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(54) **BRISTLE CONFIGURATION**
BORSTENKONFIGURATION
CONFIGURATION DE SOIES

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to toothbrush bristle profiles. More particularly, the present invention relates to unique bristle tuft profiles.

BACKGROUND OF THE INVENTION

[0002] Toothbrushes generally have a plurality of bristle tufts, each tuft having a plurality of bristles, for removing plaque and debris from tooth surfaces. Typically, bristle tufts are configured for brushing the outer surfaces of the teeth, i.e., the buccal (cheek-facing), lingual (tongue facing), and occlusal (chewing) surfaces of the teeth. Dental floss is effective in removing plaque and debris from interdental or interproximal surfaces. However, not all individuals floss on a regular basis, and some individual hardly floss at all. Accordingly, it is desirable for toothbrush bristle profiles (the contour of the free cleaning / brushing / tooth-engaging ends of the bristles as seen from a side elevational view) to be designed to remove plaque and debris not only from the outer surfaces of the teeth but also from the interdental surfaces of the teeth.

[0003] Commercially available toothbrushes with flat bristle profiles (i.e., all free ends of the bristles are on substantially the same level or, in other words, are coplanar) clean the outer surfaces of teeth adequately, but are not always as adept at cleaning interdental surfaces and providing interdental stimulation as are toothbrushes with contoured bristle profiles (having free ends at differing heights). Various bristle profiles, such as a repeating "V"-shaped (aka, sawtooth or zig-zag) profile, are known to increase the cleaning and gum-stimulating efficacy of toothbrushes.

[0004] Commercial toothbrushes typically have a brushing surface area (the surface area occupied by bristle free ends) of approximately 1 to 1.25 inches (25.4 to 35.8 mm) long and 5/16 to 3/8 inches (7.9 to 9.5mm) wide. The bristles are generally arranged in 4 to 6 longitudinally extending (i.e., from the distal to the proximal end of the head, or, in other words, from the tip of the head towards the handle) rows of bristle tufts with 5 to 14 tufts per row, and approximately 20 to 50 bristles per tuft. Typical tufts are approximately 0.063 inches (1.6 mm) in diameter, with a cross-sectional area of approximately 0.079 inches² (2 mm²). The diameters of commonly used bristles are: 0.006 inch (0.15 mm) for soft bristles, 0.008 inch (0.2 mm) for medium bristles, and 0.010 inch (0.25 mm) for hard bristles. The diameter of the bristles used in the brush, or increasing the tuft area, generally increases the stiffness of the bristles or tufts, and generally extends the life of the brush. However, such increases generally negatively affect the interdental cleaning of the brush, as well as the wear on the gums because the bristles are not as readily moved or bent to fit in the interdental spaces.

[0005] Accordingly, there is a continuing desire to improve the interdental cleaning ability of toothbrushes, especially since many individuals do not floss. Moreover, there is a desire to increase the life of the brush.

[0006] WO 97/20484 discloses a toothbrush having flexibly mounted bristles on the toothbrush head.

[0007] WO 2007/032955 discloses a toothbrush includes a head and a radial array of tooth cleaning elements being integrally moulded with the head.

[0008] US 2010/263148 A1 discloses a toothbrush with a mechanical vibratory element.

[0009] US 2011/047736 A1 discloses a toothbrush having diverging cleaning elements.

[0010] JP 2000 000118 A discloses a toothbrush with different shapes of the bristle profile.

[0011] US 2006/200925 A1 discloses a toothbrush with different cleaning elements.

[0012] JP 2001 286341 A discloses a toothbrush with outer hair bristle bundle and inner side hair bristle bundle have inclined surfaces (elevation difference of 2.0-0.5 mm of a slope) where the cleaning surface at that front-end tip of a hair bristle bundle descend by a predetermined angle toward the toothbrush center part.

SUMMARY OF THE INVENTION

[0013] In accordance with the principles of the present invention, a toothbrush is formed as defined in claim 1 with a bristle profile providing superior interdental cleaning. At least one elongated bristle tuft is formed to at least partially enclose an area, and a complementary-shaped tuft is provided in the at least partially enclosed area. The elongated tuft and the complementary tuft have angled profiles angled to a different degree, and also in a different direction. The elongated tufts are angled in different directions such that the overall arrangement imparts a unique bristle profile that is available for cleaning teeth. Accordingly, the bristle profile is not simply an ornamental configuration, but also provides enhanced interdental cleaning.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] While the specification concludes with claims which particularly point out and distinctly claiming the invention, it is believed the present invention will be better understood from the following detailed description in conjunction with the accompanying drawings, in which like reference numerals identify like elements and wherein:

FIGURE 1 is a perspective view of an exemplary toothbrush having one or more bristle profiles formed in accordance with the principles of the present invention;

FIGURE 2 is an isolated enlarged side elevational view of the head of the toothbrush shown in FIGURE 1;

FIGURE 3 is an isolated enlarged perspective view

of the head shown in FIGURE 2; and
FIGURE 4 is an isolated enlarged plan view of the head shown in FIGURE 2.

DETAILED DESCRIPTION OF THE INVENTION

[0015] An exemplary toothbrush **100** to which the principles of the present invention may be applied is illustrated in FIGURE 1, with head **110** shown in isolation in FIGURES 2, 3, and 4. Handle portion **102** and neck portion **104** of exemplary toothbrush **100** are angled with respect to each other, but need not be for purposes of the present invention. Toothbrush **100** has a proximal end **106** (at which handle **102** is provided for grasping by a user) and a distal end **108** (at which head **110** is provided) along longitudinal direction **L**. Longitudinal direction **L** is defined herein as the direction extending generally along the length of toothbrush **100** between proximal end **106** and distal end **108**. Longitudinal direction **L** may extend along handle portion **102** or neck portion **104** or along a direction there between. Transverse direction **T** is defined herein as a direction transverse to longitudinal direction **L**, such as extending across the width of toothbrush head **110**. For applications such as electric toothbrushes, handle portion **102** may have suitable attachment means (not shown) located at proximal end **106** for securing toothbrush **100** to a power source or driving means.

