(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 0 955 837 B2**

(12) **NEW EUROPEAN PATENT SPECIFICATION**
After opposition procedure

(45) Date of publication and mention of the opposition decision:
22.10.2008 Bulletin 2008/43

(45) Mention of the grant of the patent:
26.02.2003 Bulletin 2003/09

(21) Application number: **98956668.2**

(22) Date of filing: **06.11.1998**

(51) Int Cl.:
A46B 9/04 *(2006.01)*

(86) International application number:
PCT/US1998/023780

(87) International publication number:
WO 1999/023910 (20.05.1999 Gazette 1999/20)

(54) **TOOTHBRUSH**

ZAHNBÜRSTE

BROSSE A DENTS

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **12.11.1997 US 968293**
23.10.1998 US 177991

(43) Date of publication of application:
17.11.1999 Bulletin 1999/46

(60) Divisional application:
02012748.6 / 1 240 847

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Description

[0001] The invention relates generally to the field of oral care, and in particular to toothbrushes. More particularly, the invention relates to a toothbrushes with a three-dimensional bristle profile to provide improved cleaning of interproximal and gingival marginal regions of teeth.

[0002] Toothbrushing and flossing are fundamental steps in achieving good oral hygiene. The practice of flossing, unfortunately, has not met with widespread acceptance among the general populace even though it is acknowledged by the general populace that flossing is something that should be completed as part of good oral hygiene. Furthermore, even people who floss oftentimes do not perform adequate flossing in hard to reach areas of the mouth. Unfortunately, while most commercially available toothbrushes clean the outer buccal face of teeth adequately, they fail to provide improved cleaning of plaque and debris from the gingival margin, interproximal areas, lingual surfaces and other hard to reach areas of the mouth.

[0003] One reason that such toothbrushes do not adequately clean the rear-most molars (e.g. wisdom teeth or second molars) is that the one or more tufts secured to the toothbrush head at a location most distal from the toothbrush handle are not angled towards a direction along which the head extends from the handle. As such, these tufts cannot extend far enough past the end of the head of the toothbrush to sufficiently clean the molar teeth in the back of the mouth.

[0004] U.S. 4,672,706 forms the preamble of claim 1. U.S. 5,628,082, U.S. 5,446,940 and FR 2,624,360 disclose toothbrushes including a most distal tuft which is angled in a direction away from the handle. However, such articles do not also have a tuft angled in the opposite direction for enhanced interdental cleaning.

[0005] Additionally, in those brushes having tufts of bristles which angle towards the handle and other tufts which angle away from the handle, all of such tufts are essentially the same length and have the same cross-section. See, for example DE 4412301. Consequently, while these angled tufts may clean one part of the teeth in a satisfactory manner, other parts of the teeth will not be cleaned sufficiently due to the homogeneous length, spacing and cross-section of the tufts.

[0006] Further, prior art toothbrushes disclose tufts of bristles having at most three different types of cross-sections. However, there are more than three parts of the teeth which need to be cleaned by a brush (e.g. the outer buccal face, gingival margin, interproximal areas, lingual surfaces and rearward most molars). As such, prior art brushes do not provide tufts of sufficiently varied cross-section specifically designed to clean all areas of the teeth.

[0007] The present invention is directed to overcoming one or more of the problems set forth above and provides a toothbrush according to claim 1. Preferred embodiments are defined in the dependent claims.

[0008] By angling the one tuft as described in the previous paragraph, the tuft is able to extend past the end of the head of the toothbrush and thus clean molars in the back of the mouth in a more sufficient manner.

[0009] This specification also discloses a toothbrush including a handle, a head extending from the handle, and a plurality of tufts of bristles secured to the head. One of the tufts is secured to the head at a location such that no other tuft is secured to the head at a location which is more distal from the handle than the location where the one tuft is secured to the head. The one tuft is tilted away from the handle towards a direction along which the head extends from the handle. The one tuft is angled by about 81 degrees or less relative to an imaginary line which is tangent to or co-planar with a surface of the head through which the one tuft is secured to the head.

[0010] Providing angled tufts which vary in their length, cross-section or combinations thereof, allows such angled tufts to clean more than one part of the teeth. For example, one type of angled tuft will clean the buccal face of teeth while another type of angled tuft will clean the interproximal areas of the teeth.

