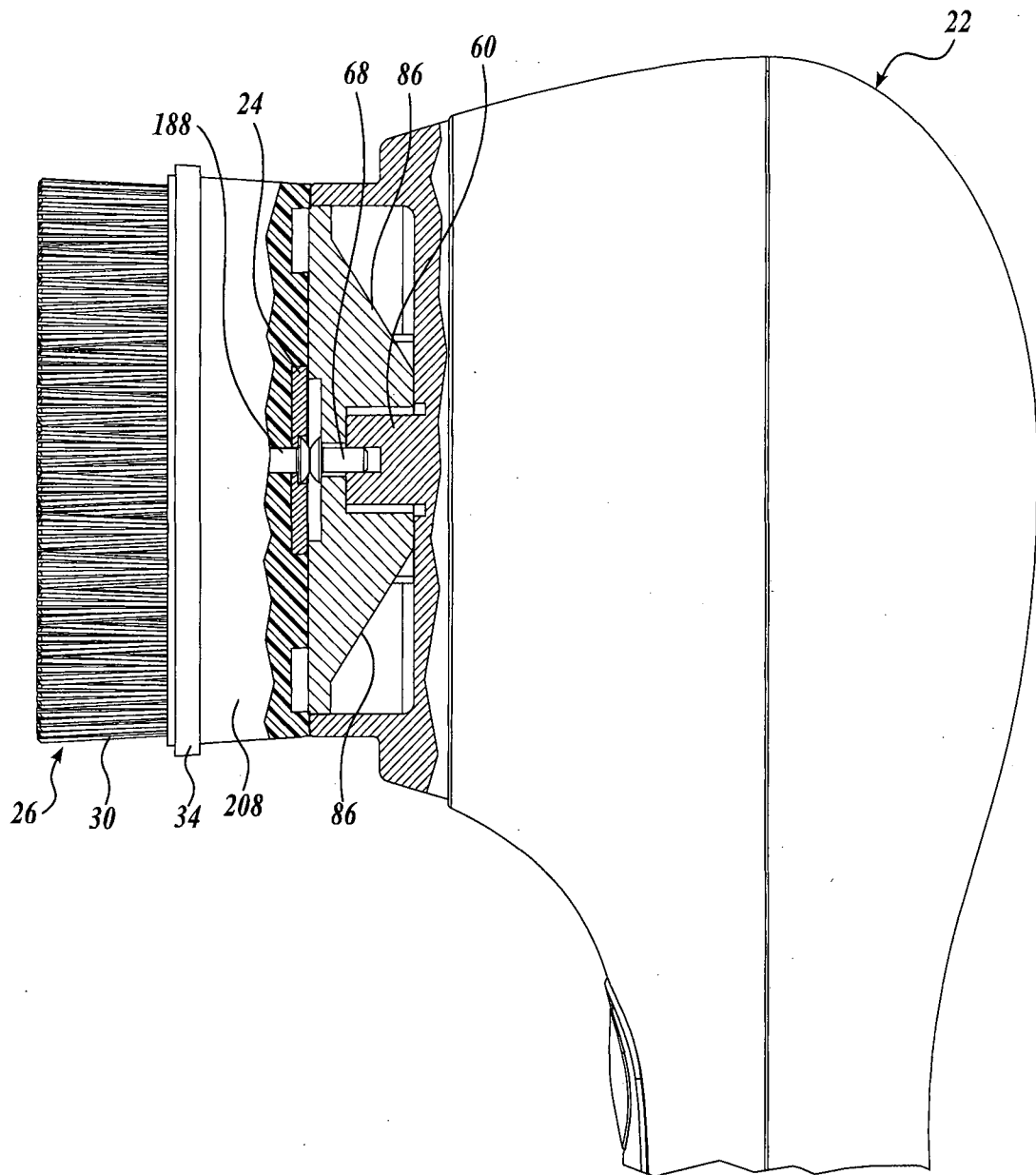


Fig. 4.

