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(54) **TOOTHBRUSH**

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(57) **ABSTRACT**

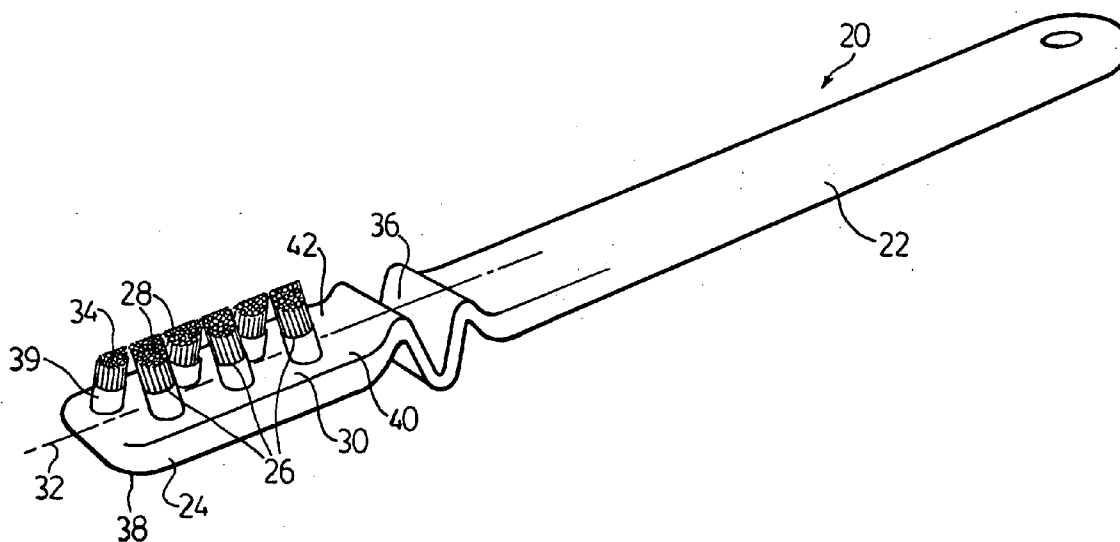
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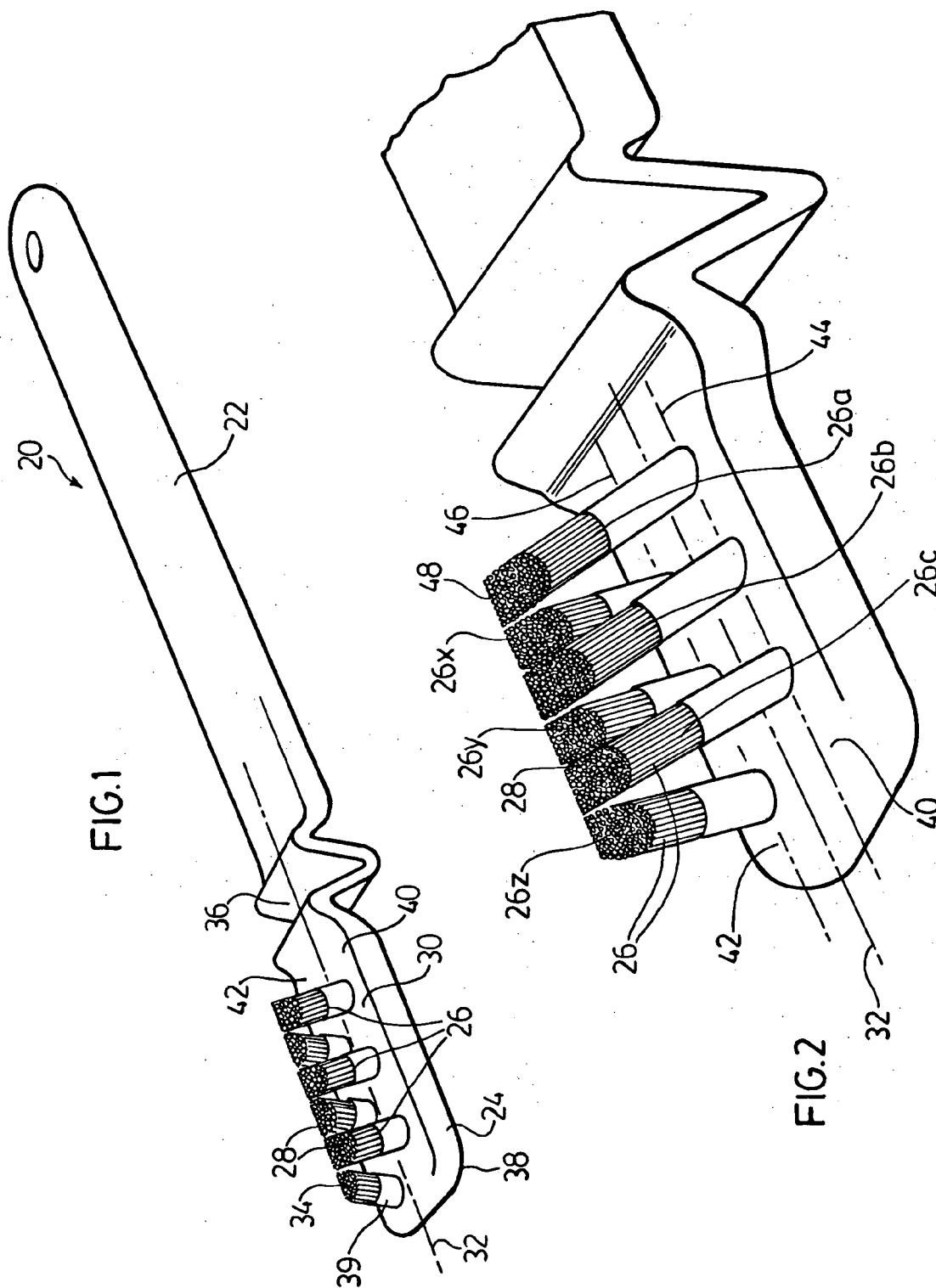
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A toothbrush includes a handle for grasping during use and a head connected to an end of the handle. The head has a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and the end of each tuft is tapered inwardly to an edge such that the edges of the tufts together combine to form a single brush edge.





