A toothbrush having a longitudinal axis, comprising a handle, the handle including a neck, a head including a bed and bristles extending from the bed, a socket enclosure forming part of and extending outwardly from a rear of the bed, the socket enclosure having a socket defined therein, a rotator connected to the neck and extending into the socket capable of moving freely within the socket while still being unable to leave said socket, the head capable of rotating, upon the head being pressed against a teeth and/or gums of a user, in a front and back direction in relation to the handle and/or a side to side direction in relation to the handle or to the longitudinal axis of the toothbrush. The rotation reduces an amount of manual rotation of the toothbrush performed by the user.
**MOSS Toothbrush with Rotating Head**

**FIG. 8**

**FIG. 9A**

**FIG. 9B**

**FIG. 9C**

**FIG. 10A**

**FIG. 11**

**FIG. 10B**
TOOTHBRUSH WITH ROTATING HEAD

FIELD OF THE INVENTION

[0001] The field of this invention is toothbrushes, and more particularly toothbrushes designed for individuals of reduced manual dexterity.

BACKGROUND OF THE INVENTION AND DISCUSSION OF THE PRIOR ART

[0002] Most toothbrushes on the market today are extremely difficult to use for people with arthritis, hand prosthesis, or other health conditions in which limited manipulative dexterity manifest themselves. The proper process of brushing teeth with a regular toothbrush involves a great number of intricate movements. A brusher must make sure that throughout the process of brushing, the brush is always at a proper angle, with brushing surface always parallel to the surface of the teeth. The front surface of the lower front teeth has to be cleaned, then the position of the toothbrush has to be reoriented with wrist and fingers and the rear “tongue” surface of the front lower teeth has to be cleaned. Then the process has to be repeated with the front and rear surface of the upper front teeth. Then the process has to be repeated with upper and lower canines and bicuspids on both sides of the mouth. Then the back teeth have to be cleaned in the same way, except that now in addition to the side surface, the upper biting surface of each tooth must be carefully cleaned.

[0003] While for most of us brushing of teeth is automatic, and while we do not think of the process in such complex terms, for people suffering from arthritis each of these simple reorientations of the toothbrush is an ordeal of pain that has to be repeated hundreds of times per brushing, several times each day. Some choose to avoid the ordeal by brushing the teeth less thoroughly, for shorter amounts of time, or not at all. Latter approaches all result in poor dental hygiene and ultimate tooth ache and loss.

[0004] The influx of battery-powered brushes with moving or rotating heads have decreased the number of back and forth movements involved in brushing, but they failed to address the problem of angular manipulations that require the greatest dexterity from arthritic patients. Back-and-forth movements are mostly performed by the upper arm, while movements required to turn and reposition the toothbrush inside of a mouth are performed by wrist and fingers—parts most affected by pain and immobility in arthritic patients. The problem is only more severe in people with partial or full hand prosthesis.

[0005] In light of the problem, there is a long-standing, strong, and previously unsatisfied need in the art for a brushing instrument that could alleviate the pain that so many people associate with the daily ritual of brushing of the teeth. There is a need for a toothbrush that, while incorporating the newest advancements in the art could also minimize the necessity of wrist and digit movements and effort in realigning the brush against the surface of the teeth.

[0006] The present invention achieves all of these objectives, while also providing numerous additional benefits.

SUMMARY OF THE PRESENT INVENTION

[0007] The toothbrush of the present invention allows a person of reduced manual dexterity to brush his or her teeth without having to manipulate or turn the brush during the course of brushing. The toothbrush is structured so that when the bristles of the head are pressed against the gum and/or teeth the head of the brush rotates relative to the longitudinal axis of the brush or relative to the handle of the brush.

[0008] To accomplish the above, the toothbrush of the present invention has a longitudinal axis and comprises a handle, the handle including a neck, and including a head that includes a bed and bristles extending from the bed. A socket enclosure in a preferred embodiment is integrally connected to the bed and extends from the rear of the bed away from the bristles. The socket enclosure has defined inside it a socket or hollow area. Inside the socket is a rotator. The rotator is rigidly connected to the neck.

