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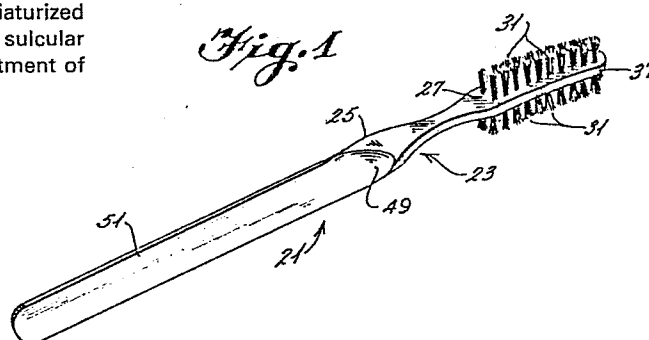
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54 Toothbrushes for cleaning sulcular areas of the teeth.

57 A toothbrush arrangement is provided specifically for cleaning sulcular areas of the teeth below the gum line. The brush head is curved and has bristles extending from opposite sides thereof, facilitating an improved access to the teeth, particularly at the gingival margins. In one embodiment, the bristles are arranged in rows which may be canted inward along the curve, with tufts on opposite sides of the curved brushing head providing access to oppositely curved dental profiles. In a second embodiment, the bristles are arranged in a single row on a miniaturized brush head. The miniaturized arrangement is particularly suited for cleaning of the sulcular areas, both at and below the gum lines in the treatment of periodontal disease and for general oral hygiene.



Toothbrushes for Cleaning Sulcular

Areas of the Teeth

This invention relates to toothbrushing, particularly in the prevention and treatment of periodontal disease. More specifically, this invention is directed to improving access to the gingival sulcus.

Much as through nature, hard structures in an aquatic environment become colonized by numerous living forms specifically adapted for growth upon submerged surfaces gingival sulcus. The teeth provide a natural habitat, or ecological niche, for microbiological life that is uniquely adapted for growth upon hard surfaces in the fluid environment of the mouth and gingival crevices. Certain types of microorganisms can attach themselves to the teeth, proliferate and invade the crevice between the gum margins and teeth, and over a period of years progressively coat the root surfaces. There is evidence that the bacteria that populate the teeth of persons with excellent periodontal health differ markedly from those that inhabit the surfaces adjacent to diseased tissues. Associated with disease are populations that differ with respect to the types of cells, their organization, and also their behaviour. For example, disease is associated with flexing masses of spirochetes, gliding rods, amoebae, etc. The toxins produced and

circulated by these microorganisms are not tolerated by the periodontal tissues, and as a result, they become inflamed, recede, and gradually separate away from the infected root surfaces. Therefore, the primary goal of periodontal therapy must be the elimination of bacterial populations that release toxic by-products in gingival crevices and pockets, in other words, control of crevicular infection.

Treatment has traditionally been primarily centered in the dental office. In one advanced method of treatment, at each visit of the patient to his dentist, a specimen is removed from selected root surfaces and examined for the prevalence of white blood cells and motile bacteria. All probable spaces are then irrigated or treated with an anti-septic solution, e.g., a 1% solution of chloramine-T. Then the root surfaces are carefully debrided with scalers, files, and other instruments to remove living and mineralized bacterial deposits. The scaling instruments are repeatedly passed through an antiseptic during the debridement procedures.

In addition to professional treatment in a dentist's office, it is beneficial for the patient to administer self-treatment on a daily basis. Such self-treatment usually comprises, in addition to toothbrushing, dental flossing, brushing inter-proximally and irrigation with various antiseptic or anti-bacterial solutions.

If there has been advanced loss of periodontal attachment (deep pocketing and bone resorption), it may be difficult to obtain adequate suppression of bacteria and white blood cells by office treatments and currently available homecare procedures alone. Therefore, patients may be advised to take an antibiotic, usually tetracycline HCl for two, possibly three weeks to suppress the bacteria in difficult-to-reach areas. Patients take 250mg of tetracycline four times a day (q.i.d.) one hour before meals and at bedtime with water. If the microscopic examination reveals negative fields at the end of two weeks of therapy, the medication is discontinued. If the microscopic examination does not reveal negative fields, or if the case is very advanced, the antibiotic may be continued for another week, unless there is an acute problem, e.g., parietal abscess, the antibiotic is not prescribed before the roots have been scaled as described, and the patient has learned a home-care regimen appropriate for his needs. The antibiotic is not used again unless microscopic findings indicate that a pyogenic or potentially pyogenic population has re-established itself.

During the initial stages of treatment patients are seen three to four times over an interval of six to eight weeks. During the follow-up maintenance period patients with advanced problems are examined clinically and microscopically every two or three months to minimize their risk of developing renewed

bacterial activity on roots and in circumradicular succi. At each visit all patients receive antiseptic irrigations and scalings that are appropriate for the problem at hand.

The oral hygiene programs used by patients are not inflexible, as a number of variations can effectively reduce the germ life that forms on the surfaces of the teeth. For example, the careful application of various salts (sodium chloride, sodium bicarbonate, sodium recinoleate, sodium periodate, aluminum chlorate, magnesium sulfate, zinc phenolsulfonate, etc.) can help to control bacterial activity on root surfaces and in circumradicular succi.

Patients are advised to irrigate, to brush and floss, or to use toothpicks whenever possible soon after eating, because food residues, particularly carbohydrates, contribute to the propagation of bacteria especially adapted for adhesion and growth upon tooth surfaces. Before retiring, or after the last meal or snack of the day, patients are advised to use measures along the following lines:

1. To floss if appropriate with floss or dental tape. This will help to open and clear some of the interdental spaces and surfaces. It will not clear concave surfaces, however.

2. To irrigate with water after flossing. Patients with advanced lesions may omit flossing and start with the irrigation. For severe lesions a warm brine solution is usually

recommended during the early stages of treatment. Patients using electric irrigators such as the Water Pik (TM) should use lower pressures unless advised differently. Placement of the irrigator tips, some of which are custom-made, is demonstrated on special models, at chairside, and if necessary before a mirror over a sink.