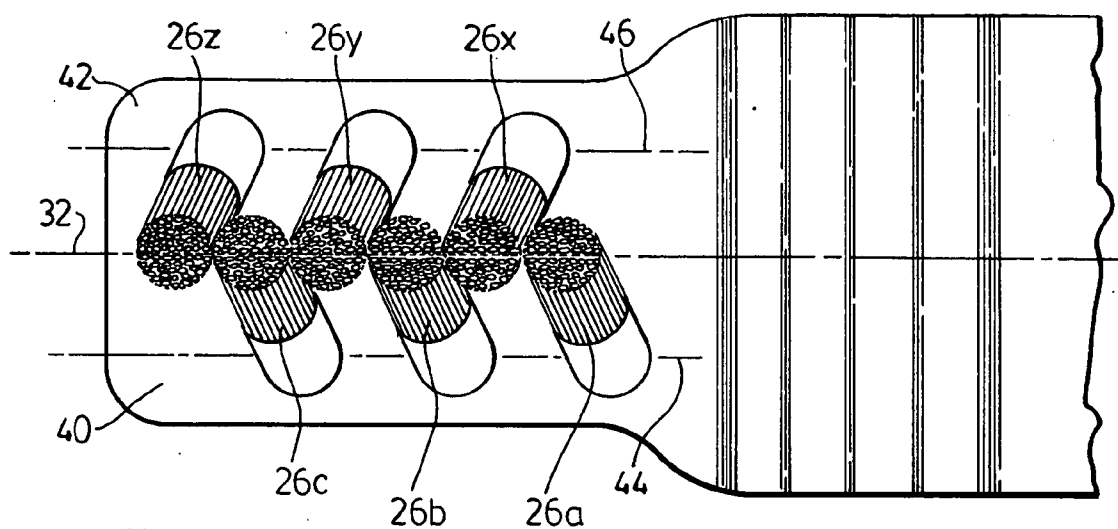


FIG. 3

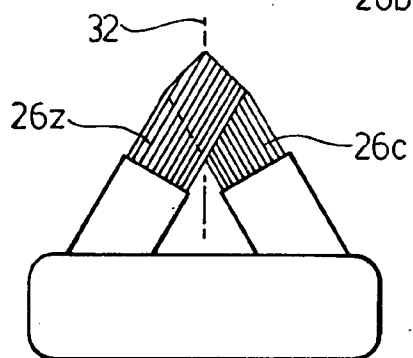


FIG. 4

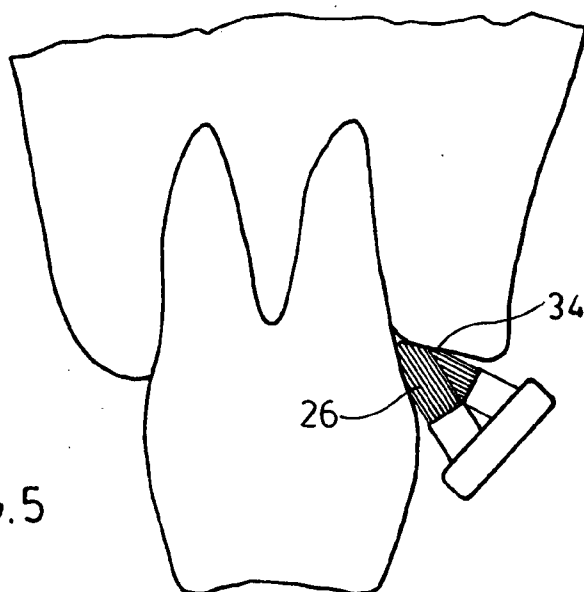
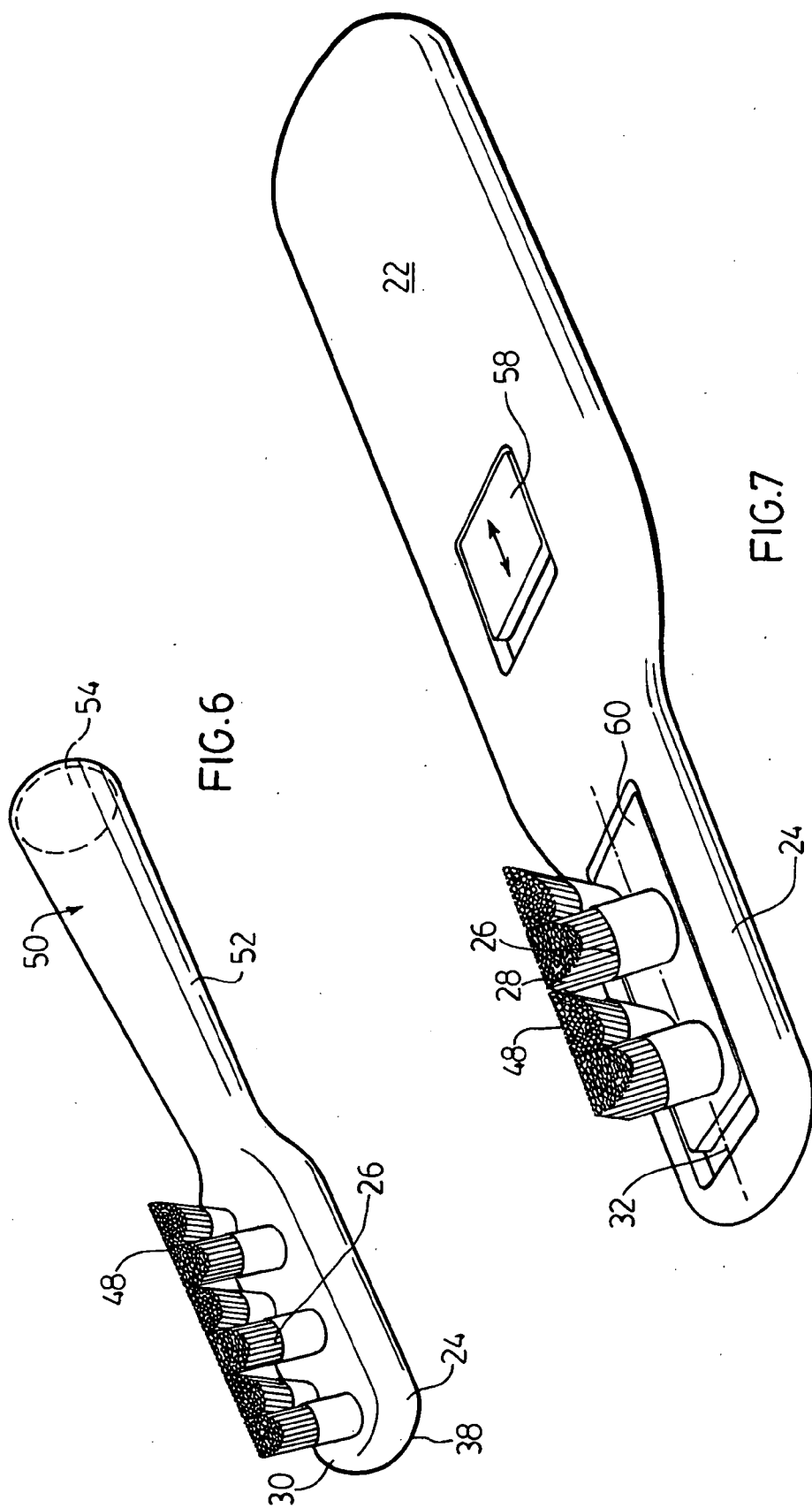


