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(54) Oral care implement having diverging cleaning elements

(57) An oral care implement implementing a cleaning element arrangement having diverging cleaning elements. In one aspect, the invention is an oral care implement comprising a handle and a head. A plurality of cleaning elements extend from the first surface of the head so as to form a ring about an axis extending from the first surface of the head. Each of the cleaning elements from the first surface of the head at inclined orientation so as to radially diverge from the axis. In one embodiment, a cleaning element wall also extends from the first surface of the head and circumferentially surrounds the plurality of cleaning elements. In another aspect, the invention may be an apparatus for incorporation into an ansate oral care implement that utilizes the aforementioned arrangement of cleaning elements.

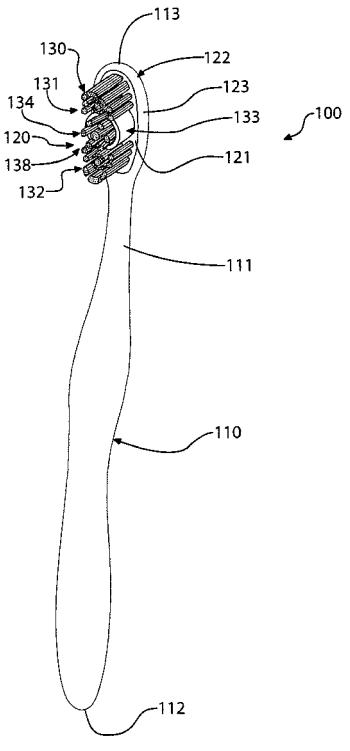

FIG. 1

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Description

Cross-Reference to Related Applications

[0001] This application claims priority to United States Patent Application Serial No. 12/547,627 filed August 26, 2009, the contents of which are incorporated herein by reference.

Field of the Invention

[0002] The present invention relates generally to ansate oral care implements, and specifically to toothbrushes, either manual or powered, that have a handle and a head having cleaning elements for oral cleaning.

Background of the Invention

[0003] A toothbrush is used to clean teeth by removing plaque and debris from the surfaces. Conventional toothbrushes are provided with a flat bristle trim that limit their ability to conform to the curvature of the teeth, to penetrate into the interproximal areas between the teeth, to sweep away the plaque and debris, and to clean along the gum line. Additionally, such toothbrushes have a limited ability to retain dentifrice for cleaning the teeth. During the brushing process, the dentifrice typically slips through the tufts of bristles and away from the contact between the bristles and the teeth. As a result, the dentifrice often is spread around the mouth, rather than being concentrated on the contact of the bristles with the teeth. Therefore, the efficiency of the cleaning process is reduced.

[0004] While substantial efforts have been made to modify the cleaning elements of toothbrushes to improve the aforementioned deficiencies, the industry continues to pursue arrangements of cleaning elements that will improve upon the preceding technology.

[0005] An example of an early attempt to improve the cleaning elements of a toothbrush is disclosed in an existing oral care implement having two or three circular brush sections which are arranged within holders that may be screwed into mating receptacles in the tooth brush handle so that they can be removed and replaced as needed. Each brush section contains stiff cleaning elements and is spaced from the other along the longitudinal axis of the handle at a distance less than the thickness of a tooth so that the brush operates on both the lingual (inside) and facial (outside) surfaces of the teeth.

[0006] Another example is a toothbrush with a head containing a flexible, rubber-like prophylaxis polishing cup or "prophy cup" similar to that used by dental personnel to professionally clean teeth. This prophy cup is loaded with toothpaste by the user and applied to the teeth. According to this patent, the "soft rubber-like prophy cup device follows the contours of teeth more effectively than bristles." A ring of cleaning elements ("bristle tufts") are placed about the periphery of the toothbrush head which co-act with the prophy cups to clean the user's teeth and gums.

[0007] More recently, the strategic arrangement and combination of cleaning elements in the form of elastomeric prophy cups and bristle tufts has become more common as a way of improving cleaning efficiency and maintaining the dentifrice in place during brushing. One example of the combined use and strategic arrangement of elastomeric prophy cups and bristle tufts is a toothbrush having a head portion comprising a plurality of inner loops formed by elastomeric walls. The central inner loop is surrounded by an outer loops formed of bristles. A central cleaning element, formed as a bristle tuft, is located within the elastomeric inner loops.

[0008] Another example of the combined use and strategic arrangement of elastomeric prophy cups and bristle tufts can be found in a toothbrush having a head portion comprising a plurality of soft elastomer prophy cups surrounded by bristle rings. In another embodiment, a toothbrush is disclosed wherein the centralized prophy cups are formed by groups of densely packed cleaning elements that are surrounded by bristle rings. The bristle rings in this embodiment are also disclosed as having one or more tufts at an inclination.

Summary of the Invention

[0009] In one aspect, the invention can be an oral care implement comprising: a handle; a head connected to the handle, the head comprising a first surface and a second surface opposite the first surface, and an axis extending from the first surface; and a plurality of cleaning elements extending from the first surface of the head and arranged in a ring about the axis, wherein each of the cleaning elements extends from the first surface of the head at an inclined orientation so as to radially diverge from the axis; a cleaning element wall extending from the first surface of the head, the cleaning element wall circumferentially surrounding the plurality of cleaning elements; and the cleaning elements extending beyond a top surface of the cleaning element wall.

[0010] In another aspect, the invention can be an oral care implement comprising: a handle; a head connected to the handle, the head comprising a first surface; and a plurality of cleaning elements arranged on the first surface so as to form a ring about an axis extending from the first surface of the head, wherein each of the cleaning elements extend from the first surface of the head at an inclined orientation so as to diverge from the axis.

[0011] In yet another embodiment, the invention can be an oral care implement comprising: a handle; a head connected to the handle, the head comprising a first surface and a second surface opposite the second surface; a hollow cleaning element cone extending from the first surface of the head, the hollow cleaning element cone circumferentially surrounding an axis extending from the first surface of the head, wherein the hollow cleaning element cone extends from the first surface of the head so

as to radially diverge from the axis; and a cleaning element wall extending from the first surface of the head and circumferentially surrounding the hollow cleaning element cone.

[0012] In still another aspect, the invention can be an apparatus for incorporation into an ansate oral care implement comprising: a base having a first surface: a hollow cleaning element cone extending from the first surface of the head and arranged so as to circumferentially surround an axis extending from the first surface of the base, wherein the hollow cleaning element cone extends upward from the first surface of the head so as to diverge from the axis; and a cleaning element wall extending upward from the first surface of the head and circumferentially surrounding the hollow cleaning element cone.

[0013] In a further aspect, the invention can be an apparatus for incorporation into an ansate oral care implement comprising: a base having a first surface: a plurality of cleaning elements arranged on the first surface so as to form a ring about an axis extending from the first surface of the head, wherein each of the cleaning elements extends upward from the first surface of the head at an inclined orientation so as to diverge from the axis; and a cleaning element wall extending upward from the first surface of the head and surrounding the plurality of cleaning elements so as to form a substantially closed loop.

[0014] In a yet further aspect, the invention can be an apparatus for incorporation into an ansate oral care implement comprising: a base having a first surface: a plurality of cleaning elements arranged on the first surface so as to form a ring about an axis extending from the first surface of the base, wherein each of the cleaning elements extend upward from the first surface of the base at an inclined orientation so as to diverge from the axis.

[0015] In a still further aspect, the invention can be an oral care implement comprising: a handle; a head connected to the handle, the head comprising a first surface; a plurality of cleaning elements arranged on the first surface so as to circumferentially surround an axis extending from the first surface of the head, wherein each of the cleaning elements extends upward from the first surface of the head at an inclined orientation so as to diverge from the axis; and a cleaning element wall extending upward from the first surface of the head and circumferentially surrounding the plurality of cleaning elements.

[0016] In an even further aspect, the invention can be an oral care implement comprising: a handle; a head connected to the handle, the head comprising a first surface; a plurality of circumferentially spaced-apart cleaning elements extending from the first surface of the head and arranged equidistant from an axis extending from the first surface of the head, wherein the cleaning elements extend from the first surface of the head at an inclined orientation so as to radially diverge from the axis; and a cleaning element wall extending from the first surface of the head and circumferentially surrounding the plurality of cleaning elements.

Brief Description of the Drawings

[0017] This invention is capable of use in a broad array of oral care implements and hygiene products. The drawings illustrate one use of the invention and are not to be construed as the only embodiment of the invention.

[0018] Figure 1 is a perspective view of an ansate oral care implement, in the form of a manual toothbrush, according to one embodiment of the present invention.

[0019] Figure 2 is a front view of the toothbrush of Figure 1.

[0020] Figure 3 is a right-side view the toothbrush of Figure 1, the left-side view of which is a mirror image.

[0021] Figure 4 is a top view of the toothbrush of Figure 1.

[0022] Figure 5 is a close-up perspective view of the head of the toothbrush of Figure 1.

[0023] Figure 6 is a front view of the head of the toothbrush of Figure 5.

[0024] Figure 7 is a cross-sectional view of the head of the toothbrush of Figure 5 along view VII-VII of Figure 6.

[0025] Figure 8 is a cross-sectional view of the head of the toothbrush of Figure 5 along view VIII-VIII of Figure 6.

[0026] Figure 9A is a perspective view of an ansate oral care implement, in the form of a manual toothbrush, according to a second embodiment of the present invention.

[0027] Figure 9B is a close-up front view of the head of the toothbrush of Figure 9A..

[0028] Figure 10A is a perspective view of an ansate oral care implement, in the form of a manual toothbrush, according to a third embodiment of the present invention.

[0029] Figure 10B is a close-up front view of the head of the toothbrush of Figure 10A.

[0030] Figure 11A is a perspective view of an ansate oral care implement, in the form of a manual toothbrush, according to a fourth embodiment of the present invention.

[0031] Figure 11B is a close-up front view of the head of the toothbrush of Figure 11A.

[0032] Figure 12A is a perspective view of an ansate oral care implement, in the form of a manual toothbrush, according to a fifth embodiment of the present invention.

[0033] Figure 12B is a close-up perspective view of the head of the toothbrush of Figure 12A.

[0034] Figure 12C is a front view of the toothbrush of Figure 12A.

[0035] Figure 13 is a perspective view of a cleaning element disc according to an embodiment of the present invention.

Detailed Description of the Drawings

[0036] In the following description, the invention is discussed in terms of a manual toothbrush incorporating the novel arrangement of cleaning elements. However, in other forms, the invention could be in the form of other

oral care implements including a soft-tissue cleansing implement, a powered toothbrush, or other ansate implement designed for oral care. Additionally, the invention can take the form of disc-like plates that incorporate the novel arrangement of cleaning elements for operable cooperation with a manual or powered oral care implement, such as a toothbrush or soft-tissue cleansing implement.