3. After the irrigation the teeth may be treated with mixture of 3% hydrogen peroxide, salt (sodium chloride), and baking soda (sodium bicarbonate). One way to prepare the mixture follows: a bottle-capful of peroxide is poured into a tumbler or medicine cup; about 1/4 teaspoon of salt is added to the solution. The bristles of the toothbrush are moistened with the peroxide-saline solution and then dipped into baking soda. Some of the soda will cling to the bristles (as conventional toothbrushing with baking soda) and the bristles are then used to smear the mixture along the gum margins and into the spaces between the teeth. Typically, the teeth are not brushed at this time. Instead, the patient is urged to use the tip of a finely pointed stimulator (e.g. Butler 600) to wipe bacteria and pus from his root surfaces by inserting the point gently between the gum margins and teeth and by moving it carefully along the tongue-side and cheek-side of the teeth. The procedure includes pressing the tip firmly into spaces between the teeth to squeeze out bacteria and pus from approximal root surfaces. A mirror

with a good light source is usually necessary to enable one to watch this procedure carefully. After every tooth has been carefully encircled in this manner, the teeth are brushed with the soda-salt-peroxide mixture.

The patient then brushes, using a small brush with fine flexible bristles. The brush is held at about a 45° angle towards the gingival margins and it is rapidly jiggled back and forth to distribute the antibacterial paste into the crevices between the teeth and gum margins (gingival crevices). For this purpose an electro-mechanical toothbrush can be very helpful. One that has a fast circular motion will help to spin the soda paste into gingival crevices and other difficult-to-reach sites. The electric toothbrush made by Water Pik works well for this purpose because of its circular motion. A toothpick held in a special handle, "Perio-Aid", may be used in areas where more positive action is needed. Various types of special brushes may be recommended for special situations. Patients need guidance from a dentist or a hygienist for proper use of these procedures.

After using the salt preparation, patients should rinse with water until all taste of salt has disappeared. Patients on low-sodium diets can substitute magnesium sulfate (Epsom salt, MgSO_4) for the sodium chloride and sodium bicarbonate. The taste is slightly bitter when first applied, but not objectionable. With magnesium sulfate the consistency of the

paste will be somewhat granular. Glycerol, GlyOxide and other adjuvants may be tried. The efficacy of the agents and delivery system will be revealed by periodic microscopic examinations of specimens removed from the circumradicular spaces.

4. If root surfaces become sensitive after the gums recede, patients are advised to apply a few drops of fluoride gel (1.0% neutral or slightly acidulated sodium fluoride gel available on prescription) to the sensitive areas with a cotton swab, the stimulator, or a brush. The fluoride treatment is applied after the teeth have been cleaned as described, and the mouth is not rinsed after the application. Sensitivity usually subsides within a few days. The gel can be reapplied if needed.

As can be seen, such a procedure is usually quite time-consuming, in the order of 35 minutes for each daily routine. This requires, in addition to a certain amount of personal will from the patient, at least an average intellectual capacity in order that he can comprehend all of the steps required. It would therefore be desirable to provide an arrangement which can be used to combine all of the above steps (with the exception of step 5) into one or two steps.

Description of the Prior Art

Various arrangements have been proposed to modify toothbrushes to facilitate cleaning of the gingival and

interproximal areas of the teeth. For example, a device called Proxabrush (TM), marketed by the John O. Butler Company is sized, and positioned by a special handle, to fit into the interproximal spaces between teeth. This device is represented by U.S. Patent 4,222,143. While cleaning of the interproximal areas of the teeth is desirable, my invention is directed to a thorough cleaning of the sulcular areas between the gums and the teeth. Various other arrangements to clean the interproximal areas have been advanced.

Various arrangements have been advanced which provide brushes which are particularly suitable for cleaning certain areas of the teeth and gums. One toothbrush arrangement surrounds a group of centre bristles with bristles which are softer and longer in order to provide an improved massage of the gums and improve the cleaning of the teeth. A few toothbrushes have been advanced having curved toothbrush heads or toothbrush heads with oppositely disposed bristles. For example, a toothbrush proposed by Gracey in U.S. Patent 1,513,104 provides a wrap-around arrangement for bristles resulting in the majority of the bristles extending from opposite sides of an oval head. By providing an upwardly-curved portion of the stem, the insides of the teeth can be brushed with the handle held flat and the upwardly-turned portion remaining clear of the front teeth.

A curved head toothbrush is described in Funk, U.S. Patent 2,697,239. In that arrangement, the brushhead is arranged

transversely to the stem of the toothbrush, so that the handle extends outwardly from the mouth, perpendicularly to the gum lines of those teeth being brushed.

Despite the various past proposals, no prior art toothbrush is presently known which combines a curved toothbrush head with bristles disposed on opposite sides of the toothbrush in order to provide improved access to the teeth and to the sulcular areas. Additionally, it should be noted that the curvature of a toothbrush head tends to restrict the toothbrush to brushing curves in one direction, permitting the improved access only to certain areas of the mouth. For example, a toothbrush having a stem which curves, with the bristles facing downward, away from the handles to the left would be useful for brushing the tongue side and the cheek side areas of the teeth in the lower left jaw and in the upper right jaw, while presenting only a cumbersome arrangement for brushing the teeth in the lower right jaw and the upper left jaw.

Furthermore, when it is desired to reach into the sulcus between teeth, a curvature of the brushhead is often necessary in order to facilitate the brush fitting between the gum and the roots of the teeth without unduly lacerating the gums.

It is felt that, by providing a group of brushes which are specifically adapted to cleaning the sulcular areas of the teeth, that the daily-treatment routine can be greatly simplified and

accomplished in a reduced amount of time. By penetrating the sulcular areas with a brushing device, the teeth are generally cleaned, with normal toothbrushing functions being accomplished with little additional effort.

Summary of the Invention

It is accordingly an object of the invention to provide an improve means for cleaning the teeth and particularly the sulcular areas of the teeth. It is an additional object to provide a toothbrush which may be controlled to and is contoured to provide an improved access to the sulcular areas of the gums to permit a more thorough cleaning of these areas, particularly in the treatment of periodontal disease. By providing such an arrangement, the routine for daily self-treatment for patients is simplified and made less time consuming, with the routine being comprehensible even to people of mediocre intelligence.