FIG. 5



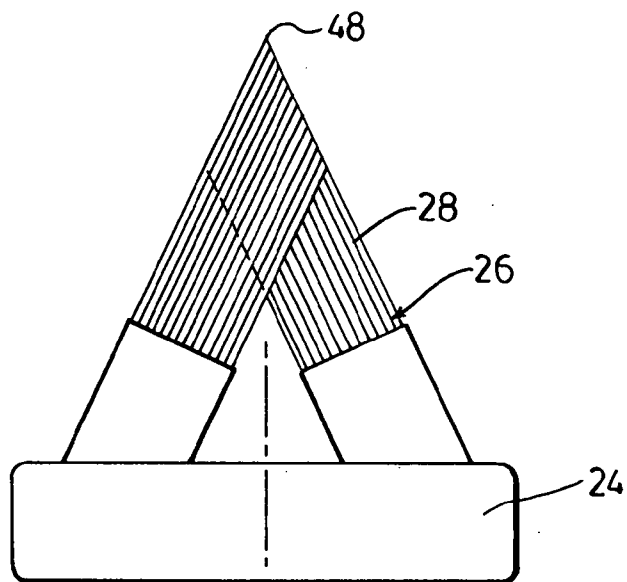


FIG. 8

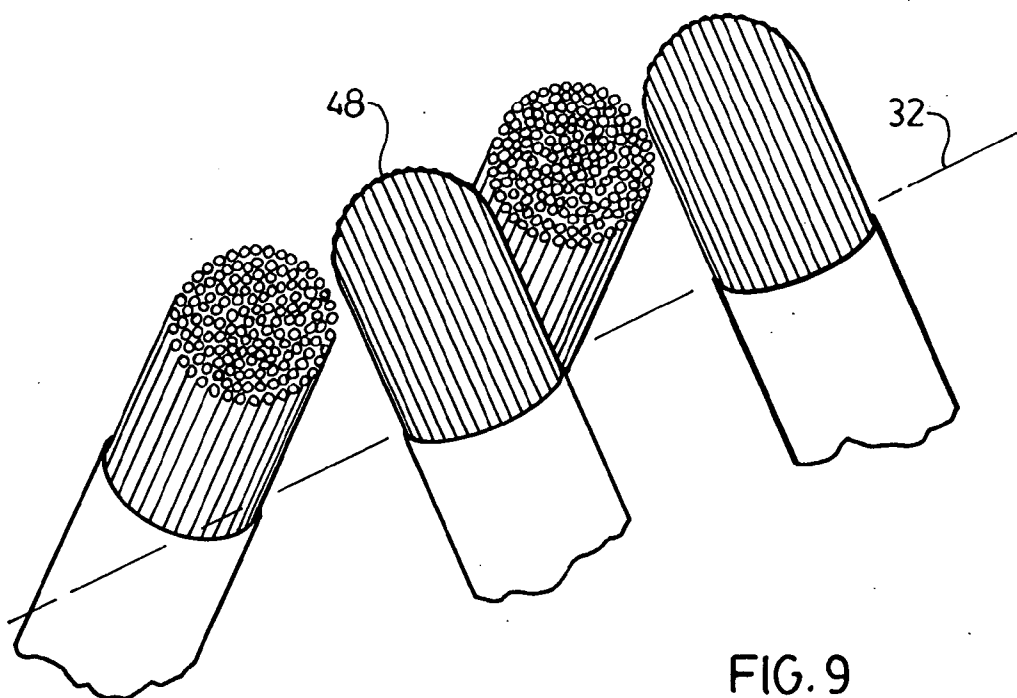


FIG. 9

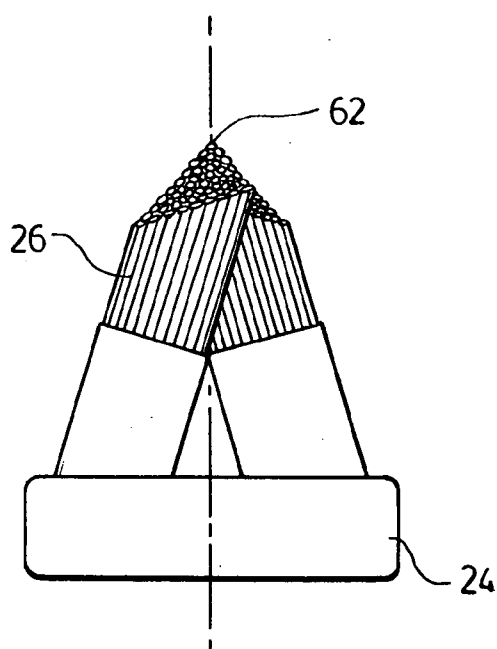