[0037] Referring first to Figures 1-4 concurrently, a toothbrush **100** is illustrated according to one embodiment of the present invention. The toothbrush **100** generally comprises a handle **110** and a head **120.** The handle **110** provides the user with a mechanism by which he/she can readily grip and manipulate the toothbrush **100.** The handle **110** is generically illustrated and may be formed of many different shapes, sizes, materials and a variety of manufacturing methods that are well-known to those skilled in the art. If desired, the handle **110** may include a suitable textured grip (not shown) made of elastomeric material or can be a multipart construction. Stated simply, the details of the handle **110** are not limiting of the present invention and, thus, require no further discussion for purposes of the present invention.

[0038] The toothbrush **100** extends from a proximal end **112** to a distal end **113** along a longitudinal axis **A-A** (illustrated in FIG. 2 and as point **A** in FIG. 4). For purposes of simplicity, the longitudinal axis **A-A** of the toothbrush **100** is considered to be coaxial with the longitudinal axis of the head **120.** However, it is of course possible for the longitudinal axis of the head **120** and the toothbrush **100** to not be coaxial with each other. The head **120** is operably connected to a distal end of the handle **110.** The head **110** and handle **120** of the toothbrush are preferably formed as a single unitary structure using a molding, milling, machining or other suitable process. However, in other embodiments, the handle **110** and head **120** may be formed as separate components which are operably connected at a later stage of the manufacturing process by any suitable technique known in the art, including without limitation thermal welding, a tight-fit assembly, a coupling sleeve, adhesion, or fasteners. Whether the head **120** and handle **110** are of a unitary or multi-piece construction (including connection techniques) is not limiting of the present invention.

[0039] It should be noted at this time that relative terms such as distal, middle, proximal, upper, lower, top, bottom, left, right etc. are merely used to delineate relative positions of the components of the toothbrush **100** with respect to one anther and are not intended to be in any further way limiting of the present invention.

[0040] The head **120** generally comprises a front surface **121,** a rear surface **122** and a peripheral surface **123.** The front surface **121** and the rear surface **122** of the head **120** can take on a wide variety of shapes and contours, none of which are limiting of the present invention. For example, the front and rear surfaces **121, 122** can be planar, contoured or combinations thereof. Moreover, if desired, the rear surface **122** may also comprise additional structures for oral cleaning, such as a soft tissue cleanser, such as the one disclosed in U.S. Patent 7,143,462, issued December 5, 2006 to the assignee of the present application, the entirety of which is hereby incorporated by reference. Furthermore, while the head **120** is normally widened relative to the neck **111** of the handle **110,** it could in some constructions simply be a continuous extension or narrowing of the handle **110.**

[0041] The front surface **121** comprises a collection of cleaning elements **130** extending therefrom for cleaning contact with an oral surface. While the collection of cleaning elements **130** is particularly suited for brushing teeth, the collection of cleaning elements **130** can be also be used to clean oral soft tissue, such as a tongue, gums, or cheeks instead of or in addition to teeth. As used herein, the term "cleaning element" is used in a generic sense to refer to any structure that can be used to clean or massage an oral surface through relative surface contact. Common examples of "cleaning elements" include, without limitation, filament bristles, fiber bristles, nylon bristles, spiral bristles, rubber bristles, elastomeric protrusions, flexible polymer protrusions, co-extruded filaments, flag bristles, crimped bristles, anti-bacterial bristles and combinations thereof and/or structures containing such materials or combinations.

[0042] Generally, the collection of cleaning elements **130** comprises a first set **131** of cleaning elements, a second set **132** of cleaning elements and a third set **138** of cleaning elements. The third set **138** of cleaning elements generally comprise a prophylaxis polishing cup **133** (a prophy cup) and a conical arrangement **134** of elongated cleaning elements. The conical arrangement **134** is located within and surrounded by the prophy cup **133**.

[0043] Referring now to FIGS. 5 and 6 concurrently, the details of the novel arrangement and orientation of the cleaning elements on the head **120** of the toothbrush **100** will now be discussed according to one embodiment of the present invention. It should be understood that the concepts and arrangements of particular subsets of the collection of cleaning elements will be described below in relation to certain shapes, axes, and hypothetical regions or zones. It is to be understood, however, that such concepts and arrangements can be described in a wide variety of terms and manners.

[0044] Conceptually, the head **120** comprises a distal region **124,** a middle region **125** and a proximal region **126.** The first set of cleaning elements **131a-j** extend from the distal region **124** of the head **120**. The second set of cleaning elements **132a-j** extend from the proximal region **126** of the head **120**. The third set of cleaning elements, which consists of the prophy cup **133a-b,** a plurality of angled cleaning elements **134a-f,** and a central cleaning element **135,** extend from the middle region **125** of the head.

[0045] In the illustrated embodiment, the cleaning elements **131a-j, 132a-j** of the first and second sets are tufts or arcuate walls of densely packed fibrous bristles. However, one or more (or various subsets) of the clean-

ing elements **131a-j**, **132a-j** of the first and second sets can take on other forms, such as elastomeric walls or fingers.

[0046] When bristle tufts are used as the desired cleaning elements, the bristle tufts can be connected to the head **120** in any manner known in the art. For example, anchor free tufting (AFT) could be used to mount the cleaning elements. In AFT, a plate or membrane is secured to the brush head such as by ultrasonic welding. The bristles extend through the plate or membrane. The free ends of the bristles on one side of the plate or membrane perform the cleaning function. The ends of the bristles on the other side of the plate or membrane are melted together by heat to be anchored in place. Any suitable form of cleaning elements may be used in the broad practice of this invention. Alternatively, the bristles could be mounted to tuft blocks or sections by extending through suitable openings in the tuft blocks so that the base of the bristles is mounted within or below the tuft block.

[0047] The particular arrangement and number of the cleaning elements **131a-j, 132a-j** of the first and second sets within the distal and proximal regions **124, 126** can vary greatly as desired, and should not be consider as a limitation of the present invention unless specifically recited in the claims. In fact, in certain embodiments of the present invention, the first and second sets of the cleaning elements **131a-j, 132a-j** may be omitted all together or substantially altered. Nonetheless, a particularly useful and effective arrangement of the first and second sets of the cleaning elements **131a-j, 132a-j** has been developed (discussed below in relation to FIGS.5-6) and is to be considered as part of the invention in certain embodiments.

[0048] The middle region **125** of the head comprises an arrangement of cleaning elements that is specifically designed to improve the efficacy of cleaning oral surfaces, retain dentifrice on the head **120** of the toothbrush during brushing and/or massaging, and distribute the dentifrice among the collection of cleaning elements on the head **120.** As mentioned above, the middle region **125** comprises a prophy cup **133** (which is formed by arcuate cleaning element walls **133a-b,** angled elongated cleaning elements **134a-f** and central elongated cleaning element **135.** Preferably, the cleaning element walls **133a-b** are elastomeric walls while the elongated cleaning elements **134a-f, 135** are tufts of densely packed fibrous bristles. In other embodiments, however, the prophy cup **133** can be formed by densely packed walls of fibrous bristles and/or the elongated cleaning elements **134a-f** can be elastomeric fingers.

[0049] Suitable elastomeric materials include any biocompatible resilient material suitable for uses in an oral hygiene apparatus. To provide optimum comfort as well as cleaning benefits, the elastomeric material preferably has a hardness property in the range of A5 to A40 Shore hardness, and most preferably A25 Shore hardness. One preferred elastomeric material is styrene-ethylene/butylene-styrene block copolymer (SEBS) manufactured by GLS Corporation. Nevertheless, SEBS material from other manufacturers or other materials within and outside the noted hardness range could be used.

[0050] Referring now to FIGS 6-8 concurrently, the details and structural cooperation of the prophy cup **133,** the cleaning elements **134a-f,** and the central cleaning element **135** will be described. The cleaning elements **134a-f** extend from the front surface **121** of the head in an angled (i.e., inclined) manner (relative to a general plane formed by the top surface 121). The cleaning elements **134a-f** are arranged in a spaced-apart manner that forms a ring that circumferentially surrounds an axis **B-B.** The axis **B-B** extends from the front surface **121** of the head **120** in a direction away from the rear surface **122** of the head **120.** In the preferred embodiment, the axis **B-B** extends from the front surface **121** of the head **120** in a substantially normal orientation. Of course, in other embodiments, the axis **B-B** may be at an angle other than normal to the front surface **121.** Each of the cleaning elements **134a-f** is inclined so as to radially diverge from the axis **B-B** at an angle Θ as it extends away from the front surface **121** of the head **120.** Preferably, for each cleaning element **134a-f,** the angle Θ is in a range of 1 to 15 degrees, more preferably 3 to 5 degrees, and most preferably 4 degrees. While all of the cleaning elements **134a-f** radially diverge from the axis **B-B** at the same angle Θ in the illustrated embodiment, it is possible for the angles of radial divergence to vary among the cleaning elements **134a-f.** Furthermore, while six cleaning elements **134a-f** are illustrated as forming the hollow cone, any number of cleaning elements can be used in other embodiments.

[0051] Conceptually, the cleaning elements **134a-f** collectively form a hollow cone structure (which in the illustrated embodiment is a truncated cone). As used herein, the term "cone" is not limited to a circular cross-section and is intended to include truncated cones. The hollow cone structure formed by cleaning elements **134a-f** forms a funnel-like internal cavity **136** for receiving a dentifrice. The cleaning elements **134a-f** are equidistantly circumferentially spaced from one another so that a space exists between adjacent cleaning elements **134a-f.** While in the illustrated embodiments, the hollow cone is formed by spaced apart cleaning elements, in alternative embodiments the hollow cone can be formed by an angled wall (or angled wall segments) formed by an elastomer or densely packed bristles.

[0052] The hollow cone formed by the cleaning elements **134a-f** is concentrically arranged about the axis **B-B** and is congruent with the conical axis. The elongated central cleaning element **135** extends from the front surface **121** of the head **120** along the axis **B-B** within the funnel-like cavity **136.** The central cleaning element **135** is preferably a tuft of densely packed fibrous bristles but can also be an elastomer finger or other material or structure. Of course, the central cleaning element **135** may even be omitted in certain embodiments of the invention.

[0053] The hollow cone formed by the cleaning ele-

ments **134a-f** is circumferentially surrounded by a cleaning element wall (formed by arcuate sections of cleaning element walls **133a-b).** Collectively, the cleaning element walls **133a-b** form the prophy cup as a substantially closed loop that concentrically surrounds the hollow cone formed by the elongated cleaning elements **134a-f.** While the prophy cup is formed by two arcuate sections of cleaning element walls **133a-b** in the illustrated embodiment, the prophy cup (and the substantially closed-loop) can be formed by a single wall section or by more than two wall sections in other embodiments.