[0016] Toothbrush head **110** has a head surface **112** from which bristles **114** extend. Bristles **114** may include one or more toe tufts **116** at the proximal-most end of head surface **112** configured for reaching a user's back teeth. Typically, a toe tuft is a larger bristle tuft that preferably has an angled contour, such as illustrated in the exemplary embodiment of FIGURES 1-4. Heel tuft **117** at the distal-most end of head **110** may also be included. Peripheral tufts **118** may optionally be provided, extending from head surface **112**, and particularly configured for cleaning the user's gums. The height of peripheral tufts **118** may be selected to be higher or lower than the height of any of the other cleaning bristles extending from head surface **112**, depending on the desired cleaning effect of such bristles. In the embodiment of FIGURES 1-4, peripheral tufts **118** are somewhat elevated or higher than the interior bristles (the bristles lying closer to the centerline of head **110**) to clean the user's gumline effectively, particularly along the gingival margin. Also, each tuft along the periphery of head **110** may be profiled for additional cleaning benefits. For example, in the embodiment of FIGURES 1-4, peripheral tufts **118** are convexly curved to optimize cleaning efficacy.

[0017] The exemplary toothbrush illustrated in FIGURES 1-4 is an adult full-sized head. It will be appreciated that the principles of the present invention, to be detailed next, may be applied to other types of heads, such as compact heads, or the smaller-sized heads used on children's toothbrushes. For instance, more compact head designs may be obtained by not including a toe tuft, by

eliminating various bristle tufts, and / or by adding some gum massagers for massaging the user's gums and / or for indicating if the toothbrush is being used with too much pressure against the gums and teeth.

[0018] The bristle profile (i.e., the profile or contour of the cleaning ends or free ends of the bristles, as seen from a side elevational view) of a toothbrush formed in accordance with the principles of the present invention is configured to provide superior interdental cleaning. The individual bristles used to achieve the inventive bristle tuft profile of the present invention may be generally circular in cross-section, with individual bristle diameters of between about 0.004 inch (0.1 mm) and about 0.014 inch (0.4 mm). However, other cross-sectional bristle shapes, such as oval, square, rectangle, hexagonal, plus-sign, star, etc., are also contemplated. Bristles are typically made of synthetic fibers, such as nylon 6,12. It will be appreciated that other materials may be used within the scope of the present invention. The free cleaning ends of the bristles may be formed in any desired manner, such as straight-cut, rounded, tapered, or otherwise contoured. It will be appreciated that the individual bristles need not all be identical to one another. For instance, bristles of different diameters or cross-sectional shapes may be provided on a toothbrush head **110** of a toothbrush **100** formed in accordance with principles of the present invention.

[0019] Bristles **114** on toothbrush head **110** include at least one elongated tuft **120** shaped and configured to enclose, at least partially, an area. More particularly, elongated tuft **120** is "elongated" in the sense that the cross-sectional shape of such tufts (e.g., when viewed from a plan view, such as in FIGURE 4) is not completely symmetrical, such as a circular cross-section. Preferably, elongated tuft **120** is "elongated" in the sense that it is longer along one of a width or length of the cross-sectional shape thereof. Furthermore, elongated tuft **120** is configured to "enclose, at least partially, an area" in the sense that elongated tuft **120** is not substantially straight, but, instead, extends about an area such that an area is bound on more than one side by elongated tuft **120**. For example, exemplary elongated tuft **120** of the embodiment of FIGURES 1-4 is V-shaped and thus partially encloses an area between the legs of the V shape thereof. In accordance with the present invention, bristles **114** on toothbrush head **110** further include a complementary-shaped tuft **122** shaped to complement the shape enclosed by elongated tuft **120**. Complementary-shaped tuft **122** is shaped at least to fit within the area enclosed by elongated tuft **120**. The shape of elongated tuft **120** defines a contoured interior shape **121** and complementary-shaped tuft **122** has a complementary and most preferably matching contour following the contour of contoured interior shape **121** of elongated tuft **120**. In other words, elongated tuft **120** and complementary-shaped tuft **122** are shaped to substantially match each other in shape to interfit or to be interconnected so that the set of tufts may interact with each other while remaining in-

dependently formed tufts nonetheless. For example, complementary-shaped tuft **122** of the embodiment of FIGURES 1-4 has a cross-sectional shape with at least a portion that is substantially triangular in cross-section to complement the interior angle formed by the inner bristles of elongated tuft **120** and the angular-shaped area enclosed by elongated tuft **120**. In accordance with the principles of the present invention, one or both of the tufts in the combination of elongated tuft **120** and complementary-shaped tuft **122** may be contoured to form a unique bristle profile (i.e., contour formed by the bristle ends for contacting the user's teeth, such as may be seen along a side elevational view of head **110**).

[0020] The tufts of a tuft grouping formed in accordance with the principles of the present invention described above are spaced apart from and independent of one another. Typically, tufts are spaced approximately 0.5mm apart from one another to differentiate the tufts from one another as well to function substantially separately and independently from one another. The tufts of a tuft grouping are contoured independently. At least one tuft in a tuft grouping has a bristle profile different from the bristle profile of the other tufts of the tuft grouping. FIGURES 1-4 show that elongated tuft **120** and complementary-shaped tuft **122** have angled bristle profiles, the angle of the bristle profile of elongated tuft **120** differing in degree and direction from the direction of the bristle profile of complementary-shaped tuft **122**.

