

647782

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

We, COLGATE-PALMOLIVE COMPANY
A corporation organized and existing under the laws of the State
of Delaware of 300 Park Avenue, New York, New York 10022, United
States of America, hereby apply for the grant of a Standard
Patent for an invention entitled

"TOOTHBRUSH"

which is described in the accompanying complete specification.

Details of basic applications:-

Number of basic application:- 501,992

Name of Convention country in which basic application was
filed:- United States of America

Date of basic application:- 29 March 1990

Details of basic application:-

Number of basic application:- 636,802

Name of Convention country in which basic application was
filed:- United States of America

Date of basic application:- 2 January 1991

Our address for service is: F.B. RICE & CO.,
28A Montague St,
Balmain N.S.W. 2041

Dated this 15 day of March 1991

COLGATE-PALMOLIVE COMPANY

By: _____
Registered Patent Attorney

TO: The Commissioner of Patents,
COMMONWEALTH OF AUSTRALIA

Commonwealth of Australia
The Patents Act 1952
DECLARATION IN SUPPORT

In support of the (Convention) Application made by:
COLGATE-PALMOLIVE COMPANY, of
300 Park Avenue
New York, New York 10022, United States of America
for a patent for an invention entitled:

TOOTHBRUSH

I (We) Robert C. Sullivan, Chief Patent Counsel
of and care of the applicant company do solemnly and sincerely declare as follows:

~~that I am not the applicant for the patent~~
~~but~~

b) I am (We are) authorised by the applicant(s) for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.

The basic application(s) as defined by section 111 (142) of the Act was (were) made

on 29 March 1990 in United States of America

on 2 January 1991 in United States of America

or ~~in~~

by John P. Curtis, Kedar N. Rustogi, John C. Crawford, James H. Kemp, Thomas E. Mintel, Bert D. Heinzelman, Donald R. Lamond and Laura H. Edelman

The basic application(s) referred to in this paragraph is(are) the first application(s) made in a Convention country in respect of the invention the subject of the application.

~~the inventors or actual inventors of the invention~~ John P. Curtis of RR #1 Box 180, Bloomsbury, New Jersey, USA; Kedar N. Rustogi of 36 Oakley Drive, Kendall Park, New Jersey, USA; John C. Crawford of South Lake Blvd, Lake Mahopac

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~~is (are) the actual inventor(s) of the invention and the facts upon which~~ the applicant company

~~is (are) entitled to make the application are as follows:~~

~~the applicant is the assignee of the invention from the said actual inventor(s).~~

MAR 4 1991

Declared at New Jersey U.S.A. this _____ day of _____ 19_____

Signed

 Status Chief Patent Counsel

Declarant's Name Robert C. Sullivan

F. B. RICE & CO PATENT ATTORNEYS
This form is suitable for any type of Patent Application. No legalisation required.



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- (56) Prior Art Documents
US 4268933
US 3722020
US 2567080
- (57) Claim
1. A toothbrush head and a handle, the head having an upper surface, the head having a longitudinal axis and terminating in a free end remote from said handle, tufts of bristles extending generally upwardly from said surface, the tufts arranged in three groups of rows wherein each row of said three groups is transverse to said longitudinal axis and is longitudinally spaced from next adjacent rows, the tufts of each row of the first group being shorter in height than those of the other rows, the tufts in each row of the second group so arranged that the endmost tuft in each row thereof tilts laterally outwardly toward a respective side of said head and the remaining tufts of each row of said second group extend substantially upwardly from said head surface, some of said first and second groups alternating with each other along the longitudinal axis of the head, said third group of tufts located nearest said head free end and including two tufts each tilting laterally outwardly toward a respective side of said head.

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COMPLETE SPECIFICATION

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Related Art :

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Laura H. Edelman

Address for Service : F.B. RICE & CO.,
Patent Attorneys,
28A Montague Street,
BALMAIN. 2041.

Complete Specification for the invention entitled:

"TOOTHBRUSH"

The following statement is a full description of this invention
including the best method of performing it known to us:-

This invention relates to a toothbrush and more particularly to a toothbrush having its bristles so arranged as to be effective for the removal of plaque from teeth with manual brushing. The prior art is aware of a 5 number of toothbrush constructions. However, none of the latter exhibits a tuft arrangement which performs several tooth and gumline cleaning functions regardless of the style or technique of brushing. A number of toothbrush manufacturers set out specific brushing techniques on 10 their brush containers. If, however, a purchaser does not pay attention to them, or forgets these techniques, then less than optimum teeth cleaning results.