[0009] The rotator is free to move within the socket but the rotator, which might be a ball, is unable to leave the socket either because the entrance to the socket is too narrow or because it is held to the inside wall of the socket enclosure at an end of said inside wall distal from the entrance by a wire or other string or structure that is attached to the inside wall of socket enclosure distal from the entrance and the same wire is also attached to the rotator, either by piercing the outside surface of the rotator or by running through a diameter of the rotator and coming out on the other end. In this case the wire cannot fall out of the rotator because the wire has a free end near the entrance that is thicker and this prevents the wire from detaching from the rotator. However, the rotator is still free to move around within the socket.

[0010] The head and socket enclosure capable of rotating, upon the head being pressed against a teeth and/or gums of a user, in a front and back direction in relation to the handle and/or a side to side direction in relation to the handle or the longitudinal axis of the toothbrush. The rotation reduces an amount of manual rotation of the toothbrush performed by the user.

[0011] As a result the person holding the brush need not use his wrists to turn the brush but merely uses the force of the brush against the teeth and/or gums to effectuate a rotating of the head of the brush and hence a rotating of the bristles.

IMPORTANT OBJECTS AND ADVANTAGES

[0012] The following important objects and advantages of the present invention are:

[0013] (1) To provide a toothbrush designed specifically for people with poor manual dexterity;

[0014] (2) To provide a toothbrush with improved reach into the crevices of the gums;

[0015] (3) To provide a toothbrush that is designed specifically to eliminate and/or severely reduce the need of the user to turn his or her wrist;

[0016] (4) To provide a toothbrush that is of simple construction;

[0017] (5) To provide a toothbrush that is easy to use;

[0018] (6) To provide a toothbrush that in preferred embodiments looks essentially like an ordinary toothbrush;

[0019] (7) To provide a toothbrush that in preferred embodiments achieves its desired objectives without requiring the insertion of odd-looking components into one’s mouth;

[0020] (8) To provide a toothbrush with greater tooth surface contact during brushing;

[0021] (9) To provide a toothbrush that naturally rotates and aligns its brushing surface to be at the best angle for...
providing close contact between the teeth/gums and the broadest brushing surface of the toothbrush;

(0022) (10) To provide a toothbrush that is more comfortable to use than prior art toothbrushes;

(0023) (11) To provide a toothbrush that would allow people with limited manipulative dexterity to change the fine angle orientation of bristles with minimal exertion of force and minimal reorientation of the wrist and digits of the hand;

(0024) (12) To provide a toothbrush that would allow people with limited manipulative dexterity to change the fine angle orientation of bristles without releasing the grasp of the handle and without repositioning the toothbrush handle in hand;

(0025) (13) To provide a toothbrush with full left-right reorientation of the bristles that would allow people with compromised grasping ability to reach both sides of their mouth with toothbrush bristles without releasing the grasp of the handle;

(0026) (14) To provide a toothbrush with a head that is capable of rotating on a broad range of directions and amounts in relation to the handle of the toothbrush and/or in relation to the longitudinal axis of the toothbrush;

(0027) (15) To provide a toothbrush that would allow people with limited manipulative dexterity to reach both sides of their mouth with toothbrush bristles with minimal exertion of force and minimal reorientation of the wrist and digits of the hand;

(0028) (16) To provide a toothbrush that is convenient and efficient for brushing the teeth in hard-to-see areas (such as back teeth), or for brushing without a mirror; and

(0029) (17) To provide a toothbrush with a head that can rotate in all directions for better contact with the teeth and greater access to hard-to-reach areas.

