ABSTRACT

A polyaxial toothbrush constructed to provide a brush portion with a plurality of axes of pivotal movement relative to a handle which can assume a straight or intermittently-angled shape position is described. The toothbrush is formed by interconnecting a brush portion and a head portions by a universal joint to define a polyaxial joint. The universal joint includes a substantially spherical end and a substantially spherical appendage extending outwardly sized to cooperate with the spherical cavity. Such construction and arrangement provides universal movement between the brush and handle portions. The toothbrush further has at least one resilient member extending between the brush portion and handle portion of the invention, providing resistance to the pivoting brush portion with respect to the handle portion.
RIGHT ANGLE TOOTH BRUSH

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Application 60/920,301, filed on Mar. 27, 2007, the contents of which are herein incorporated by reference.

FIELD OF INVENTION

[0002] The invention relates to oral hygiene, more specifically to a polylaxial toothbrush constructed to provide a brush portion with a plurality of axes of pivotal movement with regard to a handle.

BACKGROUND OF THE INVENTION

[0003] Proper oral hygiene is considered paramount to the development and maintenance of a strong and healthy mouth. In addition to professional dental care and regular cleanings, proper and effective teeth brushing removes the sticky, colorless biofilm known as plaque produced mostly by bacteria. Failure to remove plaque on a regular basis results in the build-up and thickening of biofilm. Removal of plaque through brushing prevents formation of cavities and periodontal diseases. Gingivitis is an early form of gum disease that if left untreated can result in the more advanced disease of periodontitis. Progression of periodontitis ultimately results in tooth loss.

[0004] Proper brushing technique is considered one of the best daily methods to maintain healthy teeth and gums. In addition, the correct type of toothbrush aids the user in developing the proper oral hygiene strategy. Although no human mouth may be exactly the same, certain areas are often hard to reach, resulting in damage to the mouth and inadequate plaque removal. Thus, there is a need for an improved toothbrush that provides a cleaning portion having at least two axes of pivotal movement relative to a handle portion to provide contact with hard to reach areas without causing injury to the cheek.

[0005] The prior art is filled with modifications and improvements to the standard toothbrush. Despite the numerous modifications, most toothbrushes contain the basic parts of a handle and head portion. Toothpaste is added to the head region and a brush is then articulated in an acceptable and useful manner. One of the problems associated with the modern toothbrush is the rigid handle. This rigidity often results in the stretching of the mouth when placing the brushing head along teeth associated with the lateral side. For instance, when brushing the right side of the mouth individuals tend to extend the wall of the right lateral cheek. The placement of the brushing head tends to cause stretching of the lateral cheek wall, resulting in minor injuries to the right angle of the mouth. Minor injury of the mouth is further associated with the left lateral side. In addition, right handed individuals have difficulty brushing the outside of the molar teeth associated with the left side of the face and the inside of the molar teeth associated with the right side of the face. Left handed individuals have the opposite problem, having difficulty brushing the outside of the molar teeth associated with the right side of the face and the inside of the molar teeth associated with the left side of the face. A handle that is not permanently straight and has the capability to bend at various angles along a plurality of axes of motion would alleviate the problem.

DESCRIPTION OF THE PRIOR ART

[0006] Various improvements to the toothbrush have been developed over the years relating to the head region, the cleaning elements, and development of various mechanical types. In addition, the prior art is filled with improvements which advance the capabilities of the toothbrush to effectively contact hard to reach places in the mouth. To this end, such improvements have focused on the bending of the brush head or creating pivot capability of the head relative to the handle along a single axis.

[0007] U.S. Patent Application 2007/0151058 discloses a toothbrush made partially of an elastomeric material having a flexible link in the neck and between the head and neck. While this toothbrush has a slightly flexible bend near the head region, the toothbrush is generally rigid and lacks a pivot. As a result, the head and handle are fixed in one position.

[0008] U.S. Pat. Nos. 5,491,866 and 7,251,849 describe toothbrushes having a handle, a brush and a pivot connection between the brush and handle. Both of these inventions provide for a moveable head region, however, the movement generated relative to the handle is limited.

[0009] U.S. Pat. Nos. 4,979,258 and 4,731,896 disclose toothbrushes having a joint connecting two segments of the toothbrush which provides greater pivoting motion as compared to the '866 and '849 type patents. Despite the fact that the '258 and '896 describe movement of the head section relative to a handle, such movement is limited to movement along a single axis. Patent Re. 36,407 discloses a toothbrush having a joint connection having a spring biased actuation member having a plurality of sprockets which provides incremental articulated movements of the head portion with respect to the handle portion. Movement of the head portion relative to the handle suffers from the same shortcoming as the other prior art devices in that movement is limited along a single axis.

