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Scopp et al.

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[54] **CONTOURED TOOTHBRUSH**

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[52] **U.S. Cl.** ..... **15/167 R**

[51] **Int. Cl.** **A46b 15/00**

[58] **Field of Search** ..... 15/167 R, 167 A, 15/159 R, 159 A

[56] **References Cited**

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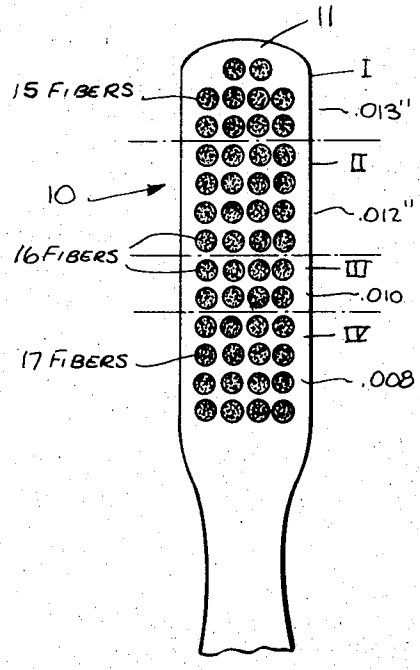
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[57] **ABSTRACT**

A contoured toothbrush adapted to reach and clean areas which are inaccessible to conventional toothbrushes, the configuration of the brush being such as to conform to the natural convexity of the teeth. The toothbrush is constituted by an array of tufts, each formed by a cluster of bristles mounted on a shank, the height of the tufts in the longitudinal direction diminishing progressively from the front to the rear of the array. The diameter of each bristle is proportionally related to the height thereof (the taller the thicker, and the shorter the thinner), whereby the consistency of the brush is effectively homogeneous. In the transverse direction, the height of the tufts follows a curve to define a concave channel which conforms to the convex form of the teeth engaged thereby.

6 Claims, 4 Drawing Figures



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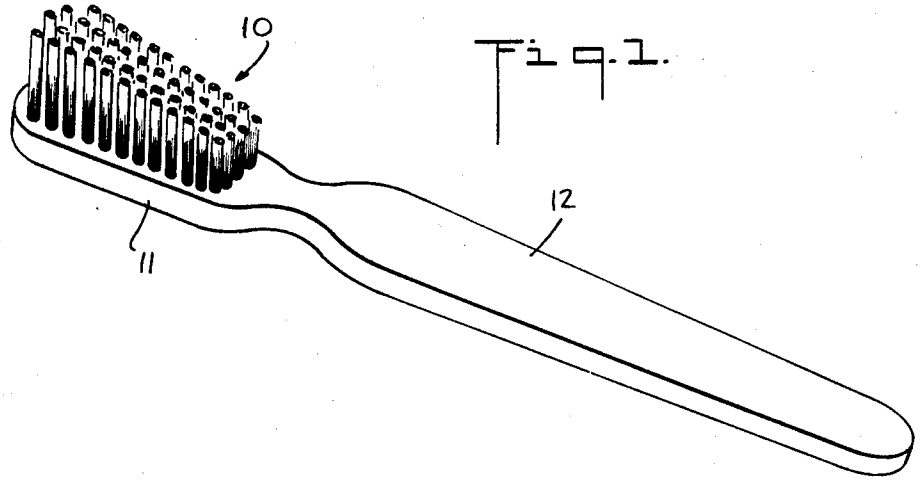


Fig. 1.

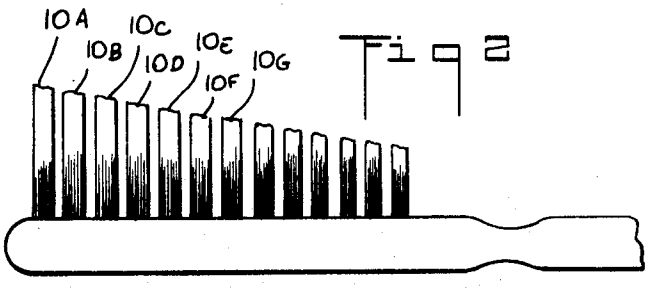


Fig 2

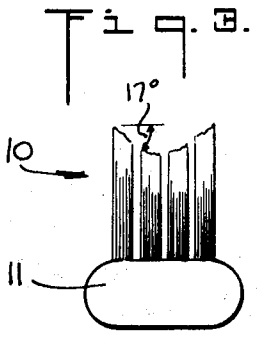


Fig. 3.