[0021] Elongated tuft **120** has a planar bristle profile. In the embodiment of FIGURES 1-4, elongated tuft **120** is V-shaped and is angled from the point of the "V" upwardly to the ends of the legs of the "V". As such, elongated tuft **120** presents a substantially planar cleaning surface that is angled with respect to the substantially planar surface of toothbrush head surface **112** from which the bristles extend. Complementary-shaped tuft **122** has a bristle profile (or contour) different from that of elongated tuft **120**. For instance, complementary-shaped tuft **122** may be contoured from any of its edges (e.g., one of the three corners of the complementary-shaped tuft **122** of the embodiment of FIGURES 1-4) across to the opposite edge (e.g., to another corner). The contouring of complementary-shaped tuft **122** may be complimentary to the contouring of elongated tuft **120**. As illustrated in the exemplary embodiment of FIGURES 1-4, complementary-shaped tuft **122** presents a substantially planar cleaning surface that is angled downwardly toward head surface **112** in a direction opposite the direction in which elongated tuft **120** is angled.

[0022] As will be appreciated, the complementary contouring of elongated tuft **124** and complementary-shaped tuft **122** in accordance with the principles of the present invention provides a tuft grouping that can sweep around teeth and reach interproximal areas (via raised sections of elongated tuft **120** and complementary tuft **122**) while also simultaneously polishing outer tooth surfaces (via lower sections of elongated tuft **124** and complementary-shaped tuft **122**). For purposes of the present invention,

a "raised section" of a bristle tuft formed in accordance with principles of the present invention is a section having free cleaning ends extending above other bristles of that tuft. Also for purposes of the present invention, a "lower section" of a bristle tuft formed in accordance with principles of the present invention is a section having free cleaning ends below the free cleaning ends of other bristles in that tuft.

[0023] As may be appreciated, provision of bristles in a bristle tuft having a height greater than the height of other bristles in the tuft generally permits such higher bristles to access interdental spaces better than the other bristles in the tuft and also to contour around non-flat or contoured surfaces. The shorter bristles provide lateral support to the higher bristles, imparting a degree of rigidity to improve cleaning efficacy, and also provide the ability to work with a contoured structure (e.g., tooth or gumline, tongue, etc.). It is believed that the provision of complementary shaped tufts in a grouping of tufts which are grouped together to interfit and having matching side contours to have a combined cross-sectional shape of a desired configuration (hereinafter a "tuft grouping") provides increased interdental cleaning capability over a single profiled tuft with at least one bristle of greater height than the other bristles in the tuft. Comparisons of toothbrush models based on principles of the present invention show better cleaning performance over various profiled toothbrushes (i.e., toothbrushes with bristles of differing heights) without tuft groupings as in the present invention. The complementary tufts of a tuft grouping formed in accordance with the principles of the present invention are capable of providing lateral support to one another, yet are spaced apart to permit a degree of independent movement among bristles of separate tufts in the tuft grouping. The improvement in cleaning capability of a tuft grouping formed in accordance with the principles of the present invention is believed to be due to not only the increased heightened bristles, but also the capability of bristles in each tuft to work somewhat independently of bristles in another tuft of the tuft grouping (i.e., not completely independently, since the tufts are closely spaced together, yet more independently than bristles in the same tuft). The individual tufts making up a tuft grouping thus work independently yet also synergistically together. In addition, the formation of the different tufts of a tuft grouping to have different profiles (elongated tuft **120** being angled in a first direction and complementary-shaped tuft **122** being angled in a different direction) is believed to provide enhanced cleaning efficacy over the same tuft grouping having a flat profile (in other words, all bristles in all tufts in the tuft grouping having the same height). Testing of an in vitro model has shown that biofilm removal interproximally is at least 19% greater in an exemplary tuft grouping as illustrated in the exemplary drawings than in a similar tuft grouping with a flat trim (no contour or trim profile, with all bristles of substantially the same height).

[0024] In accordance with a separate and independent

aspect of the present invention, exemplary embodiment of FIGURES 1-4 also show additional optional tufts 134 and 134' which, preferably, together form a tuft grouping separate and independent from the tuft grouping formed by elongated tufts 120 and complementary-shaped tufts 122. Exemplary tufts 134 of the exemplary embodiment of FIGURES 1-4 have a generally elongated rectangular cross-section. Exemplary tufts 134' are formed by the substantially perpendicular intersections of tufts shaped similar to tufts 134. However, other cross-sectional shapes of tufts 134 and 134' are within the scope of the present invention. Tufts 134 and 134' may be arranged to form, together, an extended tuft grouping extending laterally and / or longitudinally along toothbrush head 110. In the exemplary embodiment of Figures 1-4, the tuft grouping of tufts 134 and 134' form an extended elongated tuft grouping extending laterally back and forth between the left and right sides of toothbrush head 110 and also longitudinally along toothbrush head 110 and generally along longitudinal axis L. More particularly, the tuft grouping of tufts 134 and 134' form a sawtooth tuft pattern, such as a "W" shape, on toothbrush head 110 of a toothbrush 100. The tuft grouping formed by tufts 134 and 134' may be configured to complement one or more tuft groupings of elongated tufts 120 and complementary-shaped tufts 122. Such configuration complements the arrangement of exemplary elongated tufts 120 and complementary-shaped tufts 122. However, other configurations of tuft groupings formed from tufts 134 and 134' are within the scope of the present invention.

[0025] In some embodiments, each of tufts 134 and 134' may be trimmed to have a combined profile of a predetermined configuration, preferably a unique bristle profile providing improved cleaning efficacy. If desired, such combined bristle profile may complement the bristle profile of tuft groupings such as formed by elongated tufts 120 and complementary-shaped tufts 122. For instance, the bristle profiles of tufts 134 and 134' may include raised sections with bristles higher than other bristles in the tuft for reaching into and cleaning interdental areas. In the exemplary illustrated embodiment, the "W" tuft pattern formed by tufts 134 and 134' have a bristle profile complementing the profile of the tuft groupings formed by elongated tufts 120 and complementary-shaped tufts 122. More particularly, tufts 134' have a cross-sectional shape angled to complement the outer angle of elongated tufts 120 and have a bristle profile angled to a different degree than the bristle profile of elongated tufts 120. In one embodiment, the bristle profile of tufts 134' may be angled in a direction opposite the direction in which the bristle profile of elongated tufts 120 are angled. It will be appreciated that other bristle profiles are within the scope of the present invention.

