(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
16 June 2011 (16.06.2011)

PCT

(10) International Publication Number
WO 2011/070550 A1

(51) International Patent Classification:
A46B 3/22 (2006.01) *A46B 9/06* (2006.01)
A46B 9/04 (2006.01)

(21) International Application Number:
PCT/IB2010/055759

(22) International Filing Date:
10 December 2010 (10.12.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10 2009 057 483.2
10 December 2009 (10.12.2009) DE
10 2010 051 877.8
22 November 2010 (22.11.2010) DE

(71) Applicants *(for all designated States except US)*: **BRAUN GMBH** [DE/DE]; Frankfurter Strasse 145, 61476 Kronberg/Taunus (DE). **STÖRKEL, Jens** [DE/DE]; Frankfurter Strasse 145, 61476 Kronberg/Taunus (DE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **VITT, Martin** [DE/DE]; Gronauerstrasse 29, 60385 Frankfurt/Main (DE). **WINKLER, Tilmann** [DE/DE]; Talweg 29, 61476 Kronberg/Taunus (DE).

(74) Common Representative: **BRAUN GMBH**; c/o Eileen L. Hughett, Global Patent Services, 299 East Sixth Street Sycamore, Building, 4th Floor, Cincinnati, OH 45202 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

(54) Title: TOOTHBRUSH

(57) Abstract: A toothbrush having a toothbrush head with a top side at which cleaning elements for cleaning teeth are arranged. The cleaning elements and the head can facilitate the removal of foam, plaque and undesired particles.

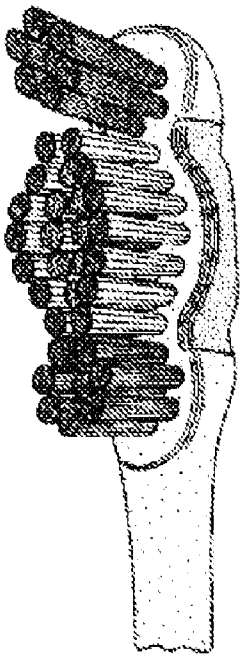


Fig. 70

WO 2011/070550 A1

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

TOOTHBRUSH

FIELD OF THE INVENTION

The invention relates to a toothbrush having a toothbrush head with a top side to which cleaning elements for cleaning teeth are arranged.

BACKGROUND OF THE INVENTION

The utilization of toothbrushes to clean one's teeth has long been known. In general, toothbrushes include a head and a handle. The head includes a plurality of bristle tufts which extend from a top surface of the head. The bristle tufts generally consist of a plurality of filaments which are attached to the head in a suitable fashion. In addition to bristle tufts, some toothbrushes available on the market also provide elastomeric elements in an effort to achieve benefits such as gum massaging, tongue cleaning, etc.

The use of elastomers at various points on toothbrush heads is known. The elastomer in toothbrushes can be provided at the bottom side of the head or the lateral surface as a soft surface. As an example, tongue scrapers made of elastomer plastic on the bottom side of the head are well known. Furthermore, toothbrushes are known in which elastomer massaging rods are arranged at the lateral surfaces or laterally spaced from the tooth cleaning elements on the top side of the head. Finally, also known are elastomers at the top side of the head as cleaning elements for cleaning teeth. Relevant examples are WO-A-2003/055351, WO-A-1999/037181, WO-A-2000/076369, WO-A-1998/018364, and US-A-2007/0101525.

In an effort to increase efficiency, some toothbrushes utilize a much more densely populated cleaning element field. Bristle tufts and/or elastomeric elements can be spaced very close together. However, a disadvantage of such toothbrushes is that, during brushing, plaque and other undesired substances can get caught between the bristles, which are then retained in the cleaning element field and thereby may have a damaging effect on the tooth enamel when teeth are cleaned and polished.

Therefore, there is a need for a toothbrush which can facilitate the removal of plaque and other undesired items from the cleaning element field.

SUMMARY OF THE INVENTION

A toothbrush constructed in accordance with the present invention can facilitate the removal of plaque and/or undesired substances from the bristle field. In some embodiments, foam removal, plaque removal, and/or undesired particle removal may be accomplished by utilization of lateral surfaces having a curvature that deviates from a straight line. An elastomer region at the lateral surface can be provided either with a constriction or a flat portion or a convex curvature, and the provision of a section at the lateral surface that consists of hard plastic and that is provided with an outward bulge or a convex curvature can facilitate this removal.

In other embodiments, a toothbrush is provided having a toothbrush head at whose top side first and second cleaning elements for cleaning teeth are provided, wherein the first cleaning elements have first bristle tufts with a long and a short side and thus, in cross-section, an approximately rectangular or oval base. This essentially creates toothpaste and foam carriers within the elongated tufts, which make it possible for foam to escape at the corners of the base where no tufts are arranged. As an alternative, first bristle tufts are provided, also named compound or multiple tufts, each of which conventionally has a circular cross-section; however, because they are strung together along a straight line each, the result is a square or rhombic bristle arrangement. Accordingly, for a rhombus, 4 straight lines are provided, each having several bristle tufts. These tufts are designed to be longer the than cleaning elements arranged within the polygon (e.g., the rhombus), resulting in the formation of a recessed, in particular trough-like, toothpaste receiving reservoir that is surrounded by tufts. This contributes to the toothpaste gradually distributing in the oral cavity during tooth brushing. According to the alternative design, the "corners" of the rhombus, square, or other polygon are formed by bristle tufts, and according to the embodiment having tufts with a short and a long side by interstices without forming a corner in the strictly geometric sense.

In contrast to the conventional rounded, possibly pot-shaped, design of a recessed toothpaste receiving region, the polygonal design of this toothpaste receiving reservoir in the bristle area makes it easier, after the toothbrush head has been packed with bristles, to trim the bristles that border the receiving region on the side to their desired length and round off their ends in order to achieve the desired topography of the free bristle ends. Because in a polygonal design of the toothpaste receiving region that is recessed on the inside, the centers of the bristle tuft forming the polygon as a tuft or as a plurality of tufts lie on a straight line in each case, it is possible

that adjacent tufts that are not part of the polygon can be more easily pushed out of the way by means of deflector plates or displacers in order to trim certain regions of the bristle area to the desired length and/or to round off the ends in isolation from other bristle tufts. In doing so, the deflector plate is threaded between the bristle tufts of the packed head and subsequently pivoted laterally, making it possible to separately trim tufts to the correct length relative to adjacent tufts. The polygonal design of the toothbrush receiving region may certainly also be of advantage for those toothbrushes that are not produced in this way using anchor wire tufting but rather, e.g., without an anchor wire.

An advantageous further design provides that a plurality of first bristle tufts are arranged on the top side in such a way that their combined circumferential surface forms an approximately triangular, square, rhombic, or pentagonal base.

An advantageous further design provides that the first bristle tufts are arranged in such a way that four first bristle tufts enclose a square base.

An advantageous further design provides that the second cleaning elements have second bristle tufts with a circular cross-section and/or elastomer cleaning elements.

An advantageous further design provides that the first bristle tufts are designed to be longer than the second bristle tufts and/or that the first bristle tufts enclose the second bristle tufts or the elastomer cleaning elements.

An advantageous further design provides the compound/multiple bristle tufts of the first bristle tufts and the bristle tufts of the second and third cleaning elements each have circular cross sections, wherein immediately adjacent bristle tufts are arranged with the shortest lateral distance to one another; in the direction of the longitudinal center axis with a distant smaller than 0 mm and in the direction of the transverse axis with a distance of from 0 to 0.5 mm. A distant smaller than 0mm along the longitudinal axis of the brush can be achieved by a shifted placement of the tufts of the polygon and the tufts inside the polygon. Thus if the brush is viewed from the lateral longitudinal side the distance between neighboring tufts appears to be overlapping and less than 0mm.

According to a further aspect, a toothbrush is provided having a toothbrush head with cleaning elements for cleaning teeth, which are grouped in various care zones in each case, having at least one pre-cleaning zone with longer cleaning elements relative to the cleaning elements in the cleaning zone, wherein the pre-cleaning zone is arranged at the free end of the toothbrush head, and having a polishing zone or massaging zone consisting of elastomer clean-

ing elements and a toothpaste receiving zone designed in a trough-like shape. In known bristle areas, multiple care zones are not arranged separated from one another; rather, differently effective cleaning elements are mixed with others nearby. Therefore, the care properties of the cleaning elements should be arranged according to their various functions at the head in local groupings.

Further goals, advantages, features, and possible applications of the present invention result from the following descriptions of exemplary embodiments by way of the drawings. The subject matter of the present invention is formed from all of the described or depicted features, individually or in any meaningful combination, and independently of their summary in the claims or their relations of dependence.

BRIEF DESCRIPTION OF THE DRAWINGS

It is shown:

Fig. 1 A top view of the top side of a toothbrush head in a schematic representation according to the invention,

Fig. 2 A schematic cross-sectional representation along the line A-A in Fig. 4B of a toothbrush head according to Fig. 1,

Fig. 3 An enlarged representation of section y in Fig. 1,

Figs. 4A-4D A side view, top view of the top side, perspective top view, and perspective view of the bottom side each of the toothbrush head according to Figure 1,

Fig. 4E An enlargement of section x in Figure 4B,

Fig. 4F An enlargement of the terminal section of the toothbrush head according to Fig. 4B,

Fig. 5A-5E A right side view, top view of the top side, left side view, perspective top view, and perspective view of the bottom side each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 6A-6E A right side view, top view of the top side, left side view, a perspective top view, and further perspective top view each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 7A-7D A side view, top view of the top side, perspective top view, and further perspective top view each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 8A-8D A side view, top view of the top side, perspective top view, and perspective back view each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 9A-9F A right side view, top view of the top side, left side view, view of the bottom side, perspective top view, and further top view each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 10A-10D A top view of the top side, side view, perspective top view, and perspective back view each of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 11 A perspective top view of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 12A-12B A perspective representation and a cross-sectional representation of an elastomer cleaning element having a platform with a square base of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 13 A perspective representation of an elastomer cleaning element having a platform with an approximately triangular base of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 14A-14B A perspective representation and a cross-sectional representation of an elastomer cleaning element having a platform with a circular base of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 15A-15C A perspective representation, a longitudinal cross-sectional representation, and a top view of the top side of a toothbrush head with an elastomer cleaning element having a platform with a circular base according to the invention, modified in relation to Figure 1,

Fig. 16A-16C A perspective representation, a longitudinal cross-sectional representation, and a top view of the top side of a toothbrush head with an elastomer cleaning element having a platform with a circular base according to the invention, modified in relation to Figure 1,

Fig. 17A-17C A perspective representation, a longitudinal cross-sectional representation, and a top view of the top side of a toothbrush head with an elastomer cleaning element having a platform with a circular base according to the invention, modified in relation to Figure 1,

Fig. 18A-18C A perspective representation, a longitudinal cross-sectional representation, and a top view of the top side of a toothbrush head with an elastomer cleaning element having a platform with an approximately triangular base according to the invention, modified in relation to Figure 1,

Fig. 19A-19C A perspective representation, a longitudinal cross-section, and a top view of the top side of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 20A-20B A perspective representation of the top side and a perspective view of the bottom side of a toothbrush head according to the invention, modified in relation to Figure 1,

Fig. 21A-21B A perspective representation of the top side and a perspective view of the bottom side of a toothbrush head with a spherical second component according to the invention, modified in relation to Figure 1,

Fig. 22 A perspective representation of the top side of a toothbrush head with a spherical second component according to the invention, modified in relation to Figure 1,

Fig. 23 A perspective representation of the top side of a toothbrush head with a spherical second component according to the invention, modified in relation to Figure 1,

Fig. 24A-24B A perspective representation each of a toothbrush head having a rhombic toothpaste receiving zone according to the invention, modified in relation to Figure 1,

Fig. 24C-24D A side view each of a modified toothbrush head having a rhombic toothpaste receiving zone according to Figure 24a),

Fig. 24E-24F A top view each onto the bristle area of the modified toothbrush head having a rhombic toothpaste receiving zone according to Figure 24A, Figure 24F also schematically showing a handle of the toothbrush, and

Fig. 24G A further top view onto the bristle area of the modified toothbrush head having a rhombic toothpaste receiving zone according to Figure 24A with a representation of the bristle displacers used.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1-24 G show toothbrush heads or sections thereof that are connected with any toothbrush neck and handle to form a toothbrush. These heads are equally suitable for purely manual toothbrushes and electrically powered ones. Each of the features of the toothbrush heads shown in these embodiments can be designed in reduced form or in a different combination than those represented. Although most embodiments show a tongue scraper having a specific structure on the underside of the head, all of the embodiments can also be made without a tongue scraper or be provided with another tongue scraper structure. Furthermore, some embodiments have elastomer cleaning elements 17 (shown in Figure 9F)(elastic cleaning elements 17 preferably made of soft material) in combination with bristle tuft cleaning elements, while others have only bristle tuft cleaning elements.