[0054] As a result of being circumferentially surrounded by the prophy cup (which is formed by the arcuate cleaning element walls **133a-b),** an annular channel **137** exists between the hollow cone (formed by the cleaning elements **134a-f)** and the cleaning element wall (formed by arcuate cleaning element walls **133a-b).** The arcuate cleaning element walls **133a-b** are circumferentially spaced from one another so that gaps **139** exist along the longitudinal axis **A-A** of the head **120.**

[0055] Referring solely now to FIG. 7, each of the cleaning elements **134a-f** extends at an incline from the first surface **121** of the head **120** and terminate in cleaning ends **144a-f** respectively. The prophy cup (which consists of arcuate cleaning element walls **133a-b)** extends normally from the first surface **121** of the head **120** and terminates in top surfaces **143a-b.** In other embodiments, the prophy cup (which consists of arcuate cleaning element walls **133a-b)** may extend from the first surface **121** of the head **120** at an inclined orientation, either inclined toward or away from the axis **B-B**.

[0056] The cleaning elements **134a-f** (and thus the hollow cone) has a height H_1 while the prophy cup (and, thus, the arcuate cleaning element walls **133a-b)** has a height H_2 (measured relative to the front surface **121** of the head **120).** The height H_1 is preferably greater than the height H_2. In one embodiment, the height H_1 is preferably in the range of 7 to 13 millimeters, most preferably 10 millimeters, while the height H_2 is preferably in the range of 5 to 11 millimeters, most preferably 6.5 millimeters. Thought of another way, cleaning element walls **133a-b** circumferentially surround only a base portion of the cleaning elements **134a-f** while a top portion of the cleaning elements **134a-f** extends beyond the top surfaces **143a-b** of the cleaning element walls **133a-b.**

[0057] In a preferred construction, the cleaning elements **134a-f** are preferably located within a range of 3 to 6 millimeters from the axis **B-B**, and most preferably 4 millimeters (measured from the base of the cleaning elements **134a-f).** The walls **133a-b** of the prophy cup are preferably located within a range of 6 to 12 millimeters from the axis **B-B,** and most preferably about 8 millimeters. As a result of the inclined/diverging orientation of the cleaning elements **134a-f** and their close proximity to the walls **133a-b** of the prophy cup, the inner top top edge of the walls **133a-b** of the prophy cup abut against one or more of the cleaning elements **134a-f.** In one preferred embodiment, the width of the prophy cup **133** extends the substantial entirety of the width of the head **120.**

[0058] Referring now to FIGS. 5-8 concurrently, the mechanism of action of the novel cleaning element arrangement of the toothbrush **100** will be described. The following discussion is set forth as an explanation of the improved operation of the present invention. The following discussion is not to be construed as limiting the scope of the invention, unless specifically recited in the claims.

[0059] A dentifrice is initially applied to the head **120** of the toothbrush **100** which fills the cavity **136** formed by the hollow cleaning element cone (which is formed by the elongated cleaning elements **134a-f).** The funnel shape of the cavity **136** helps capture, hold and direct the dentifrice into the toothbrush during dentifrice application and subsequent brushing. The central elongated cleaning element **135** may further assist with dentifrice maintenance and dispersion. Once the dentifrice fills the cavity **136,** it can flow through the spaces between adjacent elongated cleaning elements **134a-f** and into the annular channel **137** formed between the hollow cleaning element cone (which is formed by the elongated cleaning elements **134a-f)** and the prophy cup (consisting of arcuate walls **133a-b).** The inclined orientation of the elongated cleaning elements **134a-f** results in the annular channel **137** having a substantially closed roof (at least in certain sections), thereby further helping to keep the dentifrice within the toothbrush **100.** The dentifrice then flows through the gaps **139** formed between the arcuate sections **133a-b,** Because the gaps **139** are located only along the longitudinal axis **A-A** of the head, the dentifrice escaping from the prohpy cup via the gaps **139** is forced into the first and second sets **131a-j, 132a-j** where it is further distributed during the brushing and/or massaging of oral surfaces.

[0060] Finally, by surrounding the hollow cleaning element cone (which is formed by the elongated cleaning elements **134a-f)** with a shorter prophy cup (formed by arcuate walls **133a-b),** the prophy cup can provide additional support and rigidity to the elongated cleaning elements **134a-f** during brushing. More specifically, when the elongated cleaning elements **134a-f** are not under the standard forces imparted during brushing (i.e., in a non-use state), the elongated cleaning elements **134a-f** are either slightly spaced from the arcuate walls **133a-b** or abutted against the top inner edges of the arcuate walls **133a-b** in a non-forced state. However, when the elongated cleaning elements **134a-f** are subjected to standard forces imparted during brushing, the elongated cleaning elements **134a-f** flex outwardly from the axis **B-B** and come into contact with the arcuate walls **133a-b,** which provide additional support for the elongated cleaning elements **134a-f** so tha more effective cleaning can be achieved. In some embodiments, the plurality of cleaning elements **134a-f** are also taller than any of the cleaning elements of the first and second sets that are immediately adjacent the prophy cup (not illustrated).

[0061] Additionally, when the arcuate walls **133a-b** are constructed of an elastomeric material, additional bene-

fits are achieved. Specifically, the arcuate shaped elastomeric elements **133a-b** help spread toothpaste onto the tubules of the teeth. This helps reduce the sensitivity of the tooth because the tubules are thereby reduced in size. This is also a benefit with whitening because the toothpaste is spread onto the tubules. Moreover, elastomeric walls are better than bristles at this wiping toothpaste into the tubules of the teeth.

[0062] Referring back to FIGS. 5-6 and 8 concurrently, a preferred arrangement of the cleaning elements **131a-j, 132a-j** of the first and second sets **131, 132** within the distal and proximal regions **124, 126** of the head **120** will be described according to one embodiment of the present invention. All of the cleaning elements **131a-j, 132a-j** extend from the front surface **121** of the head in a substantially normal orientation.

[0063] The first set **131** comprises a first grouping consisting of cleaning element walls 131c-e and elongated cleaning elements **131a-b, 131f-g,** This first grouping of cleaning elements **131a-131g** is disposed in a par-elliptical arrangement along the distal periphery of the head **120,** The elongated cleaning elements **131a-b, 131f-g** are preferably cylindrical bristle tufts whose free ends taper to a point. The cleaning element walls 131c-e are preferably walls of densely packed bristles. The height of the cleaning element walls 131c-e increase toward the distal end of the head **120,** thereby forming a tapered edge at the distal edge of the cleaning element field.

[0064] Similarly, the second set **132** comprises a first grouping consisting of cleaning element walls 132c-e and elongated cleaning elements **132a-b, 132f-g.** This first grouping of cleaning elements **132a-132g** is disposed in a par-elliptical arrangement along the distal periphery of the head **120.** The elongated cleaning elements **132a-b, 132f-g** are preferably cylindrical bristle tufts whose free ends taper to a point. The cleaning element walls 132c-e are preferably walls of densely packed bristles. The height of the cleaning element walls 132c-e increase toward the distal end of the head **120,** thereby forming a tapered edge at the distal edge of the cleaning element field.

[0065] The first set **131** also comprises a second grouping, consisting of arcuate cleaning element walls **131h, 131j** and central cleaning element **131i..** The arcuate cleaning element walls **131h, 131j** are arranged so as to form a loop about a center point from which the central cleaning element 131i extends. The arcuate cleaning element walls **131h, 131j** are preferably elastomeric walls but can be densely packed bristles. This second grouping of cleaning element **131h-j** is located within the par-elliptical shape formed by the first grouping of cleaning elements **131a-g.** The central cleaning element **131i** extends a height that is greater than the height of the arcuate cleaning element walls **131h, 131j.** The height of the central cleaning element **131j** is less than the height of the central cleaning element **135** of the third set **138.** However, the height of the arcuate cleaning element walls **131h, 131j** is grater than the height of the arcuate wall elements **133a-b** of the third set **38.**

[0066] Similarly, the second set **132** also comprises a second grouping, consisting of arcuate cleaning element walls **132h, 132j** and central cleaning element **132i.** The arcuate cleaning element walls **132h, 132j** are arranged so as to form a loop about a center point from which the central cleaning element **132i** extends. The arcuate cleaning element walls **132h, 132j** are preferably elastomeric walls but can be densely packed bristles. This second grouping of cleaning element **132h-j** is located within the par-elliptical shape formed by the first grouping of cleaning elements **132a-g.** The central cleaning element **132i** extends a height that is greater than the height of the arcuate cleaning element walls **132h, 132j.** The height of the central cleaning element **132j** is less than the height of the central cleaning element **135** of the third set **138.** However, the height of the arcuate cleaning element walls **132h, 132j** is grater than the height of the arcuate wall elements **133a-b** of the third set **38.**

[0067] Both of the loops formed by the arcuate cleaning element walls **132h, 132j** and **131h, 131j** respectively are located so that their center points are located along the longitudinal axis **A-A of** the head **120.**

[0068] Referring now to FIGS. 9A-9B concurrently, a manual toothbrush **200** according to a second embodiment of the present invention is illustrated. The toothbrush **200** is identical to the toothbrush **100** described above with respect to FIGS. 1-8 except that the central cleaning element **135** is omitted. In order to avoid redundancy, a further detailed description of the toothbrush **200** and its functioning is omitted with the understanding that the corresponding elements of toothbrush **200** are numbered the same as the toothbrush **100** except that they are in the "200 series." The above discussion with respect to toothbrush **100** is thus applicable to the toothbrush **200.**

[0069] Referring now to FIGS 10A-10B concurrently, a manual toothbrush **300** according to a third embodiment of the present invention is illustrated. The toothbrush **300** is identical to the toothbrush **100** described above with respect to FIGS. 1-8 except that the hollow cone structure **334** is formed by eight elongated cleaning elements rather than six. In order to avoid redundancy, a further detailed description of the toothbrush **300** and its functioning is omitted with the understanding that the corresponding elements of toothbrush **300** are numbered the same as the toothbrush **100** except that they are in the "300 series." The above discussion with respect to toothbrush **100** is thus applicable to the toothbrush **300**.