[0026] A toothbrush may be formed in accordance with the principles of the present invention using methods similar to those disclosed in U.S. Pat. No. U.S. Pat. No. 5,609,890, issued to G.B. Boucherie N.V. on March 11, 1997, or U.S. Pat. No. 6,582,028 issued to MC Schiffer

GmbH on June 24, 2003.

[0027] If desired, any or all of the bristles of toothbrush 100 may be formed of a material which may whiten or remove stains from teeth. For instance, the bristles may be formed from calcium carbonate such as sold by Pedex GmbH, a brand of Lenzing Plastics GmbH of Wald-Michelbach, Germany. In a preferred embodiment, such bristles may be used to form tufts 134 and 134' arranged in a desired pattern along toothbrush head 110 to improve efficacy.

[0028] It will be appreciated that although only a pair of complementary tufts (an elongated tuft and a complementary-shaped tuft) is described herein, more than two tufts may be provided to form a combined tuft grouping formed of more than one tuft, each tuft of the grouping having a cross-section complementing one or more of the other tufts in the grouping. In accordance with the principles of the present invention, at least one tuft of such tuft grouping has a profile different from the profile of the other tufts in the grouping. More particularly, in accordance with the principles of the present invention, at least one tuft of such tuft grouping has an angled profile that is angled differently from the profile of the other tufts of such tuft grouping. Preferably, at least two tufts of such tuft grouping have angled profiles, the angled profiles differing from each other. Most preferably, at least one of the tufts at least partially surrounds at least one of the other tufts of such tuft grouping (i.e., at least one tuft at least partially encloses an area in which at least one other tuft grouping is provided in a shape complementing the interior shape formed by the elongated tuft).

[0029] Various embodiments of toothbrushes formed in accordance with the principles of the invention have been described above. Each embodiment is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention cover such modifications and variations as come within the scope of the appended claims and their equivalents.

[0030] The present invention may be better understood with reference to the following examples.

EXAMPLES:

[0031] Three brushes were constructed based on the exemplary embodiment of FIGURES 1-4, with V-tufts of different lengths. The control brush had no V-tufts.

[0032] Saliva inoculated hydroxyapatite ("HA") discs were grown aerobically at 35°C for 7 days with once daily media exchanges performed for 5 days. Base Media (BM) with 12% Phosphate Buffered Saline was used for growth media. The 14th and 15th molars were brushed for 15 seconds, using 250 grams of added weight. Im-

mediately after brushing, the biofilms were harvested by sonication. Dilutions were made in 0.1% Peptone Water and cell plating was used to measure cell viability, which is indicated in terms of log CFU/mL (Colony Forming Units). Results are based on the data from each brush formed in accordance with principles of the present invention run three times for a total of 3 times each. This allows for n=3 for each brush and a control of n=3. The amount of simulated plaque left behind was then assessed compared to a control to determine how much was removed based upon the brush head design. The table below summarizes the results:

Percent Interproximal Biofilm Removed versus Brush Head Design:

Brush Head Design	% Reduction
Control	NA
9.5 mm	26.60
10.5 mm	59.56
11.5 mm	73.24

[0033] The table shows the significant improvement increase as the length of the bristles in the V-tufts (referenced in the chart above in terms of the height that the V-tuft rises above the flat section) increase.

[0034] The exemplary embodiment illustrated in the figures has several separate and independent inventive features, which each, at least alone, has unique benefits which are desirable for, yet not critical to, the present invention. Therefore, the various separate features of the present invention need not all be present in order to achieve at least some of the desired characteristics and / or benefits of the present invention. One or more separate features may be combined, or only one of the various features need be present in a formed in accordance with the principles of the present invention, whether or not explicitly indicated. Therefore, the present invention is not limited to only the embodiments specifically described herein. Another exemplary embodiment of the inventive features are illustrated in U.S. Application No. 29/338,240.

[0035] Elements shown as integrally formed may be constructed of multiple parts or elements shown as multiple parts may be integrally formed, the operation of elements may be reversed or otherwise varied, the size or dimensions of the elements may be varied. The presently disclosed embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims, and not limited to the foregoing description.

Claims

1. A toothbrush (100) comprising:

an elongated tuft of bristles shaped and configured to enclose, at least partially, an area, thereby forming an elongated bristle tuft (120) having a contoured interior shape (121) surrounding the partially enclosed area, wherein the elongated tuft extends about the area such that the area is bound on more than one side by the elongated tuft; and

at least one complementary-shaped tuft of bristles (122) in the at least partially enclosed area enclosed by said elongated tuft (120), said at least one complementary-shaped tuft of bristles (122) being shaped at least to fit within the partially enclosed area enclosed by said elongated tuft (120) and to complement said contoured interior (121) of said elongated bristle tuft (120); wherein:

said elongated bristle tuft (120) and said complementary-shaped bristle tuft (122) extend from a substantially planar head surface (112) of a toothbrush head (110); said elongated bristle tuft (120) has a bristle profile presenting a cleaning surface angled to a first degree with respect to said toothbrush head surface (112);

said complementary-shaped bristle tuft (122) has a bristle profile presenting a cleaning surface angled to a second degree with respect to said toothbrush head surface (112), said second degree differing from said first degree said bristle profile of said elongated bristle tuft (120) and said bristle profile of said complementary-shaped bristle tuft (122) are substantially planar;

wherein said bristle profile of said elongate bristle tuft (120) extends in a first direction angled with respect to said toothbrush head surface (120); and

said bristle profile of said complementary-shaped bristle tuft (122) extends in a second direction angled with respect to said toothbrush head surface (112) wherein said second direction is different from said first direction.