The present invention consists in a toothbrush comprising a longitudinal stem having a rear handle portion and a forward bristle-supporting portion, characterised in that the bristle-supporting portion has two oppositely-facing surfaces from which the bristles extend in opposite directions, and is curved along its length to provide improved access to the gingival areas of the teeth for penetration into the sulcular areas to provide the user with a means to apply the curved

portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile; the bristles being grouped in tufts and the tufts being arranged in a plurality of rows along the longitudinal length of the bristle-supporting portion with at least some of the tufts being canted with respect to each of the surfaces of said bristle-supporting portion towards the inside of the curve thereof.

The invention also consists in a toothbrush comprising a stem defining a handle portion and a bristle-supporting portion, said bristle-supporting portion extending generally in a plane, characterised by said bristle-supporting portion curving along its length in said plane to conform to a curved dental profile and having generally oppositely facing bristle-supporting surfaces, said bristles extending substantially perpendicularly from each of said oppositely facing surfaces which are each inclined with respect to said plane so that said bristles are canted inwardly toward the inside of said curve.

The invention further consists in a toothbrush wherein a plurality of tufts of bristles extend from opposite sides of a bristle-supporting portion, characterised by a longitudinal stem having a handle portion forming a rear part of the stem and said bristle-supporting portion defining a forward part of the stem and having two oppositely facing surfaces from which said

bristles extend, said portion curving along its length with said oppositely-facing surfaces generally parallel to the curvature of said portion providing improved access to the gingival areas of the teeth for penetration into the sulcular areas, and the bristles extending from two opposite sides of the bristle-supporting portion to permit said improved access by providing the user with a means to apply the curved portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile, whilst said handle portion is twisted with respect to said bristle-supporting portion, each of the surfaces of the bristle-supporting portion having slightly inclined portions with a step therebetween, the bristles being grouped in rows of tufts which extend perpendicularly from the respective slightly inclined portions of said surfaces so that the tufts are canted towards the axis of curvature of the bristle-supporting portion.

The invention still further consists in a toothbrush wherein a plurality of tufts of bristles extend from opposite sides of a bristle-supporting portion, characterised by a longitudinal stem having a handle portion forming a rear part of the stem and said bristle-supporting portion defining a forward part of the stem and having two oppositely facing surfaces from which said bristles extend, said portion curving along its length to provide improved access to the gingival areas of the teeth for

penetration into the sulcular areas, and the bristles extending from two opposite sides of the bristle-supporting portion to permit said improved access by providing the user with a means to apply the curved portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile, whilst said handle portion is twisted with respect to said bristle-supporting portion, the oppositely-disposed faces of said bristle-supporting portion forming an angle with each other so that said bristle-supporting portion is wedge shaped, the tufts of bristles extending perpendicularly from said oppositely facing surfaces.

In one aspect of the invention, the bristles are moulded into a bristle-supporting portion of the brush so that the brush may be inserted in the interproximal areas of the teeth for the insertion into the sulcus below the interproximal gum lines.

Brief Description of the Drawings

Figure 1 is a perspective view of the toothbrush according to one embodiment of the invention;

Figure 2 is a top view of the toothbrush of Figure 1;

Figure 3 is a sectional view taken along lines 3-3 of Figure 2;

Figure 4 is a sectional view, as in Figure 3, showing a modification in the toothbrush of Figures 1 and 2, showing an arrangement for canting the bristles;

Figure 5 is a sectional view as in Figures 3 and 4, showing yet another modification of the toothbrush of Figures 1 and 2 wherein the bristles are canted;

Figure 5A shows the cross-sectional view of the toothbrush head in one embodiment of the present invention;

Figure 5B shows the cross-sectional view of the toothbrush head in another embodiment of the present invention;

Figures 6 and 7 show the toothbrush being used to treat the sulcus of left and right sides of the mouth, respectively;

Figure 8 is a sectional view showing details of the penetration of the brush into the sulcular areas;

Figure 9 is a perspective view of another embodiment of the toothbrush according to the present invention;

Figure 10 is a side view of the toothbrush of Figure 9;

Figure 11 is a top view of the toothbrush, so as to that shown in Figures 9 and 10, further modified to include additional side bristles;

Figure 12 is a cross-sectional view taken along lines 12-12 of Figure 11;

Figure 13 shows the operation of Figures 9 and 10; and

Figure 14 is a cross-sectional view showing details of the cleaning operation shown in Figure 13.

Detailed Description of the Preferred Embodiments

Referring to Figure 1, the toothbrush 21 according to the invention comprises a generally planar stem 23 consisting of a

handle 25 and a bristle-supporting head 27. As is the case with conventional toothbrushes, the handle 25 and the head 27 are preferably moulded as a single piece. Referring to Figures 1-3, two oppositely disposed faces 29 which are generally parallel to the plane of head 27 appear on the head 27 from which tufts of bristle 31 extend. The head 27 is generally curvate so that the faces 29 form disc portions.

Referring particularly to Figure 3, it can be seen that the tufts 31 extend completely from the head 27 so as to occur on opposite sides of the head 27. Thus, while the view of the toothbrush from Figure 1 shows toothbrush curving (looking from the handle 25) to the right, the same toothbrush can be turned over so as to appear curving to the left as shown in Figure 2. It can be seen that, by having tufts 31 extending opposite the faces 29 of the toothbrush, a symmetry is achieved. It is clear, as will be described later, that, even though the toothbrush is curved, the single head of the toothbrush is useful for all teeth as will be described later.

The tufts 31 are preferably made from soft or extra soft rounded tip bristles in order to facilitate thorough cleaning of the sulcular areas without lacerating the soft tissue of the sulcus. As described above, the curved contour of the toothbrush head 27 improves access to the sulcus. Further enhancement of the function may be had by angling one or more rows of tufts as

seen in Figures 4 and 5. In these figures, tufts 33, 34 and 35 are canted toward the concave side 37 of toothbrush head 27' and 27''. While this cant can be provided at various angles, a cant which is 15° from parallel to the axis of curvature would be typical. Referring to Figure 4, by providing some tufts such as tuft 39 at the ends of the tufts, a tuft concentration is provided at the point where it is most desired to achieve a brushing action; that is under the sulcus, particularly when a minimum of force is applied by the user.