[0070] Referring now to FIGS 11A-11B concurrently, a manual toothbrush **400** according to a fourth embodiment of the present invention is illustrated. The toothbrush **400** is identical to the toothbrush **100** described above with respect to FIGS. 1-8 except that the hollow cone structure **434** is formed by ten elongated cleaning elements rather than six. In order to avoid redundancy, a further detailed description of the toothbrush **400** and its functioning is omitted with the understanding that the

corresponding elements of toothbrush **400** are numbered the same as the toothbrush **100** except that they are in the "400 series." The above discussion with respect to toothbrush **100** is thus applicable to the toothbrush **400.**

[0071] Referring now to FIGS 12A-12C concurrently, a manual toothbrush **500** according to a fifth embodiment of the present invention is illustrated. The toothbrush **500** is identical to the toothbrush **100** described above with respect to FIGS. 1-8 except that the central cleaning elements **135** is omitted and the elongated cleaning elements **534a-f** that form the hollow cone structure **534** converge upon the axis B-B, thereby forming a full cone rather than a truncated cone. In order to avoid redundancy, a further detailed description of the toothbrush 500 and its functioning is omitted with the understanding that the corresponding elements of toothbrush **500** are numbered the same as the toothbrush **100** except that they are in the "500 series." The above discussion with respect to toothbrush **100** is thus applicable to the toothbrush **400.**

[0072] Referring now to FIG. 13, a cleaning element disc **600** for incorporation into an ansate oral care implement is illustrated according to one embodiment of the present invention. The cleaning element disc **600** is essentially a plate-like disc that incorporates the third set **138** of cleaning elements described above with respect to FIGS. 1-8. The apparatus **600** generally comprises a circular base plate **601** and the third set **138** of cleaning elements described above with respect to FIGS. 1-8. In order to avoid redundancy, a further detailed description of the third set **138** of cleaning elements is omitted. However, it is to be understood that the cleaning element disc **600** can utilize any of the variations of the cleaning element arrangement disclosed above with respect to FIGS. 9A-12C.

[0073] The cleaning element disc **600** is particularly suited for use with powered toothbrushes wherein the cleaning element disc **600** will lock into place on the powered toothbrush and be operably coupled to a rotary element. The cleaning element disc **600,** however, can also be used in manual toothbrushes wherein the cleaning element disc **600** can snap lack/ lock into and out of the head of the toothbrush for replacement. Such techniques are known in the art.

[0074] Finally, it should be noted that in certain embodiments of the invention, a plurality of the third sets **138** of cleaning elements can be arranged on the head **120** of the toothbrush **100.** In such an embodiment, the third sets **138** of cleaning elements are preferably aligned along the longitudinal axis **A-A** of the head **120.** Moreover, in such an embodiment, any of the embodiments of the third sets can be used.

[0075] While a number of embodiments of the current invention have been described and illustrated in detail, various alternatives and modifications will become readily apparent to those skilled in the art without departing from the spirit and scope of the invention. As various changes could be made in the above methods, compositions and structures without departing from the scope of the invention, it is intended that all matter contained in this application, including all mechanisms and/or modes of interaction described above, shall be interpreted as illustrative only and not limiting in any way the scope of the appended claims.

Claims

1. An oral care implement comprising:

a handle;
a head connected to the handle, the head comprising a first surface and second surface opposite the first surface;
a plurality of cleaning elements extending from the first surface of the head and forming a ring about an axis, wherein each of the cleaning elements extend from the first surface of the head at an inclined orientation so as to radially diverge from the axis; and
a cleaning element wall extending from the first surface of the head and surrounding the plurality of cleaning elements so as to form a loop that surrounds the ring, wherein the cleaning element wall is an elastomeric wall.

2. The oral care implement of claim 1, wherein the cleaning element wall is shorter than the plurality of cleaning elements.

3. The oral care implement of claim 1 wherein the plurality of cleaning elements are bristle tufts.

4. The oral care implement of claim 1 wherein the cleaning elements are spaced from a top inner edge of the cleaning element wall and are flexible into contact with the top inner edge of the cleaning element wall.

5. The oral care implement of claim 1 wherein the cleaning element wall comprises a plurality of arcuate sections that collectively define a substantially closed loop, each arcuate section separated from an adjacent arcuate section by a gap; and wherein the cleaning element wall comprises only two arcuate sections, and wherein the arcuate sections are arranged so that the gaps are located along a longitudinal axis of the head.

6. An oral care implement comprising:

a handle;
a head connected to the handle, the head comprising a first surface and a second surface opposite the second surface;
a hollow cleaning element cone extending from

the first surface of the head, the hollow cleaning element cone circumferentially surrounding an axis extending from the first surface of the head, wherein the hollow cleaning element cone extends from the first surface of the head so as to radially diverge from the axis; and
a cleaning element wall extending from the first surface of the head and circumferentially surrounding the hollow cleaning element cone, wherein the cleaning element wall is an elastomeric wall.

7. The oral care implement of claim 6 further comprising:

the hollow cleaning element cone terminating in a cleaning end and the cleaning element wall terminating in a top surface;
the cleaning end of the hollow cleaning element cone being at a first height above the first surface of the head; and
the top surface of the cleaning element wall being at a second height above the first surface of the head;
wherein the first height is greater than the second height.

8. The oral care implement of claim 6 wherein the hollow cleaning element cone diverges from the axis at an angle in a range of 3 to 5 degrees.

9. The oral care implement of claim 6 wherein the hollow cleaning element cone is formed by a plurality of circumferentially spaced apart cleaning elements, wherein each of the cleaning elements of the hollow cleaning element cone extend from the first surface of the head so as to radially diverge from the axis; and wherein the plurality of circumferentially spaced apart cleaning elements are bristle tufts.

10. The oral care implement of claim 6 wherein the hollow cleaning element cone is formed by a plurality of circumferentially spaced apart bristle tufts.

11. The oral care implement of claim 6, wherein the cleaning element wall forms a loop comprising one or more gaps located along a longitudinal axis of the head, wherein the cleaning element wall is free of gaps that are not located along the longitudinal axis of the head;
wherein the head comprises a distal region, a middle region and a proximal region; and wherein the axis is located within the middle region of the head; and wherein the oral care implement further comprises a first set of cleaning elements extending from the first surface of the head in the distal region and a second set of cleaning elements extending from the first surface of the head in the proximate region; and wherein the loop is located entirely within the middle region.

12. An oral care implement comprising:

a handle;
a head connected to the handle, the head comprising a first surface;
a plurality of circumferentially spaced-apart cleaning elements extending from the first surface of the head and arranged equidistant from an axis extending from the first surface of the head, wherein the cleaning elements extend from the first surface of the head at an inclined orientation so as to radially diverge from the axis; and
a cleaning element wall extending from the first surface of the head and circumferentially surrounding the plurality of cleaning elements, wherein the cleaning element wall is an elastomeric wall.