Referring to Figures 1-4F, the toothbrush head 1 made of hard material or of a first component 2 is provided with a lateral surface or an outside edge 3, which is interrupted by a single or several elastomer regions that can be designed as a constriction 4. The constrictions, in some embodiments, can be an overmolded soft material layer or a second component made of elastomer plastic 5. Referring to Figure 4E, the width b_1 of the constriction corresponds to 55%-85% of the width b_2 of the remaining widest outside edge line 6 of the head when viewed from above in the center 7 of the constriction. The outside edge line 6 is generally parallel to a longitudinal center plane of the toothbrush head 1 and is tangent to an outer edge of the head representing the largest width of the head 1. The center 7 of the constriction 4 represents the smallest width of the head 1, in the related constriction 4 being measured.

The constriction 4 proceeds in a concave manner 8 and is thus directed to the inside towards the longitudinal center plane of the toothbrush head. The concave curvature can be formed by the angle β and different radii R_{Xi}. The effect of a narrow concave constriction radius provided with elastomer can be that toothpaste foam 20 is received very well. The passage of the foam 20 from a top side 16 of the head 1 to the constriction 4 can further be influenced by the angle α.

For example, where the tops side 16 is angled downward toward the constriction 4, plaque 25 sliding down the cleaning elements 10 during brushing can be moved more easily with foam 20 in the direction of the constriction 4. Accordingly, the foam 20 first migrates partly from the free ends of the cleaning elements 10 to the top side 16 of the head 1 and then to a lateral surface of the head 3. Due to the change of direction during brushing, foam 20 can be effectively retained and then removed along with the plaque 25 contained therein from the constrictions 4 to the preferably convexly curved sections of the same lateral surfaces 3, which may be made of hard plastic.

According to several embodiments shown – see in particular Figures 5 to 10 – each of the constrictions divides the brush into different tooth care zones. The care zones for various tooth care tasks are arranged at specific local sections of the head, which can reduce the likelihood of a mixing of other cleaning elements for other cleaning purposes within a zone. The tasks of the care zones can be determined by various types of cleaning elements, e.g., different types of filaments, tuft cross-sections, size of bristle tuft cross-sections, elastomer elements 17, or the effective length of the cleaning elements.

Each of the zones can be divided into two or more subzones. Each subzone is designed and equipped in such a way that various tasks are possible during the brushing process. As shown in Figures 5A through 5E, a pre-cleaning zone 500A may be present near a distal end 520 of a brush head 510 and near a proximal end 530 of the head 510. As shown in Figure 5A, the pre-cleaning zone 500A may comprise a plurality of cleaning elements 511 which are configured as the outermost cleaning elements adjacent the distal end 520 and adjacent the proximal end 530.

The cleaning elements 511 of the pre-cleaning zones 500A may be configured such that their heights vary. For example, as shown, the cleaning elements adjacent the distal end 720 may be configured such that the height of the cleaning elements 511 decreases in a direction toward the handle. Additionally, these cleaning elements 511 may be trimmed at an angle such that a peak is formed adjacent the cleaning elements 511 nearest the distal end 520. Similarly, the cleaning elements 511 in the pre-cleaning zone 500A adjacent the proximal end 530 may be configured such that the cleaning elements 511 have varying height. As shown, the cleaning elements 511 may decrease in height from the proximal end 530 toward the distal end 520. Additionally, these cleaning elements 511 may be trimmed at an angle such that a peak is formed adjacent the cleaning elements 511 nearest the proximal end 530.

A cleaning zone 500B may be disposed between the pre-cleaning zones 500A. Additionally, an interdental zone 500D may be generally disposed in a similar area as the cleaning zone 500B. The interdental zone 500D may comprise cleaning elements 513 which are disposed on either side of cleaning elements 512 for the cleaning zone 500B. As shown, the interdental zone 500D may comprise a convex arcuate trim.

As shown, a polishing zone 500C may comprise a plurality of cleaning elements 514 which are disposed between the cleaning elements 511 for the pre-cleaning zone 500A and the cleaning elements 512 for the cleaning zone 500B. The polishing zone 500C may comprise cleaning elements 514 which have a larger cross section than those adjacent thereto.

As shown in Figure 6A-6E, a pre-cleaning zone 600A disposed adjacent a distal end 620 of a brush head 610 and a proximal end 630 of the head 610 may comprise a plurality of cleaning elements 611. The cleaning elements 611 may be configured as the outermost cleaning elements adjacent the distal end 620 and adjacent the proximal end 630 of the head 610. The pre-cleaning zones 600A may be configured similar to the pre-cleaning zones 500A described heretofore.

A cleaning zone 600B may be disposed between the pre-cleaning zones 600A. Additionally, an outer zone 600E may be generally disposed in a similar area as the cleaning zone 600B. The outer zone 600E may comprise cleaning elements 615 which are disposed on either side of cleaning elements 612 and 613.

As shown, the cleaning zone 600B may comprise a convex arcuate trim, and similarly, the outer zone 600E may comprise a convex arcuate trim. In some embodiments, the cleaning elements 615 of the outer zone 600E may have a shorter height than the cleaning elements 613 of the cleaning zone 600B.

As shown, a polishing zone 600C may comprise a plurality of cleaning elements 614 which are disposed between the cleaning elements 611 for the pre-cleaning zone 600A and the cleaning elements 613 for the cleaning zone 600B. The polishing zone 600C may comprise cleaning elements 614 which have a larger cross section than those adjacent thereto.

Zone 600D may comprise a plurality of cleaning elements 612 disposed adjacent a periphery of the head. Additionally, a portion of the plurality of cleaning elements 612 may be disposed inboard of the cleaning elements 615 of the outer zone 600E.

As shown in Figures 7A through 7D, in some embodiments, a brush head 710 may be divided into a pre-cleaning zone 700A, a cleaning zone 700B, a post-cleaning zone 700C and a

toothpaste holding zone 700D. As shown, the toothpaste holding zone 700D may be disposed within the cleaning zone 700B. For example, as shown, cleaning elements 713 of the cleaning zone 700B may surround, at least in part, cleaning elements 712 of the holding zone 700D. In some embodiments, the cleaning elements 712 of the holding zone 700D may be shorter than the cleaning elements 713 of the cleaning zone 700B. In this manner a recessed area may be formed in the cleaning element field which may provide better retention of, for example, toothpaste.

The pre-cleaning zone 700A may be configured similar to the pre-cleaning zones discussed heretofore, e.g. 500A and 600A. The post-cleaning zone 700C may be configured such that the cleaning elements 711 increase in height toward a proximal end 730 of the brush head 710. However, unlike the pre-cleaning zone 700A, the gradual increase in height may be slightly less than that present for the cleaning elements 712 of the pre-cleaning zone 700A.

As shown in Figures 8A through 8D, similar to the configuration of the head 710 shown in Figures 7A-7D, a head 810 of Figures 8A through 8D may comprise similar zones, e.g. 800A, 800B, 800C, and 800D. Zone 800A may be configured similar to the pre-cleaning zones 500A, 600A, and 700A described heretofore. Zone 800B may be configured as described heretofore with regard to cleaning zones 500B, 600B, and/or 700B. Zone 800C may be configured similar to the post-cleaning zone 700C described heretofore. Zone 800D may be configured as described heretofore with regard to the holding zone 700D. In other embodiments, zone 800D may be configured similarly to zone 600D or interdental zone 500D.

Additionally, head 810 may comprise a plurality of elastomeric elements 17 which border a cleaning zone 800B on either one or both sides. The elastomeric elements 17 may extend from a common base 817. The base 817, as shown in Figure 2 can be integrally formed with the elastomeric material of the tongue cleaner.

As shown in Figures 9A through 9F, a brush head 910 constructed in accordance with the present invention may comprise a pre-cleaning zone 900A adjacent a distal end 920 and a pre-cleaning zone 900A adjacent a proximal end 930. A cleaning zone 900B may be disposed between the pre-cleaning zones 900A. Additionally, a gap 945 may be present between the pre-cleaning zones 900A and the cleaning zone 900B. This gap 945 may facilitate the removal of the foam 20 (shown in Figure 1) from the cleaning element field toward a constriction as described previously.

The pre-cleaning zone 900A may be configured similar to the pre-cleaning zones 500A, 600A, 700A, and/or 800A discussed heretofore. The cleaning zone 900B may be configured

similar to the cleaning zone 500B, 600B, 700B, and/or 800B described heretofore. The pre-cleaning zone 900A may comprise a plurality of cleaning elements 911. The cleaning zone 900B may comprise a plurality of cleaning elements 912 which are disposed between the cleaning elements 911 of the pre-cleaning zones 900A.

Cleaning elements 913 of an outer zone 900D may be positioned between a first set of cleaning elements 912 and a second set of cleaning elements 912. The cleaning elements 913 may be oriented in any suitable shape. As shown, the cleaning elements 913 may be arranged such that the cleaning elements 913 form a diamond shape on the head 910. Within the diamond shape of the cleaning elements 913, cleaning elements 914 of a holding zone 900C may be disposed. The cleaning elements 914 may similarly be configured in a diamond shape. As shown, the cleaning elements 913 and the cleaning elements 914 may be configured such that they form an outer diamond and an inner diamond shape. Additionally, the cleaning elements 913 may have a height which is less than the height of the cleaning elements 914.

The head 910 may further comprise a plurality of elastomeric elements 17. A first set of elastomeric elements 17A may extend from a first base 917A. The first base 917A may be integrally formed with the elastomeric material of the tongue cleaner. Similarly, the first set of elastomeric elements 17A may be integrally formed from the first base 917A. The brush head 910 may further comprise a second set of elastomeric elements 17B may extend from a second base 917B. The second set of elastomeric elements 17B may be configured similar to the first set of elastomeric elements 17A, and the second base 917B may be configured similar to the first base 917A.

As shown, the first set of elastomeric elements 17A and/or the second set of elastomeric elements 17B may have a height which is shorter than that of the cleaning elements 913 of the outer zone 900D. Additionally, in some embodiments, the first set of elastomeric elements 17A and/or the second set of elastomeric elements 17B may have an angle of taper. The angle of taper may be greater than about 0.5 degrees, greater than about 1 degrees, greater than about 1.5 degrees, greater than about 2.0 degrees, greater than about 2.5 degrees, greater than about 3.0 degrees, and/or less than about 3.0 degrees, less than about 2.5 degrees, less than about 2.0 degrees, less than about 1.5 degrees, less than about 1.0 degrees, or any number or any range within the values provided. The angle of taper may be beneficial during the manufacturing process. For example, the angle of taper can facilitate the removal of the elastomeric elements from an injection mold.

A third set of elastomeric elements 17C may extend from a third base 917C. The third set of elastomeric elements 17C may be configured similar to the first set of elastomeric elements 917A, and the third base 917C may be configured similar to the first base 917A. A fourth set of elastomeric elements 17D may extend from a fourth base 917D. The fourth set of elastomeric elements 17D may be configured similar to the first set of elastomeric elements 17A, and the fourth base 917D may by configured similar to the first base 917A.

As shown in Figure 10, a brush head 1010 may comprise a pre-cleaning zone 1000A disposed adjacent a distal end 1020 and a pre-cleaning zone 1000A adjacent a proximal end 1030. A cleaning zone 1000B may be disposed between the pre-cleaning zones 1000A. Polishing zones 1000C may be surrounded, at least in part, by cleaning elements 1011 of the pre-cleaning zones 1000A. As shown, cleaning elements 1013 of the polishing zones 1000C are completely surrounded by cleaning elements 1011.

An inner zone 1000D may be surrounded, at least in part, by cleaning elements 1012 of the cleaning zone 1000B. As shown, cleaning elements 1014 of the inner zone 1000D may be completely surrounded by cleaning elements 1012 of the cleaning zone 1000B.

The brush head 1010 may be configured such that a plurality of constrictions 1004 is present along a periphery of the head 1010. The constrictions 1004 may be configured as discussed heretofore with regard to the constrictions 4. Additionally, the pre-cleaning zones 1000A may be separated from the cleaning zone 1000B by a plurality of elastomeric elements 17. For example, as shown, a first set of elastomeric elements 1017A may separate the pre-cleaning zone 1000A adjacent the distal end 1020 from the cleaning zone 1000B. Additionally, a second set of elastomeric elements 1017B may separate the cleaning zone 1000B from the pre-cleaning zone 1000A adjacent the proximal end 1030 of the brush head 1010.