It may also be advantageous to cant the tufts 31 inward in order to permit brushing without the bristles harshly rubbing the inside of the patient's cheek.

In the embodiments shown in Figures 5A and 5B, the tufts are canted with reference to the major axis of the toothbrush head and extend perpendicularly from the surface of the head. In Figure 5A, toothbrush head 27A is twisted with reference to handle 25 so that angle β between major axis A-A of handle 25 and major axis B-B of toothbrush head 27A is about 42° to 48° , preferably 45° . The surfaces 28A, 28C and 28B, 28D of the toothbrush head 27A from which the tufts extend are slanted at an angle of α and are separated by step 30A and 30B, respectively. β ranges from about 10° to 15° . Since surface 28A, 28B, 28C and 28D are slanted with reference to axis B-B and since tufts 34A, 34B, 35A and 35B extend perpendicularly

from the surfaces, the tufts are canted with reference to axis B-B. Typically, tufts 34A, 35A, 34B and 35B have the same length.

In the embodiment shown in Figure 5B, toothbrush head 27B is twisted with reference to handle 25 at the same angle as shown in Figure 5A. However, the cross-sectional view of the head has the form of a wedge and the surfaces in which the tufts are embedded are not provided with any steps, i.e. the surfaces are continuous. As illustrated in Figure 5B, toothbrush head 27B is wedge-shaped, with side W of the head being thicker than the other, T. Tufts 34, 35 extend perpendicularly from surfaces 28E and 28F of the head. Surfaces 28E and 28F are inclined with respect to major axis C-C of the toothbrush head at an angle of from about 10° to 15° . In other words, surfaces 28E and 28F form an angle of from about 20° to 30° with each other. As a result of the inclined surfaces, tufts 34, 35 are canted with reference to axis C-C although they extend perpendicularly out of surfaces 28E and 28F. Typically, tufts 34, 35 have the same length. The embodiments shown in Figures 5A and 5B have rounded corners to prevent the user from lacerating his gums.

It should be further pointed out that, while specific tuft arrangements, such as two parallel rows are shown, alternate arrangements are possible. For example, while rounded tip bristles are conventionally provided in Nylon, it is also

possible to substitute natural bristles for the rounded-tip bristles. Additionally, a wide variety of bristle heights and cant angles are possible, provided that the ultimate goal of achieving improved access to the sulcular areas of the teeth is facilitated.

Referring to Figures 6 to 8, the toothbrush 21 normally is used in a manner specifically directed to improve access to the sulcular areas. This is accomplished by holding the brush at an acute angle to the surface of the teeth so as to direct the bristles 31 down into the sulcular areas. As can be seen in Figure 8, since the sulcus 41 is normally diseased when such treatment is prescribed, it tends to be separated from its adjacent tooth 43. There, the toothbrush 21 is so positioned that most of the bristles 31 contacting the teeth are closely adjacent the gingival margins 45 defined by the boundaries between the gums and the teeth and consequently the sulcus 41 where the gums contact the teeth. Specifically, it is desirable that at least a portion of the tufts 31 penetrate so as to contact the sulcus 41 and the sulcular areas of the tooth 43.

In order to facilitate the holding of the toothbrush at that position, the handle 25 is preferably contoured as can best be seen in Figures 1 and 2. In those figures, the handle 25 has been twisted, leaving depressions 49 on either side of the handle. The user is then able to grip the round part 51 of the

handle 25 with his fingers and is able to place his thumb in one of the depressions 49 or at that portion of the stem 23 leaving adjacent the brush head 27 in accordance with his preference. It can be seen that, since the depressions 49 occur on both sides of the toothbrush 21, the toothbrush is reversible. Therefore, in Figure 6, side A is turned upward whereas in Figures 11, side A is turned downward. In both cases, the bristles extending from the face 29 which is opposite side A are contacting the teeth, with tufts 31 on the concave side of the toothbrush 31 contacting the outside of the teeth in Figure 6 and bristles on the convex side of the toothbrush 31 primarily contacting the teeth in Figure 7. As is clear from the drawings, the brushing of other teeth would result in the application of other tufts 31 to those teeth. While not shown, it is also possible, particularly when brushing the outside of the teeth, for one to substantially close his jaws and brush both top and bottom rows of the teeth simultaneously. This is, of course, facilitated by having all the bristles canted as shown in Figures 5, 5A and 5B.

In order to provide access to the sulcus in the interproximal areas of the teeth, a smaller version of the curved-head toothbrush is provided as is seen in Figures 9 to 14. Referring to Figure 9, the small brush 55 is provided with a row of bristle tufts 57 which extends from two sides of a curved brushing head 59 in a manner previously described. These tufts can be single-bristle tufts or the multi-bristle tufts 57 shown.

Additionally, the bristles can be moulded from the same material together with the remainder of the toothbrush 55, eliminating a necessity to join the bristles in the tufts 57 to the brush head 59 during the moulding of the small toothbrush 55. Referring to Figures 11 and 12, it is also possible to provide fine brush bristles 61 along the concave and convex side of the brush head 59. This enables the portion of the teeth aligned with the brush head 59 to be cleaned despite a tendency of the teeth and gums to align the brush so that some portions of the teeth would only contact the brushing head 59 rather than tufts 57.

Referring to Figures 13 and 14, the interproximal areas 65 between adjacent teeth 67, 68 become enlarged during advanced periodontal disease because the diseased gums recede downward. Nevertheless, the interproximal spaces, such as interproximal space 65 remains somewhat confined. Therefore, the small brush 55 according to the present invention should be less than 1 centimeter between the ends of the tufts 57. Therefore, each tuft should be no more than 4 millimeters long in order to accommodate the physical denominations of the brush head 59. In the preferred embodiment, the tufts 57 are approximately two millimeters long, with the total distance between the tips of the tufts being six millimeters. While this may seem slightly large, this enables one row of tufts 57 to assist in forcing an opposed row of tufts 57 into contact with the sulcus. Since the

small toothbrush 55 is fairly small, the amount of force other than reciprocating force exerted by the user's hand must be limited. Therefore, a small flat handle 67 is provided, the handle being suitable for grip between the user's thumb and forefinger. This enables the user to aim and angle the small toothbrush 55 into each of the sulcular areas adjacent each tooth, as can be seen in Figure 14. The handle 67 exhibits a symmetry permitting reversal of the direction of curvature of the toothbrush by the user in a manner such as the handle 25 permits a reversal of the direction of curvature of toothbrush 21.