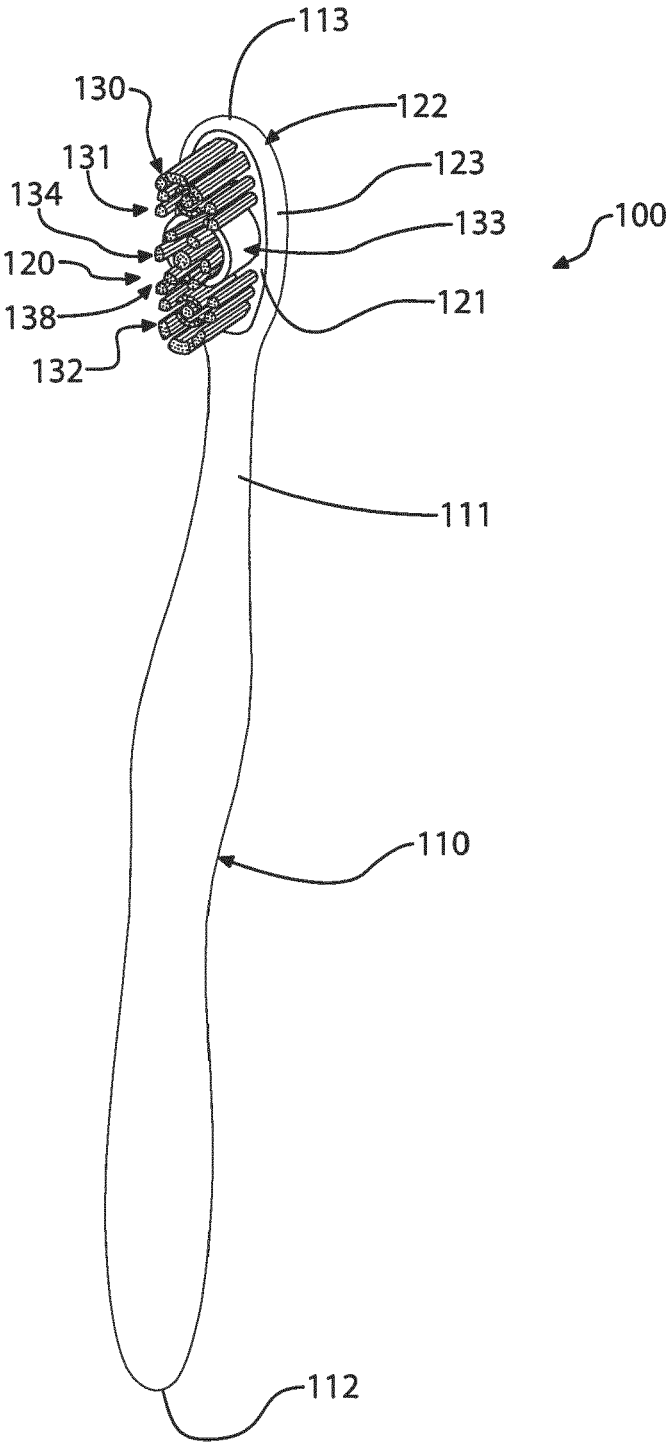

FIG. 1

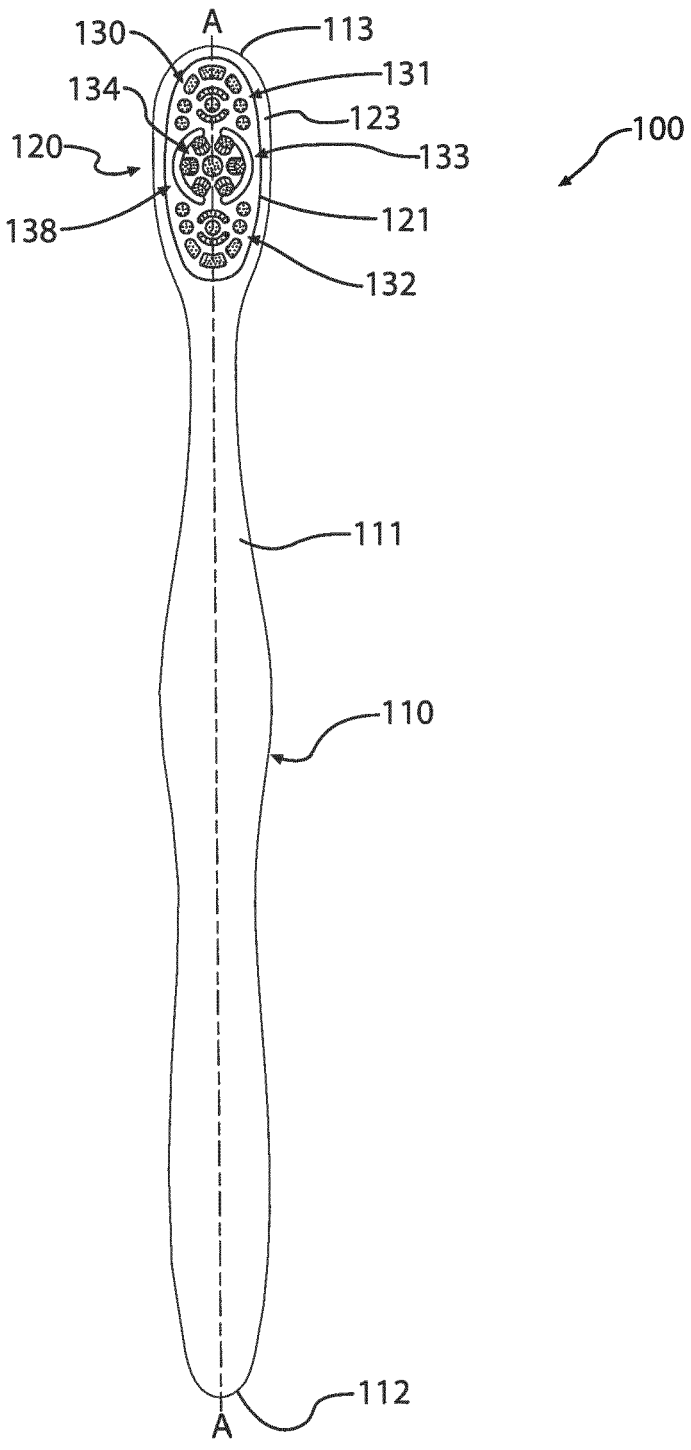

FIG. 2

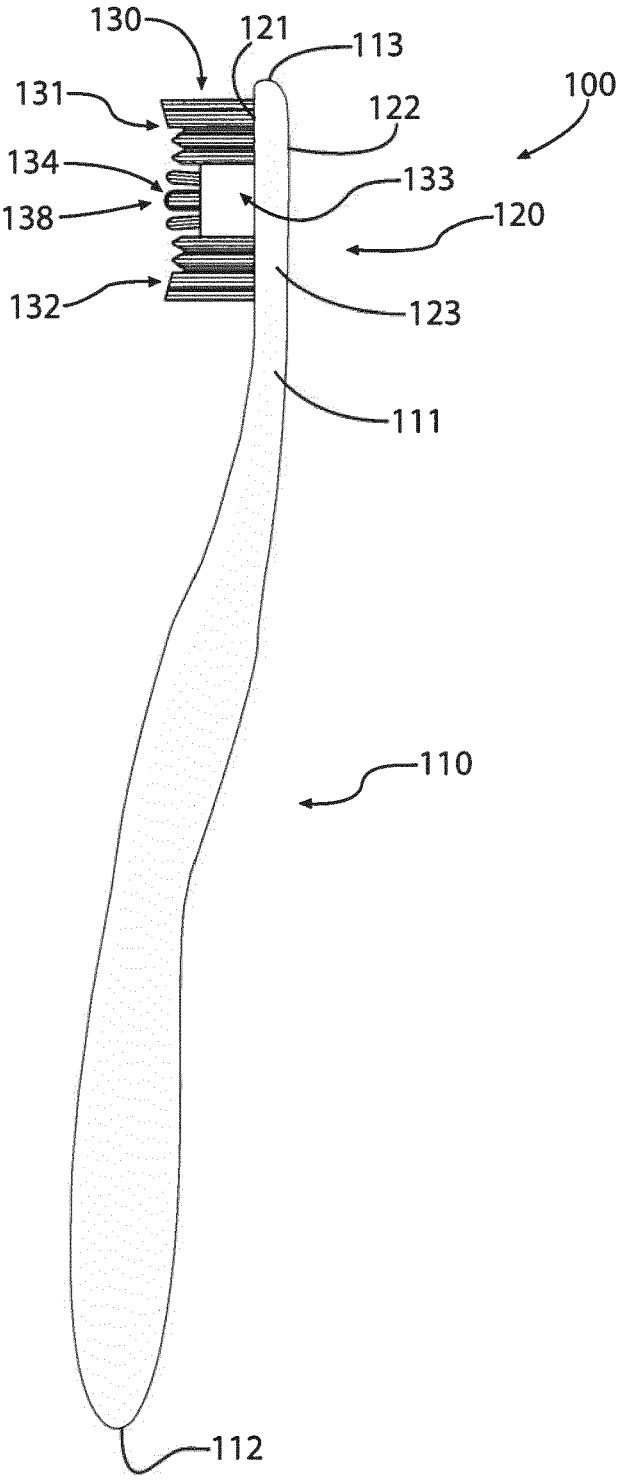

FIG. 3

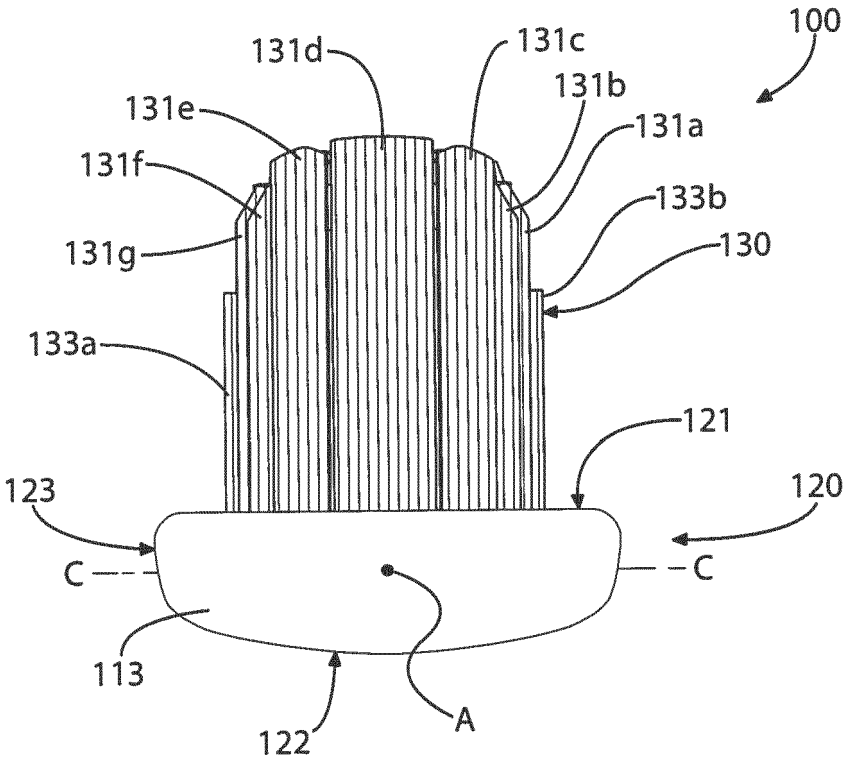
100
131d
131c
131b
131e
131a
131f
133b
131g
130
133a
121
123
120
C
C
113
122
A

FIG. 4

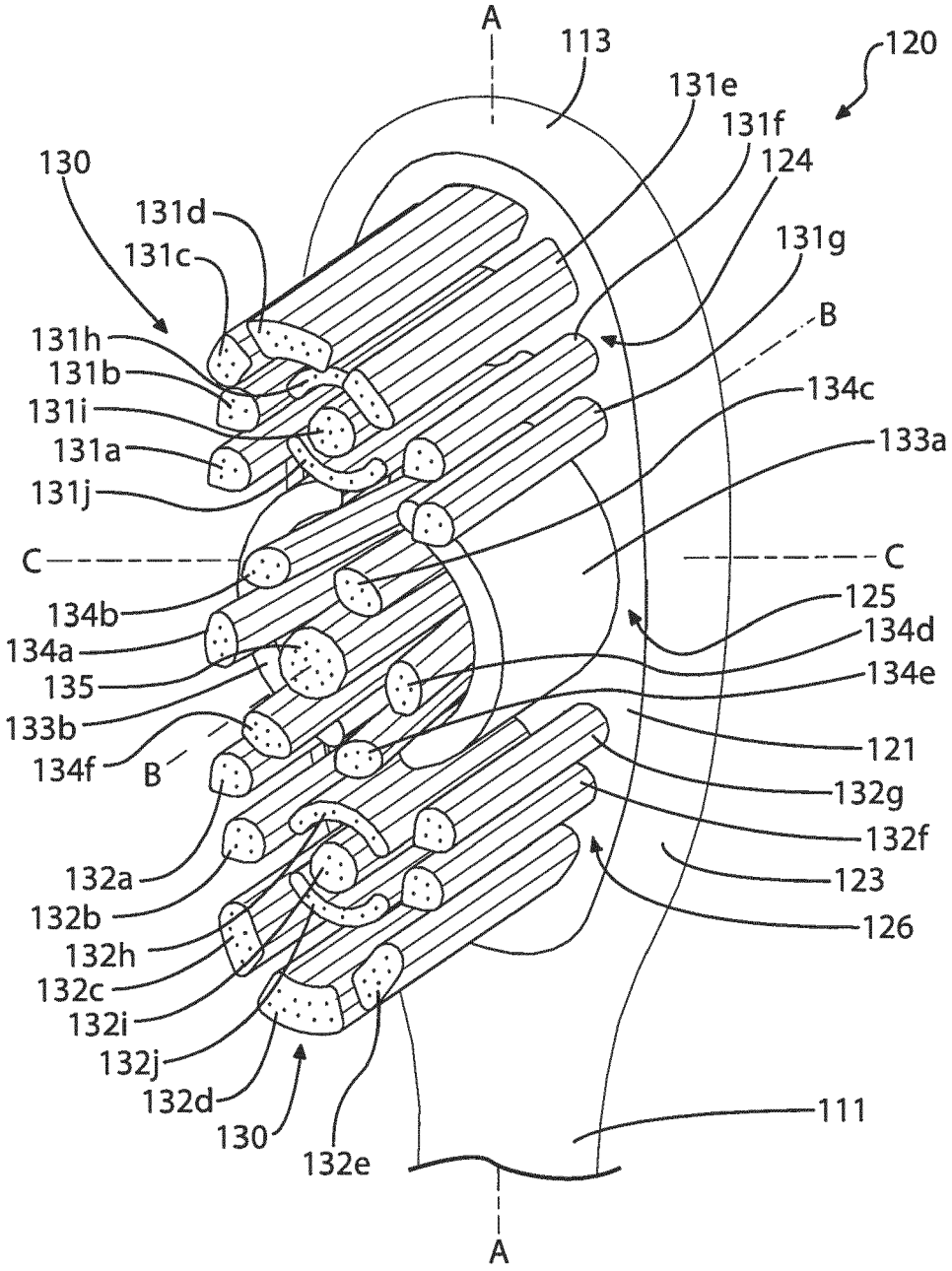
A
113
120
131e
131f
124
130
131d
131c
131g
B
131h
131b
131i
131a
131j
134c
133a
C
C
134b
125
134a
134d
135
134e
133b
121
134f
B
132g
132f
132a
123
132b
126
132h
132c
132i
132j
132d
130
132e
111
A