The pre-cleaning zones 1000A may be configured as discussed heretofore with regard to the pre-cleaning zones 500A, 600A, 700A, 800A, and 900A. Additionally, either one or both of the pre-cleaning zones 1000A may be configured similar to the post-cleaning zones 700C and 800C described heretofore. The cleaning zones 1000B may be configured similar to the cleaning zones 500B, 600B, 700B, 800B, or 900B.

The various care zones described heretofore may be achieved in a variety of ways. For example, as shown in figure 11, a toothbrush head 1110, may realize different care zones by arranging shorter tufts 19 in the center of the top side, mixed tufts 21 having long filaments in a

core region and shorter filaments in an edge region of the same tuft 21, and tufts 24 having tapered filaments.

In some embodiments, cleaning elements may be provided which perform multiple functions and as such, a dual care zone may be created. For example, as shown in figures 12 to 14, elastomer cleaning elements 1226A to 1226C having a platform 1227A to 1227C that are injection-molded in one piece, may perform both a toothpaste retaining function and a polishing function. To achieve the toothpaste retaining function, the free ends of these elastomer cleaning elements may lie lower than the adjacent bristle tufts which exceed them in height, creating a trough-like structure. It is possible to join the platforms 1227A to 1227C to the heads using an injection molding process or another joining technology.

As shown in Figures 15A through 15C, a toothbrush head 1510 may comprise an elastomeric element described in Figures 12A-14B. For example, as shown, toothbrush head 1510 may comprise elastomeric element 1226C. The elastomeric element 1226C may be disposed generally in a center of the brush head 1510. As shown, the elastomeric element 1226C may be surrounded, at least in part, by a plurality of cleaning elements 1512. As discussed above, the elastomeric element 1226C may have a height which is less than that of the cleaning elements 1512 such that a holding zone is created similar to zones 700D, 800D, and 900C.

As shown in Figures 16A through 16C, a toothbrush head 1610 may comprise an elastomeric element as described in Figures 12A-14B. For example, as shown, toothbrush head 1610 may comprise elastomeric element 1226C. As shown, the elastomeric element 1226C may be surrounded, at least in part, by a plurality of cleaning elements 1612. As shown, the elastomeric element 1610 may be positioned longitudinally offset from the center of the brush head 1610.

Referring to Figures 17A through 17C, a toothbrush head 1710 may comprise a plurality of elastomeric elements 1226A. The elastomeric elements 1226A may be longitudinally offset from one another and separated by at least one cleaning element. The elastomeric elements 1226A may be configured such that either one or both form a holding zone, e.g. have a height which is less than adjacent cleaning elements.

As shown, brush head 1710 may comprise a fist plurality of cleaning elements 1728 which have a rectangular cross section. The first plurality of cleaning elements 1728 can be attached in elongated openings of the head 1710 and can have various width to depth proportions. In horizontal cross-section, each of the first plurality of cleaning elements 1728 can be

approximately rectangular. The first plurality of cleaning elements 1728 can be arranged at an angle to a longitudinal axis of the head. In some embodiments, the first plurality of cleaning elements 1728 can form an angle delta of between 30 to 60 degrees with the longitudinal axis.

As shown in Figures 18A through 18C, a toothbrush head 1810 may comprise an elastomeric element 1226B adjacent a distal end 1820 of the head 1810. The elastomeric element 1226B may form a portion or all of a pre-cleaning zone as described heretofore. As shown, the elastomeric element 1226B may be angled with respect to a top surface 1825 of the head 1810. The angle may be any suitable measure of degrees. The inclination may be away from a proximal end 1830. Embodiments are contemplated where a second elastomeric element similar to the elastomeric element 1226B is utilized adjacent the proximal end 1830. In such embodiments, the second elastomeric element may be inclined with respect to the top surface 1825 away from the distal end 1820.

As shown in Figures 19A through 19C, a toothbrush head 1910 may comprise a plurality of cleaning elements which does not include an elastomeric elements arranged at an angle with respect to a longitudinal axis 29 of the head 1910. As shown, the head 1910 may comprise a first plurality of cleaning elements 1928 attached in elongated openings of the head 1910 and can have various width to depth proportions. In horizontal cross-section, each of the first plurality of cleaning elements 1928 can be approximately rectangular. The first plurality of cleaning elements 1728 can be arranged at an angle to a longitudinal axis of the head. In some embodiments, the first plurality of cleaning elements 1728 can form an angle delta of between 30 to 60 degrees with the longitudinal axis 29.

Referring to Figures 20A and 20B, in some embodiments, a toothbrush head 2010 may comprise a first component 30 and a second component 31A. The first component 30 may comprise a first material and the second component may comprise a second material which is different than the first material. The first material may be harder than the second material in some embodiments. The second material may comprise a hard material similar to that of the first material. Where the second component 31A comprise a soft material, embodiments are contemplated where the second component 31A is integrally formed with the material of a tongue cleaner. The first component 30 can have a flat top side or bristle plate, and may be provided with cleaning elements. The second component 31A can be made of hard or soft plastic and may be flexibly or movably mounted in the first component 30. The second component 31A can

be designed to be approximately spherical in part and may terminate with a flat or likewise spherical top side at which the cleaning elements are arranged.

As shown in Figures 21A and 21B, a toothbrush head 2110 may comprise a first component 2130 and a second component 31B. In such embodiments, the first component 2130 and the second component 31B may comprise similar materials as those described with regard to figures 20A and 20B. Additionally, the first component 2130 may comprise an opening which extends from a top surface of the first component 2130 to a bottom surface of the first component 2130. The second component 31B may be disposed within the opening and have a plurality of cleaning elements attached thereto. The second component 31B may have a top surface which is slightly elevated above the top surface of the first component 2130.

As shown in Figure 22, a toothbrush head 2210 may comprise a first component 2230 and a second component 31C. The first component 2230 may have a distal portion 2220 and a proximal portion 2231. The distal portion 2220 and the proximal portion 2231 may be longitudinally separated. The second component 31C may be positioned between the distal portion 2220 and the proximal portion 2231. In such embodiments, the second component 31C may be integrally formed from the material for a tongue cleaner. The first component 2230 and the second component 31C may comprise the materials described heretofore with regard to Figures 20A and 20B.

As shown in Figure 23, a toothbrush head 2310 may comprise a first component 2330 and a second component 31B. The first component 2330 may be configured similarly to the first component 2230 discussed previously. Namely, the first component 2330 may comprise a distal portion 2320 and a proximal portion 2331 which are longitudinally separated from each other. The second component 31B may be disposed between the distal portion 2320 and the proximal portion 2331. The second component 31B may be integrally formed with the material of the tongue cleaner, in some embodiments. The first component 2330 and the second component 31B may comprise the materials described heretofore with regard to Figures 20A and 20B.

Each of Figures 24A to 24G shows different views of the same toothbrush head 100, which is another variant of the preceding toothbrush heads. The already described features of the other toothbrush heads according to Figures 1 to 23 can be utilized in the embodiment according to Figures 24A to 24G. The toothbrush has a longitudinal center axis 110 and a lateral axis 111 perpendicular thereto.

According to Figures 24A to 24G, the toothbrush head 100 as well as the neck 102 and the handle 101 of the toothbrush can be produced from a first hard plastic component in an injection molding process. On a back side 2476 of the head 100 or the bottom side (optional), the head 100 may comprise cut-outs on lateral surfaces 107 and 108 between a top side 2475 and the back side 2476. In a second injection molding step, the cut-outs can be filled with a soft plastic component consisting of an elastomer in order to provide a tongue scraper (optional) on the back side 2476 and an alternating hard-soft structure on the lateral surface 107 and 108 of the head 100. According to this embodiment, the soft plastic at the lateral surfaces 107 and 108 may also be the base for lateral soft massaging fingers 103, which are arranged adjacent to the bristle area. Two pairs of massaging fingers 103 for massaging the gums can be provided on each side of the head. The number of massaging fingers 103 can optionally vary. The length of the massaging fingers 103 can be shorter than that of the adjacent bristles. The neck and handle can be designed in any way. In one variant, the head, neck, and handle are each provided with a hard plastic component and at least one soft plastic component.

As shown in Figures 24E, 24F, and 24G, the shape of the head 100 is designed in such a way that the head 100 tapers with regard to the width both towards the free end 104 and the opposing end 105 that borders the neck 102. A middle region 106 on the top side 2475 of the head 100 can be designed to have the greatest width. Accordingly, the lateral surfaces 107 and 108 can be convexly curved. In some embodiments, the lateral surfaces 107, 108 comprise a hard plastic, then, in the base region of the first pair of massaging fingers 103 of soft plastic. In the direction of the neck at the widest point 106, the lateral surfaces 107 and 108 may comprise hard plastic, and continuing in the direction of the neck, each lateral surface 107, 108 of the base region of each second pair of massaging fingers consists of soft plastic, and further in the direction of the neck follows again a hard plastic region at each lateral surface 107 and 108. Hard and soft sections thus alternate repeatedly at each lateral surface 107, 108. As a consequence, there are alternating sections at the lateral surfaces 107 and 108, which have slightly adhesive properties and distribute the toothpaste foam in the mouth, and regions along which the toothpaste foam is not transported as readily with the lateral surfaces. This may create an effect that is comparable to that achieved by means of constrictions, as shown in Figures 1 to 3. The nonlinear shape of the head 100 having convex bulges is likewise suitable to exert a positive influence on removing foam.

Additionally, the nonlinear shape of the head 100 having convex lateral bulges is likewise suitable to exert a positive influence on removing foam, since the foam is more exposed due of the convex curvature, and thus the least amount of foam remains at this location. Figure 24d) shows that at the lateral surfaces, starting from the free end of the head 104, a hard plastic section 126 alternates with an elastomer section 127, with a hard plastic section 128, with a further elastomer section 129, and with a hard plastic section 103 adjacent to the neck. Advantageously, each of the hard and soft sections extends over the entire height of the lateral surface.

Having massaging fingers 103 and a tongue scraper 109, the head 100 can offer at least two care zones, e.g. one for the treatment of the tongue and the cheeks and another for the treatment of the gums. As shown in Figure 24G, the tooth cleaning area of the head 100 may comprise further care zones, which can be designed in such a way that specifically determined tooth regions are thoroughly cleaned.

For example, provided in one region adjacent to the free end 104 and adjacent to the neck 105 are cleaning elements, forming a pre-cleaning zone 2400A. The pre-cleaning zone 2400A may be configured similar to the pre-cleaning zones described herein. These cleaning elements can be somewhat longer and designed to be slightly angled compared with most of the typical bristle tufts. Because these cleaning elements are arranged on each end of the head, these cleaning elements also automatically pre-clean the teeth.

After the pre-cleaning zone 2400A, a number of cleaning elements follows on both sides of the top side 2475 of the head 100, in particular cleaning elements for interdental cleaning 2400E. These cleaning elements may be designed to be longer than immediately adjacent cleaning elements and can be arranged in a row parallel to the transverse axis.

In a center region of the head 100, cleaning elements are arranged to form the cleaning zone 2400B and the polishing zone 2400D. These cleaning elements can be particularly dense, offset in relation to one another in the transverse direction, and arranged at the head in such a way that the bristles bend slightly and provide an intensive cleaning and polishing effect. In contrast, the bristles of the interdental and pre-cleaning zones 2400E and 2400A, respectively, are less densely arranged and can therefore bend easier, so that the greater length is not an unpleasant sensation.

The polishing zone 2400D in this embodiment can be formed by a first plurality of cleaning elements, which together form a rhombic configuration or enclose a rhombic base when

viewed from above. The center points of the drill holes of the first plurality of cleaning elements may lie on a straight line 112, 113, 114, and 115 in each case (see Figure 24E). These straight lines may likewise enclose a polygon or a rhombus. According to the Figures 24, each of the cleaning elements forming the polygon is an approximately circular tuft in cross-section, so that several tufts form one side each of the rhombus. By contrast, some of the zones of Figures 17, 18, and 19 comprise approximately rectangular or oval bristle tufts, seen in cross-section, and in which one side of the rhombus is designed from one or two tufts. On the inside of the polishing zone 2400D are cleaning elements, which form the toothpaste holding zones 2400C. These are shorter than the immediately adjacent tufts of the rhombic polishing zone 2400D, so that a trough-like recess is created for receiving toothpaste.