BRIEF DESCRIPTION OF THE DRAWINGS

(0030) FIG. 1 is a front view of the toothbrush of the present invention;

(0031) FIG. 2 is a rear view of the present invention;

(0032) FIG. 3 is a right side view of the present invention; the left side view being identical thereto;

(0033) FIG. 4 is a bottom view of the present invention;

(0034) FIG. 5 is a top view of the present invention;

(0035) FIG. 6 is a partial fragmentary vertical cross-sectional view of the toothbrush of the present invention;

(0036) FIG. 7 is a perspective view of toothbrush of the present invention pressed against a user’s teeth and in rotated position;

(0037) FIG. 8 is a fragmentary right view of an alternative embodiment of the toothbrush of the present invention having a flexible neck and showing the brush in flexed position;

(0038) FIG. 9a is a fragmentary side view of the main embodiment of the toothbrush of the present invention rotated in an “X” axis;

(0039) FIG. 9b is a fragmentary side view of the main embodiment of the toothbrush of the present invention rotated in a “Y” axis;

(0040) FIG. 9c is a fragmentary side view of the main embodiment of the toothbrush of the present invention rotated in a “Z” axis;

(0041) FIG. 10A is an enlarged perspective view of the rotator and handle of the main embodiment separated from and without the head and socket enclosure.

(0042) FIG. 10B is a top view of the rotator and handle of the main embodiment separated from and without the head and socket enclosure; and

(0043) FIG. 11 is a side view of a further alternative embodiment of the rotator, neck and head for the toothbrush of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

(0044) The apparatus of the present invention will now be illustrated by reference to the accompanying drawings. Preferred embodiments of the toothbrush of the present invention have been assigned reference numeral 10. Other elements have been assigned the reference numerals referred to below.

(0045) The toothbrush 10 of the present invention is designed to reduce the amount of manual rotation of the toothbrush performed by the user. Toothbrush 10 comprises handle 20, which handle 20 includes neck 22. In certain alternative embodiments, handle 20 does not have a distinct neck p Tp. Toothbrush 10 also includes head 30. Head 30 includes a bed 32 and bristles 34 extending from the bed 32. Bed 32 extends from the surface from which bristles 34 extend back to the rear surface of the head 30 of toothbrush 10.

(0046) The general concept of the toothbrush of the present invention is to allow the head 30 of the toothbrush 10 to move in relation to the handle 20 or longitudinal axis of the brush when a user having poor manual dexterity attempts to brush his or her teeth.

(0047) In a preferred embodiment, neck 22 is made of rigid plastic or another rigid substance. In an alternative embodiment shown in FIG. 8, however, neck 22a is flexible and in particular is flexible enough to bend in response to a user pressing the head 30 of the brush 10 against the teeth and/or gums. This is further way to cause rotation of head 30 relative to the main part of handle 20 (other than neck 22a) or to the longitudinal axis of the brush 10. In effect, this provides another way for the force of the brush against the teeth and/or gums to be accommodated without the user having to turn his or her wrist or hand. The flexible neck 22a is a feature that can be incorporated with any of embodiments of the present invention.

(0048) Bed 32 includes a socket enclosure 40 extending outwardly away from the bristles 34. The socket enclosure 40 has a socket 42 defined in said socket enclosure.

(0049) Toothbrush 10 includes socket enclosure 40 having a socket 42 defined in said socket enclosure 40. In a preferred embodiment, socket enclosure 40 is integrally formed from bed 32 and merely extends the plastic or other material that bed 32 is made of outwardly away from the bristles 34, as best seen from FIGS. 3 and 6. Socket enclosure 40 is shaped so as to have defined therein a socket 42 inside said socket enclosure 40.

(0050) In an alternative embodiment of socket enclosure, socket enclosure 40, socket enclosure 40 is not integrally formed with bed 32 but is affixed thereto and extends outwardly away from the bristles 34. In this case, a first portion of socket enclosure 40 may extend into bed 32 and a second portion of socket enclosure 40 may extend outwardly away from bed 32. Socket enclosure 42 would then be either partially inside bed 32 or outside bed 32 adjacent to bed 32.

(0051) Accordingly, FIG. 6 is only one of many acceptable configurations of the location of socket 42 in relation to bed.
32 and is only one of many acceptable configurations of the shape and location of socket enclosure 40. In a preferred embodiment, however, socket enclosure 40 should not extend so far out of bed 32 that the user will be placing into his or her mouth a toothbrush head that is shaped dramatically different than a conventional toothbrush head whose rear surface of its bed is largely or substantially flat or only slightly curved. It is believed that toothbrush consumers would be more comfortable and accepting of using a brush 10 incorporating the present invention if said brush 10 had a head 30 shaped as close as possible to a conventionally shaped head.