[0011] By providing tufts with at least five types of cross-sections, these tufts can clean all areas of the teeth (e.g. the outer buccal face, gingival margin, interproximal areas, lingual surfaces and rearward most molars) properly.

[0012] These and other aspects, objects, features and advantages of the present invention will be more clearly understood and appreciated from a review of the following detailed description of the preferred embodiments and appended claims, and by reference to the accompanying drawings.

FIG. 1 is a perspective view of a toothbrush according to the present invention;
FIG. 2 is a top view of the toothbrush of FIG. 1;
FIG. 3 is a side view of the toothbrush of FIG. 1;
FIGs. 4 and 5 are partial side views of the head and respective portions of the tufts of the toothbrush of FIG. 1;
FIG. 6 is a partial sectional view of the head of the toothbrush taken along the lines of 6-6 of FIG. 3; and
FIG. 7 perspective view of the head and a portion of the handle of the toothbrush of FIG. 1.

[0013] Beginning with FIGS. 1-3, a toothbrush 10 includes a handle portion 12 and a head portion 14 which extends from the handle in a direction D. The overall length of toothbrush 10 is preferably about 19.6 cm. (about 7.7) inches while the width of head 14 at its widest portion is preferably about 1.3 cm. (about 0.5 inches). A main portion 16 of handle 12, and head 14 are made of a unitary piece of polypropylene. Remaining portions of handle 12, including thumb gripping portion 18, optional Trademark 24 (preferably about 2.1 cm. (about .83 inches) long) and finger gripping portion 20 are preferably

made of a thermoplastic elastomer, preferably kraton rubber (a hydrogenated or unhydrogenated oil filled block co-polymer of styrene and butadiene or isoprene having a shore A hardness of between about 5 and about 70). Thumb gripping portion 18 and a portion of finger gripping portion 20 have a series of seventeen raised ribs 22 which aid in the gripability of the handle. Ribs 22 are preferably 0.13 cm. (.05 inches) in width.

[0014] With reference to FIGs. 3-7, a plurality of tufts 26 of bristles are secured to head 14 of the toothbrush. Each tuft is made up of a large number of bristles, and all of the bristles are preferably end-rounded. There are five different types of tufts secured to the head each tuft type having a cross-section which differs in both area and shape to the other tuft types.

[0015] A first type of tuft, type 28, is made up of bristles formed of poly-butylene-terephthalate (PBT) with an abrasive such as kaolin clay particles mixed throughout the PBT. These bristles are between about .013 to .023 cm. (about .005 to .009 inches) in diameter, preferably .018 cm. (.007 inches) in diameter. The length of these bristles, measured from surface 30 of head 14, is about 1.18 cm. (.440 inches). The cross-sectional tufted area for tuft 28 is about .2406 $cm.^2$ (about 0.0373 square inches), providing a tuft volume measured from the head surface of about .2687 $cm.^3$ (about .0164 cubic inches) (preferably this volume is between about .246 and .295 cm^3 (about .015 and .018 cubic inches)). There is only one type 28 tuft secured to head 14 and it is located more distal from handle 14 than any other tuft.

[0016] A second type of tuft, type 32, is made up of nylon Indicators™ type bristles which are formed of 6.12 nylon and colored blue on their external surface. As is well known in the art, the blue coloring on these bristles is slowly worn away as the brush is used over time to indicate the extent to which the toothbrush is worn. These bristles are between about .013 to .023 cm. (about .005 to .009 inches) in diameter, preferably .018 cm. (.007 inches) in diameter. The length of these bristles, measured from surface 30 of head 14, is about .889 cm. (about .350 inches). The cross-sectional area of each tuft 32 is about 0.0290 $cm.^2$ (about 0.0045 square inches). As shown in FIG. 6, type 32 tufts have a round cross-section. There are between 8 and 12 type 32 tufts secured to head 14.

[0017] A third type of tuft, type 34, is made up of bristles formed of PBT with an abrasive such as kaolin clay particles mixed throughout the PBT. These bristles are between about .013 to .023 cm. (about .005 to .009 inches) in diameter, preferably .018 cm. (.007 inches) in diameter. The length of these bristles, measured from surface 30 of head 14, is about 1.18 cm. (about .440 inches). The cross-sectional area of each tuft 34 is about .0174 $cm.^2$ (about 0.0027 square inches). There are between eight and twelve type 34 tufts secured to head 14. As shown in FIG. 6, type 34 tufts are rectangular in shape with rounded ends.