Figures 24C and 24D demonstrate that the free ends of the cleaning elements, with the exception of the protruding bristle tufts used for interdental cleaning 2400E and the recessed tufts in the toothpaste holding zone 2400C, form an approximately double concave curve along the longitudinal center axis 110. The interruption of the topography of this double concave curve by protruding bristle tufts in the interdental zone 2400E increases the interdental cleaning effect because immediately adjacent tufts are especially short, making deep interdental penetration possible.

The head is injection-molded to have tuft holes to be packed with bristle tufts, into which the bristle tufts are then packed and attached with an anchor wire, in some embodiments. In the region of the free ends, the bristle tufts are subsequently trimmed to the correct length and end-rounded. In order for the different bristle tufts to be trimmed to the desired length, displacers can be used, which pass laterally through the bristle area and which laterally displace or bend certain cleaning elements in such a way that desired tufts can be treated or trimmed while tufts which are displaced are not treated. It may be assumed that the configuration of the head is also advantageous in anchor free tufting (AFT method).

Shown in Figure 24G are the paths of the displacers 116-125, in some embodiments. During the manufacturing process, displacers 118, 119, 124, and 125 are used, which are movable in parallel to the transverse axis. The displacers 120, 121, 122, and 123 are moved diagonally through the bristle area. Because the toothpaste holding zone 2400D and the tufts enclosing the same are in the form of a polygon or rhombus, a dense bristle area with optimum topography can be provided because the diagonal displacers can be guided in parallel to the straight

lines of the rhombus 112-115. Furthermore provided are displacers 116 and 117, which are guided essentially in the longitudinal direction along a curved path.

The following describes further advantages and variants of the above-mentioned heads.

In one variant, the toothbrush has: a toothbrush head having a first and a second component, at each of which cleaning elements are arranged for cleaning teeth, wherein the second component has a partly spherical or ball-shaped geometry, wherein each of the first and the second component has a flat top side at which the cleaning elements are arranged and both of these top sides are arranged to be inclined toward one another, wherein the second component is movably mounted relative to the first component, wherein of the first and the second component are made of material having different properties, in particular having different hardnesses, wherein the second component forms a raised platform relative to the top side of the first component.

Advantageously, the constrictions or the different adhesive properties alternating on the lateral surfaces remove the foam created during brushing from the bristle area better and thus provide better wetting of the foam in the entire oral cavity instead of retaining the foam in the bristle area. The continuous removal of freshly created foam furthermore makes it possible that additional foam from the applied toothpaste is created without being impeded by the already existing foam. From this it follows that these constrictions make a greater amount of foam available for brushing during the entire brushing process compared with conventional toothbrush heads. As a result, care substances for tooth enamel, gums, etc. contained in the toothpaste can provided better, faster, and longer-lasting to the desired locations than is the case with conventional toothbrush heads.

It has been shown that along constrictions in combination with an elastomer surface at the lateral surface of the toothbrush head, foam and plaque are transported very differently than at a smooth lateral surface lacking constrictions or elastomer coating. This effect is amplified even more if a surface with very different adhesive properties is designed at the same lateral surface. This is the case when providing partly a foam-retaining elastomer and partly a hard component that glides through foam.

By applying a soft material to the hard material with an angle of inclination of the transition region towards the constriction, the flow behavior of the foam can be influenced as to whether it can flow slowly or fast from the brush head.

In a further embodiment of the constriction, it extends over the entire bristle plate and thus functions as a stopper for the mixture of foam and dirt, which is produced in the front and back cleaning zones of the cleaning elements of the head. This mixture of foam and dirt is then effectively removed by the geometry of the constrictions. This effect can be amplified further with the aid of special stop and drain elements and the application of well-directed channel geometry.

Because of the above-describe embodiment, a multifunctional brushing process can be achieved that makes it possible to eliminate plaque, optionally polish the tooth, as well as provide the tooth and the gums with active substances in one tooth brushing motion.

An advantageous further design provides that the lateral surface having the constriction is covered partly with the elastomer and partly with the hard component.

An advantageous further design provides that the constriction is at least partly covered with the elastomer.

An advantageous further design provides that the region of the lateral surface, which is arranged adjacent to the constriction, is provided with the hard component – and not with the elastomer.

An advantageous further design provides that the lateral surfaces are arranged along the longitudinal side of the toothbrush head, are convexly curved to the outside, and are provided with the hard component. A further advantage of the constrictions is better removal of dirt particles that were taken up by the foam from the toothbrush bristle area. The convex curve adjacent to the constriction achieves that the dirt-binding foam is continuously removed from the brushing area, and dirt particles thus cannot damage the tooth during the ongoing brushing and polishing process.

According to a further aspect, it is provided that a platform is arranged on the top side of the toothbrush head, that the elastomer cleaning elements are attached to this platform, and that the elastomer cleaning elements and the platform are made of the same elastomer. The cleaning effect of elastomer cleaning elements is linked to the wiping effect along the tooth. The wiping surface of a rod-shaped cleaning element is increased when it is designed to be thinner. However, depending on the contact force, a negative effect may occur during brushing due to elastomer cleaning elements that are too flexible. It is therefore desirable to determine the flexibility of elastomer cleaning elements not only according to their hardness but also according to how

much they yield over their total length. In addition, thin, long elastomer cleaning elements are more difficult to produce. It is suggested that the elastomers are manufactured to have a platform or socket in a single injection-molding cycle.

An advantageous further design provides that the platform has a square, rectangular, oval, or circular base and that an axis of symmetry of the platform base is arranged within the longitudinal center plane of the toothbrush.

An advantageous further design provides that the platform extends away vertically from the top side between 10% to 90%, in particular from 10 to 50%, in particular from 10 to 30% of the total longitudinal extension of the platform having elastomer cleaning elements. This leads to a positive wiping behavior of the cleaning elements and good producibility the same time.

An advantageous further design provides that the top side of the platform at which the elastomer cleaning elements are arranged is designed to be flat and parallel to the top side of the toothbrush head, or designed to be spherically arched.

An advantageous further design provides that the elastomer cleaning elements are designed to be pin-shaped, in particular cylindrical, or that they taper conically towards the free ends.

It is advantageously provided that the free ends of the elastomer cleaning elements are arranged adjacent to the bristle cleaning elements, and wherein the bristle cleaning elements project farther from the top side than the free ends of the elastomer cleaning elements, so that both cleaning elements together create a trough-like cross-sectional area for receiving toothpaste. A trough-like recess formed by the cleaning elements thus leads to uniform distribution of toothpaste in the mouth.

A further aspect provides that the toothbrush head is made of a first and a second component, at each of which cleaning elements are arranged, wherein the second component has a partly spherical or ball-shaped geometry. The ball-shaped geometry also causes a changed flow behavior of toothpaste foam or plaque along this geometry with the above-described advantages.

An advantageous further design provides that each first and second component has a flat top side, at which cleaning elements are arranged and that these two top sides are arranged to be inclined toward one another. Such a design of a second component permits simplified manufacture of cleaning elements in special inclined embodiments while maintaining the brushing advantages through inclined cleaning elements.

An advantageous further design provides that the second component is movably mounted relative to the first component.

An advantageous further design provides that the first and the second component are made of material having different properties, in particular having different hardnesses.

An advantageous further design provides that the second component forms a raised platform relative to the top side of the first component.

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

WHAT IS CLAIMED IS:

1. A toothbrush having a toothbrush head with a top side at which elements are arranged for cleaning teeth, with a bottom side that is arranged opposite to the top side and that connects the top side with the bottom side with lateral surfaces, wherein at least one lateral surface has a curvature, and wherein the toothbrush head has an elastomer component and a hard plastic component, wherein the surface of the lateral surface having the curvature is partly covered with the elastomer and partly with the hard component.

2. The toothbrush according to Claim 1, wherein lateral surfaces are arranged along the longitudinal side of the toothbrush head, which are convexly curved to the outside or provided with an outward bulge and are provide with a hard plastic component.

3. The toothpaste according to Claim 1, wherein the region of the lateral surfaces that is adjacent to the convex curvature, is provided with elastomer on both sides.

4. The toothbrush according to any one of the preceding claims, wherein each lateral surface is designed to alternate hard plastic, elastomer, hard plastic, elastomer, and hard plastic.

5. The toothbrush according to claim 1, wherein the lateral surfaces are provided partly with elastomer and partly with a hard plastic component over the entire height extending from the bottom side to the top side.

6. The toothbrush according to claim 1, wherein the lateral surface has a cut-out near the surface relative to the hard plastic component, which is filled with the elastomer.

7. The toothbrush according to claim 1, wherein an elastomer tongue scraper on the bottom side develops into a region with elastomer at the lateral surface and further into elongated massaging fingers made of the same elastomer.

8. A toothbrush having a handle and a toothbrush head at whose top side first, second, and third cleaning elements are provided for cleaning teeth, wherein the first cleaning elements have first bristle tufts, which, as single tufts, each have a long and a short side and thus an approximately rectangular or oval base in cross-section, or, as compound tufts separated from one another, are arranged with their center points along a straight line each of a first bristle tuft each in such a way that enveloping area of compound tufts has first bristle tufts that have an approximately rectangular or oval base in cross-section, wherein a longitudinal center axis of the toothbrush proceeds from a free handle end to a free head end and a transverse axis is arranged perpendicular to the longitudinal center axis, wherein several first bristle tufts are arranged on the top side in such a way that their combined circumferential surface forms an approximately triangular, square, rhombic, or pentagonal base.

9. The toothbrush according to Claim 8, wherein the combined circumferential surface of the first bristle tufts forms a square or rhombic base, wherein two corners of the square or rhombus of the first cleaning elements are arranged along a longitudinal center axis of the toothbrush and the two additional corners of the square or rhombus of the first cleaning elements are arranged on an axis transverse to the longitudinal center axis.

10. The toothbrush according to Claim 8, wherein the first cleaning elements surround the second cleaning elements, and the first cleaning elements are designed to be longer than the second cleaning elements, resulting in a trough-like toothpaste receiving zone formed by the free ends of the second cleaning elements and the surrounding end areas of the first cleaning elements.

11. The toothbrush according to claim 8, wherein the first cleaning elements are of different lengths and the second cleaning elements are of the same lengths.

12. The toothbrush according to claim 8, wherein the compound bristle tufts of the first bristle tufts and the bristle tufts of the second and third cleaning elements each have circular cross sections, wherein immediately adjacent bristle tufts are arranged with the shortest lateral distance to one another; in the direction of the longitudinal center axis with a dis-

tant smaller than 0 mm and in the direction of the transverse axis with a distance of from 0 to 0.5 mm.

13. The toothbrush according to claim 8, wherein the second cleaning elements have second bristle tufts with a circular tuft cross-section and/or elastomer cleaning elements.

14. The toothbrush according to claim 8, wherein the first bristle tufts are designed to be longer than the second bristle tufts and/or that the first bristle tufts enclose the second bristle tufts or the elastomer cleaning elements.

15. A toothbrush having a handle and a toothbrush head, at whose surface first, second, and third cleaning elements are provided for cleaning teeth, wherein the first cleaning elements surround the second cleaning elements, wherein the second cleaning elements are designed to be shorter than the first cleaning elements, wherein the free ends of the first cleaning elements and the second cleaning elements form a trough-like toothpaste receiving zone, and wherein the first cleaning elements form an approximately triangular, square, rhombic, or pentagonal enveloping area of the base enclosed therewith.

16. A toothbrush having a toothbrush head with a top side having cleaning elements made of an elastomer for cleaning teeth, wherein a platform is arranged on the top side of the toothbrush head, that the elastomer cleaning elements are attached to the platform, and that the elastomer cleaning elements and the platform are made of the same elastomer.

17. The toothbrush according to Claim 16, wherein the platform has a square, rectangular, oval, or circular base and that an axis of symmetry of the platform base is arranged within the longitudinal center plane of the toothbrush.

18. The toothbrush according to claim 16, wherein the platform extends away vertically from the top side between 10% to 90% of the total longitudinal extension of the platform having elastomer cleaning elements.

19. The toothbrush according to claim 16, wherein the top side of the platform at which the elastomer cleaning elements are arranged is designed to be flat and parallel to the top side of the toothbrush head or designed to be spherically arched.

20. The toothbrush according to claim 16, wherein the elastomer cleaning elements are designed to be pin-shaped, in particular cylindrical, or that they taper conically towards the free ends.