In a broad aspect, the present invention provides a toothbrush head and a handle, the head having an upper 15 surface, the head having a longitudinal axis and terminating in a free end remote from said handle, tufts of bristles extending generally upwardly from said surface, the tufts arranged in three groups of rows wherein each row of said three groups is transverse to 20 said longitudinal axis and is longitudinally spaced from next adjacent rows, the tufts of each row of the first group being shorter in height than those of the other rows, the tufts in each row of the second group so arranged that the endmost tuft in each row thereof tilts 25 laterally outwardly toward a respective side of said head and the remaining tufts of each row of said second group extend substantially upwardly from said head surface, some of said first and second groups alternating with each other along the longitudinal axis of the head, said third 30 group of tufts located nearest said head free end and including two tufts each tilting laterally outwardly toward a respective side of said head.



tend to move tangentially and thus push each other along as they sweep across tooth surfaces. Generously spaced tufts of this invention move erratically as they negotiate the often irregular contours of tooth crevices.

5 Each of a first group of tufts is anchored into generally round cavities and includes a center or middle tuft and a pair of laterally outermost tufts, each of which are substantially perpendicular to the surface of the brush head. This group defines interproximal bristles which reach into crevices between teeth.
10 The tufts of this group allow for individual bristle fibers to penetrate tight interproximal spaces and create fans of bristle tips as they are wiped across tooth surfaces. By generally round is meant circular in shape and nearly circular such as elliptical.

15 Each of a second group of tufts is anchored into polygonal cavities, preferably quadrangular, and most preferably rectangular. There are preferably six or seven tufts, although five or eight tufts can also be used. Each tuft of the second group extends substantially perpendicularly to the surface of the brush head.

20 Each of a third group of tufts is anchored into generally round cavities and this group includes approximately fourteen tufts positioned along the perimeter of the brush head. Approximately six outermost tufts on each side of the center line of the head tilt laterally outwardly toward the nearest side of the brush head. Two forwardmost tufts (towards the free end of the head) tilt 25 laterally, toward their respective side of the brush head, and also tilt forwardly. These forwardmost tufts which tilt forwardly and laterally may also be considered as a fourth group or as a subgroup of the third group. The perimeter tufts of this group are angled outward from the center line of the brush head so that they project

into the gingival marginal area at the base of the crowns of the teeth. This action occurs as downward force is applied to the brush head and is not dependent upon a non-perpendicular orientation of the brush head relative to the tooth surfaces.

5 These perimeter tufts of bristles are angled so that they are unable to structurally support one another as downward and horizontal force is applied by the user.

Conventional, perpendicularly oriented bristle tufts tend to act as a series of columns and thus support suspended bristles as 10 they pass over embrasures. The minimized overall compression strength afforded by this angled configuration allows individual tufts of bristles to penetrate embrasures, sub-gingival and interproximal spaces without being inhibited from doing so by surrounding bristle tufts.

15 Angled tufts move in the direction of their angle. As downward and horizontal force is applied to the brush head, tufts of bristles skid across tooth surfaces generally in the direction dictated by the angle of the tuft hole in which the bristles are anchored to the brush head rather than simply curl back in the 20 opposite direction in which they are pushed. The construction of this invention is to integrate multi-directional motion of bristles during unidirectional actuation of the brush.

When forced into the direction of their angle, bristles will spring out of crevasses as stresses are exceeded to contain them 25 in place. This dynamic action will tend to fling plaque out of interproximal spaces. Conventional devices tend to pack plaque into spaces as bristle tufts sweep over embrasures.

The weak flexure strength of generously spaced individual bristle tufts allows for the reduction of bristle height without

causing the sensation of increased bristle stiffness. Conventional brushes trimmed to the shorter height are perceptibly stiffer and tend to cause trauma to the mucosa. Minimized bristle height allows for greater clearance (and thus enhance reach to the rear
5 molars) between the buccal surfaces of the teeth and the mucosal lining.

Angled tufts of bristles will assume varying heights as they are deformed, yet will be uniform in height when not in use. Angled bristles will project above the tips of straight bristles
10 as the former are forced into a perpendicular orientation during use. This effect, caused by the greater length of the hypotenuse of a triangle, allows for the angled tufts to reach deeply into interproximal and gingival marginal areas as perpendicular orientation is assumed.

15 Generally round tufts of bristles are preferably trimmed to a taller height than polygonal tufts. This configuration allows for the round tufts of bristles to penetrate interproximal spaces before tooth surfaces contact the bristle tips of polygonal tufts.

20 Compact linear rows of shorter polygonal tufts uniformly sweep plaque off tooth surfaces without inhibiting adjacent round tufts of bristles from penetrating embrasures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partial perspective view of a toothbrush formed in accordance with a first embodiment of this invention.

25 Figure 2 is a partial perspective view of a toothbrush formed in accordance with a second embodiment of this invention.