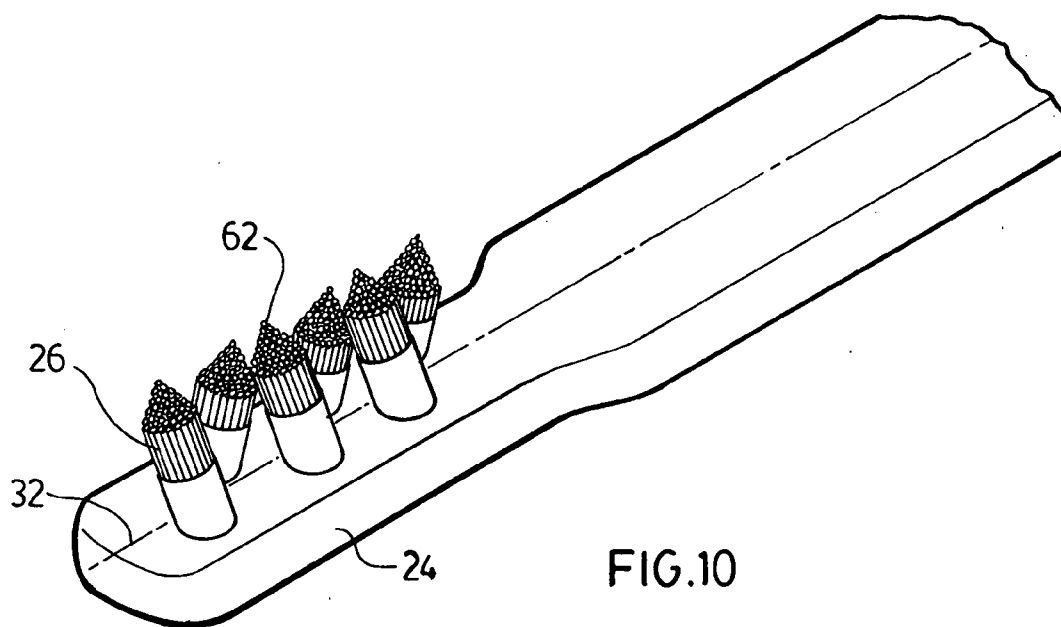
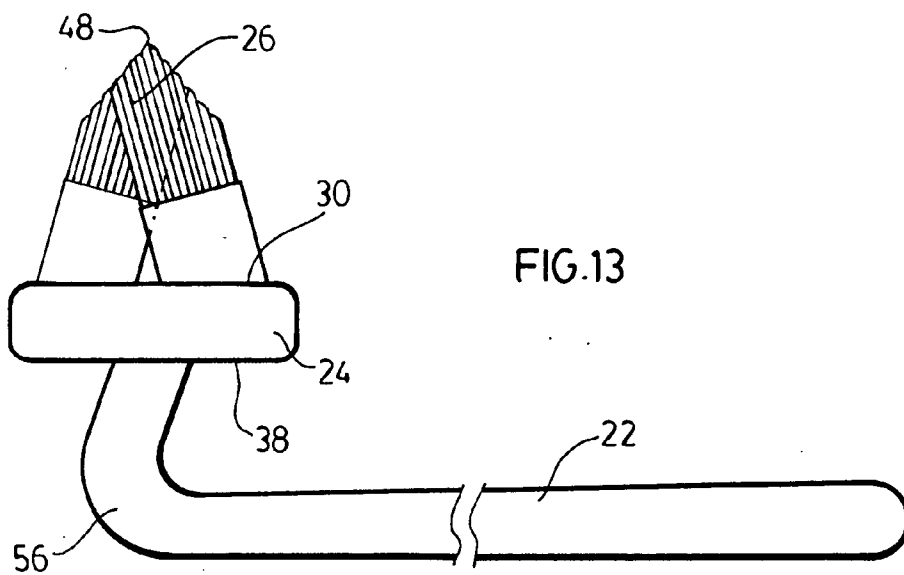
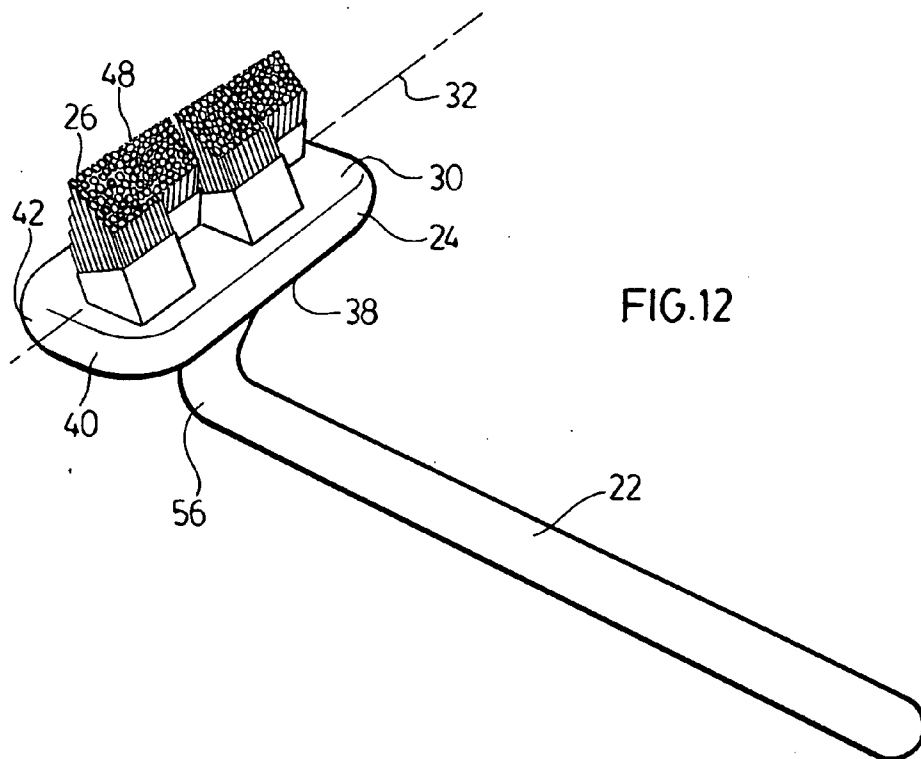