[0010] U.S. Pat. No. 5,184,368 describes a toothbrush having a handle located at one end and a brush located on the other end. The brush head is pivotally mounted to the handle. As described therein, two types of pivots are described. A brush head is pivotally mounted to a handle and is described to provide for a preset, limited angular positioning relative to the brush handle. The position and movement is fixed to a position by a tightening pin. Also described is a pivotal mounting in the form of a ball and socket. The pivot is mounted between the handle and brush head. While this may provide a greater movement of the head portion, the handle portion remains fixed and makes it difficult to reach some sections of the mouth without extending the lateral walls of the cheek.

[0011] U.S. Pat. No. 4,654,922 describes a tooth brush having two ends joined together by alternative joints. In one embodiment, the head portion is connected by a bail or wheel joint. Although this type of joint may provide greater movement than previous toothbrushes, the movement associated with this toothbrush is limited along a single axis. Moreover, the degree to which the portions can bend is limited to less than 90 degrees. The disclosure further provides for use of a rod joint. This type of joint, however, provides rotational movement but does not provide angular bending movement.
Therefore, what is needed in the art is a toothbrush that has axial rotation and/or lateral bending in varying angles and degrees, including bending at angles of 90 degrees or greater.

SUMMARY OF THE INVENTION

The present invention is directed to a toothbrush and more particularly a polyaxial toothbrush that can assume a straight or intermittently angled bent shape. The toothbrush is formed by interconnecting two portions by a universal joint. A brush portion is defined by a first end and a second end. The first end having a plurality of bristles extending outwardly and the second end having a first portion of the universal joint. The toothbrush also has a handle portion having a first end and a second end. The first end of the handle portion having a second portion of the universal joint. The ends of the universal joints are arranged to cooperate with each other to provide multiple axes of movement. The toothbrush further has at least one resilient member extending between the brush portion and handle portion of the invention which provides resistance to the pivoting brush portion with respect to the handle.

As described herein, the term polyaxial joint is understood to include, albeit not limited to a universal joint, a constant velocity joint, Cardan joint, a Hardy-Spicer joint, a Thompson coupling, a rag joint, a gimbal joint, and an elastic coupling.

As described herein, a plurality of axes of pivotal movement includes pivotal movement in one or more axes, 360 degree axial rotation, and lateral bending at varying degrees including 90 degrees or greater.

Accordingly, it is a primary objective of the instant invention to provide a polyaxial toothbrush having a universal joint connection that provides movement of a brush portion relative to the handle portion.

It is a further objective of the instant invention to provide a toothbrush having a universal joint connection that defines a polyaxial joint providing a head portion with a plurality of axes of pivotal movement relative to the handle portion.

It is yet another objective of the instant invention to provide a toothbrush having a universal joint connection that defines a polyaxial joint providing a head portion with a plurality of axes of pivotal movement relative to the handle portion which provides brushing capabilities in the straight or intermittently-angled positions.

It is a further objective of the instant invention to provide a polyaxial toothbrush having a universal joint connection that defines a polyaxial joint between the head and handle portion permitting axial rotation and/or lateral bending in varying angles and degrees.

It is a still further objective of the invention to provide a polyaxial toothbrush which includes at least one resilient member constructed and arranged to provide a biasing force which provides resistance to pivoting of the brush portion with respect to the handle portion between a straight and bent position.

Other objects and advantages of this invention will become apparent from the following description taken in conjunction with any accompanying drawings wherein are set forth, by way of illustration and example, certain embodiments of this invention. Any drawings contained herein constitute a part of this specification and include exemplary embodiments of the present invention and illustrate various objects and features thereof.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1A represents a side view of an embodiment of the toothbrush indicating the brush portion, handle portion, universal joint and resilient member; FIG. 1B represents a side view of the brush portion; FIG. 1C represents a side view of the handle portion; FIG. 2 is a back view of the toothbrush; FIG. 3A is a transverse view of the toothbrush; FIG. 3B is an embodiment of the first portion of the universal joint. FIG. 3C is an embodiment of the second portion of the universal joint; FIG. 4 shows the toothbrush in the bent position; and FIG. 5 shows the connection between the first and second portions of the universal joint defining a polyaxial joint in the bent position.