Figures 3 to 6 are plan views of the toothbrush of Figure 1 and illustrate, with respective Figures 3a to 6a, the function of

the several groups of tufts and their contact with teeth T and gums denoted as G.

Figure 7 is a top plan view of a modified version of the toothbrush of Figure 2.

5 Figure 8 is a top plan view of a modification of the toothbrush of Figure 7.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Figure 1, the numeral 10 denotes generally the toothbrush of this invention and includes a head 12 having a flat upper surface 14 and a longitudinal axis 16. The head is, typically, integrally joined to a handle 20, with head longitudinal axis 16 not necessarily coincident (as shown) with the longitudinal axis of handle 20, only a portion of the latter being shown. The handle construction forms no part of the invention. Both head 12 and handle 20 may be formed of suitable plastic material such as any of those commonly used.

Any of a first group of polygonal tufts is denoted as 24, with a single wide tuft 25 defining each group, each single wide tuft having its longitudinal axis oriented transversely to axis 16. It will be noted that the bristles in tufts 25 are shorter than those of the bristles in the other groups. All of the groups 24 are parallel to each other and are orthogonal to the axis 16. Tuft 25 is termed a bristle bar or bristle bar of tufts.

A second group of generally round tufts is denoted as 26, each group 26 also oriented transversely to axis 16. The two endmost tufts of row 26 are each denoted as 30, with each such tuft tilting laterally or sideways toward a respective side of head 12, (orthogonally to axis 16) by about 12 degrees with respect to the

vertical. The remaining three spaced apart tufts in each group 26, each denoted as 32 and termed interproximal bristles, are substantially perpendicular to surface 14, i.e., vertical. Each tuft 30 is laterally spaced from its next adjacent tuft 32. Tufts 5 30 and 32 are preferably of the same diameter. The bristles in tufts 30 are termed gumline bristles. Each group 26 thus contains both interproximal and gumline bristles. The groups of round tufts are preferably in rows transverse to the longitudinal axis of head 12.

10 A third group 34 is defined by two laterally spaced generally round tufts 36. Each tuft 36 tilts laterally toward its respective side of the brush head by about 30 degrees. Each tuft 36 also tilts with respect to a plane which contains it, about 14 degrees to the vertical. Thus each tuft 36 tilts both laterally and 15 forwardly toward the free end of the head. Tufts 36 are termed leading tip bristles. This group 34 is preferably comprised of two or more tufts.

20 Referring now to Figure 2 of the drawings, the construction is the same as that shown in Figure 1, except that the wide bristle bar tufts 25, each of which defines a row 24, are each replaced by a row 240 defined by individual round tufts 242. Rows 240 of tufts 242, as the tufts in the other rows 26, 24 and 34 of Figure 1, are aligned transversely to axis 16 and are longitudinally spaced therealong.

25 The construction of rows 24 of Figure 1 entails forming relatively wide transverse grooves in head 12 for receiving the bottom ends of the bristles which define each bristle bar tuft 25. This can be done manually. If currently available automated machinery is used to form such wide grooves, certain problems arise

in filling the grooves and in maintaining the bristles in each bristle bar at their desired perpendicular relation to head surface 14.

To overcome these problems, transverse rows each of closely spaced generally round holes are formed on surface 14, instead of a wide groove, as shown in Figure 2. Individual rounded tufts 242 are then, by automatic machinery currently available, inserted and fixed into these holes. The result yields rows 240 nearly identical to rows 24, with individual tufts 242 in close laterally spaced relation to each other.

It will be observed that the arrangement of rows in both embodiments is such that rows 24 and 26 (as well as rows 240 and 26) alternate along axis 16, except that two rows 26 are next to row 34. Thus, there are at this region of the head two rows 26 adjacent each other as measured along longitudinal axis 16 of head 12. The tufts of rows 26 are preferably each of the same height and, as noted above, their height as measured vertically is greater than that of the tufts of rows 24. Typically, the height of the bristles in first group 24 is about 8.5 mm, while the height (as measured vertically) of the bristles of the tufts in the second and third groups 26 and 34 is typically about 10.5 mm. The longest tufts are those in group 34, with the next longest being tufts 30. The vertical height, however, of tufts 30 and 34 is the same as measured from the head surface 14. The spacing between rows 24 (240) 26, 30, 32 and 34 is typically about 0.09 inches, as measured at the bottom of the tufts.

In the embodiment of Figure 1, the lateral spacing between tufts 32 is about 0.06 inches and the lateral spacing between tufts 30 of any group 26 is about 0.28 inches. The length of single

tufts 25 is about 0.34 inches and their thickness is about 0.06 inches. The lateral spacing between tufts 36 is about 0.070 inches. The base diameter of tufts 36 and 30 is about 0.050 inches to about 0.060 inches. The base diameter of tufts 32 is about 5 0.040 inches.