[0018] A fourth type of tuft, type 36, is made up of bristles formed of PBT with an abrasive such as kaolin clay particles mixed throughout the PBT. These bristles are between about .013 to .023 cm. (about .005 to .009 inches) in diameter, preferably .018 cm. (.007 inches) in diameter. The length of these bristles, measured from surface 30 of head 14, is about 1.12 cm. (about .440 inches). The cross-sectional area of each tuft 36 is about 0.0258 $cm.^2$ (about 0.0040 square inches). There are between four and six type 36 tufts secured to head 14. As shown in FIG. 6, type 36 tufts are rectangular in shape with rounded ends, and are wider across the head than type 34 tufts.

[0019] A fifth and final type of tuft, type 38, is made up of bristles formed of PBT with an abrasive such as kaolin clay particles mixed throughout the PBT. These bristles are between about .013 to .023 cm. (about .005 to .009 inches) in diameter, preferably .015 cm. (.006 inches) in diameter. The length of these bristles, measured from surface 30 of head 14, is about .889 cm. (about .350 inches). The cross-sectional area of each tuft 38 is about .0542 $cm.^2$ (about 0.0084 square inches). There are between four and six type 38 tufts secured to head 14. As shown in FIG. 6, type 36 tufts are rectangular in shape with rounded ends, and are wider than type 36 tufts.

[0020] Based on the cross-sectional areas of the various tufts described above, tuft type 28 has a cross-section which is more than four times as large as any other tuft secured to head 14. Although specific materials were described above from which the bristles of each tuft are made, other materials can be used. As such, any of the bristles attached to head 14 could be made from, for example, PBT with or without an abrasive such as kaolin clay, 6.12 nylon with or without an abrasive, or nylon Indicator™ material with or without an abrasive.

[0021] Additionally, the bristles within a tuft and between tufts can have varying lengths, diameters, cross-sectional shapes, cross-sectional areas, colors and be made of differing materials.

[0022] As best seen in FIGs. 2, 4 and 5 and seven, all of the tufts on head 14 are angled either towards direction D or towards the direction opposite of direction D by preferably less than about 81 degrees, more preferably between about 69 degrees to about 81 degrees, and most preferably by about 75 degrees, relative to an imaginary straight line 40 which is tangent to surface 30 of head 14. If surface 30 was flat, rather than curved, then line 40 would be co-planar with surface 30. Two outer rows of tufts 42 are angled towards direction D away from handle 12. An inner row of tufts 44 are angled opposite direction D towards handle 12 with the exception of large tuft 28 which is tilted towards direction D away from handle 12.

[0023] Toothbrush 10 can be made by the following process which is generally understood by those skilled in the art. Each of the tufts of bristles are formed by gathering together a desired amount of bristles of a selected material, length and diameter. The tufts are then inserted into apertures in part of a mold of an injection molding

machine. An end of the tuft which is or will project into the mold cavity is then melted to join the bristles together in a fused mass or ball at that end of the tuft. The mold part bearing the tufts is then joined with another portion of the mold which together define a cavity used to form main portion 16 of the toothbrush. The fused masses of the tufts are located just within the cavity.

[0024] Polypropylene is then injected into the cavity to form portion 16 of toothbrush 10. The polypropylene is then cooled at which point the partially finished toothbrush is moved to a second injection molding station. The cooled, hardened polypropylene secures the fused masses of the tufts to head 14 of the toothbrush. At the second molding station, the partially finished brush is put into a second mold having cavities to form the thumb gripping portion 18, trademark 24 and finger gripping portion 20. A thermoplastic elastomer is then injected into the mold after which the elastomer is cooled and finished toothbrush 10 is removed from the mold. The toothbrush is then packaged.