FIG. 11



TOOTHBRUSH

FIELD OF THE INVENTION

[0001] The present invention relates in general to toothbrushes and more particularly to toothbrushes having structure to aid in cleaning the teeth along the gum line.

BACKGROUND OF THE INVENTION

[0002] Plaque is a serious problem in dental care and plaque build-ups must be cleaned and removed regularly to reduce the risk of tooth decay and gum disease. It is important to regularly remove sub-gingival plaque build-up as this plaque, along with organic material builds up with the plaque, causes gum disease known as gingivitis. Because plaque hardens relatively quickly, it is important to remove any sub-gingival plaque at least each day.

[0003] Conventional toothbrushes are generally used in every day dental care and some plaque on the teeth is removed by brushing with these conventional toothbrushes. While brushing using conventional toothbrushes aids in removing some plaque that is newly formed on the teeth, such toothbrushes do not adequately remove sub-gingival plaque (plaque along the gum line). Thus, even with regular brushing, plaque can build up at the sulcus around each tooth, leading to gum disease.

[0004] Many variations to the conventional toothbrush have been proposed and are available for aiding in cleaning teeth. For example, different lengths of bristle tufts and different toothbrush head geometries are available on the market. While many of these toothbrushes are helpful in cleaning in between teeth and cleaning the back of the teeth, for example, these toothbrushes do not significantly aid in the removal of sub-gingival plaque.

[0005] Dental floss is generally used to help remove newly formed sub-gingival plaque. It is well known, however, that a very low percentage of adults floss their teeth daily and thus, the sub-gingival plaque is not regularly removed.

[0006] Accordingly, it is desirable to provide a toothbrush having structure to aid in cleaning the teeth along the gum line and removing sub-gingival plaque.