In the embodiment of Figure 2, the lateral spacing between tufts 32 is about 0.065 inches and the lateral spacing between tufts 30 of any row 26 is about 0.312 inches. The lateral spacing between tufts 242 is about 0.065 inches and that between tufts 36 10 is typically about 0.092 inches. The base diameter of all of the tufts is about 0.050 inches to about 0.060 inches.

Referring to Figures 3 to 6 and their respective counterparts Figures 3a to 6a, the specific cleaning function of the tufts of the embodiment of Figure 1 is illustrated. The several groups are 15 highlighted by vertical hatching at Figures 3 to 6. In this description, the tufts are described and grouped as to the functions they perform, while the previous description has described the tufts solely as to the several rows they define.

At Figures 3 and 3a, bristle bars 25 clean the broad surfaces 20 of the teeth with centrally located bristle packs that maximize the cleaning contact to the teeth. The shorter length of these bristles brings them into contact with the surfaces of the teeth as the longer interproximal bristles 32 (as shown in Figure 4 and 4a) enter the crevices between the teeth. Tufts 32 and 36 are 25 omitted from Figure 3a for purposes of clarity. Conventional toothbrushes do not concentrate bristle density or tuft density to such a degree, with the result that less cleaning than is desirable is accomplished on the broad tooth surfaces.

At Figures 4 and 4a, the long, centrally located interproximal

tufts of bristles 32 reach into the crevices between teeth. These
bristle tufts are spaced to allow deep cleaning access. The
specific placement pattern of these tufts allows for dynamic and
independent cleaning action. Convention toothbrushes have bristles
5 of the same length and density that tend to structurally support
each other, acting as a single block and preventing the dynamic,
independent action required for multi-task cleaning.

At Figure 5 and 5a, long flexible bristles 30 line each side
of the brush head 12 and are angled outwardly to gently sweep
10 plaque from the teeth at the gumline and from in between teeth.
The intentional outward angle results in a soft, controlled bristle
action aimed at the gumline. Conventional toothbrushes have
vertical bristles whose flexing is not controlled or directed
towards the gumline. Conventional vertical bristles can cause
15 damage to the soft gum tissue.

At Figures 6 and 6a, leading tip tufts of bristles 36 at the
tip of the brush head are angled forward to ensure that the
cleaning action reaches the teeth at the back of the mouth and
cleans in between teeth. Additionally, they clean the lingual
20 surfaces and the sulcus areas of the front teeth. Vertical
bristles limit the access of conventional toothbrushes to the back
of the mouth where plaque continues to accumulate.

There are thus four functional groups of tufts in head 12.
There are the bristle bar group defined by tufts 25, 242 and 246
25 for cleaning broad surfaces of the exposed sides of teeth, the
interproximal bristle group defined by tufts 32 for cleaning the
crevices between teeth, the gumline bristle group defined by tufts
30 for cleaning teeth at the gumline, and the leading tip bristles
group defined by tufts 36 which ensures cleaning of teeth in the

back of the mouth.

In the embodiment of Figure 7, the five generally round tufts 242 in each of rows 240 of Figure 2 are replaced by a greater number of quadrangular tufts 246 which are preferably rectangular.

5 In all other respects, the bristle/tuft configuration and dimensions are the same. Each quadrangular tuft preferably should be of about the same area as the round holes in head 12 which receive generally round tufts 242 of Figure 2. These tufts can also be square in shape but when not square in shape, the smaller dimension of each tuft 246 preferably is along each row 240, i.e., is perpendicular to axis 16. The change from a generally round to a quadrangular tuft cross section, with these dimensions of each quadrangle, permits seven quadrangular tufts 246 in each row instead of five round tufts 242, with only slight row lengthening.

10 15 The cross-sectional area of each round tuft 242 is the same as the cross-sectional area of each quadrangular tuft 246, but the tuft dimension along row 240 is smaller with a rectangular shaped tuft, the preferred shape, hence the greater number of bristles in a row 240 of rectangular tufts. Another advantage of the rectangular tuft shape is that it more nearly approximates the bristle bars 25 of Figure 1 in the number of individual bristles in each row 240. Namely, the number of bristles in each row 240 of Figure 7 is greater than the number of bristles in each row 240 of Figure 2.

20 In the embodiment of Figure 7, the lateral spacing between tufts 32 is about 0.65 inches and the lateral spacing between tufts 30 is about 0.312 inches. The lateral spacing between tufts 246 is about 0.054 inches and that between tufts 36 is about 0.092 inches. The shortest dimension of each rectangular tuft 246 is about 0.039 inches and its longest dimension is about 0.05 inches.