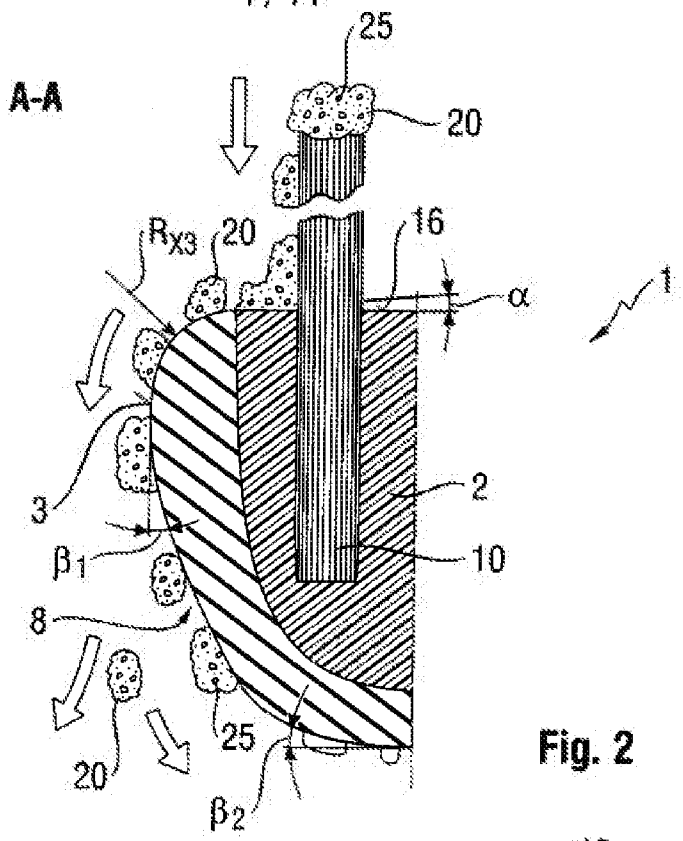


Fig. 2

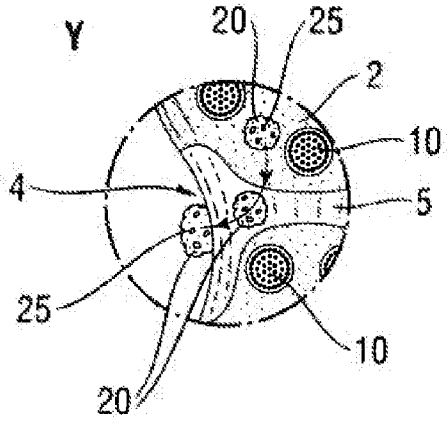


Fig. 3

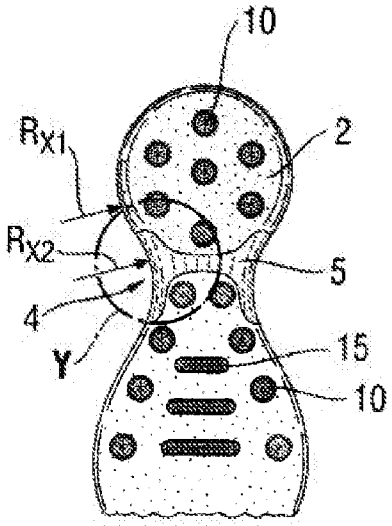


Fig. 1

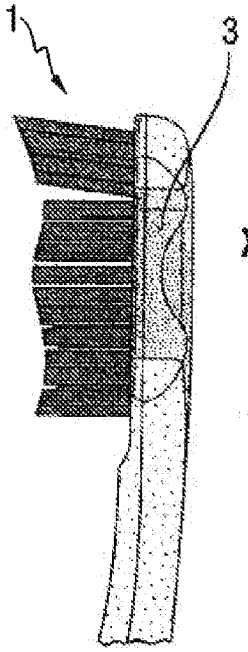


Fig. 4A

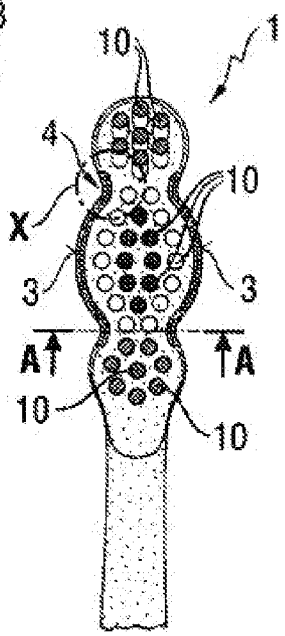


Fig. 4B

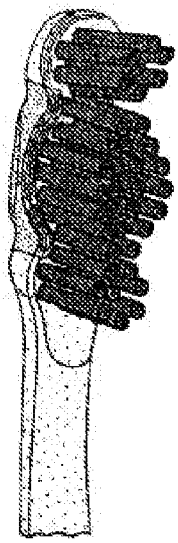


Fig. 4C

Fig. 4D

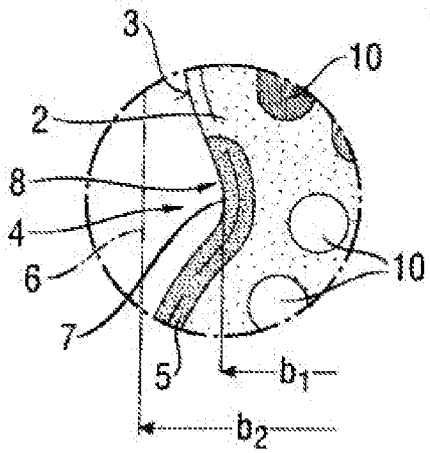


Fig. 4E

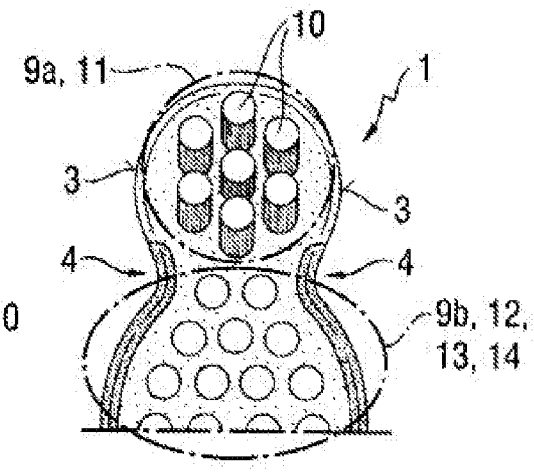


Fig. 4F

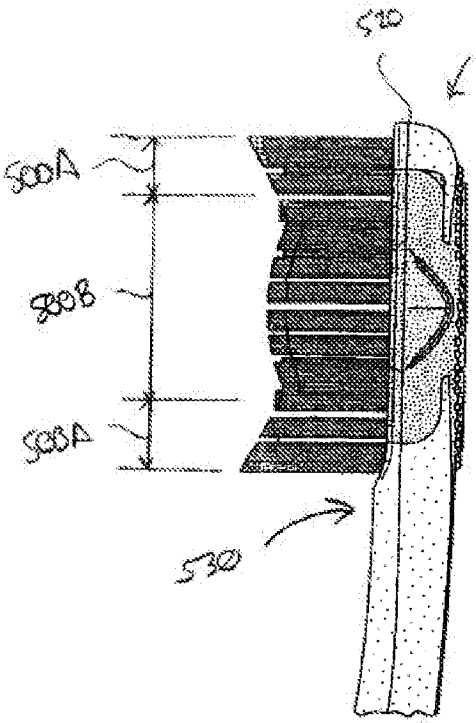


Fig. 5A

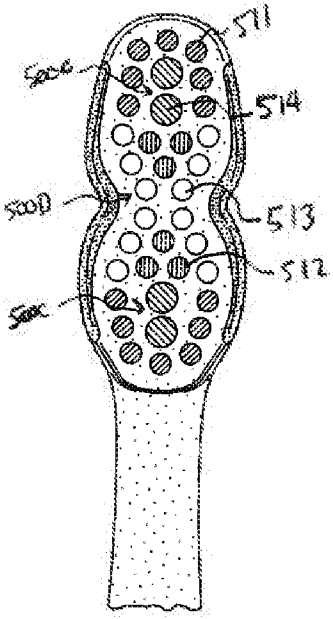


Fig. 5B

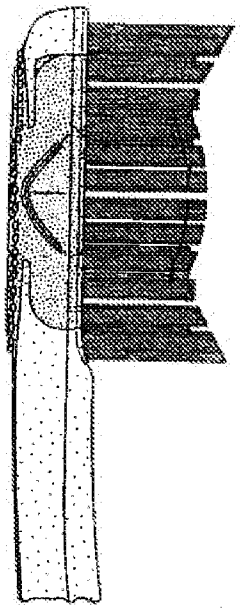


Fig. 5C

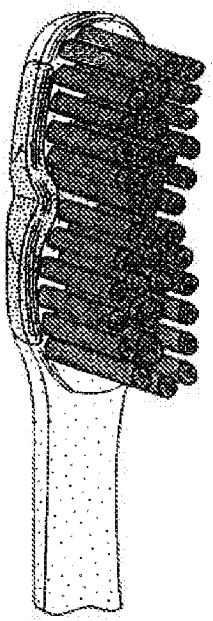


Fig. 5D

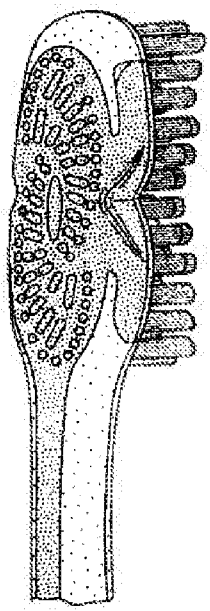


Fig. 5E

511
512
514
513

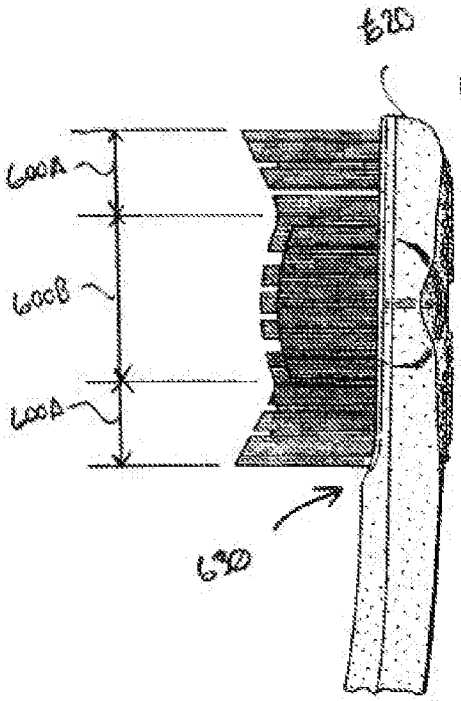


Fig. 6A

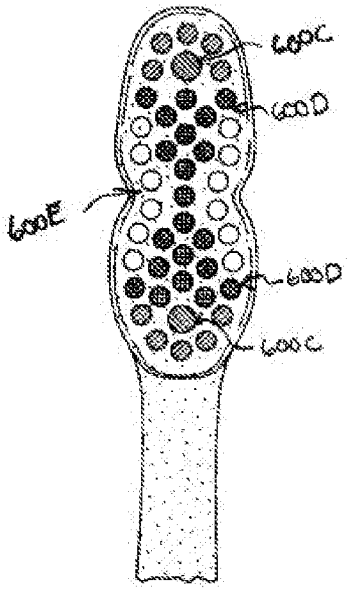


Fig. 6B

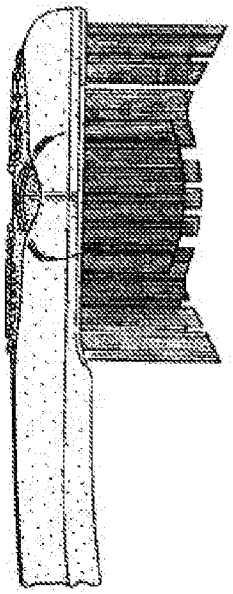


Fig. 6C

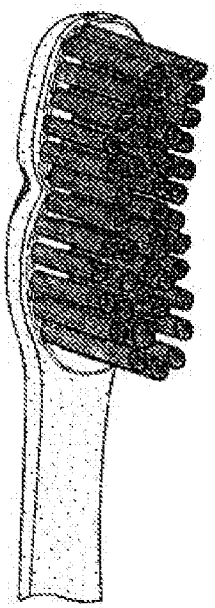


Fig. 6D

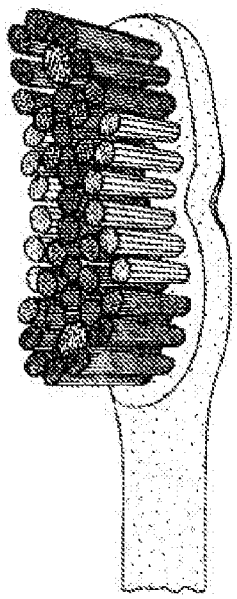
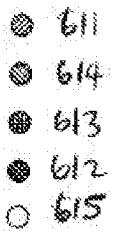