FIG. 5

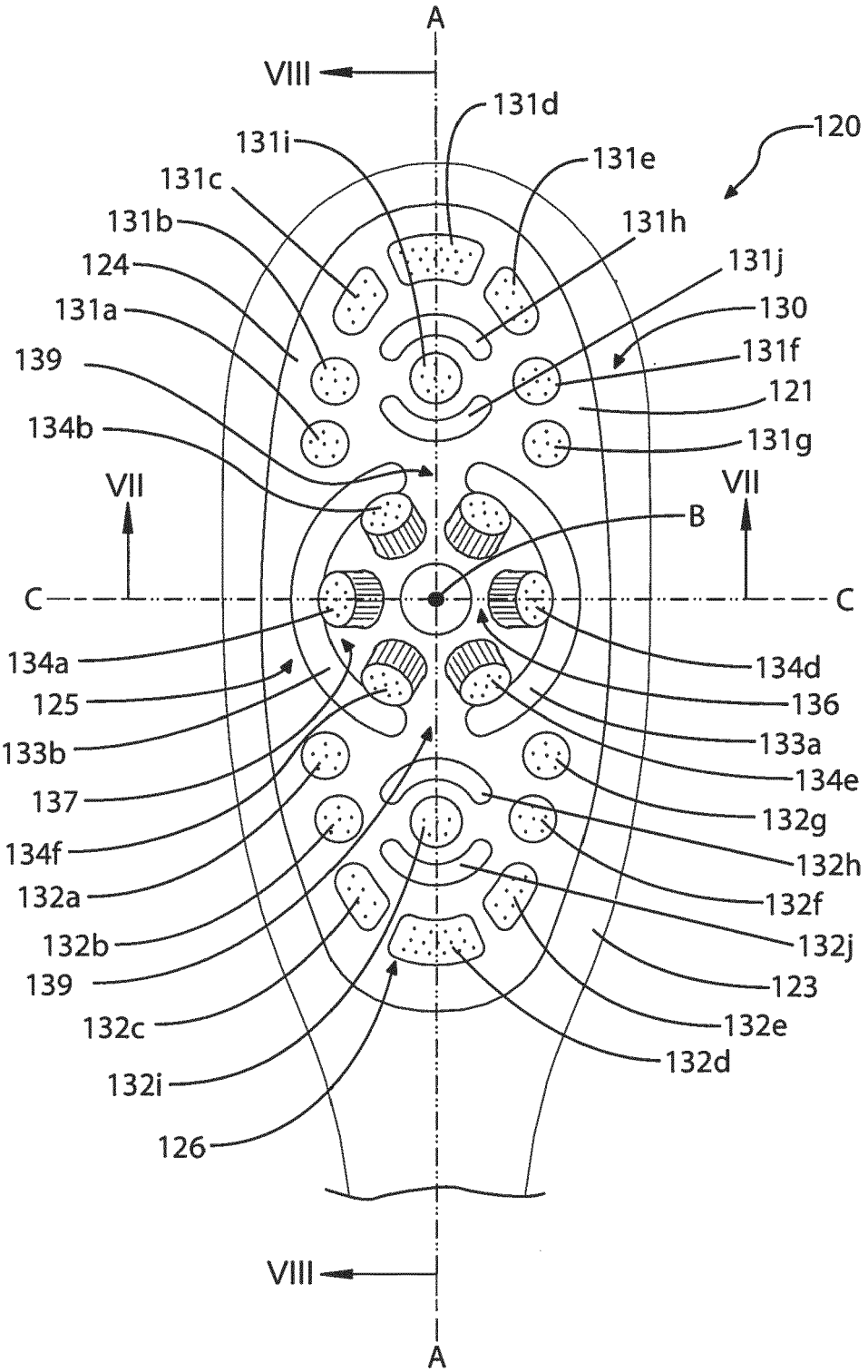
A
VIII
131d
131i
131e
120
131c
131b
131h
124
131j
131a
130
139
131f
121
134b
131g
VII
VII
B
C
C
134a
134d
125
136
133b
133a
137
134e
132g
134f
132h
132a
132f
132b
132j
139
123
132c
132e
132i
132d
126
VIII
A

FIG. 6

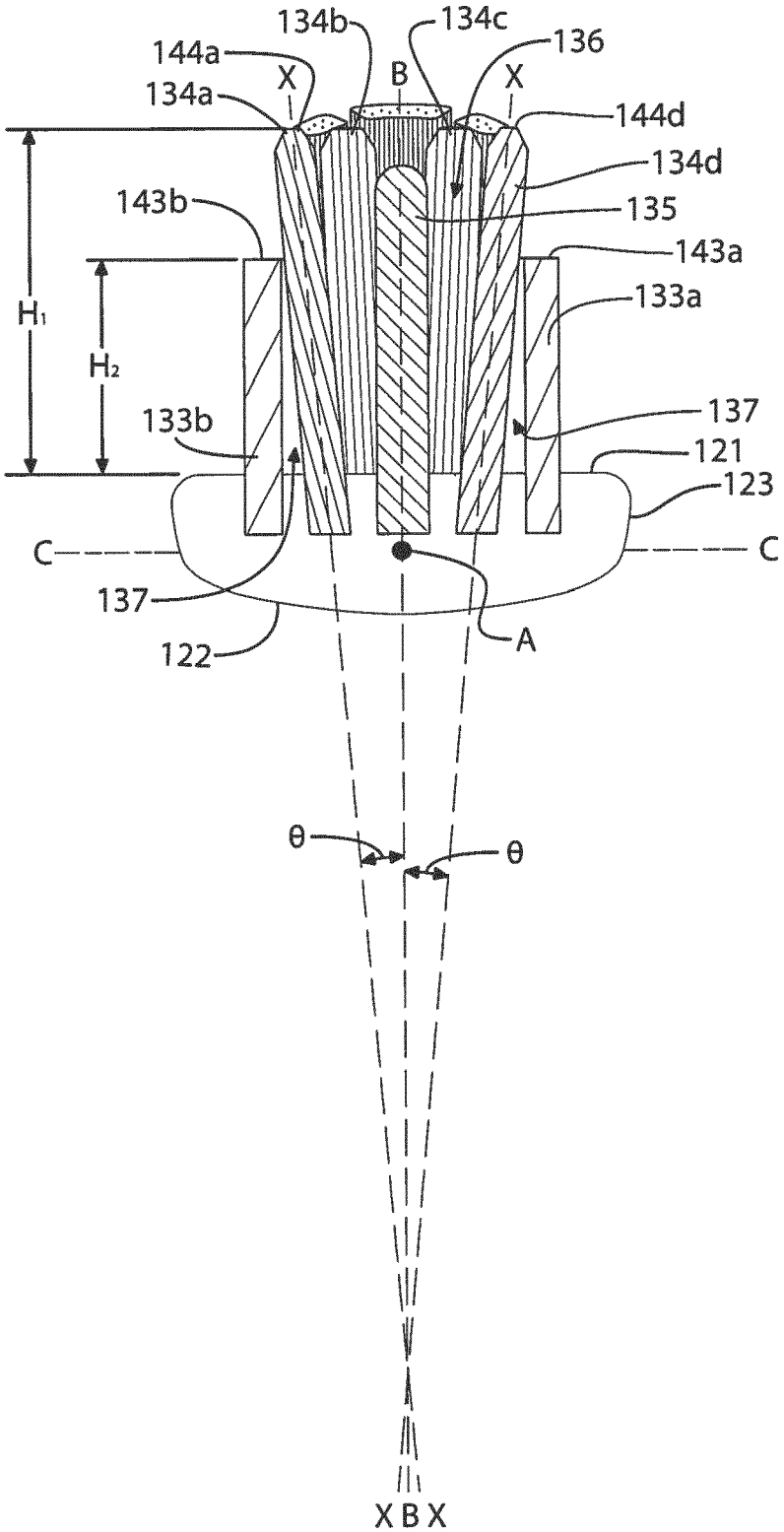
134b
134c
144a
136
X
B
X
134a
144d
134d
143b
135
143a
133a
H1
H2
133b
137
121
123
C
C
137
A
122
θ
θ
X B X

FIG. 7

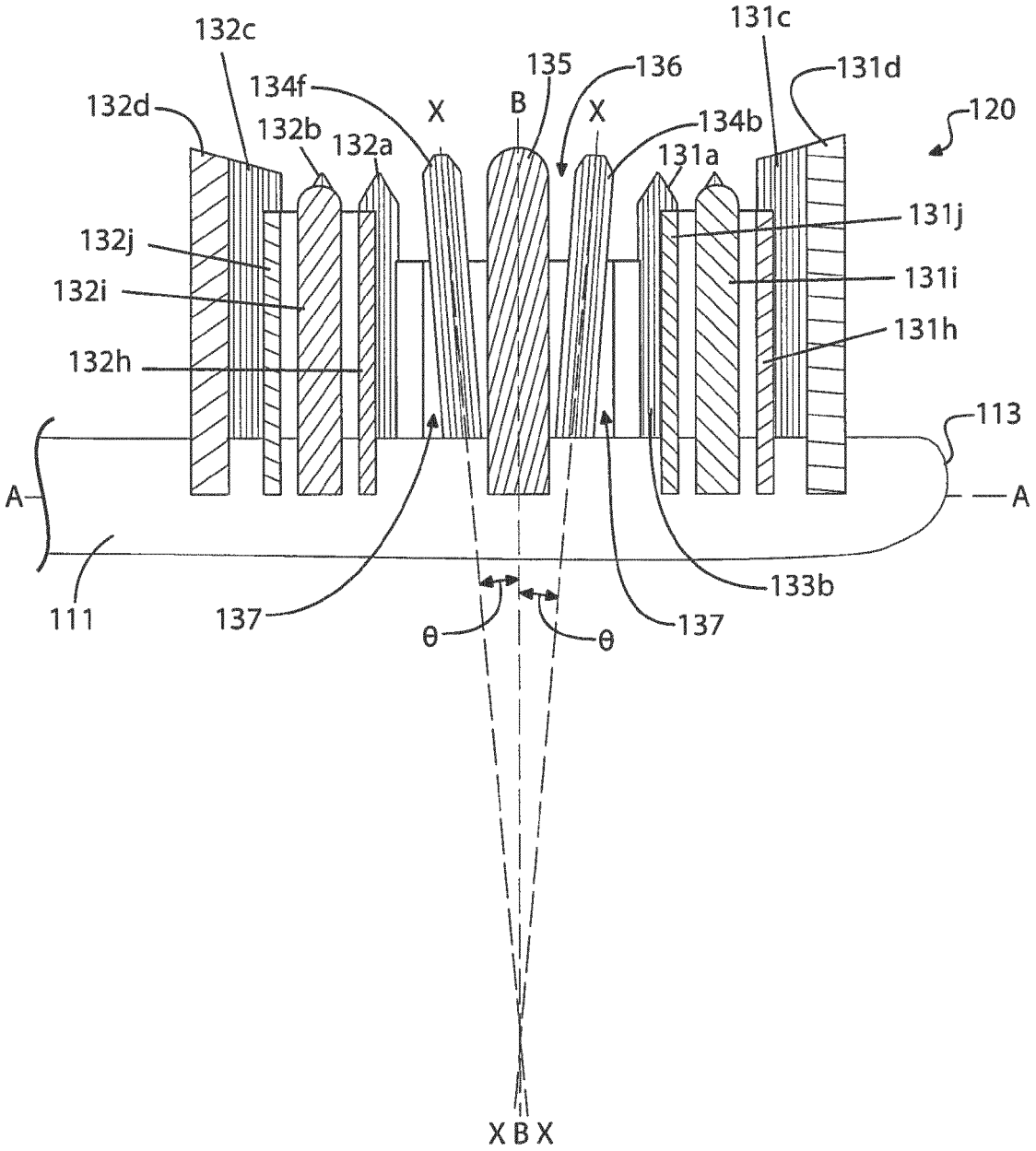
132c
131c
135
136
131d
134f
132d
X
B
X
120
132b
132a
134b
131a
131j
132j
131i
132i
131h
132h
113
A
A
133b
111
137
137
θ
θ
X B X