2. A toothbrush (100) as in claim 1, wherein said second direction is opposite said first direction.

3. A toothbrush (100) as in claim 1, wherein:

said elongated bristle tuft (120) is elongated and angled; and

said complementary-shaped bristle tuft (122) has a triangular cross-sectional shape fitting within an angled interior shape formed by said angled elongated bristle tuft (120).

4. A toothbrush (100) as in claim 1, further comprising an additional tuft grouping formed from at least one additional tuft (134, 134'), wherein said additional tuft grouping:

extends along a side of said elongated bristle tuft (120) opposite said partially enclosed area enclosed by said elongated tuft (120); and is spaced apart from and independent of said elongated bristle tuft (120).

5. A toothbrush (100) as in claim 4, wherein said additional tuft grouping has a bristle profile angled with respect to said toothbrush head surface (112) to a third degree different from said first degree with which said bristle profile of said elongated tuft (120) is angled with respect to said toothbrush head surface (112).

6. A toothbrush (100) as in claim 5, wherein said bristle profile of said additional tuft grouping is substantially planar.

7. A toothbrush (100) as in claim 5, further comprising:

at least one additional elongated bristle tuft (120) shaped and configured to enclose, at least partially, an area, thereby forming an at least one additional elongated bristle tuft (120) having a contoured interior shape (121) surrounding the partially enclosed area; and at least one additional complementary-shaped tuft of bristles (122) shaped at least to fit within the partially enclosed area enclosed by said at least one additional elongated tuft (120) and to complement said contoured interior (121) of said at least one additional elongated bristle tuft (120).

8. A toothbrush (100) as in claim 7, wherein said additional tuft grouping:

extends along a side of said at least one additional elongated bristle tuft (120) opposite said partially enclosed area enclosed by said at least one additional elongated tuft (120); and is spaced apart from and independent of said elongated bristle tuft (120).

9. A toothbrush (100) as in claim 7 wherein:

said at least one additional elongated bristle tuft (120) and said at least one additional complementary-shaped tuft (122) are arranged adjacent said elongated bristle tuft (120) and said complementary-shaped tuft (122); said additional tuft grouping extends along sides of said elongated bristle tuft (120) and said at

least one additional elongated bristle tuft (120) opposite said partially enclosed areas enclosed by said elongated bristle tuft (120) and said at least one additional elongated bristle tuft (120), respectively, to form an elongated tuft grouping pattern; and said additional tuft grouping has a bristle profile different from the bristle profile of said elongated bristle tuft (120) and said at least one additional elongated bristle tuft (120).

10. A toothbrush (100) as in claim 9, wherein:

said elongated bristle tuft (120) and said at least one additional elongated bristle tuft (120) are angled; and said additional tuft grouping is "W" shaped.

11. A toothbrush (100) as in claim 4 or claim 10, wherein said additional tuft grouping is formed from more than one bristle tuft.

Patentansprüche

1. Zahnbürste (100), Folgendes umfassend:

ein längliches Büschel Borsten, das dazu ausgelegt ist, einen Bereich zumindest teilweise zu umschließen, wodurch ein längliches Borstenbüschel (120) ausgebildet wird, das eine Innenkontur (121) aufweist, die den teilweise umschlossenen Bereich umgibt, wobei das längliche Büschel um den Bereich verläuft, sodass der Bereich auf mehr als einer Seite mit dem länglichen Büschel verbunden ist; und mindestens ein komplementär geformtes Büschel Borsten (122) in dem zumindest teilweise von dem länglichen Büschel (120) umschlossenen Bereich, wobei das mindestens eine komplementär geformte Büschel Borsten (122) so geformt ist, dass es zumindest in den teilweise von dem länglichen Büschel (120) umschlossenen Bereich passt und die Innenkontur (121) des länglichen Borstenbüschels (120) ergänzt; wobei:

das längliche Borstenbüschel (120) und das komplementär geformte Borstenbüschel (122) von einer im Wesentlichen ebenen Kopffläche (112) eines Zahnbürstenkopfes (110) verlaufen; das längliche Borstenbüschel (120) ein Borstenprofil mit einer Reinigungsfläche aufweist, die in Bezug zu der Zahnbürstenkopffläche (112) in einem ersten Winkel angewinkelt ist; das komplementär geformte Borstenbü-