Fig. 6E



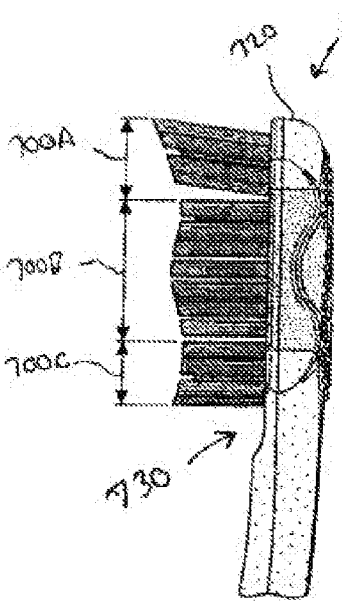


Fig. 7A

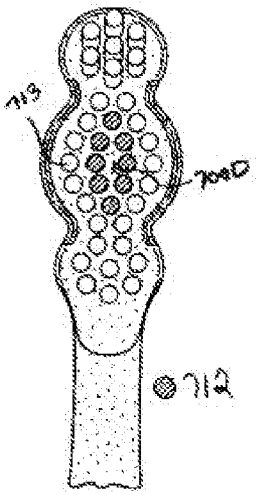


Fig. 7B

Fig. 7C

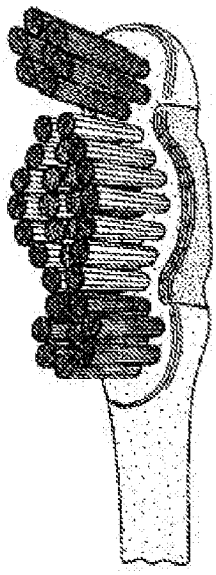


Fig. 7D

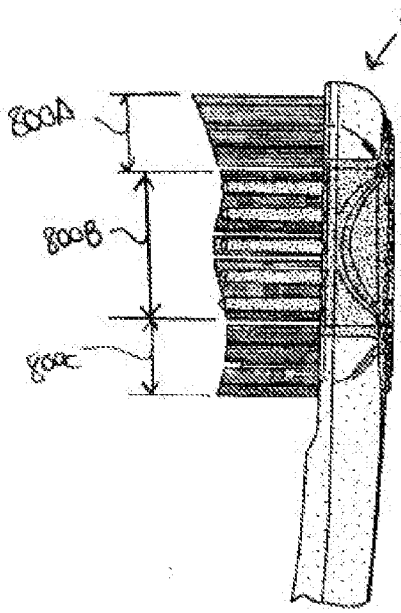


Fig. 8A

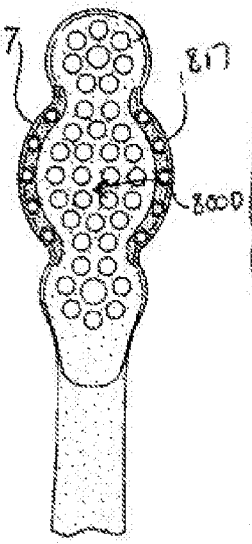


Fig. 8B

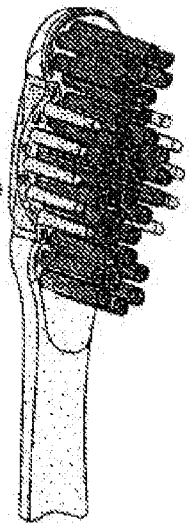


Fig. 8C

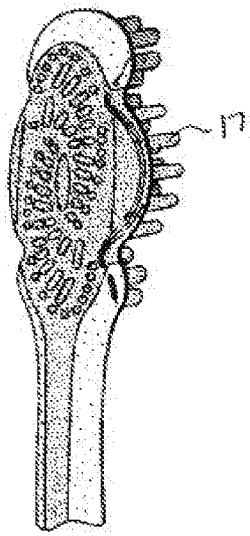


Fig. 8D

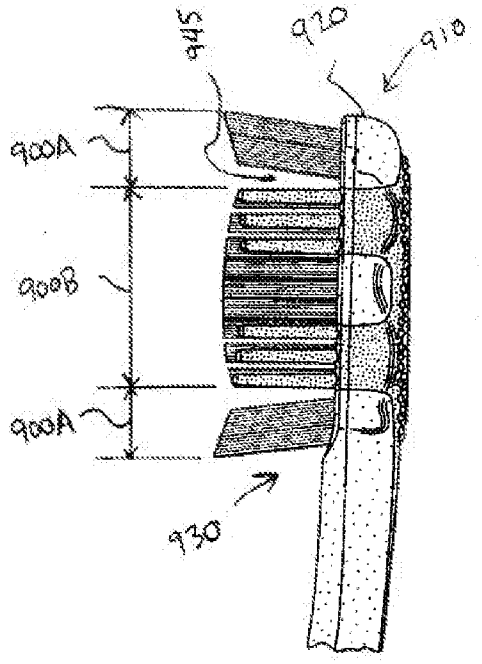


Fig. 9A

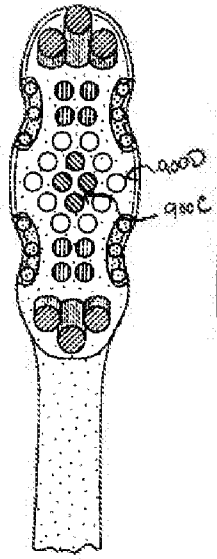


Fig. 9B

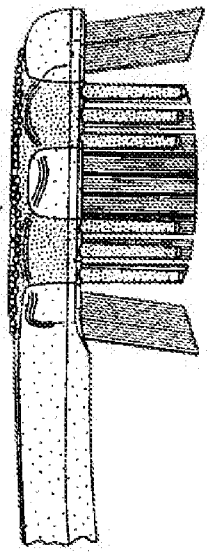


Fig. 9C

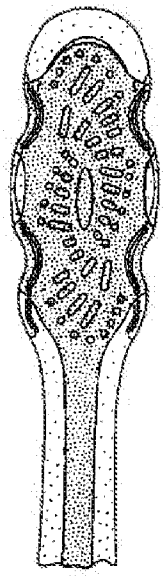


Fig. 9D

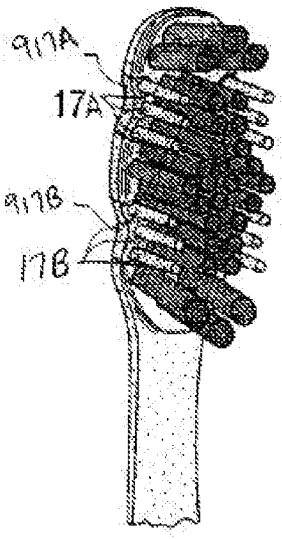


Fig. 9E

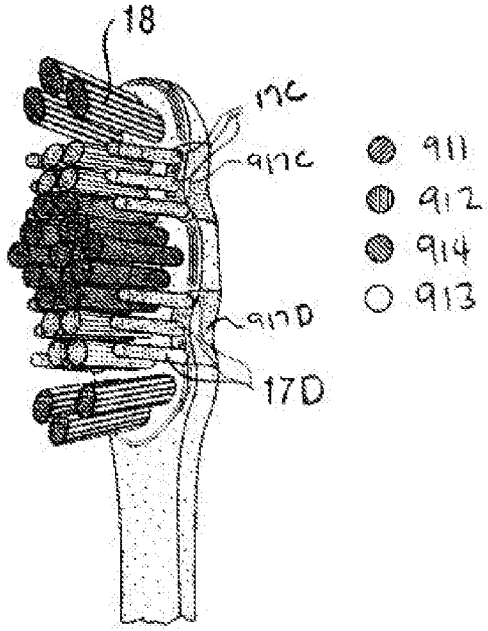


Fig. 9F

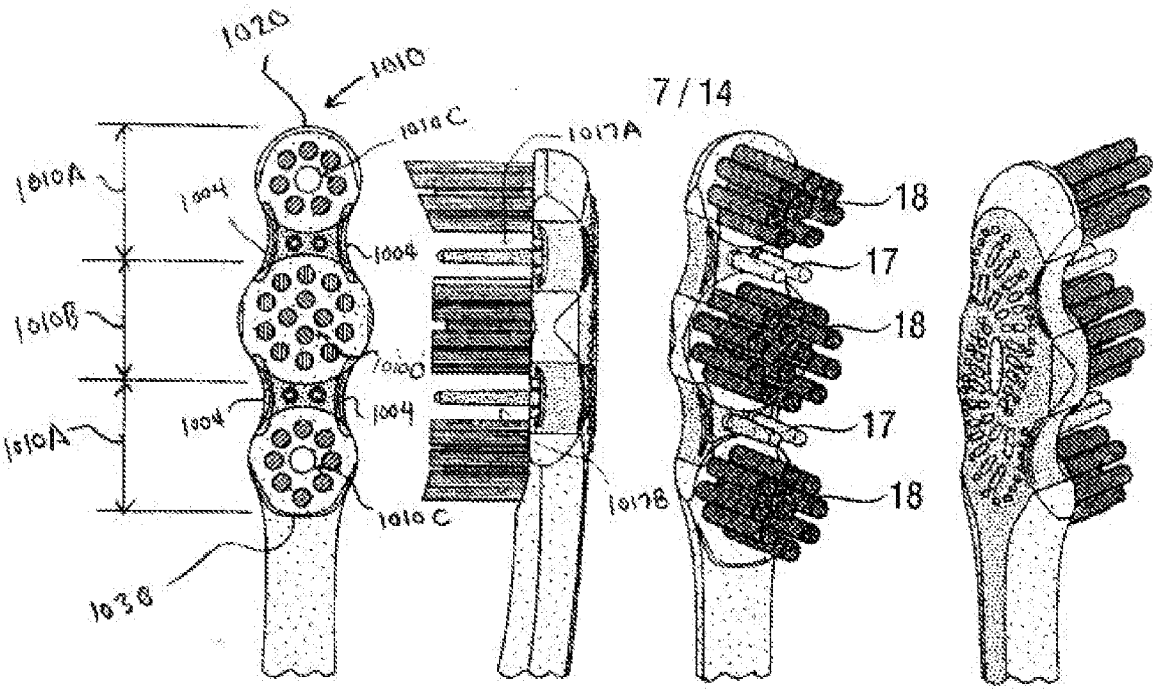


Fig. 10A Fig. 10B Fig. 10C Fig. 10D

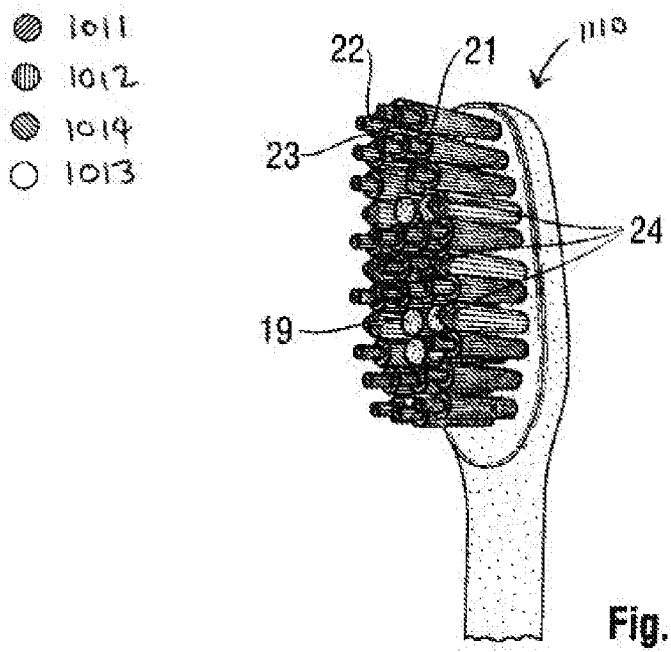


Fig. 11

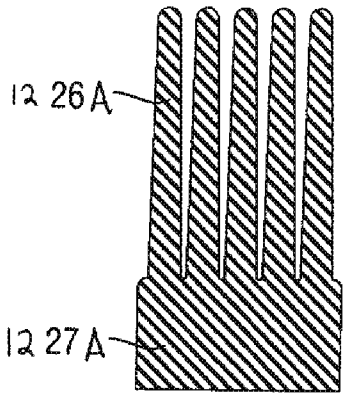


Fig. 12B

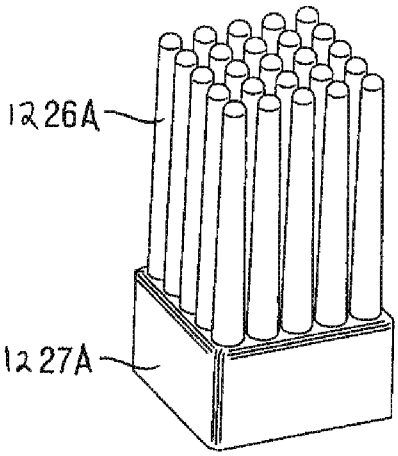


Fig. 12A

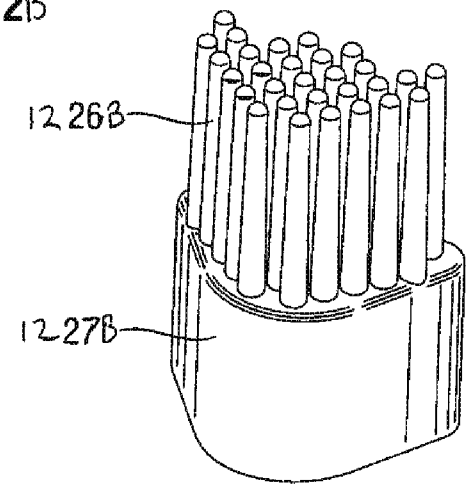


Fig. 13

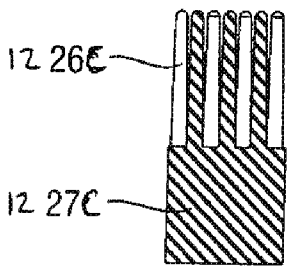


Fig. 14B

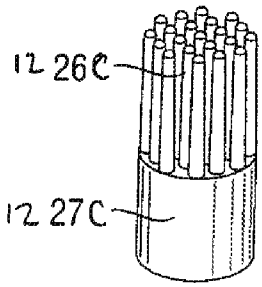


Fig. 14A

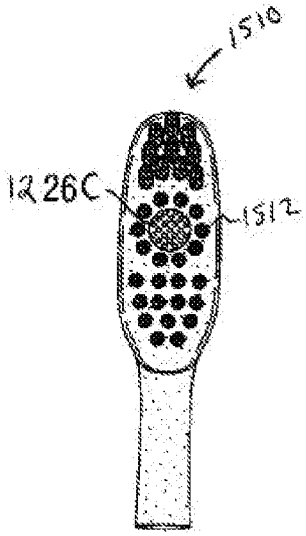