DETAILED DESCRIPTION OF THE INVENTION

The polyaxial toothbrush 10, shown in FIG. 1A, has four major components, a brush portion 20, a handle portion 30, a polyaxial, e.g. a universal joint 40, and a resilient polymeric member 50. As seen in FIG. 1B, the brush portion 20 has a first end 21 and a second end 22, an outer surface 23 and a first longitudinal centerline 24. The first end 21 of the brush portion 20 has a plurality of bristles 25 extending outwardly with respect to the outer surface 23. The second end 22 includes a portion of a universal joint 40. Although the joint may be located at any position, in one embodiment, the location is between about 4° and 4.5° from the tip of the first end 21 of the brush portion 20. In order to provide greater stability when using, the brush portion 20 may also have an enlarged, depressed area positioned proximate to the first end 21, see FIG. 2.

As shown in FIG. 1C, the handle portion 30 has a first end 31 and a second end 32, an outer surface 33 and a second longitudinal centerline 34. The outer surface 33 defines a grip. The first end 31 includes a portion of the polyaxial joint 40. The polyaxial joint 40 is constructed and arranged to provide cooperation between a first portion of the polyaxial joint associated with the second end 22 of the brush portion 20 and first end 31 of handle portion 30. This arrangement defines a polyaxial joint constructed and arranged to provide the brush portion 20 with at least two axes of pivotal movement with respect to the handle portion 30.

FIGS. 3A, 3B, and 3C, illustrates the polyaxial joint 40 of the polyaxial toothbrush 10 having a first portion 41 and a second portion 42. The first portion 41 includes a substantially spherical cavity 43 aligned along the first longitudinal axis 24. In a particular embodiment, the substantially recessed spherical cavity could further have a reverse frustoconical shape. The second portion 42 of the universal joint 40 includes a substantially spherical appendage 44 extending outwardly from the first end 31 of the handle portion 30 and aligned substantially along said second longitudinal axis 34. In a particular embodiment, the substantially spherical appendage could further have a frustoconical shape. The substantially spherical appendage 44 is sized to cooperate with the substantially spherical cavity 43 to provide universal
movement between the brush portion 20 and said handle portion 30. Not wanting to limit the invention to a specific embodiment, the first and second ends of the universal joint 40 as shown in the any of the Figures could be reversed so that the substantially spherical appendage 44 would be located at the second end 22 of the brush portion and the substantially spherical cavity 43 would be located at the first end 21 of the handle portion 30. The first and second portions of the universal joint may be molded into the second end 22 of the head portion 20 and/or the first end 31 of the handle portion 30.

Although FIGS. 3A, 3B and 3C describe a single embodiment of the polyaxial joint having mostly a spherical appendage sized to cooperate with a substantially spherical cavity, as herewith, the polyaxial joint is not limited to a particular embodiment. The polyaxial joint may be selected from numerous connections or joints which provide at least two planes or axes of pivotal movement, including a gimbal joint, an elastic coupling and a rag joint. In addition, the polyaxial joint can be selected from any type of universal joint. Universal joints generally are joints placed in a rod or shaft that allows for the bending of the rod or shaft in any direction. The universal joint generally contains hinges located close together and oriented at 90 degrees relative to each other. Simple universal joints may be composed of two yokes, a center bearing block and two pins that run through the center bearing block at right angles to each other, see for example Universal Joint, Curtis Universal Joint Co., Inc., Springfield, Mass. In addition, the polyaxial joint may be selected from a Cardan Joint, a single, flexible coupling with two yokes and a four point center cross, or the like, and a Hardy-Spicer Joint, both of which are well known in the art. In other embodiments, the polyaxial joint may be selected from constant-velocity (CV) joints, such as the Tripod (or Triax) or ball-type (such as the Rzeppa joint). An additional embodiment for the polyaxial joint may include a Thompson coupling.

The construction of the polyaxial joint provides polyaxial movement which allows movement of the brush portion 20 relative to the handle portion 30 allowing the brush portion 20 intermittently-angled movements along one axis of motion in either the forward and backward motion. In addition, the nature of the connection further allows intermittently-angled movement along a plurality of axes of pivotal movement providing a user 360 degree freedom of rotation. With this construction, the user’s hand can easily provide the force and stabilization necessary to bend the toothbrush. Rotating and bending the brush portion 20 relative to the handle portion 30 to varying degrees and angles, see FIG. 4, provides the brush portion contact with hard to reach areas, such as the lateral, medial, and back teeth.