While the invention has been described in terms of specific brush configurations, it should be clear that various modifications may be undertaken without departing from the inventive concepts expressed herein. For example, it is possible to combine small and large-curved toothbrush heads into a two sides toothbrush. Such an example of such an arrangement is found in U.S. Patent 890,143 to Kuzzer, although a different type of toothbrush head is shown. Accordingly, the invention described herein should be considered limited only as defined by the claims.

It should also be pointed out that, because of the flexible nature of the smaller (interproximal) brush, a straight head rather than a curved head may be provided. This type of straight head would readily conform to the curvature of the

interradicular sulci. It may well be that such a straight brush head may be advantageous because the patient would not be required to rotate the brush head in accordance with the direction of curvature.

It is also anticipated that the brushes according to this invention would be provided with a stem adapted to mount on conventional motorized (electric) toothbrush handles. This would permit the patient to take advantage of the efficiency of a motorized toothbrush.

Similarly, the brush heads 27, 59 may themselves be made removable from their respective handles 25, 67. This permits the heads to be changed between brushings, giving the heads a chance to more thoroughly dry and therefore reducing sepsis.

Claims

1. A toothbrush comprising a longitudinal stem having a rear handle portion and a forward bristle-supporting portion, characterised in that the bristle-supporting portion has two oppositely-facing surfaces from which the bristles extend in opposite directions, and is curved along its length to provide improved access to the gingival areas of the teeth for penetration into the sulcular areas to provide the user with a means to apply the curved portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile; the bristles being grouped in tufts and the tufts being arranged in a plurality of rows along the longitudinal length of the bristle-supporting portion with at least some of the tufts being canted with respect to each of the surfaces of said bristle-supporting portion towards the inside of the curve thereof.

2. The toothbrush as claimed in Claim 1, characterised in that each tuft comprises a plurality of individual bristles extending through the bristle-supporting portion and both of the oppositely facing surfaces of the bristle-supporting portion.

3. The toothbrush as claimed in Claim 1 or Claim 2, characterised in that substantially all of the bristles cant toward the inside of the curve of the bristle-supporting portion.

4. The toothbrush as claimed in Claim 1 or Claim 2, characterised in that the tufts of one row of said rows extending

from said oppositely facing surfaces cant toward the inside of the curve and at least another row of said rows extends substantially perpendicular to said surfaces. 0123559

5. The toothbrush as claimed in any preceding claim, characterised in that the handle portion is contoured to facilitate improved control of said toothbrush by providing a symmetrical twist in said contour to accommodate the user's thumb and the user's fingers at a desired orientation with respect to the bristle-supporting portion.

6. The toothbrush as claimed in any preceding claim, characterised in that said bristles are integrally moulded into the bristle-supporting portion and in that the length of said bristles, as they extend from either of said faces, are no more than three millimeters long.

7. The toothbrush as claimed in Claim 5, characterised in that the handle portion comprises a flattened area to facilitate grip between the user's thumb and finger while orientating the bristle-supporting portion towards the gingival sulcus.

8. A toothbrush comprising a stem defining a handle portion and a bristle-supporting portion, said bristle-supporting portion extending generally in a plane, characterised by said bristle-supporting portion curving along its length in said plane to conform to a curved dental profile and having generally oppositely facing bristle-supporting surfaces, said bristles extending substantially perpendicularly from each of said oppositely facing surfaces which are each inclined with respect to said plane so that said bristles are canted inwardly toward the inside of said curve.

9. The toothbrush as claimed in Claim 8, characterised in that said oppositely facing surface comprises at least one stepped portion, each stepped portion being canted with respect to said plane and at least some of said bristles extending from each said oppositely facing surface substantially perpendicularly to said respective stepped portion.

10. A toothbrush wherein a plurality of tufts of bristles extend from opposite sides of a bristle-supporting portion, characterised by a longitudinal stem having a handle portion forming a rear part of the stem and said bristle-supporting portion defining a forward part of the stem and having two oppositely facing surfaces from which said bristles extend, said portion curving along its length with said oppositely-facing surfaces generally parallel to the curvature of said portion providing improved access to the gingival areas of the teeth for penetration into the sulcular areas, and the bristles extending from two opposite sides of the bristle-supporting portion to permit said improved access by providing the user with a means to apply the curved portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile, whilst said handle portion is twisted with respect to said bristle-supporting portion, each of the surfaces of the bristle-supporting portion having slightly inclined portions with a step therebetween, the bristles being grouped in rows of tufts which extend perpendicularly from the respective slightly inclined portions of said surfaces so that the tufts are canted towards the axis of curvature of the bristle-supporting portion.

11. A toothbrush wherein a plurality of tufts of bristles extend from opposite sides of a bristle-supporting portion, characterised by a longitudinal stem having a handle portion forming a rear part of the stem and said bristle-supporting portion defining a forward part of the stem and having two oppositely facing surfaces from which said bristles extend, said portion curving along its length to provide improved access to the gingival areas of the teeth for penetration into the sulcular areas, and the bristles extending from two opposite sides of the bristle-supporting portion to permit said improved access by providing the user with a means to apply the curved portion of the toothbrush to opposite sides of the teeth located in all areas of the mouth, the teeth defining a curved dental profile, whilst said handle portion is twisted with respect to said bristle-supporting portion, the oppositely-disposed faces of said bristle-supporting portion forming an angle with each other so that said bristle-supporting portion is wedge shaped, the tufts of bristles extending perpendicularly from said oppositely-facing surfaces.