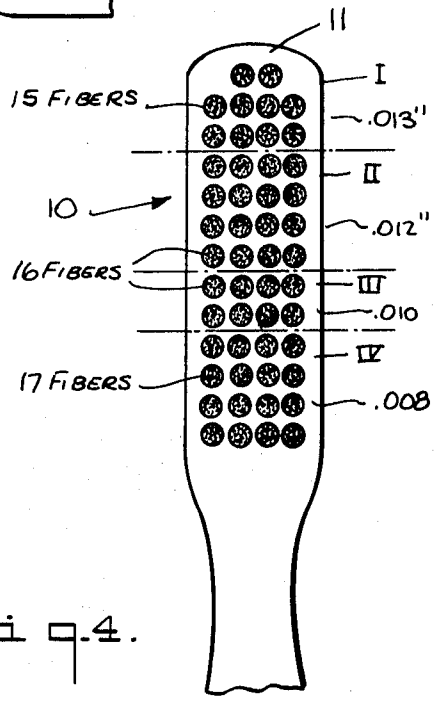


Fig. 4.

CONTOURED TOOTHBRUSH

BACKGROUND OF THE INVENTION

This invention relates generally to toothbrushes for cleaning teeth, and more particularly to a contoured toothbrush structure adapted to reach and clean areas which are inaccessible to conventional toothbrushes.

Man's permanent teeth number thirty-two in all — four incisors, two canines, four bicuspids and six molars in each jaw. Regular cleansing is necessary for the development and maintenance of sound teeth, for if plaque, debris, calculus and stains are permitted to collect, these deposits may give rise to cavities as well as periodontal disease.

Commercially available toothbrushes are constituted by an array of tufts supported on a shank, each tuft being formed by a cluster of natural or synthetic bristles. Various brush configurations have heretofore been used or proposed for the purpose of facilitating an effective brushing action. Thus in some instances, the brush formation is tapered or otherwise profiled with a view to enhancing the ability of the brush to engage remote areas.

The areas in the mouth that are particularly difficult to clean with present toothbrush configurations, are the lingual surfaces of the lower anterior teeth, the interproximal areas, the buccal, and lingual surfaces of the posterior teeth.

Experience has shown that deleterious plaque is developed on those teeth that are least accessible to the toothrbush, and even when removed, the plaque will form spontaneously. It becomes important, therefore, in the toothbrushing process, to reach and clean the more inaccessible regions such as the buccaland lingual surfaces of the posterior teeth, the interproximal areas, and the lingual surfaces of the lower anterior teeth. It is in these regions that most of the plaque, calculus and debris are lodged and cannot be removed by standard toothbrush configurations.

Another factor which comes into play in toothbrush design is the ability of the brush to retain and apply toothpaste. Toothpaste, which contains cleansing and polishing agents, is only effective if it is applied and rubbed across the exposed surface of the tooth by the brush. But with conventional toothbrush designs, much of the paste laid down on the top of the brush tends to roll off the brush as it is applied to the teeth.

SUMMARY OF THE INVENTION

In view of the foregoing, it is the main object of this invention to provide a toothbrush whose brush structure is adapted to reach and effectively clean the teeth, especially those areas in the mouth which are inaccessible to toothbrushes of conventional design.

More specifically, it is an object of the invention to provide a toothbrush whose configuration is such as to conform to the natural convexity of the teeth, thereby to bring about intimate contact between the teeth and the toothbrush bristles and to render the bristles more effective in brushing operations.

Also an object of the invention, is to provide a toothbrush which not only reaches into the crevices and between the teeth in heretofore neglected areas, but which acts to retain and fully utilize toothpaste laid down on the bristles.

Still another object of the invention is to provide a highly efficient toothbrush which may be manufactured and sold at low cost.

Briefly stated, these objects are obtained in a toothbrush having an array of tufts, each formed by a cluster of bristles mounted on a shank, the height of the tufts in the longitudinal direction diminishing progressively from the front to the rear of the array so that the longest tufts appear at the front of the brush and the shortest at the rear thereof. The diameter of the individual bristles in the brush is a direct function of the height of the bristles whereby the consistency of the brush is effectively homogeneous.

The array is further characterized by the fact that the height of the tufts in the transverse direction follow a curve imparting a concave channel formation to the top surface thereof, which channel is shaped to conform to the predominantly convex form of the teeth engaged thereby, whereby the brush lies in intimate contact with the teeth, The concavity is such as to afford a retaining channel for the toothpaste laid down on the brush.

OUTLINE OF THE DRAWING

For a better understanding of the invention as well as other objects and further features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawing, wherein:

FIG. **1** is a perspective view of a toothbrush in accordance with the invention;

FIG. **2** is a side elevation of the toothbrush;

FIG. **3** is a front end view of the toothbrush; and

FIG. **4** is a plan view thereof.

DESCRIPTION OF THE INVENTION

Referring now to the drawing and more particularly to FIG. **1**, there is shown a preferred embodiment of a toothbrush in accordance with the invention, consisting of a brush adapted to intimately engage the teeth of the user, generally designated by numeral **10**, the brush being supported on a shank **11** having handle extension **12** integral therewith. The shank handle may be formed of a suitable synthetic plastic material of the type found acceptable in conventional toothbrushes.