In Figure 7, the longest dimension of each rectangular tuft 246 is parallel to axis 16. If desired, rectangular tufts 246 of any row 240, or of all the rows 240, may be rotated 90 degrees so that the longest dimension of each rectangular tuft is 5 perpendicular to axis 16. To preserve required intertuft spacing along any row 240, it may be necessary to omit one of the tufts 246, so that any row 240 would contain only six of the rectangular tufts.

Referring now to the embodiment of Figure 8, the construction is similar to that shown in Figure 7, also utilizing rectangular polygonal tufts. The differences relate to the tuft sizes and spacing, to be later given, and to those tufts at the free end of the head, i.e., remote from the handle. In the embodiments previously described, two tufts 36 are located nearest the head free end, with each tuft tilted both forwardly (away from the handle) and laterally outwardly, away from the head center along axis 16. In the Figure 8 embodiment, the two forwardmost tufts 36 are replaced by three tufts 37 arranged in a single transverse row 250, the latter parallel to transverse rows 240. Each tuft 27 is of the same size. The middle tuft is centrally located on the tuft head 12, coincident with axis 16, and is perpendicular to the brush head. The two outermost tufts 37 tilt laterally outwardly at about 12 degrees from the vertical. These tufts can also tilt forwardly as do tufts 36 with regard to the embodiment of Figure 7. The tufts 37 each lie in a plane transverse to axis 16. Tufts 37 perform a function similar to that of tufts 36.

In the embodiment of Figure 8, the longitudinal spacing (as measured along axis 16) between the transverse rows of tufts is 0.10 inch. The spacing between the tuft receiving openings in the

brush head, as measured along each transverse row, is about 0.015 inch. The diameter of the brush head openings which receives the round tufts is about 0.06 inch. The shortest dimension of each rectangular tuft 248 is about 0.047 inch, while the longest dimension is about 0.060 inch. The rectangular tufts of Figure 8 are each denoted as 246.

In Figure 8, as in the embodiment of Figure 7, the longest dimension of each rectangular tuft is parallel to axis 16. If desired, rectangular tufts 248 of any row 240, or of all the rows 240, may be rotated 90 degrees, so that the longest dimension of each rectangular tuft 248 is perpendicular to axis 16. To preserve required intertuft spacing along any row 240, it may be necessary to omit one of the tufts 248.

The head of the embodiment of Figure 8 is about 0.1 inch longer than the head of the embodiment of Figure 7, while its width is about 0.030 inches wider. The diameter of tufts 32 and 37 may be the same or may differ. Preferably, they are of the same diameter.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A toothbrush head and a handle, the head having an upper surface, the head having a longitudinal axis and terminating in a free end remote from said handle, tufts of bristles extending generally upwardly from said surface, the tufts arranged in three groups of rows wherein each row of said three groups is transverse to said longitudinal axis and is longitudinally spaced from next adjacent rows, the tufts of each row of the first group being shorter in height than those of the other rows, the tufts in each row of the second group so arranged that the endmost tuft in each row thereof tilts laterally outwardly toward a respective side of said head and the remaining tufts of each row of said second group extend substantially upwardly from said head surface, some of said first and second groups alternating with each other along the longitudinal axis of the head, said third group of tufts located nearest said head free end and including two tufts each tilting laterally outwardly toward a respective side of said head.
2. The toothbrush head of claim 1 wherein the tufts of said second and third groups are of the same height as measured vertically.
3. The toothbrush head of claim 1 wherein two rows of tufts of said second group are positioned longitudinally next to each other and are located between said third group and that row of said first group which is nearest to said head free end.
4. The toothbrush of claim 1 wherein each tuft of said third group of tufts tilts laterally about 30 degrees from the vertical.
5. The toothbrush head of claim 1 wherein a row of said second group of tufts is nearer to said handle than any other row of any group.
- 35 6. The toothbrush head of claim 1 wherein each of the

endmost tufts of said second group of tufts tilts laterally at about 12 degrees to the vertical.

7. The toothbrush head of claim 1 wherein each row of said first group of tufts comprises a single tuft of a width substantially spanning the width of said head.
8. The toothbrush head of claim 1 wherein each row of said first group of tufts comprises a plurality of tufts substantially spanning the width of said head, said first group of tufts being laterally spaced from each other.
10. 9. The toothbrush head of claim 8 wherein each tuft in said first group is round.
10. The toothbrush head of claim 8 wherein each tuft in said first group is rectangular.
11. The toothbrush head of claim 10 wherein the shorter dimension of each rectangular tuft is transverse to said longitudinal axis.
12. The toothbrush head of claim 1 wherein said two tufts of said third row also tilt forwardly, away from said handle.
- 20 13. The toothbrush head of claim 1 wherein said third group of tufts includes a third tuft located between said two tufts, said third tuft extending substantially upwardly from said head surface.
14. The toothbrush head of claim 13 wherein all of the tufts in said third row lie in a plane substantially orthogonal to said longitudinal axis.
- 25 15. A toothbrush head substantially as hereinbefore described with reference to Figures 1 and 3-6a of the accompanying drawings.
- 30 16. A toothbrush head substantially as hereinbefore described with reference to Figure 7 or Figure 8 of the accompanying drawings.