Fig. 15C

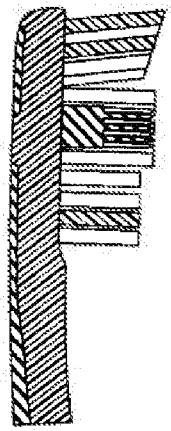


Fig. 15B

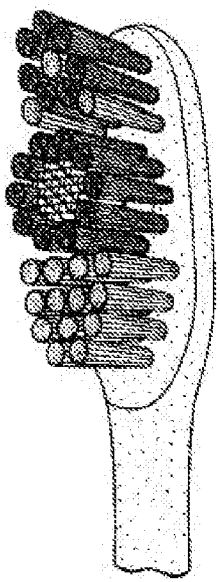


Fig. 15A

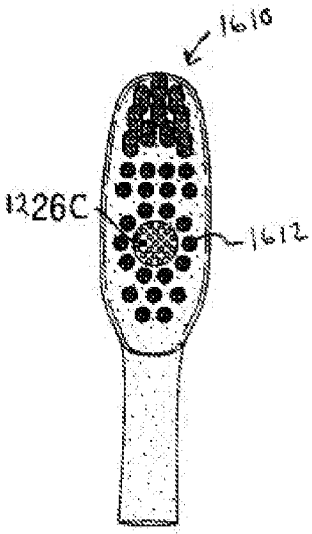


Fig. 16C

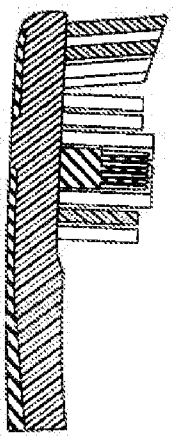


Fig. 16B

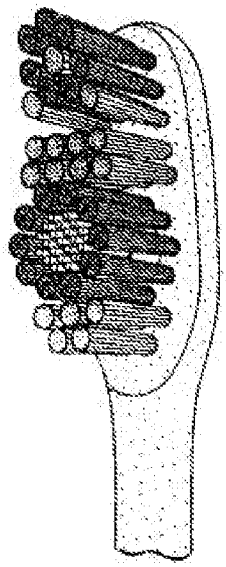


Fig. 16A

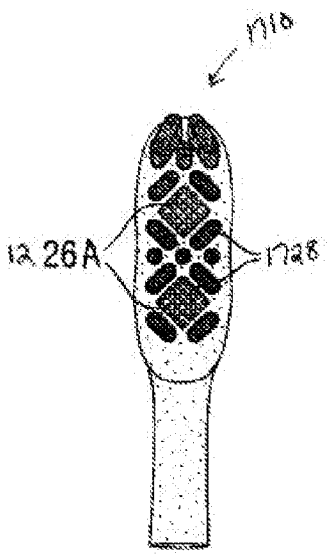


Fig. 17C

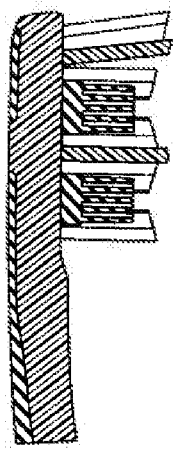


Fig. 17B

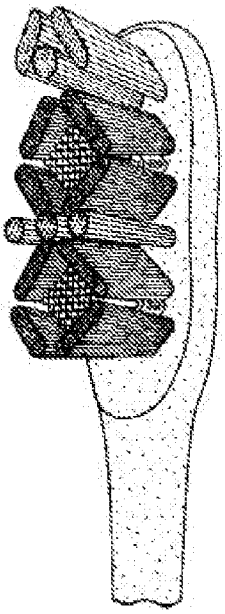


Fig. 17A

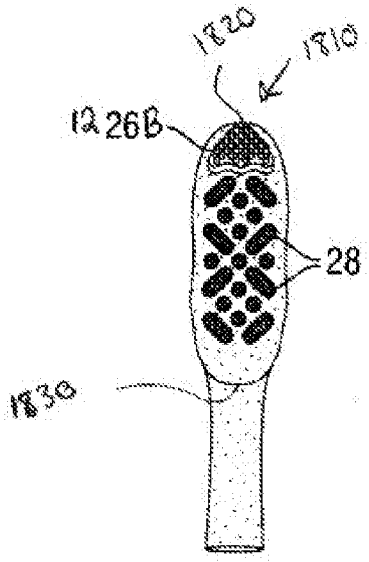


Fig. 18C

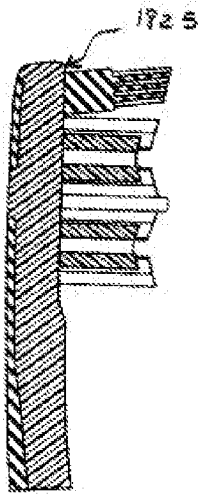


Fig. 18B

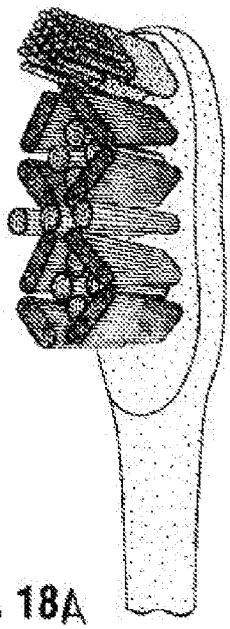


Fig. 18A

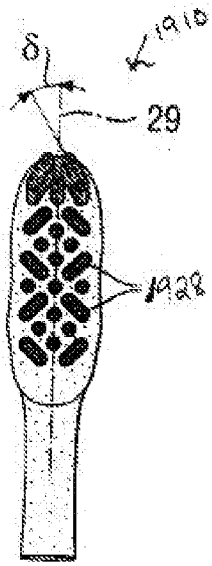


Fig. 19C

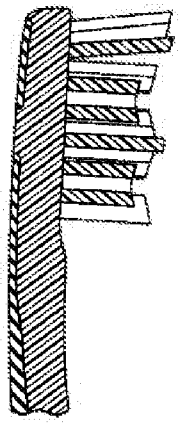


Fig. 19B

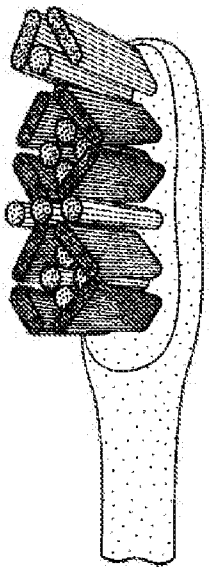


Fig. 19A

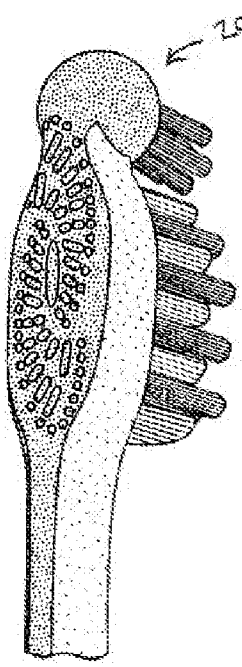


Fig. 20B

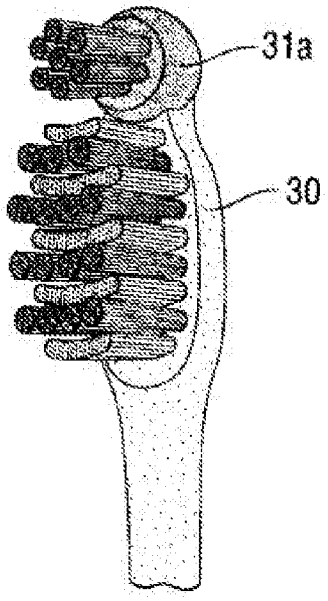


Fig. 20A

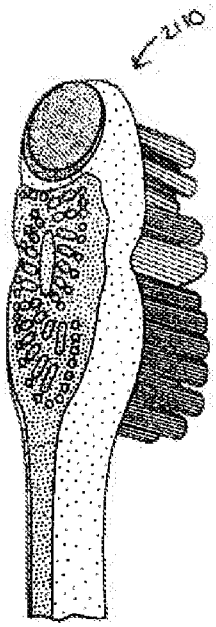


Fig. 21B

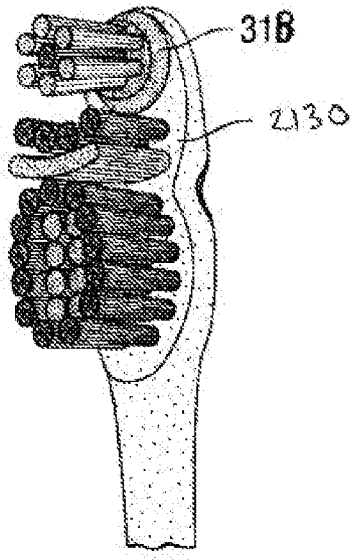


Fig. 21A

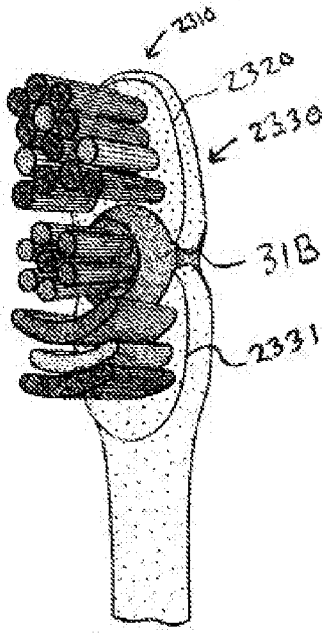


Fig. 23

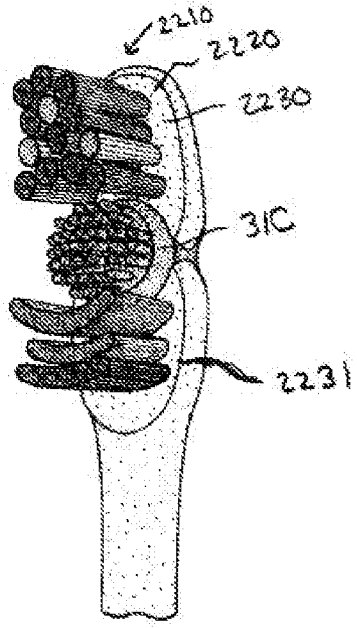
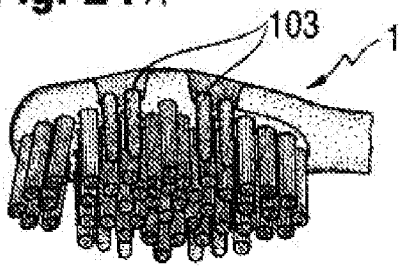