FIG. 8

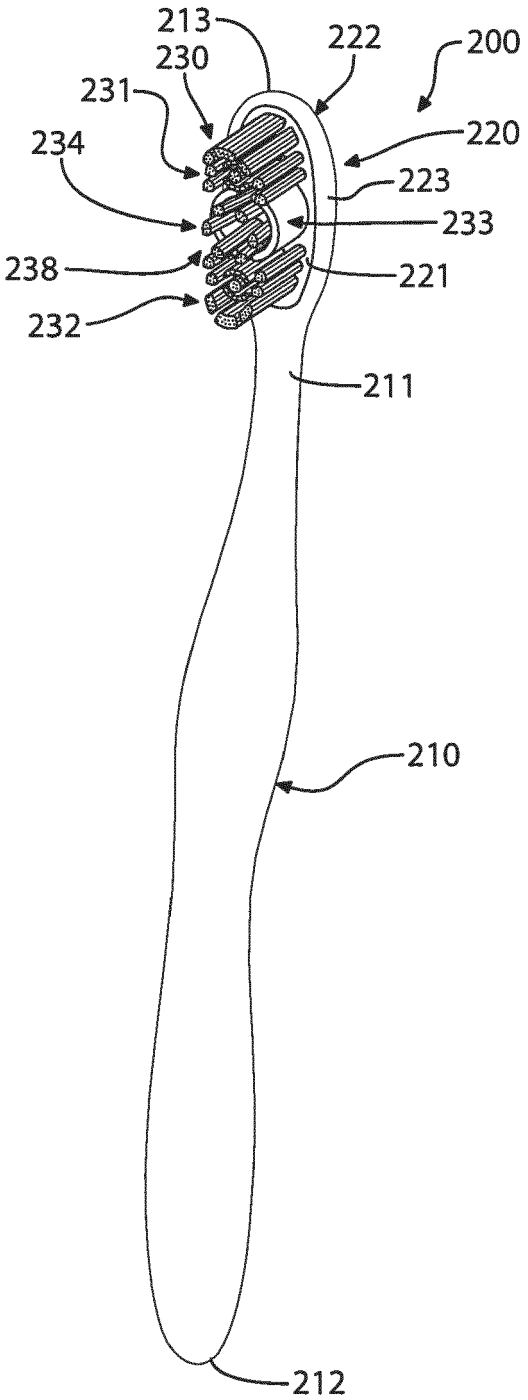
213
230
231
234
222
200
220
223
233
238
221
232
211
210
212

FIG. 9A

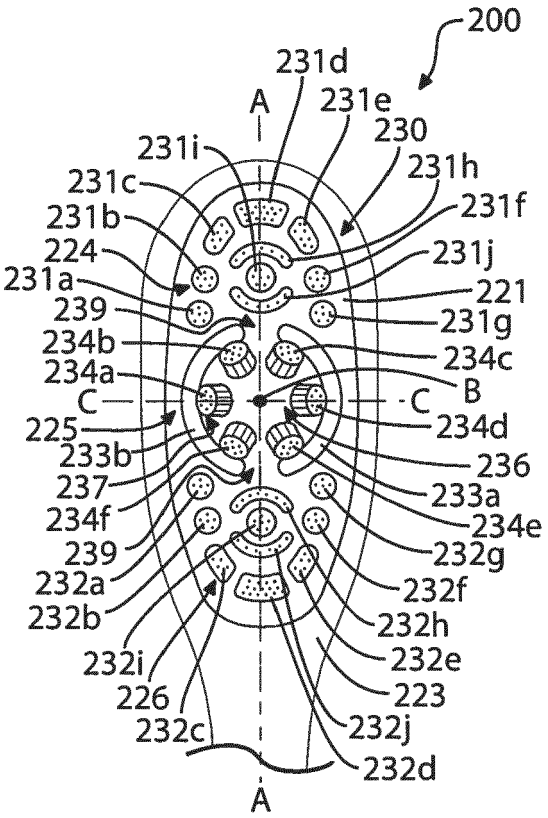
200
231d
A
231e
230
231i
231h
231c
231f
231b
231j
224
231a
221
239
231g
234b
234c
234a
B
C
C
225
234d
233b
236
237
233a
234f
234e
239
232g
232a
232f
232b
232h
232i
232e
226
223
232c
232j
232d
A