DATED this 24th day of January 1994

COLGATE-PALMOLIVE COMPANY
Patent Attorneys for the Applicant:

F.B. RICE & CO.



73556, 91

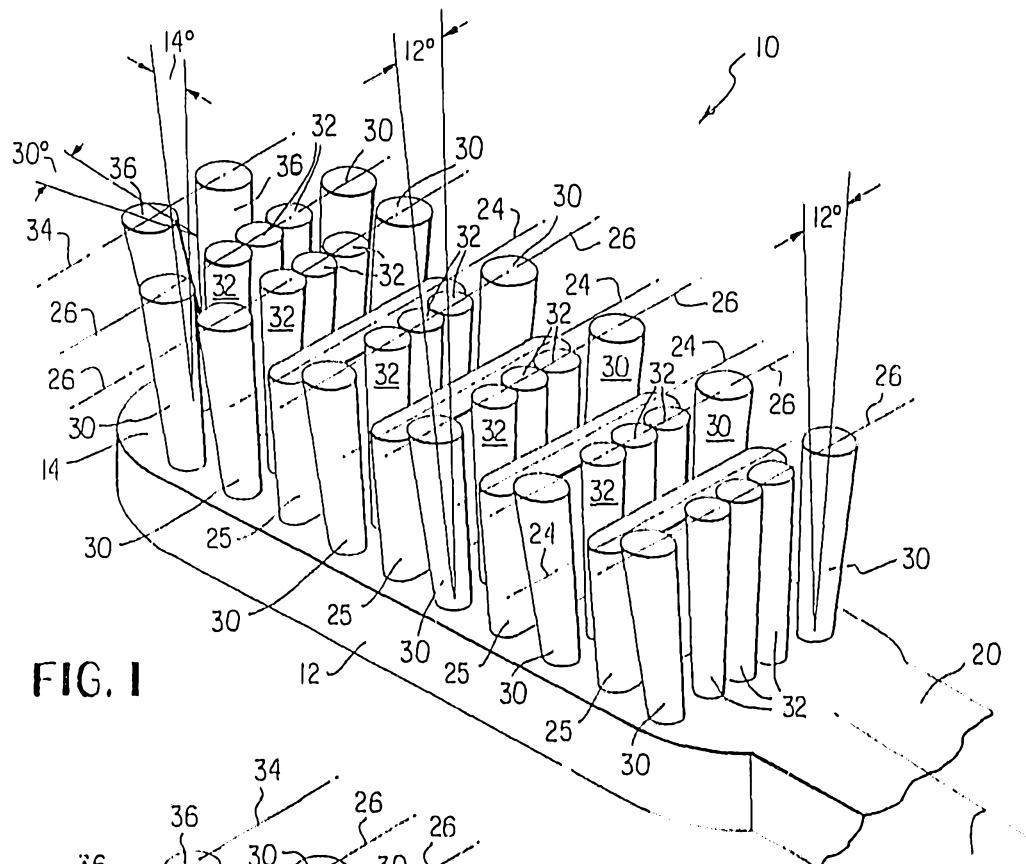


FIG. I

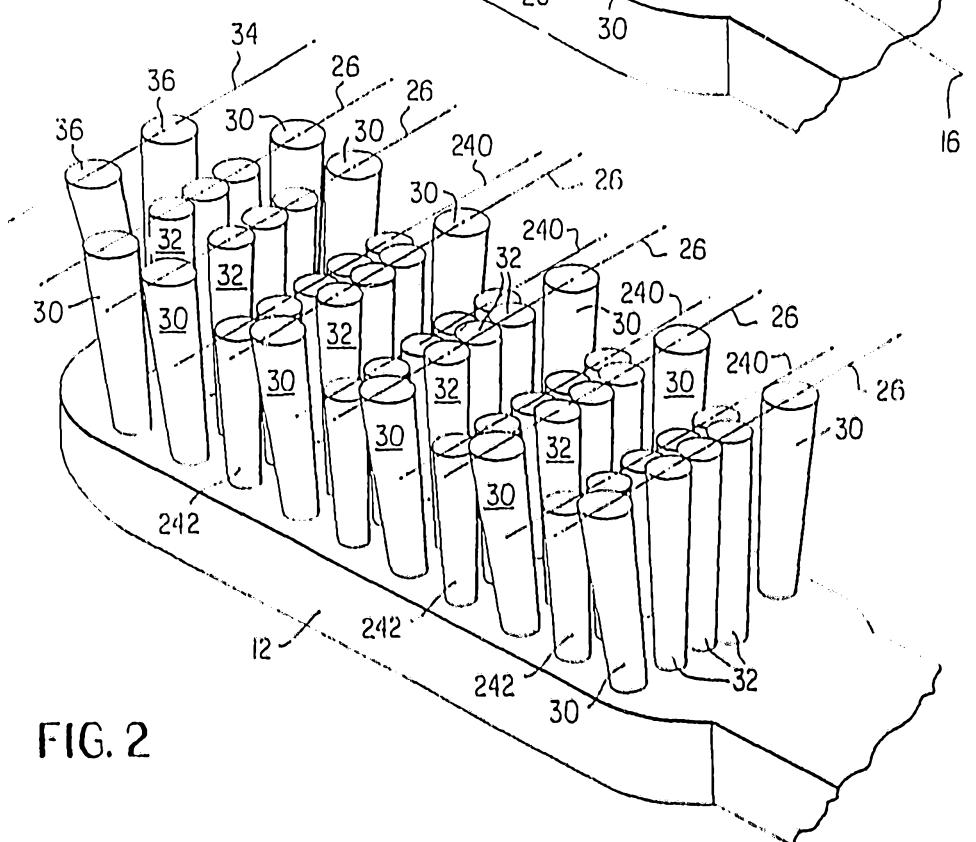


FIG. 2