SUMMARY OF THE INVENTION

[0007] According to still another aspect of the present invention, a toothbrush includes a handle for grasping during use and a head connected to an end of the handle. The head has a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and ends of the tufts are tapered inwardly.

[0008] According to another aspect of the present invention, a replaceable toothbrush head includes first and second ends and a front and a back. The head further includes a coupling at the first end for removably connecting to a handle and a plurality of tufts of bristles extending from the front, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and ends of the tufts are tapered inwardly.

[0009] According to one aspect of the present invention, a toothbrush includes a handle for grasping during use and a head connected to an end of the handle. The head has a

plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and the end of each tuft is tapered inwardly to an edge such that the edges of the tufts together combine to form a single brush edge.

[0010] Advantageously, the head of the toothbrush is configured such that the bristles can be placed at a side of a tooth during use and lightly directed into the sulcus to remove newly formed sub-gingival plaque. In one aspect, a copolyester sheath is provided for holding bristles together for sturdy, directed brush stroke and effective plaque removal. In another aspect, a stress breaker is used between the head of the toothbrush includes a flexible joint between the head and the handle or in the handle to reduce the risk of damaging the gingival tissue due to excessive force used during brushing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will be better understood with reference to the drawings and to the following description, in which:

[0012] FIG. 1 is a perspective view of a toothbrush according to an embodiment of the present invention;

[0013] FIG. 2 is an alternative perspective view of a portion of the toothbrush of FIG. 1, drawn to a larger scale;

[0014] FIG. 3 is a top view of the portion of the toothbrush of FIG. 2;

[0015] FIG. 4 is an end view of the toothbrush of FIG. 1;

[0016] FIG. 5 is an end view of the toothbrush of FIG. 4 during use;

[0017] FIG. 6 is a perspective view of a replaceable head of an electric toothbrush, according to another embodiment of the present invention;

[0018] FIG. 7 is a perspective view of an electric toothbrush according to another embodiment of the present invention;

[0019] FIG. 8 is an end view of a toothbrush according to another embodiment of the present invention.

[0020] FIG. 9 is a perspective view of tufts of bristles of the toothbrush of FIG. 8;

[0021] FIG. 10 is a perspective view of a portion of a toothbrush according to another embodiment of the present invention;

[0022] FIG. 11 is an end view of the toothbrush of FIG. 10;

[0023] FIG. 12 is a perspective view of a toothbrush according to another embodiment of the present invention; and

[0024] FIG. 13 is a side view of the toothbrush of FIG. 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Reference is first made to the FIG. 1 to describe a toothbrush according to an embodiment of the present invention, the toothbrush 20 being indicated generally by the

numeral **20**. The toothbrush **20** includes a handle **22** for grasping during use and a head **24** connected to an end of the handle. The head **24** has a plurality of tufts **26** of bristles **28** extending from a front **30** thereof, from positions on either side of a longitudinal centerline **32** of the front **30**. The tufts **26** are angled inwardly toward the centerline **32** and the end **34** of each tuft **26** is tapered.

[0026] The toothbrush **20** will now be described in more detail. As shown in the figures, the handle **22** of the toothbrush **20** extends longitudinally and is sized and shaped for grasping during use.

[0027] The head **24** and the handle **22** are connected together by an intermediary flexible joint **36**. The flexible joint **36** aids in inhibiting the transfer of excessive force onto the teeth or gingival tissue (gums) when excessive force is applied to the handle **22**. The head **24**, the handle **22** and the flexible joint **36** are integral. As shown, the head **24** extends longitudinally from the handle **22** and the flexible joint **36**. In the present embodiment, the head **24**, the handle **22** and the flexible joint **36** are unitary and are made of a molded plastic. It will be understood that the head **24** is appropriately sized and shaped for fitting into the mouth of a user during use.

[0028] The head **24** has a back **38** and the front **30**. In the figures, the head **24** is shown having two halves **40**, **42** divided by the longitudinal centerline **32**. Clearly these halves **40**, **42** are referred to herein for the purpose of clarity of explanation and, in fact, the halves **40**, **42** are integral and unitary.

[0029] Each of the tufts **26** are made of approximately 40 bristles **28** surrounded by a sheath **39**. In the present embodiment, the bristles **28** are nylon and are surrounded by the sheath **39**, which is made of copolyester.

[0030] Referring now to FIGS. 2, 3, and 4, the plurality of tufts **26** of bristles **28** extend from the front of the head **24**. In the present embodiment, three tufts **26** of bristles **28** extend from each of the two halves **40**, **42**. As shown, the three tufts **26** of bristles **28** on one half **40** are centered and equi-spaced along a longitudinally extending line **44** that is parallel with and spaced from the longitudinal centerline **32**. Similarly, three tufts **26** of bristles **28** on the other half **42** are centered and equi-spaced along a second longitudinally extending line **46** that is parallel with and spaced from the longitudinal centerline **32**.