- schel (122) ein Borstenprofil mit einer Reinigungsfläche aufweist, die in Bezug zu der Zahnbürstenkopffläche (112) in einem zweiten Winkel angewinkelt ist, wobei sich der zweite Winkel von dem ersten Winkel unterscheidet, wobei das Borstenprofil des länglichen Borstenbüschels (120) und das Borstenprofil des komplementär geformten Borstenbüschels (122) im Wesentlichen eben sind;
wobei das Borstenprofil des länglichen Borstenbüschels (120) in einer ersten, in Bezug zu der Zahnbürstenkopffläche (120) angewinkelten Richtung verläuft; und
wobei das Borstenprofil des komplementär geformten Borstenbüschels (122) in einer zweiten, in Bezug zu der Zahnbürstenkopffläche (112) angewinkelten Richtung verläuft; wobei sich die zweite Richtung von der ersten Richtung unterscheidet.
2. Zahnbürste (100) nach Anspruch 1, wobei die zweite Richtung der ersten Richtung entgegengesetzt ist.
3. Zahnbürste (100) nach Anspruch 1, wobei:
das längliche Borstenbüschel (120) länglich und angewinkelt ist; und
das komplementär geformte Borstenbüschel (122) eine dreieckige Querschnittsform aufweist, die zu einer angewinkelten Innenkontur passt, die durch das längliche Borstenbüschel (120) ausgebildet wird.
4. Zahnbürste (100) nach Anspruch 1, ferner eine zusätzliche Büschelgruppe umfassend, die aus mindestens einem zusätzlichen Büschel (134, 134') ausgebildet ist, wobei die zusätzliche Büschelgruppe:
entlang einer Seite des länglichen Borstenbüschels (120) gegenüber des durch das längliche Büschel (120) teilweise umschlossenen Bereichs verläuft; und
von dem länglichen Borstenbüschel (120) beabstandet und unabhängig ist.
5. Zahnbürste (100) nach Anspruch 4, wobei die zusätzliche Büschelgruppe ein Borstenprofil aufweist, das in Bezug zu der Zahnbürstenkopffläche (112) in einem dritten Winkel angewinkelt ist, der sich von dem ersten Winkel, in dem das Borstenprofil des länglichen Büschels (120) in Bezug zu der Zahnbürstenkopffläche (112) angewinkelt ist, unterscheidet.
6. Zahnbürste (100) nach Anspruch 5, wobei das Borstenprofil der zusätzlichen Büschelgruppe im Wesentlichen eben ist.
7. Zahnbürste (100) nach Anspruch 5, ferner Folgendes umfassend:
mindestens ein zusätzliches längliches Borstenbüschel (120), das dazu geformt und ausgelegt ist, einen Bereich zumindest teilweise zu umschließen, wodurch mindestens ein zusätzliches längliches Borstenbüschel (120) ausgebildet wird, das eine Innenkontur (121) aufweist, die den teilweise umschlossenen Bereich umgibt; und
mindestens ein zusätzliches komplementär geformtes Büschel Borsten (122), das dazu geformt ist, in den zumindest teilweise von dem mindestens einen zusätzlichen länglichen Büschel (120) umschlossenen Bereich zu passen und die Innenkontur (121) des mindestens einen zusätzlichen länglichen Borstenbüschels (120) zu ergänzen.
8. Zahnbürste (100) nach Anspruch 7, wobei die zusätzliche Büschelgruppe:
entlang einer Seite des mindestens einen zusätzlichen länglichen Borstenbüschels (120) gegenüber des durch das mindestens eine zusätzliche längliche Büschel (120) teilweise umschlossenen Bereichs verläuft; und
von dem länglichen Borstenbüschel (120) beabstandet und unabhängig ist.
9. Zahnbürste (100) nach Anspruch 7, wobei:
das mindestens eine zusätzliche längliche Borstenbüschel (120) und das mindestens eine zusätzliche komplementär geformte Büschel (122) an das längliche Borstenbüschel (120) und das komplementär geformte Büschel (122) angrenzend angeordnet sind;
die zusätzliche Büschelgruppe entlang der Seiten des länglichen Borstenbüschels (120) und des mindestens einen zusätzlichen länglichen Borstenbüschels (120) gegenüber der durch das längliche Borstenbüschel (120) bzw. das mindestens eine zusätzliche längliche Borstenbüschel (120) teilweise umschlossenen Bereiche verläuft, um ein längliches Büschelgruppenmuster auszubilden; und
die zusätzliche Büschelgruppe ein Borstenprofil aufweist, das sich von dem Borstenprofil des länglichen Borstenbüschels (120) und des mindestens einen zusätzlichen länglichen Borstenbüschels (120) unterscheidet.
10. Zahnbürste (100) nach Anspruch 9, wobei:
das längliche Borstenbüschel (120) und das mindestens eine zusätzliche längliche Borsten-

büschel (120) angewinkelt sind; und
die zusätzliche Büschelgruppe W-förmig ist.

11. Zahnbürste (100) nach Anspruch 4 oder 10, wobei
die zusätzliche Büschelgruppe aus mehr als einem
Borstenbüschel ausgebildet ist.

Revendications

1. Brosse à dents (100) comprenant:

une touffe de soies allongée formée et configurée de façon à enfermer, au moins en partie, une zone, formant ainsi une touffe de soies allongée (120) ayant une forme intérieure profilée (121) qui entoure la zone partiellement enfermée, dans laquelle la touffe allongée s'étend autour de la zone de telle manière que la zone soit limitée sur plus d'un côté par la touffe allongée; et

au moins une touffe de soies de forme complémentaire (122) dans la zone partiellement enfermée entourée par ladite touffe allongée (120), ladite au moins une touffe de soies de forme complémentaire (122) étant formée au moins de façon à s'ajuster à l'intérieur de la zone partiellement enfermée entourée par ladite touffe allongée (120) et à compléter ledit intérieur profilé (121) de ladite touffe allongée (120);
dans laquelle:

ladite touffe de soies allongée (120) et ladite touffe de soies de forme complémentaire (122) s'étendent à partir d'une surface de tête essentiellement plane (112) d'une tête de brosse à dents (110);

ladite touffe de soies allongée (120) a un profil des soies présentant une surface de nettoyage inclinée avec un premier degré par rapport à ladite surface de tête de brosse à dents (112);

ladite touffe de soies de forme complémentaire (122) a un profil des soies présentant une surface de nettoyage inclinée avec un deuxième degré par rapport à ladite surface de tête de brosse à dents (112), ledit deuxième degré étant différent dudit premier degré, ledit profil des soies de ladite touffe de soies allongée (120) et ledit profil des soies de ladite touffe de soies de forme complémentaire (122) sont essentiellement plans; dans laquelle ledit profil des soies de ladite touffe de soies allongée (120) s'étend dans une première direction inclinée par rapport à ladite surface de tête de brosse à dents (120); et

ledit profil des soies de ladite touffe de soies

de forme complémentaire (122) s'étend dans une deuxième direction inclinée par rapport à ladite surface de tête de brosse à dents (112), dans laquelle ladite deuxième direction est différente de ladite première direction.

2. Brosse à dents (100) selon la revendication 1, dans laquelle ladite deuxième direction est opposée à ladite première direction.