Claims

1. A toothbrush (10) having a head (14) with a frontal free end and a rearward section followed by a handle (12), comprising tufts of bristles (32, 34, 36, 38) arranged in one inner and two outer longitudinal rows (42, 44) on the rearward section of the head (14) and having different lengths, with tufts of bristles having either a first greater length or a second smaller length, with tufts of bristles (32, 34, 36, 38) of the first and second length being provided in every longitudinal row (42, 44) and adjacent tufts of bristles (32, 34, 36, 38) of a longitudinal row (42, 44) alternatingly having the first and the second length, **characterized in that** all the tufts of bristles (32, 34) in the outer longitudinal rows (42) are tilted in a first direction (D) towards the free end of the head (14) and all the tufts of bristles (26, 38) of the inner longitudinal row (44) are tilted towards a second direction opposite of the first direction (D) and forming an acute angle with the surface (30) of the head (14), and by a single further tuft of bristles (28) being secured to the frontal free end of the head (14) and being angled only towards the first direction (D) and having the first greater length, wherein the angle of all of the tufts on the head (14) are angled by about 81 degrees or less relative to an imaginary line which is tangent to or co-planar with a surface (30) of the head (14) through which the tufts are secured to the head and wherein the single further tuft has a cross-sectional tufted area of about 0.2406 cm^2 (0.0373 square inches); the outer longitudinal rows consist of between 8 and 12 tufts with a round cross-sectional tufted area of 0.0290 cm^2 (0.0045 square inches) and of between 8 and 12 tufts with a rectangular-shaped cross-sectional tufted area of 0.0174 cm^2 (0.0027 square inches); and the inner longitudinal row consist of between 4 and 6 tufts with a rectangular-shaped cross-sectional tufted area of 0.0258 cm^2 (0.0040 square inches) and of between 4 and 6 tufts with a rectangular-shaped cross-sectional tufted area of 0.0542 cm^2 (0.0084 square inches).

2. The toothbrush according to claim 1, **characterized in that** at least some tufts of bristles (28, 32, 34, 38, 38) provide a different color.

3. The toothbrush according to any of the preceding claims, **characterized in that** at least some tufts of bristles (28, 32, 34, 38, 38) consist of different material.

4. The toothbrush according to any of the preceding claims, **characterized in that** the first greater length and the second smaller length differ from each other by approximately 2.286 mm (0.090 inches).

5. The toothbrush according to any of the preceding claims, **characterized in that** the first greater length is approximately 11.18 mm (0.440 inches) or the second smaller length is 8.89 mm (0.350 inches).

6. The toothbrush according to any of the preceding claims, **characterized in that** each tuft of bristles (28, 32, 34, 36, 38) consists of a large number of bristles, with the bristles having rounded-off ends.

7. The toothbrush according to any of the preceding claims, **characterized in that** the bristles secured to the head (14) are made from PBT, from 6.12-nylon or from a nylon-indicators (Trade Mark) material, each with or without abrasive, such as for instance kaolin clay.

Patentansprüche

1. Zahnbürste (10) mit einem Kopf (14) mit einem vorderen freien Ende und einem hinteren Abschnitt, auf den ein Handstück (12) folgt, mit Borstenbüscheln (32, 34, 36, 38), die in einer inneren und zwei äußeren longitudinalen Reihen (42, 44) an dem hinteren Abschnitt des Kopfs (14) angeordnet sind und unterschiedliche Längen aufweisen, wobei die Borstenbüschel entweder eine erste größere Länge oder eine zweite kleinere Länge aufweisen, wobei die Borstenbüschel (32, 34, 36, 38) der ersten und zweiten Länge in jeder longitudinalen Reihe (42, 44) vorgesehen sind, und wobei benachbarte Borstenbüschel (32, 34, 36, 38) einer longitudinalen Reihe (42, 44) wechselweise die erste und die zweite Länge aufweisen, **dadurch gekennzeichnet, dass** alle Borstenbüschel (32, 34) in den äußeren longitudinalen Reihen (42) in eine erste Richtung (D) in Richtung