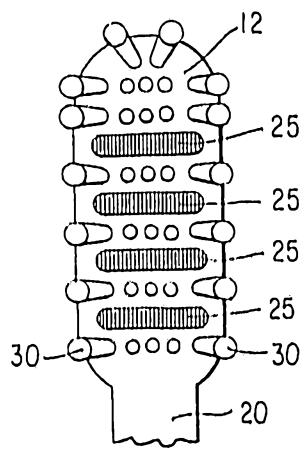


FIG. 3

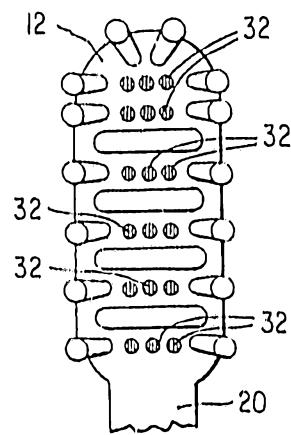


FIG. 4

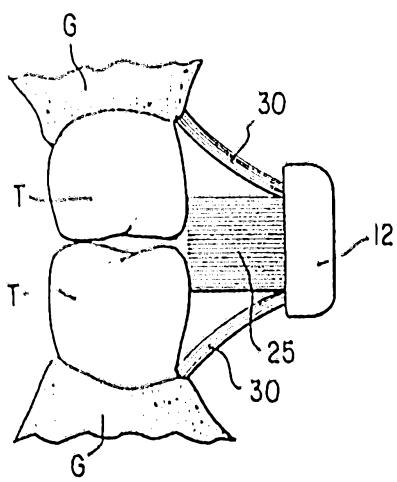


FIG. 3a

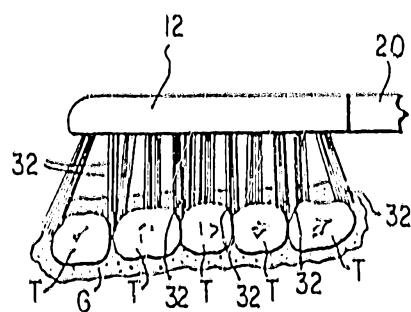


FIG. 4a

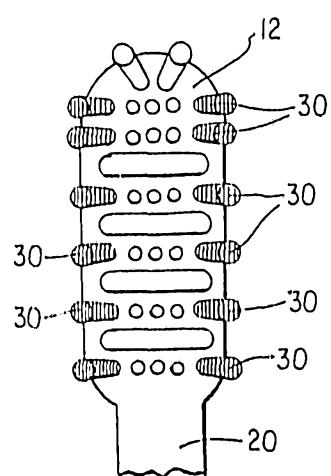


FIG. 5