3. Brosse à dents (100) selon la revendication 1, dans laquelle:

ladite touffe de soies allongée (120) est allongée et inclinée; et
ladite touffe de soies de forme complémentaire (122) a une forme de section transversale triangulaire s'ajustant à l'intérieur d'une forme intérieure inclinée formée par ladite touffe de soies allongée inclinée (120).

4. Brosse à dents (100) selon la revendication 1, comprenant en outre un groupe de touffe additionnel formé à partir d'au moins une touffe additionnelle (134, 134'), dans laquelle ledit groupe de touffe additionnel:

s'étend le long d'un côté de ladite touffe de soies allongée (120) en face de ladite zone partiellement enfermée entourée par ladite touffe allongée (120); et
est espacé et est indépendant de ladite touffe de soies allongée (120).

5. Brosse à dents (100) selon la revendication 4, dans laquelle ledit groupe de touffe additionnel a un profil des soies incliné par rapport à ladite surface de tête de brosse à dents (112) avec un troisième degré, différent dudit premier degré avec lequel ledit profil des soies de ladite touffe de soies allongée (120) est incliné par rapport à ladite surface de tête de brosse à dents (112).

6. Brosse à dents (100) selon la revendication 5, dans laquelle ledit profil des soies dudit groupe de touffe additionnel est essentiellement plan.

7. Brosse à dents (100) selon la revendication 5, comprenant en outre:

au moins une touffe de soies allongée additionnelle (120) formée et configurée pour enfermer, au moins partiellement, une zone, formant ainsi au moins une touffe de soies allongée additionnelle (120) ayant une forme intérieure profilée (121) qui entoure la zone partiellement enfermée; et

au moins une touffe de soies de forme complémentaire additionnelle (122) formée au moins pour s'ajuster à l'intérieur de la zone partiellement enfermée entourée par ladite au moins une touffe allongée additionnelle (120) et pour compléter ledit intérieur profilé (121) de ladite au moins une touffe de soies allongée additionnelle (120). 5

8. Brosse à dents (100) selon la revendication 7, dans laquelle ledit groupe de touffe additionnel: 10

s'étend le long d'un côté de ladite au moins une touffe de soies allongée additionnelle (120) en face de ladite zone partiellement enfermée entourée par ladite au moins une touffe allongée additionnelle (120); et 15
est espacé et est indépendant de ladite touffe de soies allongée (120). 20

9. Brosse à dents (100) selon la revendication 7, dans laquelle: 25

ladite au moins une touffe de soies allongée additionnelle (120) et ladite au moins une touffe de forme complémentaire additionnelle (122) sont agencées à proximité de ladite touffe de soies allongée (120) et de ladite touffe de forme complémentaire (122); 30
ledit groupe de touffe additionnel s'étend le long de côtés de ladite touffe de soies allongée (120) et de ladite au moins une touffe de soies allongée additionnelle (120) en face de ladite zone partiellement enfermée entourée par ladite touffe de soies allongée (120) et ladite au moins une 35
touffe de soies allongée additionnelle (120), respectivement, pour former un motif de groupe de touffe additionnel; et
ledit groupe de touffe additionnel a un profil des soies différent du profil des soies de ladite touffe de soies allongée (120) et de ladite touffe de 40
soies allongée additionnelle (120).

10. Brosse à dents (100) selon la revendication 9, dans laquelle: 45

ladite touffe de soies allongée (120) et ladite au moins une touffe de soies allongée additionnelle (120) sont inclinées; et 50
ledit groupe de touffe additionnel est en forme de "W".

11. Brosse à dents (100) selon la revendication 4 ou la revendication 10, dans laquelle ledit groupe de touffe additionnel est formé de plus d'une touffe de soies. 55