[0031] The tufts **26** of bristles **28** are positioned such that the first tuft **26x** (located closest to the handle **22**) on the other half **42** extends from a longitudinal position between the longitudinal positions of the first and second tufts **26a**, **26b**, respectively, extending from the one-half **40**. The second tuft **26y** (middle tuft) on the other half **42**, extends from a longitudinal position between the longitudinal positions of the second and third tufts **26b**, **26c**, respectively, extending from the one-half **40**. Similarly, the second tuft **26b** on the one-half **40** extends from a longitudinal position between a longitudinal positions of the first and second tufts **26x**, **26y**, respectively, extending from the other half **42**. Also, the third tuft **26c** on the one-half **40** extends from a longitudinal position between the longitudinal positions of the second and third tufts **26y**, **26z**, respectively, extending from the other half **42**.

[0032] Each tuft **26** is angled inwardly toward the longitudinal centerline **32**. Thus, the tufts **26a**, **26b**, **26c** on the

one-half **40**, extend from the front **30** of the head **24** and at an angle to the front **30**, toward the other half **42**. Similarly, the tufts **26x**, **26y**, **26z** on the other half **42**, extend from the front **30** of the head **24** and at an angle to the front **30**, towards the one-half **40**.

[0033] The end **34** of each of the tufts **26** is tapered to an edge **48** and the edges of all of the tufts **26** are aligned to form a single common brush edge. As shown, the tufts are angled and tapered as described above, to combined to form the single brush edge. Clearly, the taper on the tufts **26a**, **26b**, **26c**, extending from the one-half **40** is opposite the taper on the tufts **26x**, **26y**, **26z**, extending from the other half **42**.

[0034] As shown in the figures, the single brush edge is generally laterally centered along the head **24** and lies in a plane that extends through the longitudinal centerline **32** and is generally perpendicular to the front **30**. In this configuration, the single brush edge is made of tufts **26** of bristles **28** that extend from alternating halves **40**, **42** of the head **24**. Thus, the single brush edge is made of tufts **26** that extend in from alternating sides of the longitudinal centerline **32** such that each end of each tuft **26** is adjacent the end of a tuft from an opposite side of the longitudinal centerline **32**. It can be seen that the single brush edge is made of tufts **26a**, **26x**, **26b**, **26y**, **26c**, **26z**, in that order.

[0035] In use, the handle of the toothbrush **20** is grasped by the user. Toothpaste is placed along the brush edge and the head **24** of the toothbrush **20** is inserted into the mouth of the user. Brushing is carried out by lightly pressing the tufts **26** against the teeth. The tapered ends **34** of the tufts **26** lay flat against the teeth and the toothbrush **20** is moved back and forth in a reciprocating motion so that the ends **34** of the tufts lightly brush inside the gingival sulcus to remove plaque is most likely to cause gingivitis, as best shown in FIG. 5.

[0036] The flexible joint **36** between the head **34** and the handle **22** flexes to aid in inhibiting the transfer of excessive force on to the teeth or gingival tissue when excessive force is applied to the handle **22**.

[0037] Reference is now made to the FIG. 6 to describe a replaceable toothbrush head **24** in accordance with an embodiment of the present invention. As will be appreciated, the replaceable head **24** is for use with an electric toothbrush. The replaceable head includes a coupling portion **50** for connecting to the handle of the electric toothbrush. The coupling portion **50** includes a coupling art **52** and a connector **54** at an end of the coupling art for releasably connecting to a complementary and of the handle of the electric toothbrush. The connector **54** is a conventional connector **54** and therefore is not further described herein.

[0038] The remainder of the replaceable head **24** is similar to the head **24** of the toothbrush **20** of the first described embodiment. Thus, the head **24** includes the back **38** and the front **30**. The plurality of tufts **26** of bristles **28** extend from the front of the head **24** and are tapered to form the brush edge. Similar to the first described embodiment, the brush edge is made of tufts **26** of bristles **28** that extend in from alternating sides of the head **24**.

[0039] Referring now to FIG. 7, there is shown an electric toothbrush **20** according to another embodiment of the present invention. The electric toothbrush **20** includes a

handle **22** connected to a head **24**. In the present embodiment, the electric toothbrush **20** includes a switch **58** for operating to cause a platform **60** in the head **24** of the toothbrush to reciprocate. The electric toothbrush **20** of the present embodiment includes four tufts **26** of bristles **28** that extend from the platform **60** in the head **24**, rather than 6 tufts extending from the head **24**, as shown in the first described embodiment. The tufts **26** of the electric toothbrush **20**, however, are arranged in a similar manner to the first-described embodiment. That is, the plurality of tufts **26** of bristles **28** are angled inwardly toward the centerline **32** and are tapered to an edge **48** that forms part of a brush edge. The brush edge is therefore made of tufts **26** of bristles **28** that extend in from alternating sides of the head **24**.

[0040] Referring to FIGS. 8 and 9, which show an end view of a toothbrush **20** according to another embodiment of the present invention, and a perspective view of tufts **26** of bristles **28** of the toothbrush **20**, respectively. In the present embodiment, the tufts **26** of bristles **28** are angled inwardly towards the centerline **32** and are tapered such that the bristles **28** that are farthest from the centerline **32** form the upper-most part of the edge **48**. In the present embodiment, however, the edges **48** formed by each of the tufts **26** are not continuous to form a common brush edge as in the previous embodiments. Instead, the edges **48** are rounded as shown. As indicated, the bristle **28** that is farthest from the centerline **32** forms the upper-most part of each edge **48**. The upper-most parts of the edges **48** (farthest from the front **30**) are aligned and are centered above the head **24**.