12. The toothbrush as claimed in Claim 11, characterised in that said angle is no greater than 30 degrees.

13. The toothbrush of Claim 11, characterised in that said angle is substantially 20-30 degrees.

Fig. 1

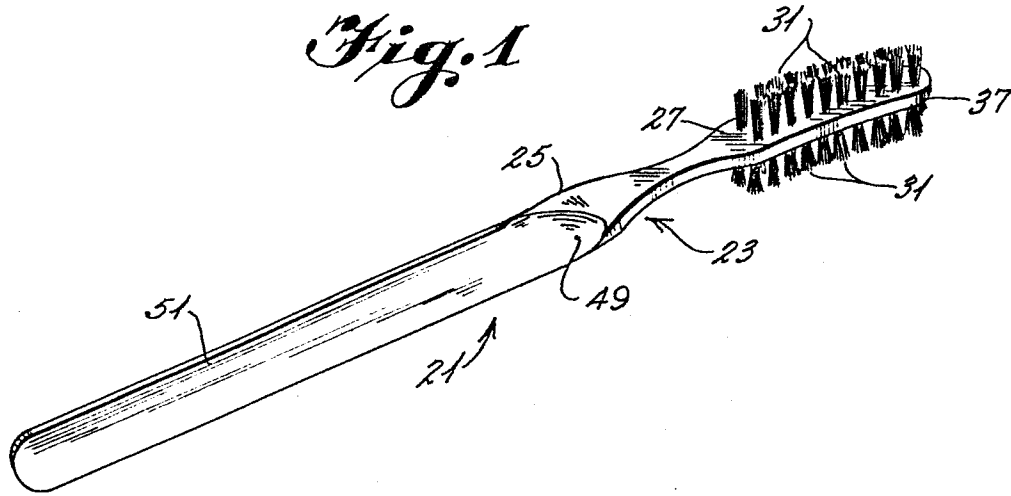


Fig. 2

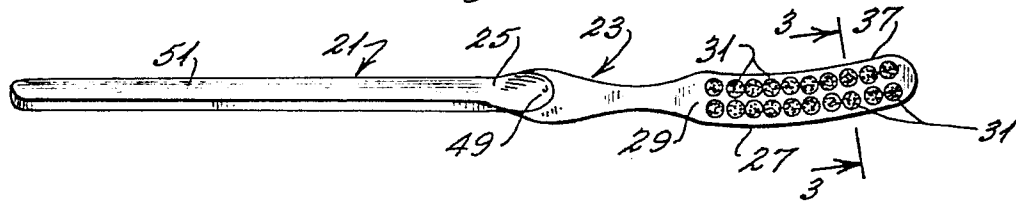


Fig. 3

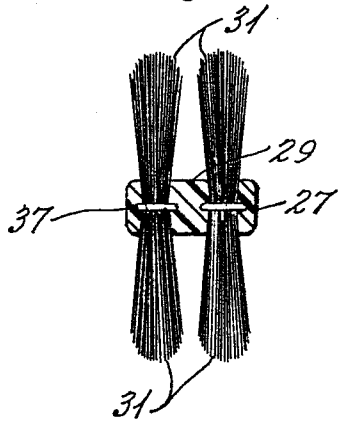


Fig. 4

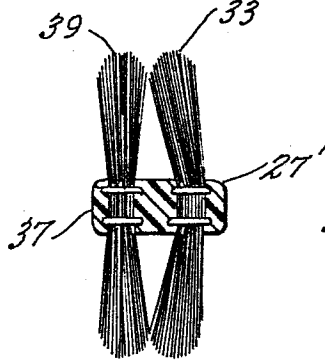
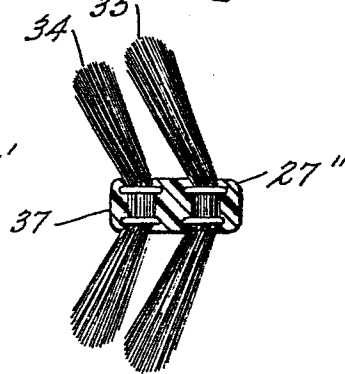
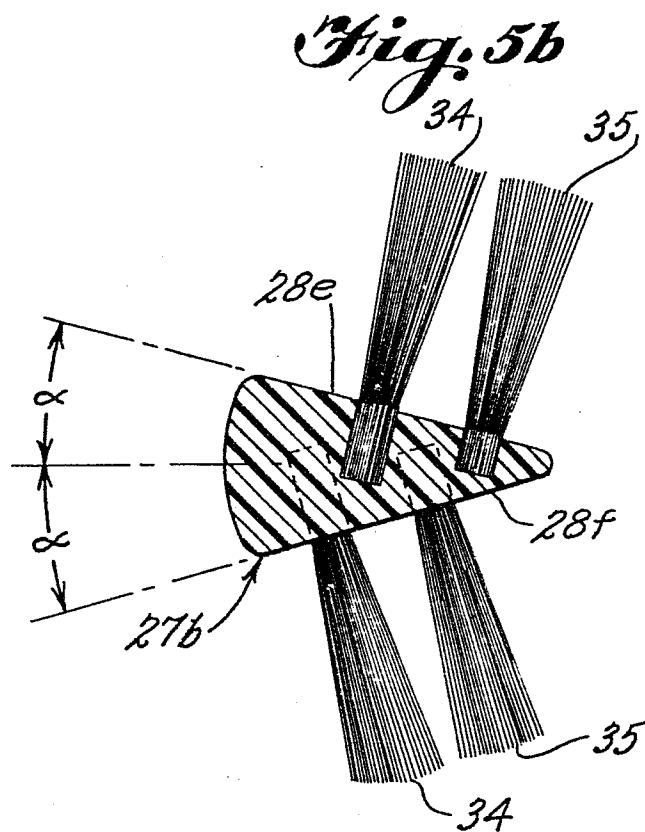
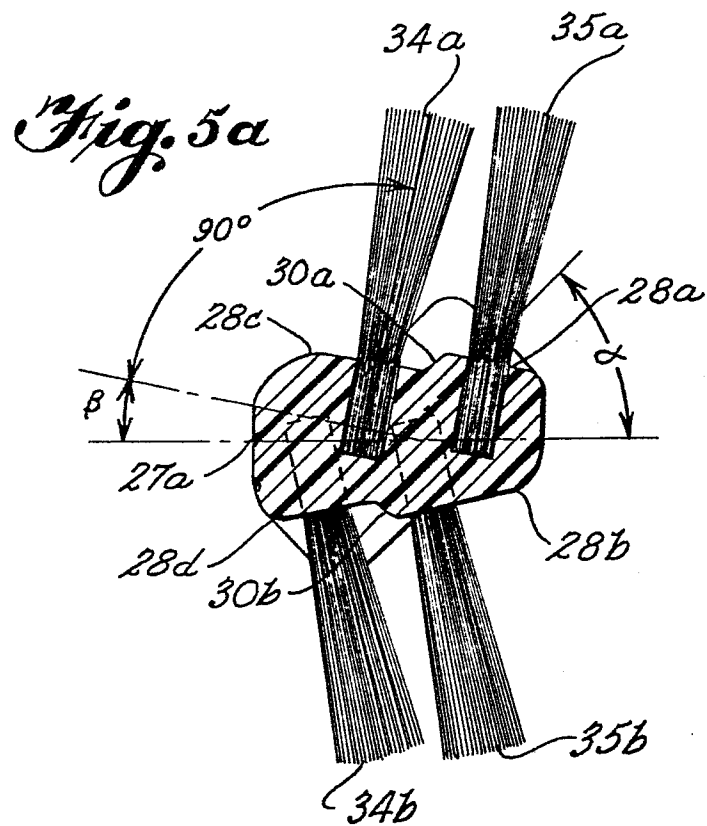