des freien Endes des Kopfes (14) geneigt sind, und wobei alle Borstenbüschel (26, 38) der inneren longitudinalen Reihe (44) in eine zweite Richtung entgegengesetzt zu der ersten Richtung (D) geneigt sind und einen spitzen Winkel mit der Oberfläche (30) des Kopfes (14) bilden, und wobei ein weiteres einzelnes Borstenbüschel (28) an dem vorderen freien Ende des Kopfes (14) angebracht und im wesentlichen ausschließlich in Richtung der ersten Richtung (D) angewinkelt ist und die erste größere Länge aufweist, wobei der Winkel aller Büschel an dem Kopf (14) einen Winkel von etwa 81 Grad oder weniger im Verhältnis zu einer imaginären Linie aufweisen, die tangential ist zu oder koplanar ist mit einer Oberfläche (30) des Kopfs (14), durch welche die Büschel an dem Kopf angebracht sind, und wobei das weitere einzelne Büschel eine Büschelquerschnittsfläche von etwa 0,2406 cm^2 (0,0373 Quadratzoll) aufweist; wobei die äußeren longitudinalen Reihen aus zwischen 8 und 12 Büscheln mit einer runden Büschelquerschnittsfläche von 0,0290 cm^2 (0,045 Quadratzoll) und zwischen 8 und 12 Büscheln mit einer rechteckigen Büschelquerschnittsfläche von 0,0174 cm^2 (0,0027 Quadratzoll) bestehen; und wobei die innere longitudinale Reihe aus zwischen 4 und 16 Büscheln mit einer rechteckigen Büschelquerschnittsfläche von 0,258 cm^2 (0,0040 Quadratzoll) und zwischen 4 und 6 Büscheln mit einer rechteckigen Büschelquerschnittsfläche von 0,0542 cm^2 (0,0084 Quadratzoll) besteht.

2. Zahnbürste nach Anspruch 1, **dadurch gekennzeichnet, dass** mindestens einige der Borstenbüschel (28, 32, 34, 36, 38) eine andere Farbe aufweisen.

3. Zahnbürste nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens einige der Borstenbüschel (28, 32, 34, 36, 38) ein anderes Material aufweisen.

4. Zahnbürste nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die erste größere Länge und die zweite kleinere Länge voneinander um ungefähr 0,2286 mm (0,090 Zoll) voneinander unterscheiden.

5. Zahnbürste nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste größere Länge ungefähr 11,18 mm (0,440 Zoll) oder die zweite kleinere Länge 8,89 mm (0,350 Zoll) entspricht.

6. Zahnbürste nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** jedes der Borstenbüschel (28, 32, 34, 36, 38) eine große Anzahl von Borsten aufweist, wobei die Borsten abgerundete Enden aufweisen.

7. Zahnbürste nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die an dem Kopf (14) angebrachten Borsten aus PBT hergestellt werden, aus 6,12-Nylon oder aus einem Nylon-Indicators (Warenzeichen) Material, die jeweils mit oder ohne Schleifmittel versehen sein können, wie etwa Kaolinerde.

Revendications

1. Brosse à dents (10) ayant une tête (14) avec une extrémité libre avant et une section arrière suivie d'un manche (12), comprenant des touffes de poils (32, 34, 36, 38) disposées en rangées longitudinales (42, 44) sur la section arrière de la tête (14) et ayant différentes longueurs, avec des touffes de poils ayant soit une première longueur plus longue, soit une seconde longueur plus courte, avec des touffes de poils (32, 34, 36, 38) de la première et de la seconde longueur étant proposées dans chaque rangée longitudinale (42, 44) et des touffes de poils adjacentes (32, 34, 36, 38) d'une rangée longitudinale (42, 44) ayant en alternance la première et la seconde longueur, **caractérisée en ce que** toutes les touffes de poils (32, 34) dans les rangées longitudinales extérieures (42) sont inclinées dans une première direction (D) vers l'extrémité libre de la tête (14) et toutes les touffes de poils (36, 38) de la rangée longitudinal intérieure (44) sont inclinées vers une seconde direction opposée à la première direction (D) et formant un angle aigu avec la surface (30) de la tête (14), et par une touffe individuelle de poils supplémentaire (28) qui est fixée à l'extrémité avant libre de la tête (14) et qui n'est orientée que vers la première direction (D) et ayant la première longueur plus longue, dans laquelle l'angle de toutes les touffes sur la tête (14) sont orientées selon un angle d'environ 81 degrés ou moins par rapport à une ligne imaginaire qui est tangente à ou co-planaire avec une surface (30) de la tête (14) à travers laquelle les touffes sont fixées à la tête (14), et dans laquelle la touffe individuelle de poils supplémentaire a une section transversale touffetée d'environ 0,2406 cm^2 (0,0373 pouce carré) ; les rangées longitudinales extérieures se composent d'un nombre de poils compris entre 8 et 12 avec une section transversale touffetée arrondie de 0,0290 cm^2 (0,0045 pouce carré) et entre 8 et 12 poils avec une section transversale touffetée rectangulaire de 0,0174 cm^2 (0,0027 pouce carré) ; et la rangée longitudinale intérieure se compose d'un nombre de poils compris entre 4 et 6 avec une section transversale touffetée rectangulaire de 0,0258 cm^2 (0,0040 pouce carré) et entre 4 et 6 poils avec une section transversale touffetée rectangulaire de 0,0542 cm^2 (0,0084 pouce carré).