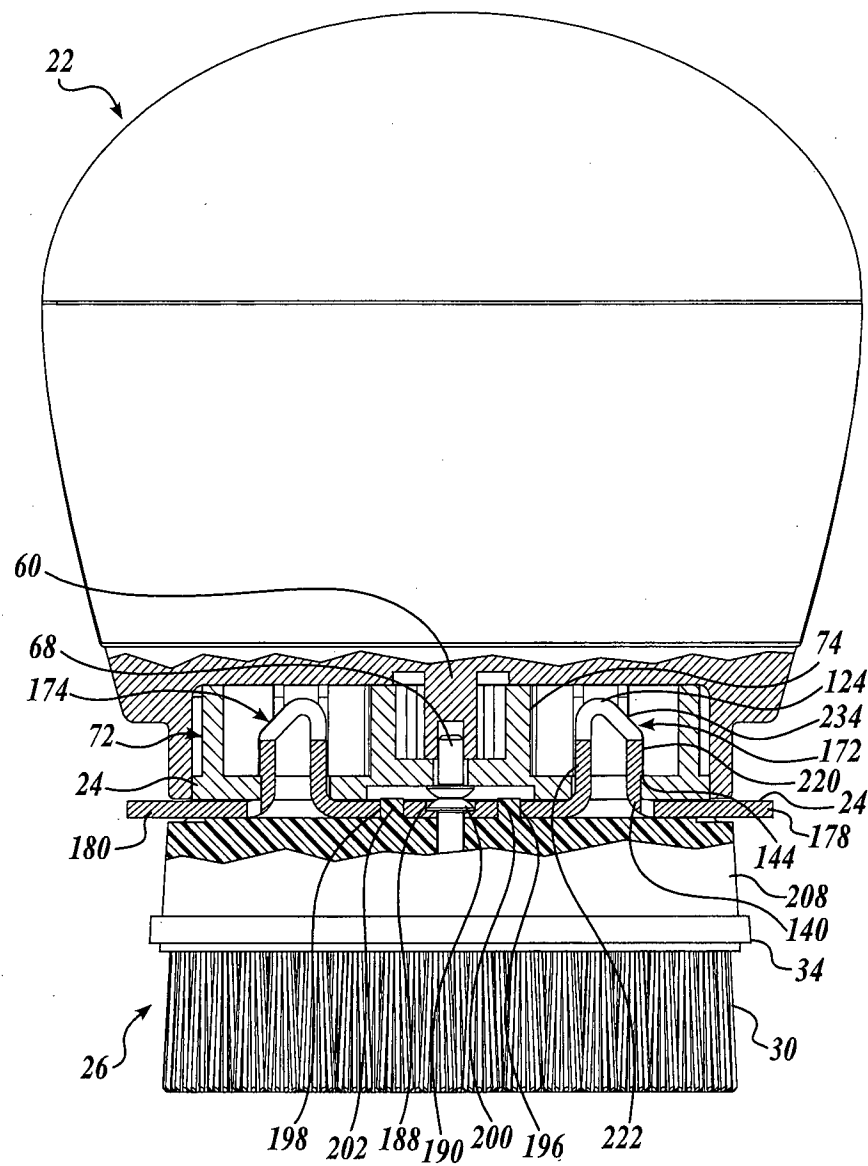


Fig.5.

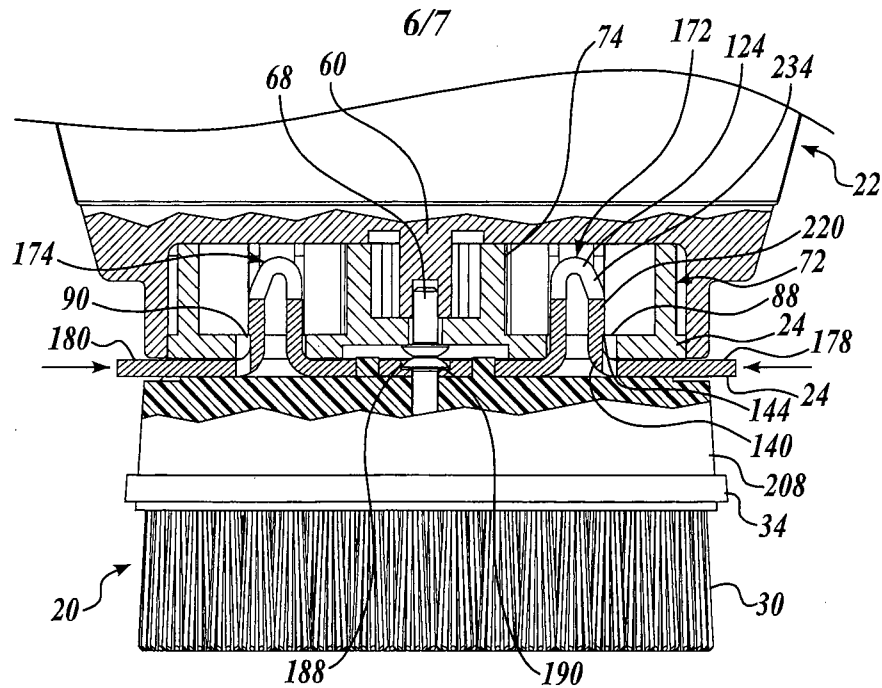


Fig. 6a.