[0052] Rotator 50 extends into the socket 42 and is free to move within said socket 42. Rotator is either not fixedly connected to the socket enclosure 40 or is connected in such a way that still allows rotator 50 to move freely in many directions within socket 42. For example, rotator 50 may have a flexible wire or other attachment structure connecting it to the surface of bed 32 from where bristles 34 emanate.

[0053] Rotator 50 is however rigidly connected to the handle 20, and in particular to neck 22. Rotator 50 is rigid and may be shaped like a ball or may be shaped like any other object, for example an ellipse that is close to spherical, as in FIG. 6. In a preferred embodiment, rotator 50 sits in socket 42 and can be moved around freely within socket 42 in a stable and reliable manner. This means that the way rotator 50 moves around within socket 42 on one given occasion should be essentially the same or similar to the way in which rotator 50 moves around within socket 42 on another occasion—this provides the user with a workable product that functions in a consistent manner. Furthermore, it means that the socket 42, socket enclosure 40 and rotator 50 are durable enough and connected in a durable way that such movement of rotator 50 within socket 42 will be reliable enough to be carried out many times over months without breaking down.

[0054] As best seen from FIG. 6, when rotator 50 moves around within socket 42, rotator cannot leave socket 42. In a preferred embodiment, this is because the entrance into socket 42 is simply too narrow. The size and shape of rotator 50 relative to the size and shape of the entrance to the socket 40 prevents said departure of rotator from leaving the socket 42 when said rotator moves within said socket 42. Those skilled in the art can appreciate that a small clearance between the rotator 50 and the inside wall 41 of the socket enclosure 40 allows rotator 50 to move around within socket 40 without allowing rotator to leave socket 42.

[0055] In an alternative embodiment, rotator 50 cannot leave socket 42 because of a loose attachment between one end of rotator 50 and an inside wall of socket enclosure 40. For example, in an alternative embodiment, a wire attached to an inside wall of socket enclosure 40 at a portion of said inside wall distal from the entrance to the socket 42 is also attached to rotator 50. In a further example, said wire might pierce a portion of the outside surface of rotator 50 or pierce a full diameter of said rotator if said rotator is a ball or spherical object. In that case the end of the wire proximal to the entrance to socket 42 would have a thicker diameter preventing the wire from detaching from rotator 50. In that way, or in other ways well known to those in the art, rotator 50 could move around freely within socket enclosure 40 and yet still not be able to leave socket 42. In the alternative embodiment, those skilled in the art will easily appreciate the amount of small clearance needed to allow movement of rotator 50 within socket 42.

[0056] It is noted that although FIG. 6 depicts the socket enclosure 40 as having a particular shape, the present invention contemplates other shapes so long as rotator 50 cannot fall out of socket 42 during rotation of rotator 50 within socket 42. Accordingly, the amount of material forming socket enclosure 40 may in certain embodiments be reduced or increased in particular areas, as desired.

[0057] The head 30 (and the socket enclosure 40 in embodiments where the socket enclosure is not defined to be part of the head or bed) is capable of moving or rotating in a variety of directions when the head 30 is pressed against the teeth and/or gums of the user during use of the brush 10. Head 30 (and socket enclosure 40 in embodiments where socket enclosure 40 is not defined as part of bed 32 or head 30 but is affixed onto bed 32), in a front and back direction in relation to the handle 20 and/or a side to side direction in relation to the handle 20. In a preferred embodiment, head 30 is capable of rotating in both the front and back direction in relation to the handle 20 and the side to side direction in relation to the handle 20 or alternatively in relation to a longitudinal axis of the toothbrush 10. In fact, in certain preferred embodiments, head 30 is capable of rotating in all directions in relation to the handle 20 or alternatively in relation to a longitudinal axis of the toothbrush 10.