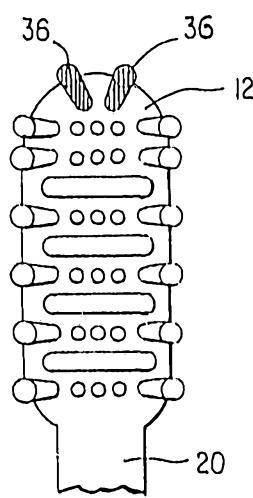


FIG. 6

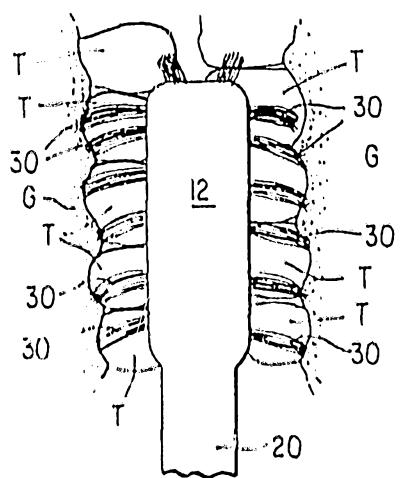


FIG. 5a

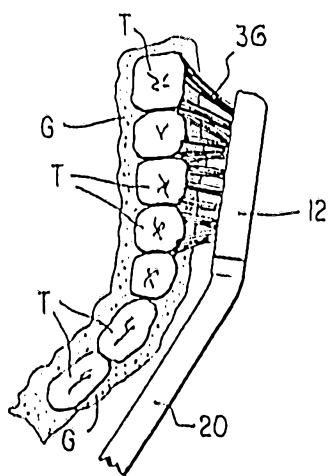


FIG. 6a

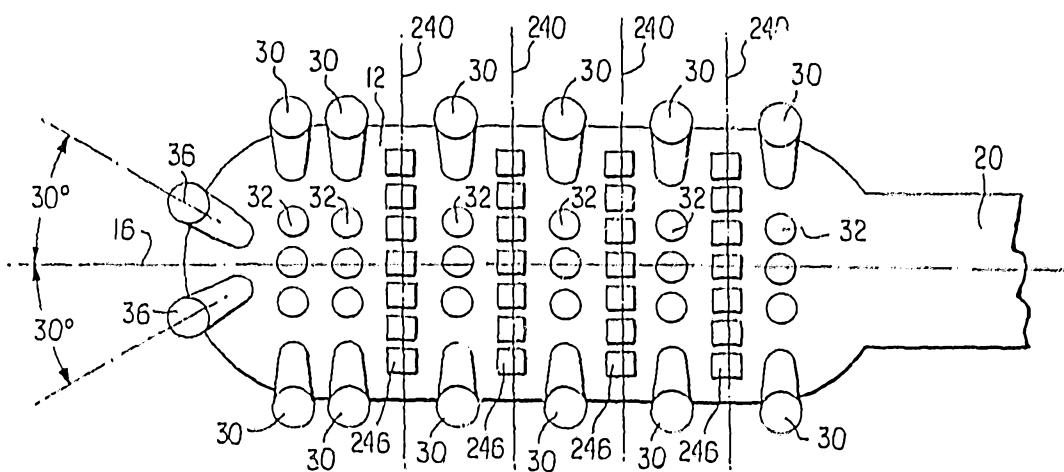


FIG. 7

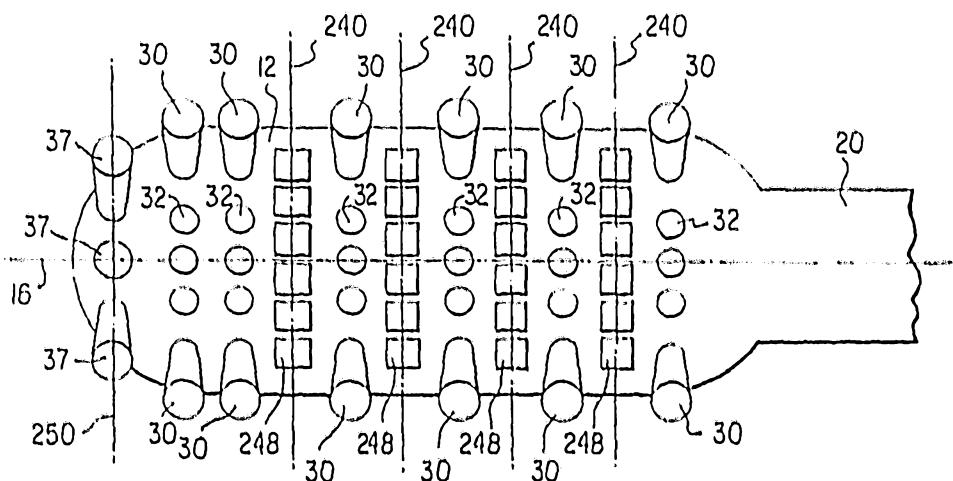


FIG. 8