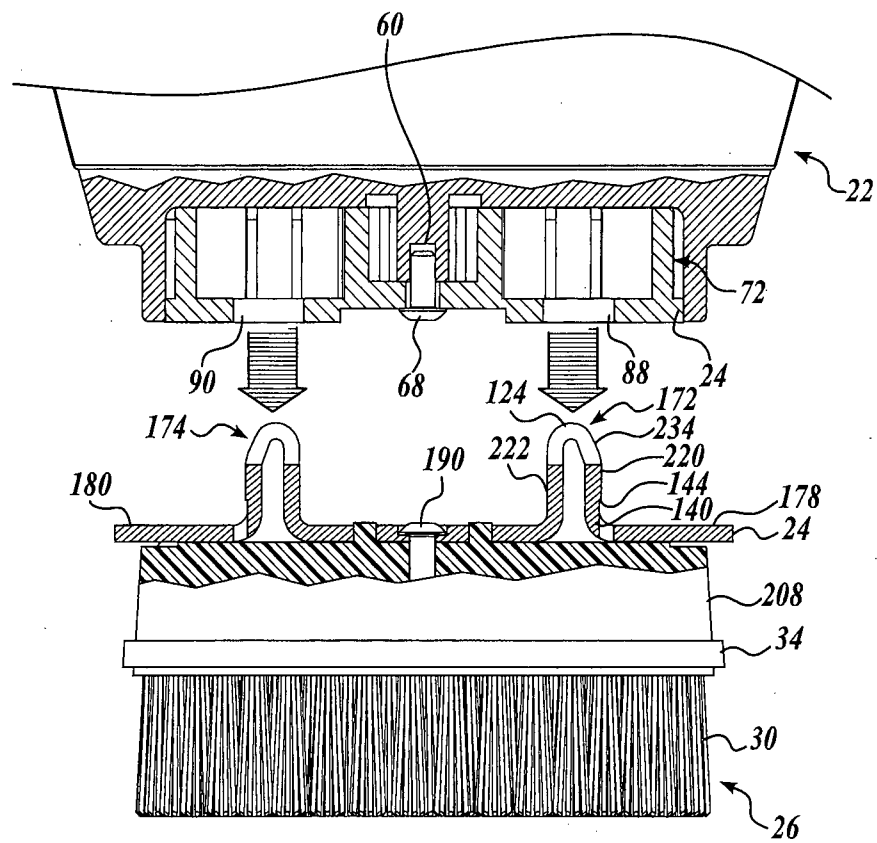
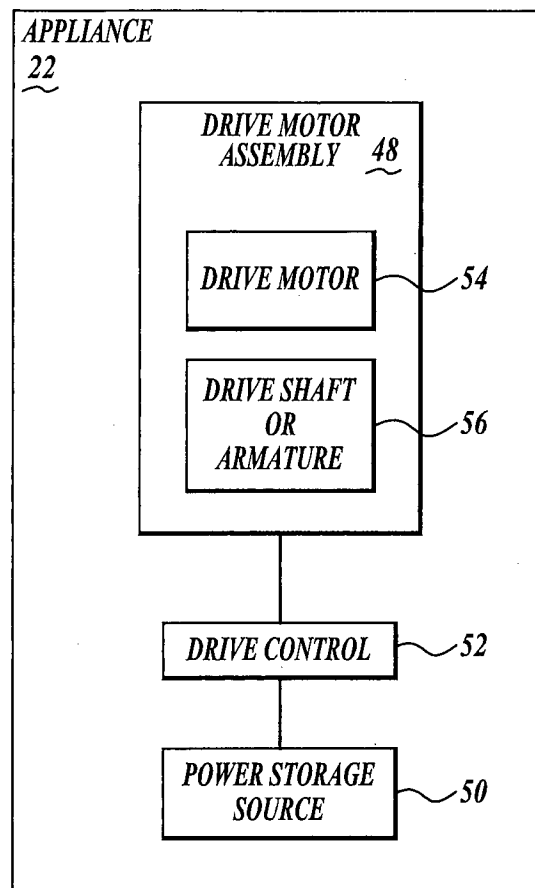


Fig. 6b.

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*Fig. 7.*

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2017/016124

A. CLASSIFICATION OF SUBJECT MATTER

INV. A46B5/00 A46B7/04 A46B13/00 A46B13/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 068 568 A (JAMES SCHNAPP) 18 December 1962 (1962-12-18) claim 1; figures 1-3 -----	1-20
A	US 2 379 969 A (VICTOR KOBLER ET AL) 10 July 1945 (1945-07-10) abstract; figures 1-6 -----	1-20
A	WO 2015/138212 A1 (MICHAEL TODD LP [US]) 17 September 2015 (2015-09-17) abstract; figure 1; example 1 -----	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

16 August 2017

Date of mailing of the international search report

24/08/2017

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2017/016124

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