The polyaxial toothbrush of the instant invention further includes at least one resilient member 50 extending between the second end 22 of brush portion 20 and the first end 31 of the handle portion 30. The resilient member 50 may be constructed and arranged to provide resistance to pivoting of the brush portion 20 with respect to the handle portion 30. Resilient member 50 may be a sleeve constructed and arranged to engage the outer surfaces 23 and 33 of the brush portion 20 and handle portion 30 respectively. Although not limiting the invention to a particular embodiment, the term resilient member is nevertheless understood to include any flexible or elastomeric material which can be constructed to cover any portion of the toothbrush 101, and as described in FIG. 5, depending on the direction of bending or rotation, the resilient member 50 can be compressed on one side 51 and extended on the opposite side 52, producing a cushioning effect and a tendency to return to a state of equilibrium. The resilient member 40 could also be constructed to cover additional areas of the handle or brush portions.

The polyaxial toothbrush 10 provides the user with the ability to brush an individual’s teeth by varying the angle of the brush portion relative to the handle portion. In a particular method of using the toothbrush to brush an individual’s teeth, the individual applies a cleaning agent, such as toothpaste, to the bristles 25. Using either hand, the three lateral fingers are placed towards the distal ends of the handle portion 30 along the outer surface 33 which forms a grip. The index finger and thumb support the proximal portion of the brush 20. In order to form a more stable grasp and properly manipulate the bending of the toothbrush, the thumb engages the enlarged, recessed section 26 of the head portion. While firmly holding the head and handle portions, pressure is applied to the portions allowing the toothbrush to assume either a straight or intermittently angled position.

All patents and publications mentioned in this specification are indicative of the levels of those skilled in the art to which the invention pertains. All patents and publications are herein incorporated by reference to the same extent as if each individual publication was specifically and individually indicated to be incorporated by reference.

It is to be understood that while a certain form of the invention is illustrated, it is not to be limited to the specific form or arrangement herein described and shown. It will be apparent to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown and described in the specification and any drawings/figures included herein.

One skilled in the art will readily appreciate that the present invention is well adapted to carry out the objectives and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments, methods, procedures and techniques described herein are presently representative of the preferred embodiments, are intended to be exemplary and are not intended as limitations on the scope. Changes therein and other uses will occur to those skilled in the art which are encompassed within the spirit of the invention and are defined by the scope of the appended claims. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiments. Indeed, various modifications of the described modes for carrying out the invention which are obvious to those skilled in the art are intended to be within the scope of the following claims.

1. A polyaxial toothbrush comprising:
   a brush portion, said brush portion having a first end and second end, an outer surface and a first longitudinal centerline, said first end of said brush portion having a plurality of bristles extending outwardly with respect to said outer surface, said second end including a first portion of a polyaxial joint;
   a handle portion, said handle portion having a first end and a second end, an outer surface and a second longitudinal centerline, said outer surface defining a grip, said first end including a second portion of said polyaxial joint, said second portion of said polyaxial joint being constructed and arranged to cooperate with said first portion
of said polyaxial joint to define a polyaxial joint constructed and arranged to provide said brush portion with at least two axes of pivotal movement with respect to said handle portion.

2. The polyaxial toothbrush of claim 1 including at least one resilient member extending between said second end of said brush portion and said first end of said handle portion, said at least one resilient member being constructed and arranged to provide resistance to pivoting said brush portion with respect to said handle portion.

3. The polyaxial toothbrush of claim 2 wherein said at least one resilient member is a sleeve constructed and arranged to engage said outer surface of said brush portion and said handle portion.

4. The polyaxial toothbrush of claim 1 wherein said first portion of a polyaxial joint includes a substantially spherical cavity aligned along said first longitudinal axis and said second portion of a polyaxial joint includes a substantially spherical appendage extending outwardly from said first end of said handle portion and aligned substantially along said second longitudinal axis, said spherical appendage sized to cooperate with said spherical cavity to provide universal movement between said brush portion and said handle portion.

5. The polyaxial toothbrush of claim 4 including at least one resilient member extending between said second end of said brush portion and said first end of said handle portion, said at least one resilient member being constructed and arranged to provide resistance to pivoting said brush portion with respect to said handle portion.

6. The polyaxial toothbrush of claim 5 wherein said at least one resilient member is a sleeve constructed and arranged to engage said outer surface of said brush portion and said handle portion.

7. The polyaxial toothbrush of claim 6 wherein said brush portion includes an enlarged, depressed area positioned above the polyaxial joint and proximal to said first end of said brush portion.

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