[0041] Reference is now made to FIGS. 10 and 11 to describe still another embodiment of the present invention. In the present embodiment, rather than the tufts **26** being tapered to an edge **48**, each of the tufts **26** is tapered to a point **62**. Similar to the edges of the first described embodiment, the points **62** are aligned and centered above the head **24**.

[0042] Reference is now made to FIGS. 12 and 13 to describe a toothbrush **20** in accordance with still another embodiment of the present invention. The toothbrush **20** in the present embodiment includes a handle **22** and a head **24**. In the present embodiment, however, the handle **22** includes an elbow **56** as shown. Instead of connecting to an end of the head **24**, the end of the handle **22** connects to the back **38** of the head **24**. The tufts **26** of bristles **28** are generally rectangular in cross-section. Similar to the first described embodiment, the tufts **26** are tapered to an edge **48** and extend from the front **30** of the head **24** at an angle toward the centerline **32** such that the edges **48** of the tufts **26** are aligned and are generally centered above the head **24**. A common brush edge is formed by the edges **48** of the tufts **26** from alternating sides **40, 42** of the head.

[0043] This configuration is particularly useful in cleaning areas that are otherwise difficult to access. In particular, this toothbrush **20** is useful for cleaning, for example, bridge portions abutting natural teeth, distal surfaces of the back tooth of the upper and lower dentition and implants at the gingival and the sublingual areas.

[0044] Specific embodiments and variations of embodiments of the present invention have been shown and described herein. However, other variations and modifications to these embodiments may occur to those skilled in the art. For example, the head **24** is not limited to the number of

tufts of bristles shown and described. Other suitable numbers of tufts are possible. Also, the size and shape of some of the heads can vary. For example, the size of the head can be made smaller for children.

[0045] Still other variations and modifications may occur to those skilled in the art. All such modifications and variations are believed to be within the sphere and scope of the present invention.

What is claimed is:

1. A toothbrush comprising:

a handle for grasping during use; and

a head connected to an end of the handle, the head having a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front, the tufts being angled inwardly toward said centerline and ends of the tufts being tapered inwardly.

2. The toothbrush according to claim 1, wherein said tufts extend at an angle toward said centerline from alternating sides of the longitudinal centerline such that the end of each tuft is adjacent an end of at least one tuft from an opposite side of said centerline.

3. The toothbrush according to claim 1, wherein each of said tufts is tapered inwardly to an edge.

4. The toothbrush according to claim 3, wherein each of said tufts is angled and tapered such that the edges of the tufts together combine to form a single brush edge.

5. The toothbrush according to claim 3, wherein said brush edge is spaced from said front of said head, and generally laterally centered along said head such that said brush edge lies in a plane that extends through said centerline and is generally perpendicular to said front.

6. The toothbrush according to claim 1, wherein each of said tufts comprise a plurality of bristles surrounded by a sheath such that ends of said bristles protrude from the sheath.

7. The toothbrush according to claim 6, wherein said sheath is a copolyester sheath.

8. The toothbrush according to claim 1, further comprising a flexible joint between said head and said handle or embedded in said handle.

9. A replaceable toothbrush head comprising first and second ends and a front and a back, the head further comprising:

a coupling at said first end for removably connecting to a handle;

a plurality of tufts of bristles extending from said front, from positions on either side of a longitudinal centerline of the front, the tufts being angled inwardly toward said centerline and ends of the tufts being tapered inwardly.

10. The toothbrush head according to claim 9, wherein said tufts extend at an angle toward said centerline from alternating sides of the longitudinal centerline such that the end of each tuft is adjacent an end of at least one tuft from an opposite side of said centerline.

11. The toothbrush head according to claim 9, wherein each of said tufts is tapered inwardly to an edge.

12. The toothbrush according to claim 11, wherein each of said tufts is angled and tapered such that the edges of the tufts together combine to form a single brush edge.

13. The toothbrush head according to claim 12, wherein said brush edge is spaced from said front of said head, and generally laterally centered along said head such that said brush edge lies in a plane that extends through said centerline and is generally perpendicular to said front.

14. The toothbrush head according to claim 9, wherein each of said tufts comprise a plurality of bristles surrounded by a sheath such that ends of said bristles protrude from the sheath.

15. The toothbrush according to claim 14, wherein said sheath is a copolyester sheath.

16. A toothbrush comprising:

a handle for grasping during use; and

a head connected to an end of the handle, the head having a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front, the tufts being angled inwardly toward said centerline and the end of each tuft being tapered inwardly to an edge such that the edges of the tufts together combine to form a single brush edge.

17. The toothbrush according to claim 16, wherein said tufts extend at an angle toward said centerline from alternating sides of the longitudinal centerline such that the end of each tuft is adjacent an end of at least one tuft from an opposite side of said centerline.

18. The toothbrush according to claim 17, wherein said brush edge is spaced from said front of said head, and generally laterally centered along said head such that said brush edge lies in a plane that extends through said centerline and is generally perpendicular to said front.

19. The toothbrush according to claim 1, wherein each of said tufts comprise a plurality of bristles surrounded by a sheath such that ends of said bristles protrude from the sheath.

20. The toothbrush according to claim 1, further comprising a flexible joint between said head and said handle or embedded in said handle.

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