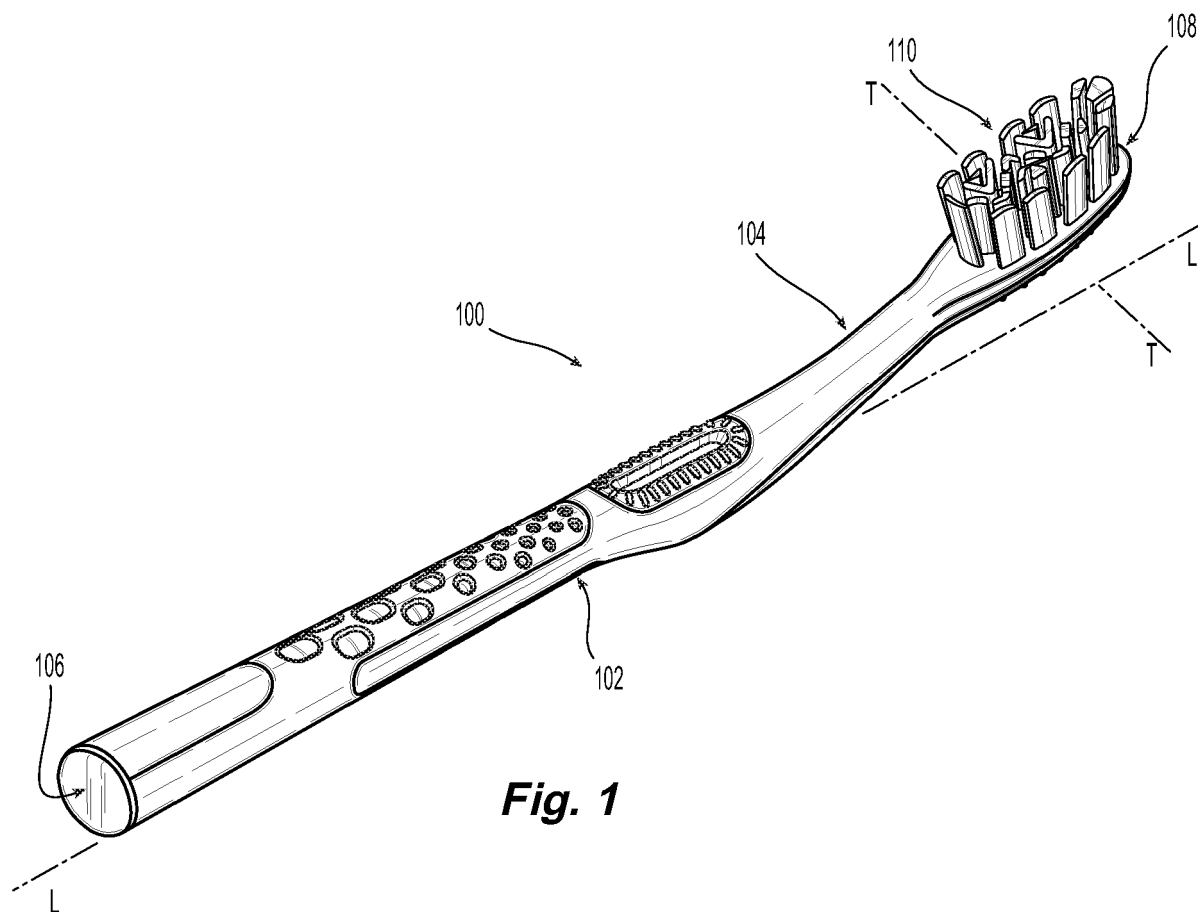


Fig. 1

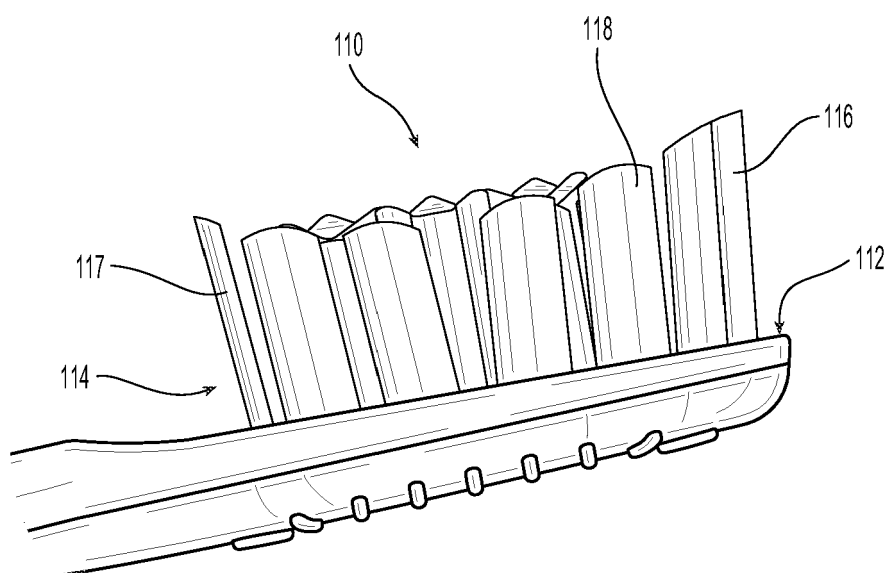
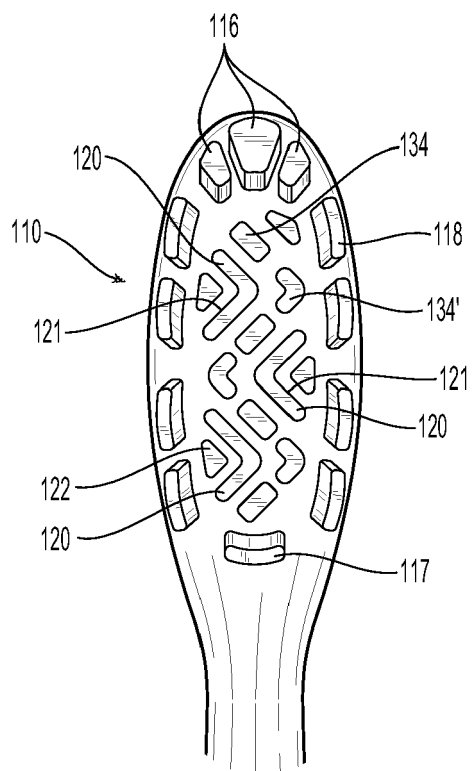
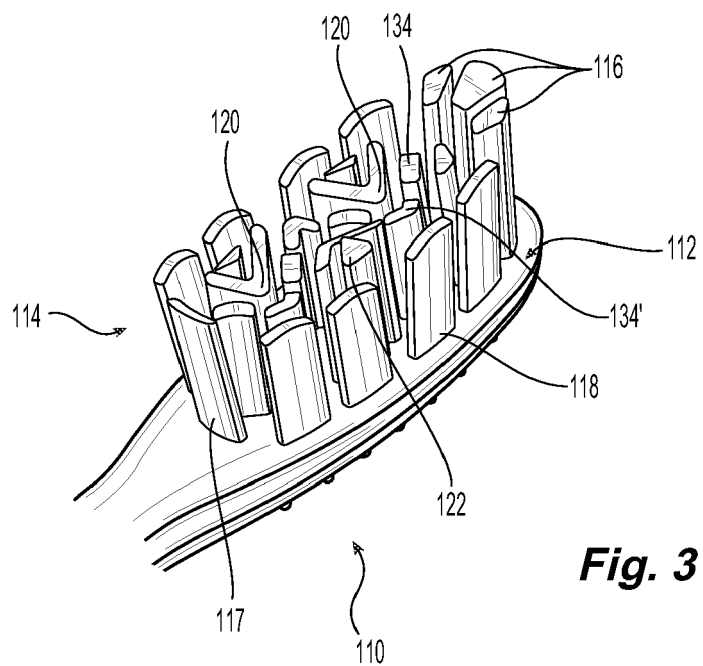


Fig. 2



REFERENCES CITED IN THE DESCRIPTION

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