2. Brosse à dents selon la revendication 1, **caractéri-**

sée en ce qu'au moins certaines touffes de poils (28, 32, 34, 36, 38) proposent une couleur différente.

3. Brosse à dent selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**au moins certaines touffes de poils (28, 32, 34, 36, 38) sont composées d'un matériau différent.

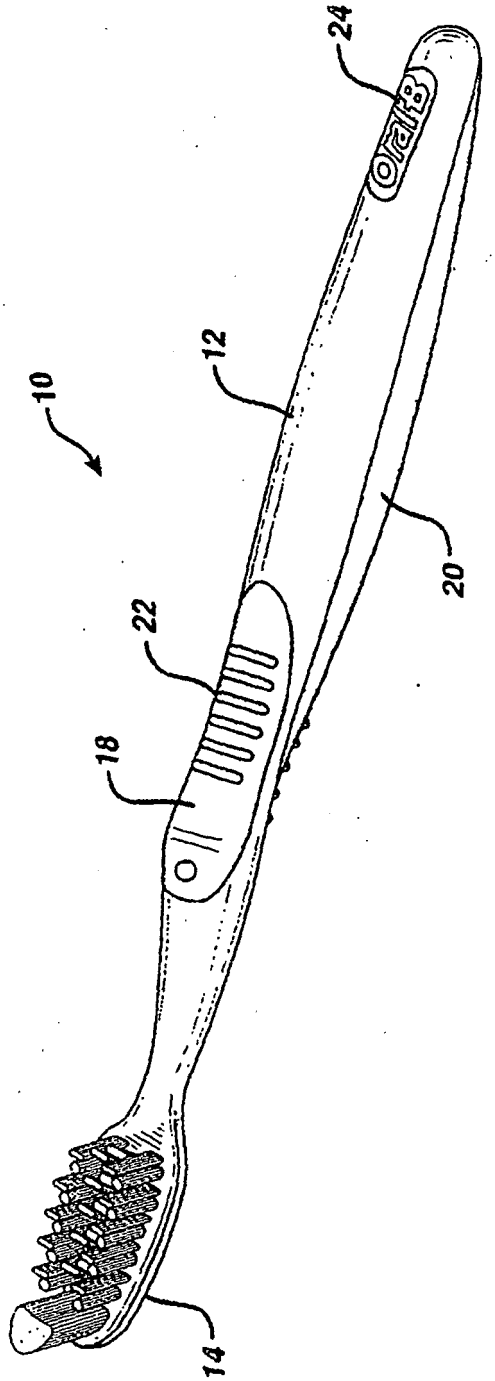
4. Brosse à dents selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la première longueur plus longue et la seconde longueur plus courte diffèrent l'une de l'autre d'environ 2,286 mm (0,090 pouce).