Fig. 5





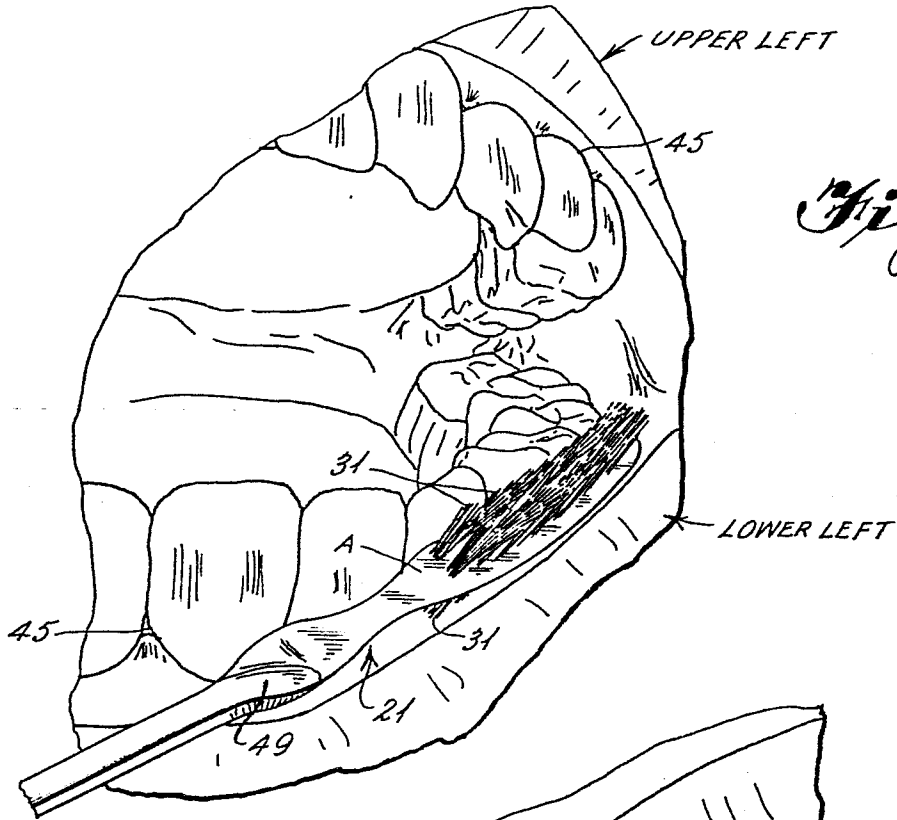


Fig. 6

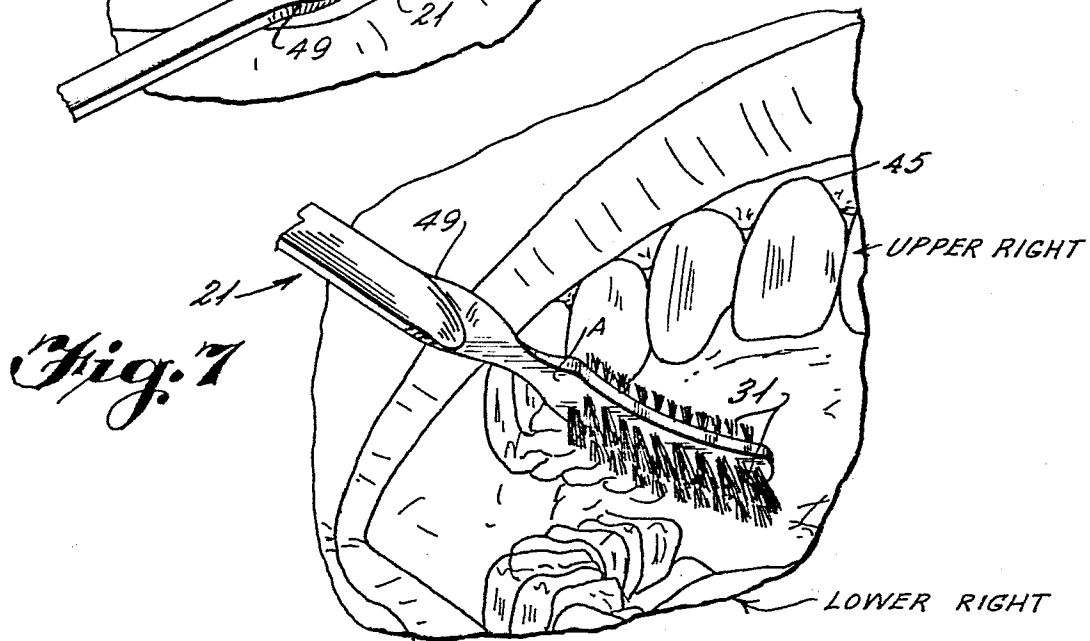


Fig. 7

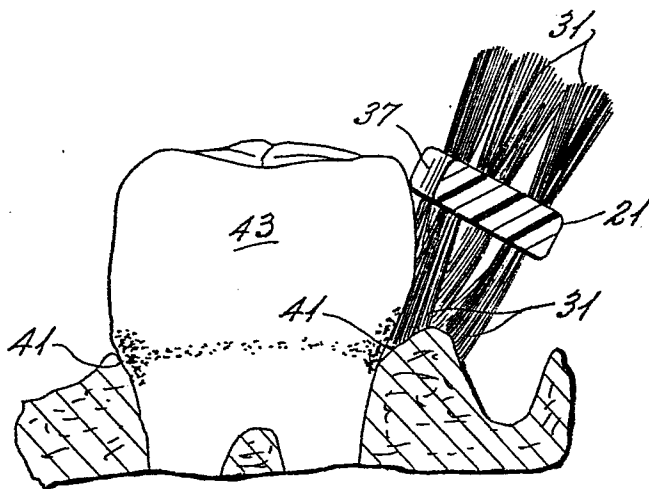
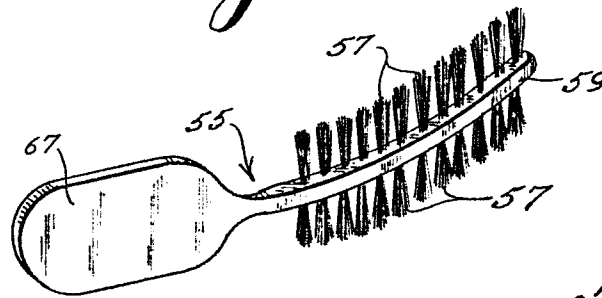
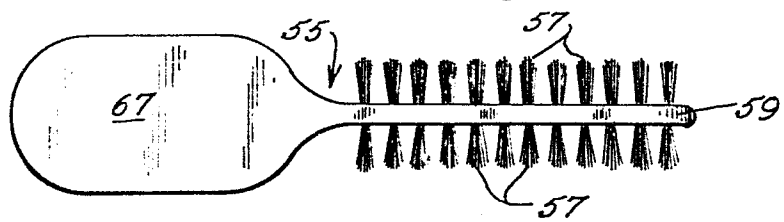
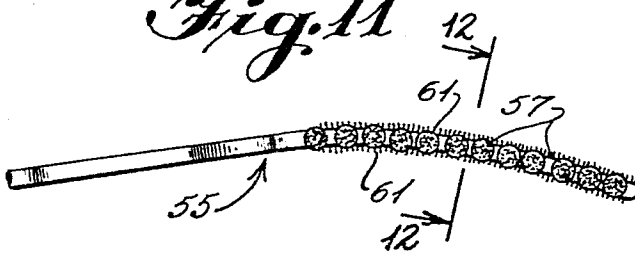
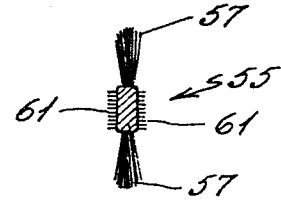
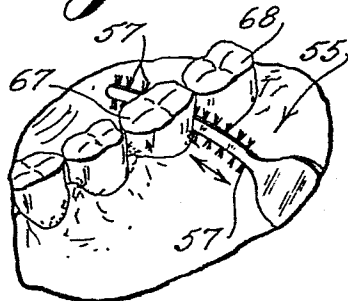
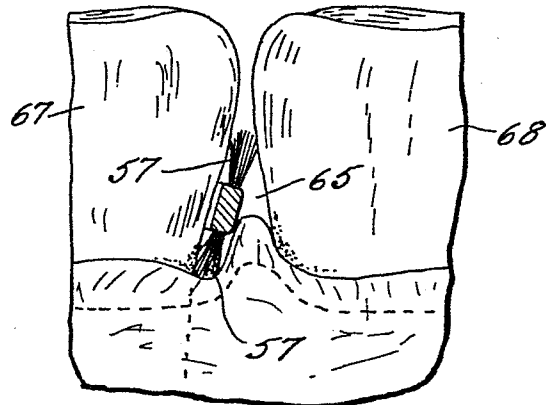


Fig. 8

Fig. 9*Fig. 10**Fig. 11**Fig. 12**Fig. 13**Fig. 14*



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	BE-A- 640 683 (SEIDMAN) * Page 6, lines 152-161; figures 19,20 *	1,4,8	A 46 B 9/04 A 46 B 5/02
Y	DE-A-3 049 563 (LAJOS) * Claims; figures 2,3 *	1,4,8	
Y	DE-A-2 130 594 (STAAS) * Whole document *	1,4,5, 7,8,10	
Y	FR-A-1 238 531 (CASTEGNIER) * Page 1, left-hand column, paragraphs 1,2,6, right-hand column, paragraphs 5,7,8; page 2, left-hand column, paragraph 1; figures 1-3 *	1,4,5, 7,8,10	
A	US-A-1 409 830 (CHICKEN) * Page 1, lines 30-55; figures 2,3 *	1,2,6	A 46 B
A	US-A-2 244 615 (GARCIN) * Page 1, left-hand column, lines 52-55, right-hand column, lines 1-11, 26-32; figures 1,2 *	1,2,6	
A	US-A-4 115 894 (PETERSON) * Figures 2-6 *	3	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-08-1984	Examiner BOURSEAU A.M.
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X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



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A	GB-A- 831 312 (PIERMARI) * Page 2, lines 54-76; figures 6,7 *	9	
A	US-A-2 094 240 (HERRICK et al.) * Whole document *	5,7	
A	FR-A- 656 139 (JUNISKI)		
A	DE-A-2 512 256 (ZEDELMAIER)		
A	US-A-3 720 975 (NELSON)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-08-1984	Examiner BOURSEAU A.M.
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T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			