FIG. 9B

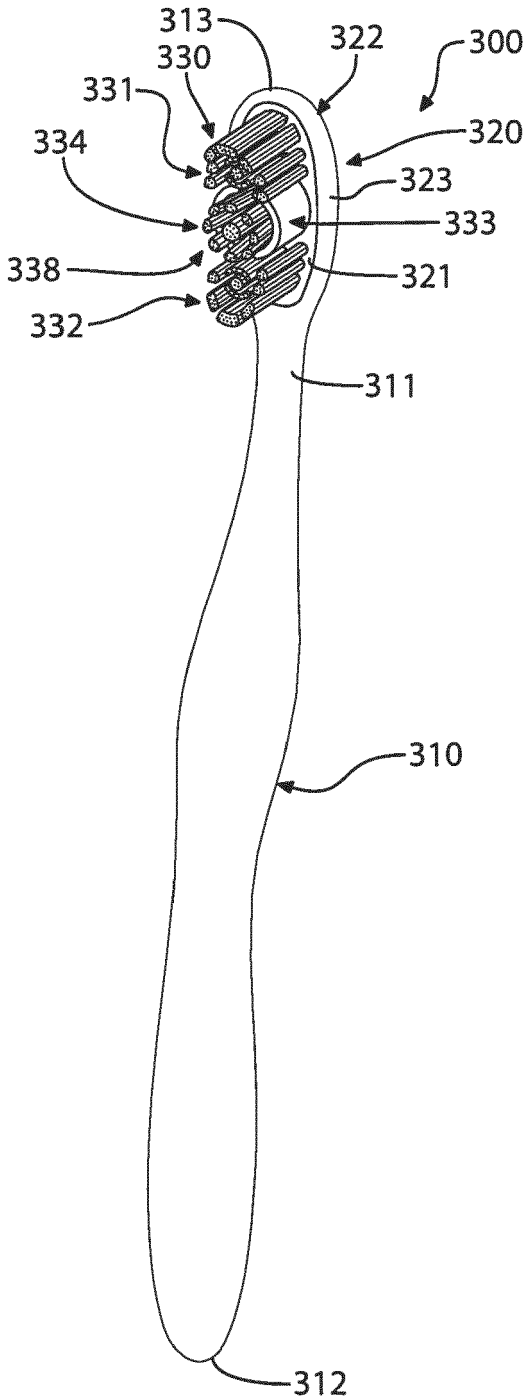

FIG. 10A

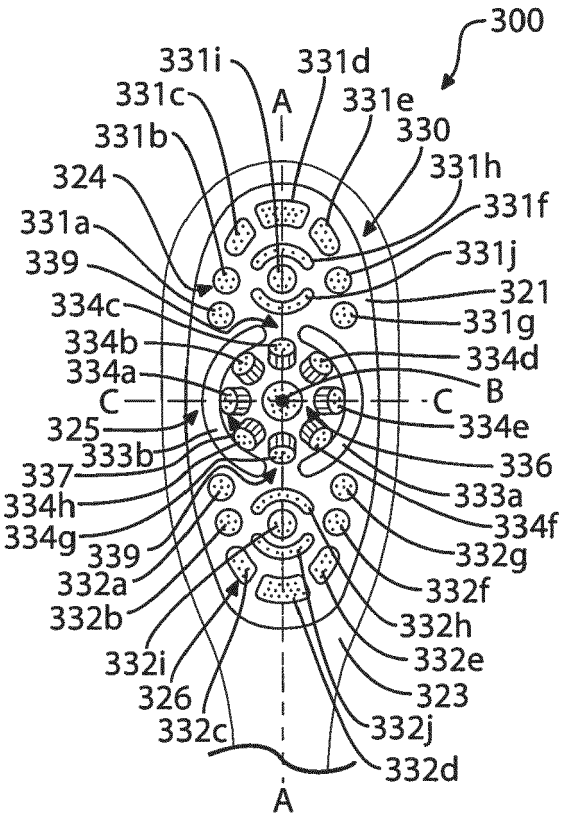

FIG. 10B

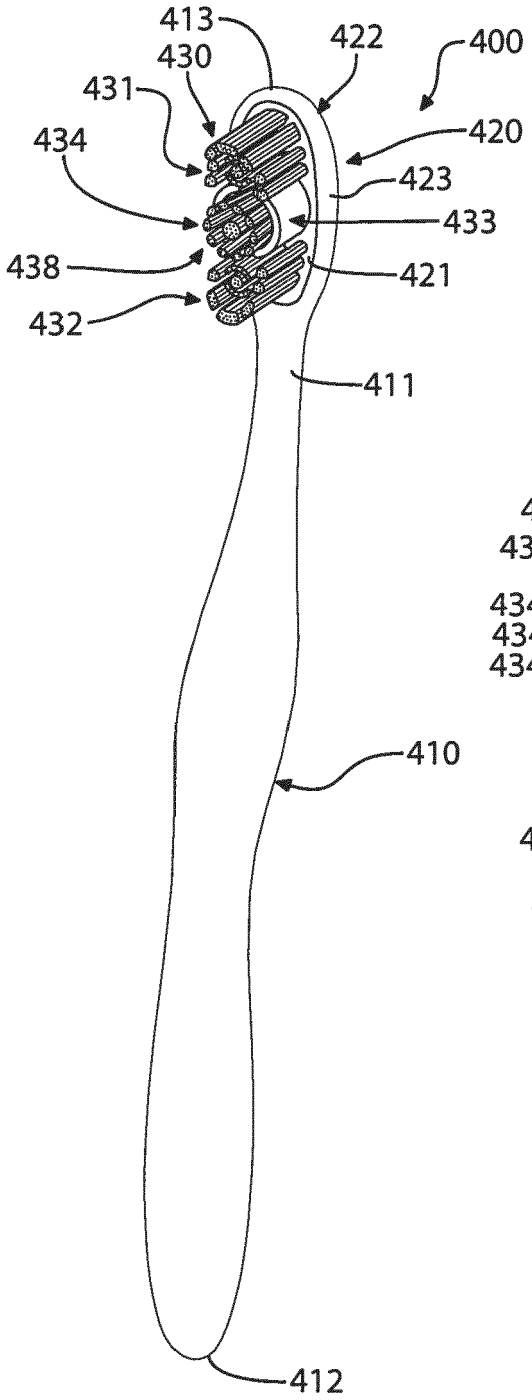

FIG. 11A

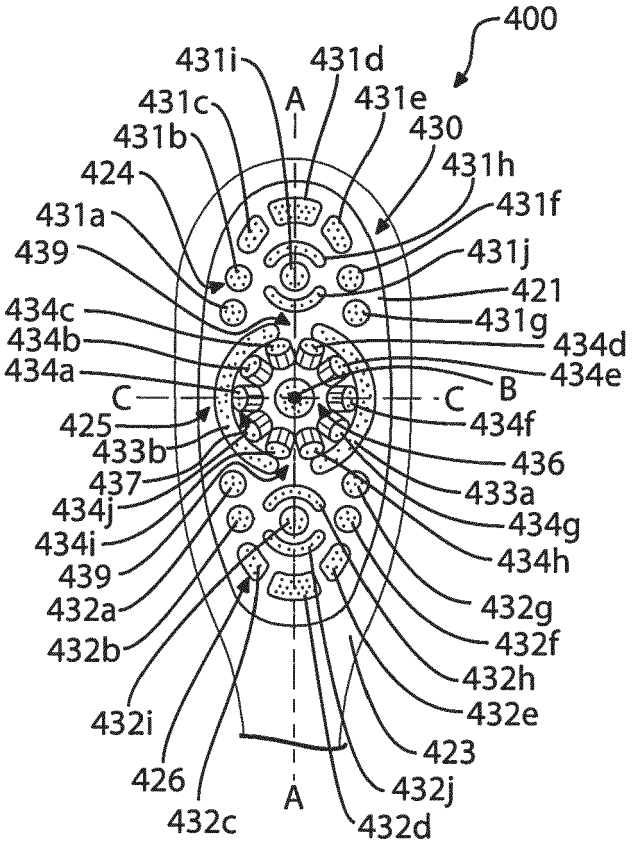

FIG. 11B

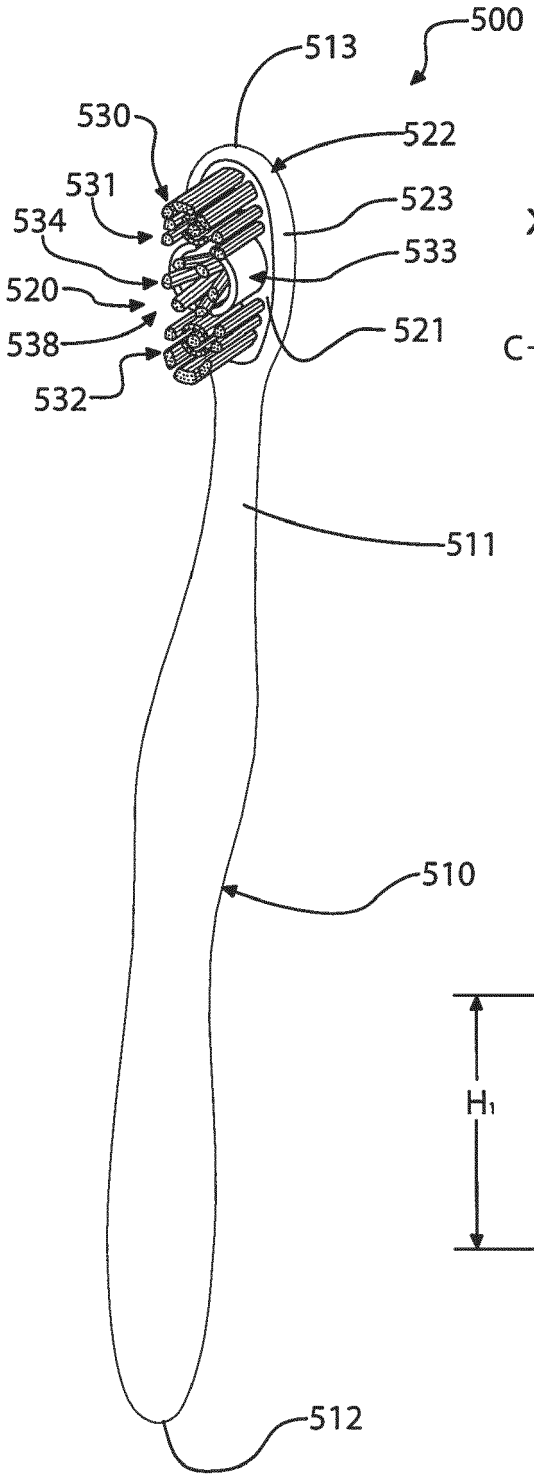

FIG. 12A

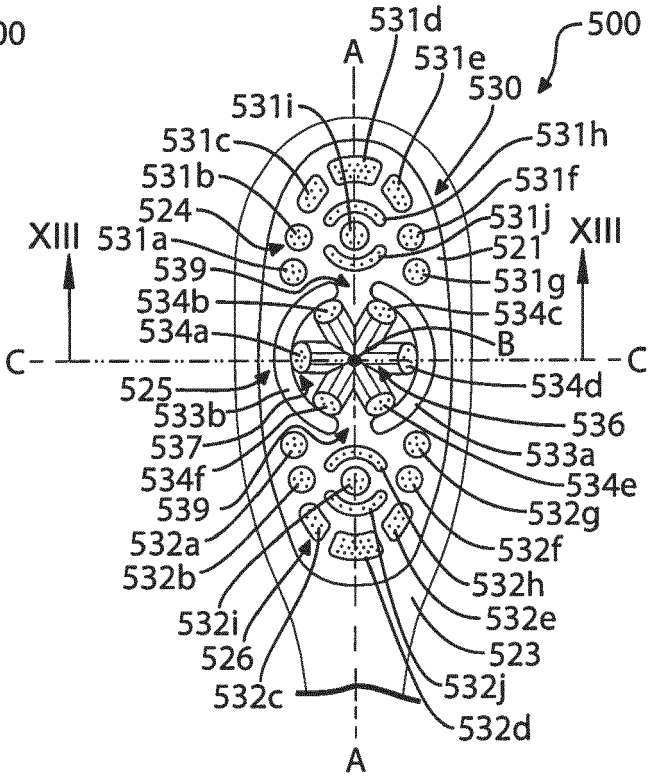

FIG. 12B

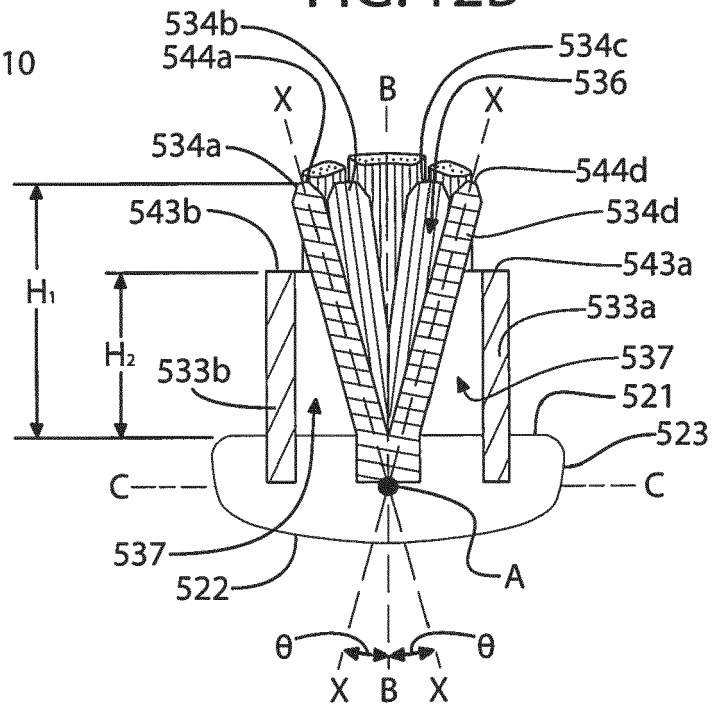

FIG. 12C

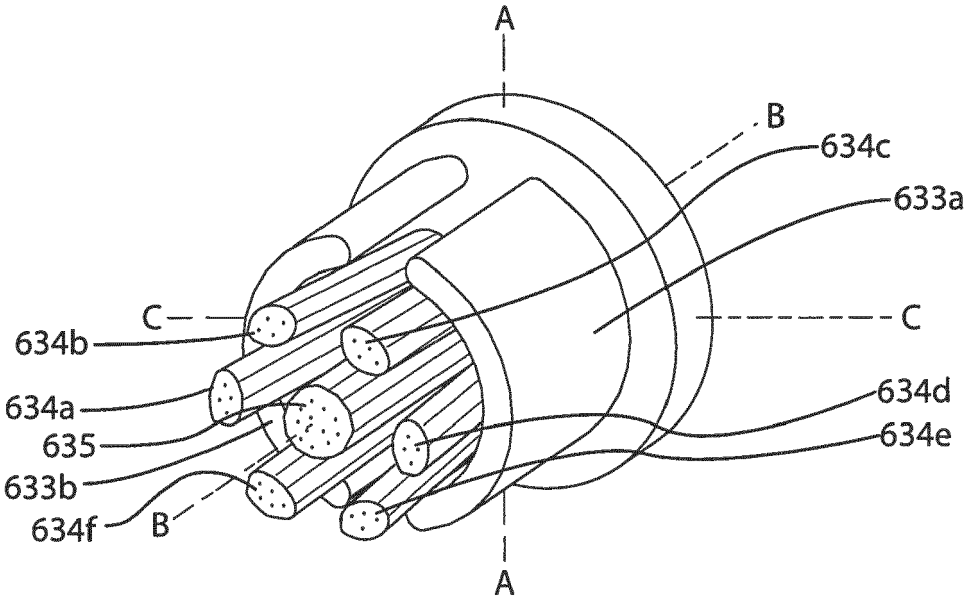

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 12547627 B **[0001]**
- US 7143462 B **[0040]**