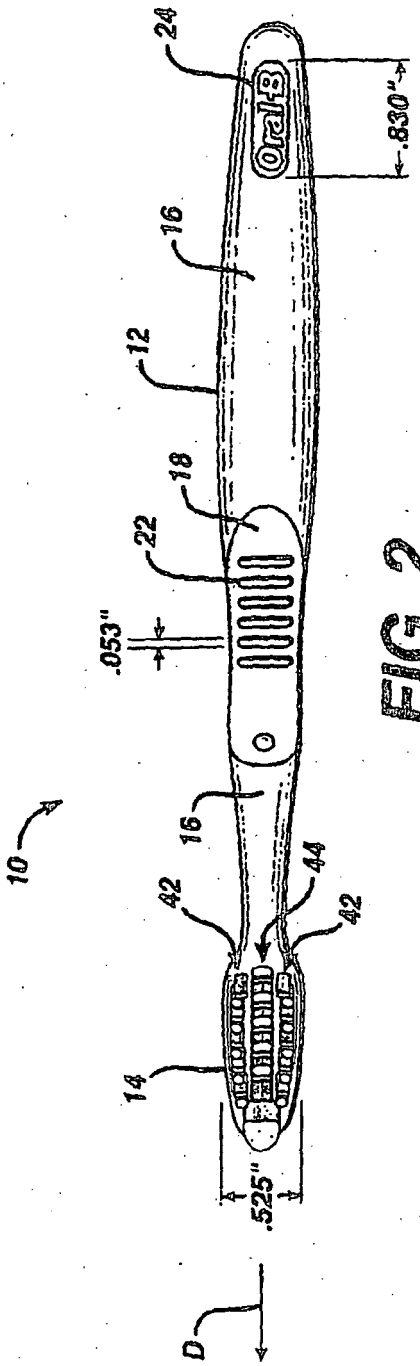
5. Brosse à dents selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la première longueur plus longue mesure environ 11,18 mm (0,440 pouce) ou la seconde longueur pus courte mesure 8,89 mm (0,350 pouce).

6. Brosse à dents selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chaque touffe de poils (28, 32, 34, 36, 38) se compose d'un grand nombre de poils avec les poils ayant des extrémités arrondies.

7. Brosse à dents selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les poils fixés à la tête (14) sont faits à partir de PBT, de nylon 6.12 ou d'un nylon Indicators (Marque Commerciale), chacun avec ou sans abrasif, tel que par exemple l'argile de kaolin.

FIG. 1

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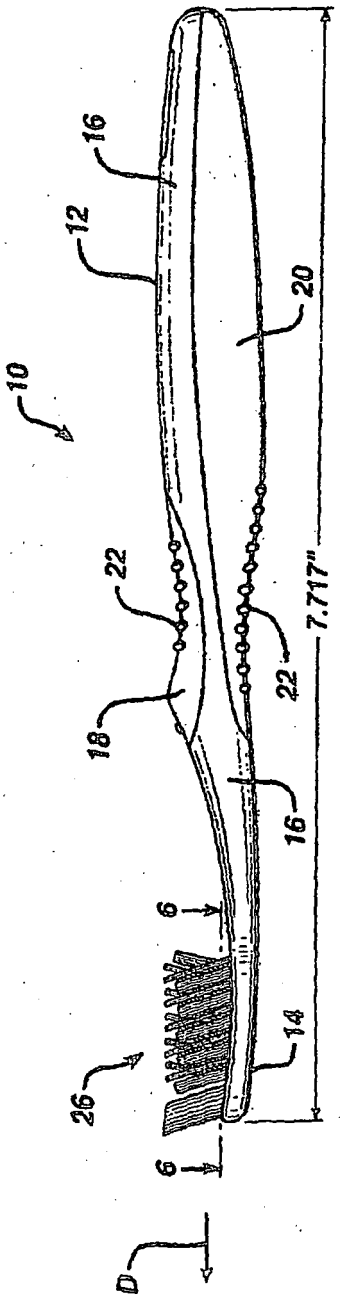
D