Fig. 22

Fig. 24A



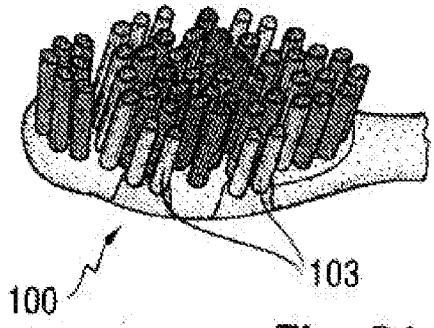
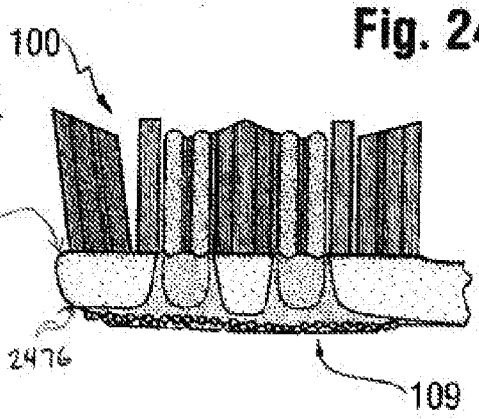


Fig. 24B

Fig. 24C



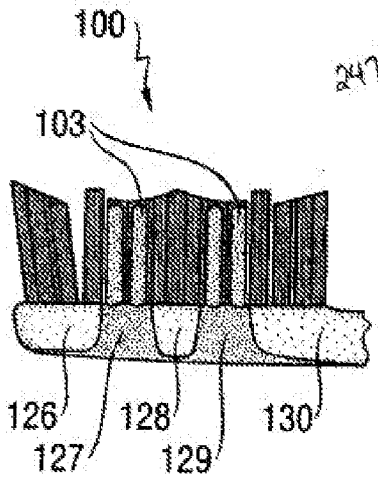


Fig. 24D

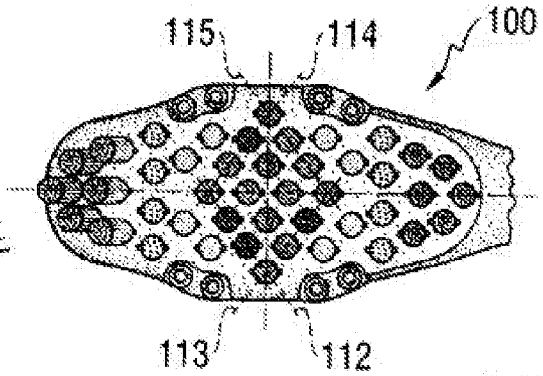


Fig. 24E

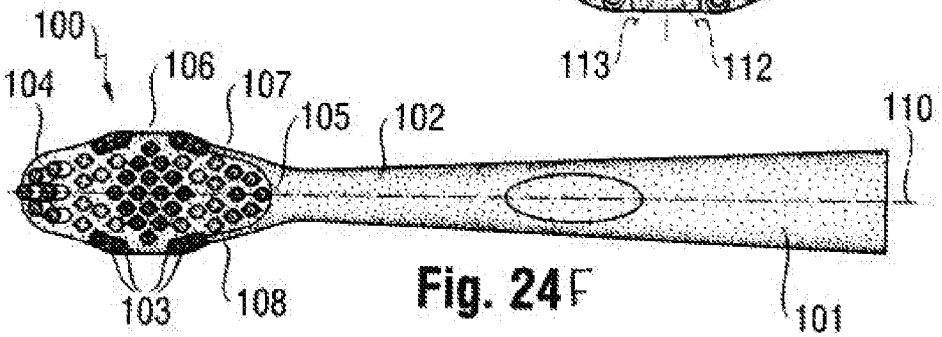


Fig. 24F

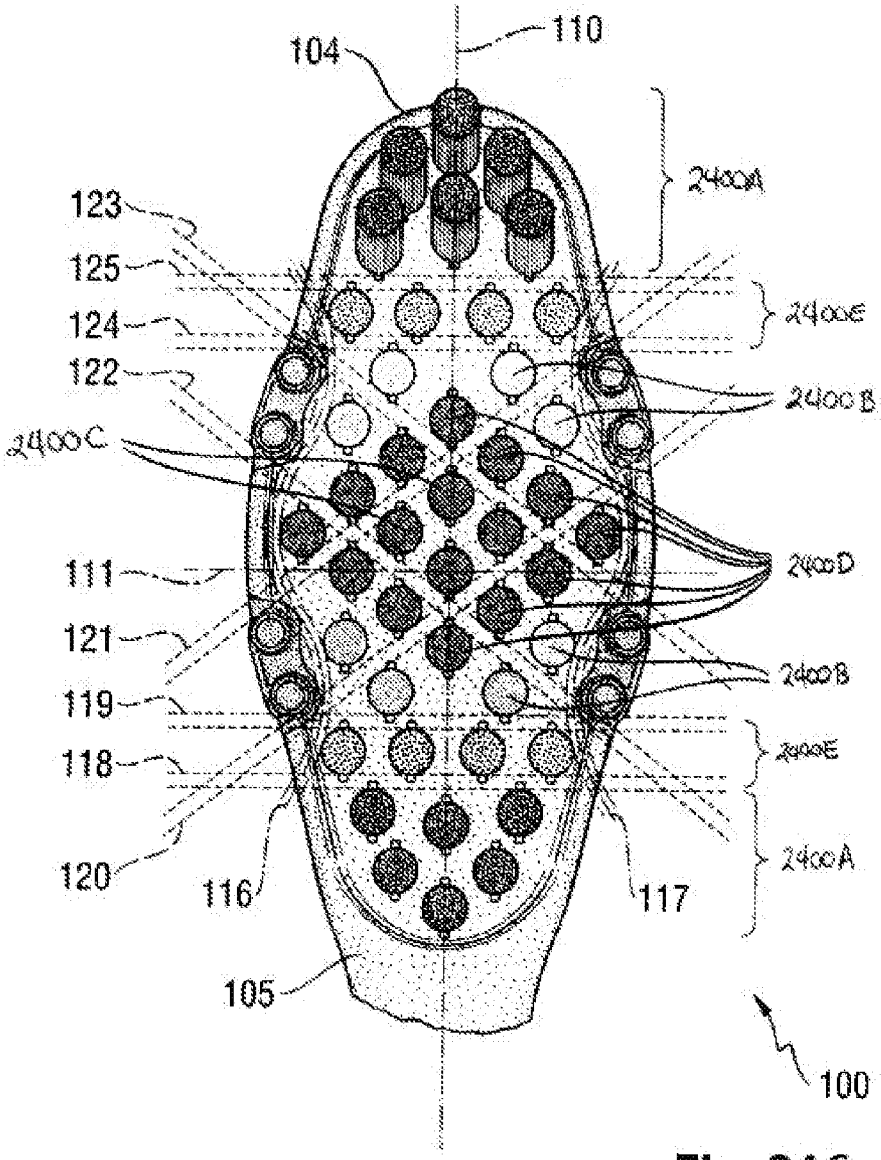

104
110
2400A
123
125
124
122
2400C
111
121
119
118
120
116
117
105
2400E
2400B
2400D
100

Fig. 24G

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/055759

A. CLASSIFICATION OF SUBJECT MATTER
INV. A46B3/22 A46B9/04 A46B9/06
ADD.

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

B. FIELDS SEARCHED

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

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/025275 A1 (MOSKOVICH ROBERT [US] ET AL) 12 February 2004 (2004-02-12)	1-3,5,6
A	abstract figures 1-4 paragraphs [0001], [0016], [0018]	4,7-20

X	WO 98/37788 A1 (SMITHKLINE BEECHAM CONSUMER [DE]; KRAMER HANS [DE]) 3 September 1998 (1998-09-03)	1-3,5,6
A	page 1, lines 1-2 page 1, lines 14-27 figures 1-8	4,7-20

X	DE 200 02 885 U1 (TRISA HOLDING AG TRIENGEN [CH]) 22 March 2001 (2001-03-22)	8,9, 12-14
A	page 3, lines 7-9, 27-30 page 4, lines 12-15, 22-27 figures 1-16	1-7,10, 11,15-20

	-/--	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 April 2011	17/05/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Kerner, Bodo

1

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/055759

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2003/074755 A1 (ALE HASAN AL [US] ET AL) 24 April 2003 (2003-04-24) figures 8,9 paragraph [0002] -----	8,9, 12-14 1-7,10, 11,15-20
X A	US 5 930 860 A (SHIPP ANTHONY D [US]) 3 August 1999 (1999-08-03) abstract figures 2-5 column 3, lines 38-47 -----	16-20 1-15
A	US 2005/060822 A1 (CHENVAINU ALEXANDER T [US] ET AL) 24 March 2005 (2005-03-24) figures 1-4 paragraph [0001] -----	1-20

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2010/055759

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004025275 A1	12-02-2004	AU 2003256903 A1	25-02-2004
		BR 0313321 A	14-06-2005
		CA 2494906 A1	19-02-2004
		CN 1674808 A	28-09-2005
		CO 5700685 A2	30-11-2006
		EP 1528873 A2	11-05-2005
		KR 20050065525 A	29-06-2005
		MX PA05001510 A	19-04-2005
		RU 2327402 C2	27-06-2008
		WO 2004014248 A2	19-02-2004
		US 2005125925 A1	16-06-2005
WO 9837788 A1	03-09-1998	AP 1048 A	12-03-2002
		AT 231349 T	15-02-2003
		AU 737732 B2	30-08-2001
		BG 63930 B1	31-07-2003
		BG 103679 A	28-04-2000
		BR 9807849 A	22-02-2000
		CA 2281736 A1	03-09-1998
		CN 1248150 A	22-03-2000
		CY 2464 B1	03-06-2005
		CZ 9903008 A3	14-06-2000
		DE 69810911 D1	27-02-2003
		DE 69810911 T2	13-11-2003
		DK 969750 T3	05-05-2003
		EP 0969750 A1	12-01-2000
		ES 2327984 T3	05-11-2009
		HK 1025020 A1	24-10-2003
		HU 0000974 A2	28-08-2000
		ID 22633 A	02-12-1999
		IL 131178 A	19-02-2004
		JP 2001504024 T	27-03-2001
		NO 994050 A	21-10-1999
		NZ 337049 A	26-01-2001
		PL 335131 A1	10-04-2000
		PT 969750 E	30-06-2003
		SI 969750 T1	31-10-2003
		SK 114299 A3	14-02-2000
		TR 9902041 T2	22-11-1999
		TW 439448 U	07-06-2001
		US 6327735 B1	11-12-2001
		ZA 9801475 A	09-11-1998
DE 20002885 U1	22-03-2001	NONE	
US 2003074755 A1	24-04-2003	EG 23314 A	30-11-2004
US 5930860 A	03-08-1999	NONE	
US 2005060822 A1	24-03-2005	AT 446059 T	15-11-2009
		AU 2004277903 A1	14-04-2005
		AU 2009200958 A1	02-04-2009
		BR PI0414329 A	07-11-2006
		CA 2537630 A1	14-04-2005
		CN 1852686 A	25-10-2006
		CN 101617890 A	06-01-2010
		CN 101617891 A	06-01-2010
		DK 1663060 T3	30-11-2009

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2010/055759

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1663060 A1	07-06-2006
		EP 2092845 A1	26-08-2009
		EP 2080446 A1	22-07-2009
		ES 2333968 T3	03-03-2010
		JP 2007505695 T	15-03-2007
		JP 2009219902 A	01-10-2009
		JP 2009219903 A	01-10-2009
		KR 20060069495 A	21-06-2006
		KR 20080052698 A	11-06-2008
		MX PA06003026 A	23-06-2006
		RU 2325870 C2	10-06-2008
		RU 2372048 C2	10-11-2009
		SG 146634 A1	30-10-2008
		WO 2005032398 A1	14-04-2005
		ZA 200602257 A	25-07-2007