Brush **10** is constituted by an array of spaced tufts, such as tufts **10A** to **10G** shown in FIG. **2**. Each tuft is formed by a small cluster of upstanding fibers or bristles, the tufts being firmly anchored in the shank. The bristles are fabricated from natural or synthetic material (i.e., nylon or polypropylene).

In order to obtain adequate coverage of the dental area to be brushed, the array in the case of an adult toothbrush, is formed by four rows of tufts, as shown. Obviously, in the case of smaller children's size toothbrushes, the array may have fewer rows.

In the array, the height of the tufts in the longitudinal direction diminishes progressively so that the longest tufts appear at the head of the brush and the shortest at the rear thereof. In a practical embodiment, the longitudinal taper may be created by a **10°** slope.

In the transverse direction, the height of the tufts is caused to follow a curve which, as best seen in FIGS. **1** and **3**, imparts a concave channel formation to the top surface of the brush. The radius of this curve is such as to create a concavity conforming to the predomi-

nantly convex surface of the human teeth engaged thereby.

Thus, when the brush is applied to the teeth, no area thereof remains neglected, for the brush surface is in intimate contact with the teeth and the larger bristles penetrate the crevices and between the teeth. Studies have shown that the inner surfaces of teeth situated in the midline of the mouth collect more calculus than other surfaces. The arm and hand positions are controlling factors for toothbrushing. Tapering the brush makes it possible to reach these inaccessible areas. Moreover, the taper angle permits cleansing of the rear teeth with greater facility by reaching further back and hugging the surfaces.

In the brush array, the tufts as best seen in FIG. **4**, are effectively divided into four sets I, II, III and IV, whose bristles differ in diameter, the bristles within any given set being all of the same diameter. Thus in the first set near the front end of the brush, all bristles have a diameter of 0.013 inches; in the second set, all bristles have a diameter of 0.012 inches; in the third, all bristles have a diameter of 0.010 inches; and in the last set, all bristles have a diameter of 0.008 inches.

As one moves from the first to the fourth set of bristles, the height of the bristles diminishes progressively whereas the diameter of the bristles is reduced in a step-wise manner as a direct function of bristle height. This correlation of bristle height and diameter renders the consistency of the brush effectively homogeneous.

In other words, while a short bristle makes the brush seem stiff and a tall bristle produces a more yieldable characteristic, by thinning the short bristles and thickening the tall bristles, one effects compensation for height to produce a substantially uniform consistency throughout the tapered brush. Thus in brushing, one does not have the feeling that one part of the brush is hard and another soft. However, since toothbrushes are generally made to have "soft""medium" or "hard" characteristics, in the design of a toothbrush in accordance with the invention, the diameter values are selected to afford an overall soft, medium or hard characteristic, as desired.

In order to maintain substantially uniform brushing characteristics despite the differences in bristle diameter, the overall peripheral dimension of all tufts in the array is made about the same regardless of tuft position. Thus, each tuft in set I, which have the thickest bristles is made up of a cluster of 15; each tuft in sets II and III having somewhat thinner bristles, is formed by a cluster of 17; and each tuft is set IV having the thinnest bristles, is formed by a cluster of 17. It is to be understood that these preferred values are given only by way of example, and that desired brush characteristics may be realized with other values.

In practice, those tufts along the edges of the brush may be dyed with a distinctive color in order to visually outline the concave channel. This channel serves to receive and retain toothpaste better than the flat top of conventional toothbrushes, for the paste is banked and cannot roll off.

While there has been shown a preferred embodiment of the invention, it is to be understood that many changes may be made without departing from the essential spirit thereof. For example, in lieu of a handle, the toothbrush may be provided with an adaptor for use in an electric toothbrush.

What we claim is:

1. A toothbrush adapted to reach and clean dental areas inaccessible to conventional toothbrushes and comprising

a. a shank; and

b. a brush constituted by a generally rectangular array of upstanding tufts anchored in said shank, each tuft being constituted by a cluster of bristles, the height of the tufts in the longitudinal direction diminishing progressively from the front to the rear of the array, the height of the tufts in the transverse direction following a curve to create a concave channel running the length of the brush and conforming to the natural convexity of teeth to be brushed, the diameter of the bristles in each tuft being a function of height whereby short bristles are thinner than long bristles to provide a brush of substantially homogeneous consistency.

2. A toothbrush as set forth in claim **1**, wherein said shank is provided with a handle extension, said shank and handle being integral with each other and being fabricated of synthetic plastic material.

3. A toothbrush as set forth in claim **2**, wherein said bristles are formed of synthetic plastic material.

4. A toothbrush as set forth in claim **1** wherein the number of bristles clustered in each tuft depends on the diameter of the bristles whereby all tufts in the brush have substantially the same peripheral dimension.

5. A toothbrush as set forth in claim **1**, wherein the tufts along the edges of the array have a distinct color to visually demark the concave channel.

6. A toothbrush as set forth in claim **1**, further including an adapter connected to said shank for attachment to an electric motor.

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