FIG. 2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D

FIG. 3

FIG. 4

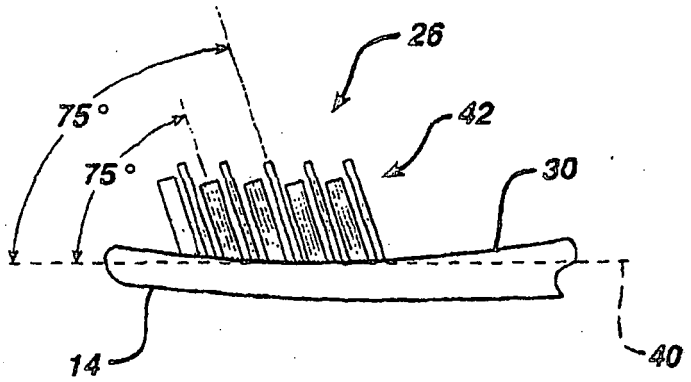


FIG. 5

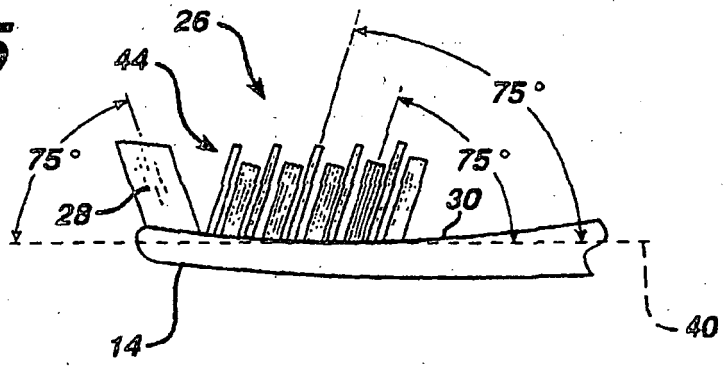


FIG. 6

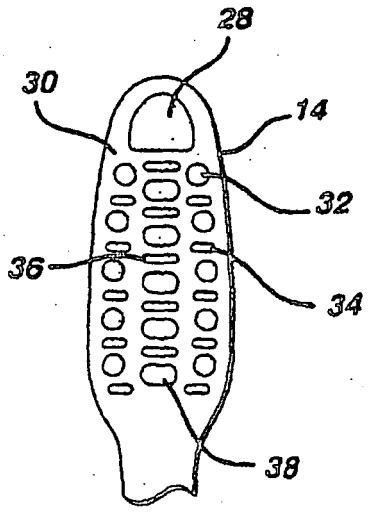
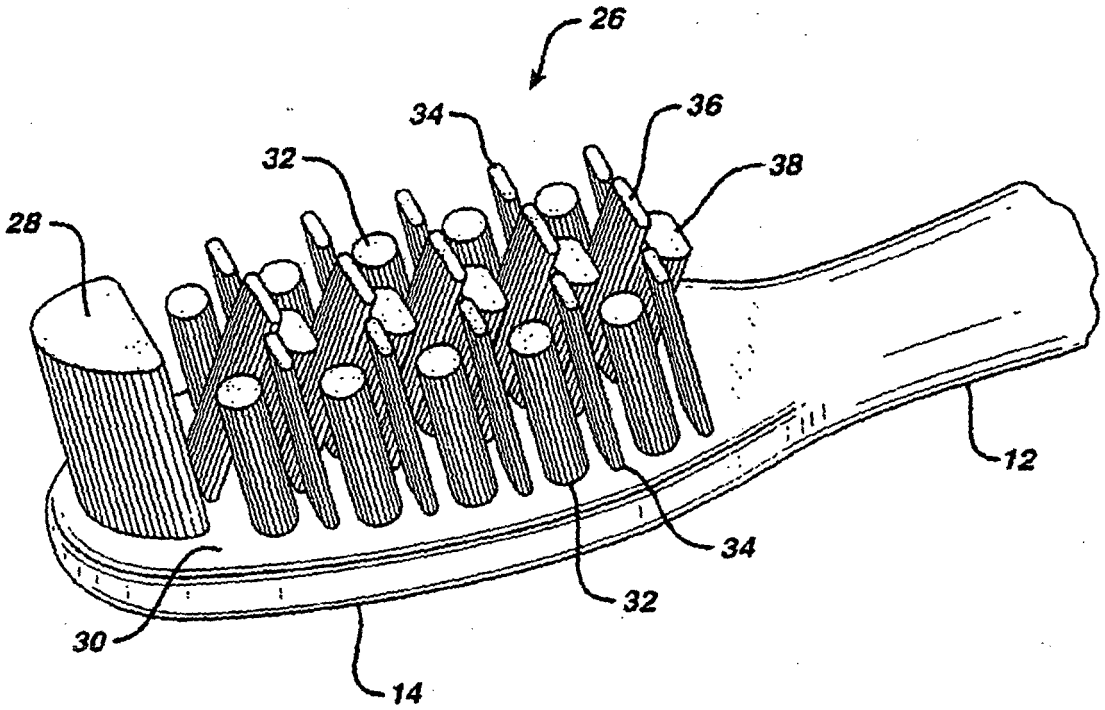


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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