[0058] Although the present invention contemplates a wide variety of motions in all directions, in one preferred embodiment, the range of front and back motion of the head 30 relative to the handle and/or relative to the longitudinal axis of the toothbrush is between approximately 10 rotational degrees and approximately 50 rotational degrees and more preferably between approximately 20 rotational degrees and approximately 40 rotational degrees. Similarly, in one preferred embodiment the range of side to side motion of the head is between approximately 10 rotational degrees and approximately 50 rotational degrees and more preferably between approximately 20 rotational degrees and approximately 40 rotational degrees.

[0059] FIGS. 9A, 9B and 9C depict fragmentary side views of the main embodiment showing rotation in three different axes. As can be seen from FIG. 9A, for example, the bristles 34 appear shorter because of the rotation in the “x” axis.

[0060] In an alternative embodiment, the head 30 can be rotated even more than 50 degrees in the front and back direction and/or in the side to side direction.

[0061] It is noted that head 30 is not moving or rotating only with respect to two axes but with respect to all three axes in all directions, although its movement has been described as being in a side to side direction and in a front and back direction. Hence, when head 30 is rotating in a direction that is in between being a “side to side” direction and a “front and back” direction, then the term “side to side direction” should be taken to mean the side to side component of the overall direction of head 30 and the term “front and back direction” should be taken to mean the front and back component of the overall direction of head 30.

[0062] At the very least, the movement of the head 32 is sufficient to obviate a need for the user to turn the toothbrush 10 manually using the user’s wrists or otherwise.

[0063] In an alternative embodiment shown in FIG. 11, in order to allow additional rotation of head 30 upon being
pressed against the teeth and/or gums of the user, the toothbrush has no socket or socket enclosure and instead rotator 50 is held against a groove 39 in a head extension 31 of head 30 such as by means of a wire 66, preferably a flexible wire, that runs through rotator 50, this wire 66 also being attached to head extension 31 of head at groove 39 of head extension 31. Accordingly, rotator 50 which extends from and is integrally connected to neck 22, has a first surface 51 that is adjacent to and conforms to a shape of the groove 39 and a second surface 56 out of which wire 66 exits. Wire 66 is preferably made of flexible metal, flexible plastic or other flexible but durable and strong materials well known to those skilled in the art. In certain embodiments, wire 66 may not be flexible at all. Wire 66 traverses rotator 50 from the first surface 51 to the second surface 56. Wire 66 is attached to rotator at least at second surface 56 and is attached to the head extension 31 at groove 39. If wire 66 is not flexible, then rotator 50 can still rotate freely in a lateral direction—side to side. As seen from FIG. 11, wire 66 can be designed so that wire 66 does not require a protruding attachment structure such as a bolt on the other side of head extension 31 in order to avoid having a bulging piece of material graze the users tongue or other areas inside the mouth during use. This is accomplished by counter sinking the bolt or other attachment structure so that it is flush with the surface of the head extension 31.

[0064] It is to be understood that while the apparatus of this invention have been illustrated and described in detail, the above-described embodiments are simply illustrative of the principles of the invention. It is to be understood also that various other modifications and changes may be devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof. It is not desired to limit the invention to the exact construction and operation shown and described. The spirit and scope of this invention are limited only by the spirit and scope of the following claims.

What is claimed is:

1. A toothbrush designed to reduce an amount of manual rotation of the toothbrush performed by the user, comprising:
   a handle, the handle including a neck,
   a head including a bed and bristles extending from the bed,
   the bed including a socket enclosure extending outwardly away from the bristles, the socket enclosure having a socket defined in said socket enclosure,
   a rotator integrally and rigidly connected to the neck and extending into the socket, the rotator free to move within said socket, the rotator and an entrance into the socket enclosure shaped so as to prevent the rotator from leaving the socket when said rotator moves within said socket,
   the head capable of rotating, upon the head being pressed against a teeth and/or gums of a user, in a front and back direction in relation to the handle and/or a side to side direction in relation to the handle.

2. The toothbrush of claim 1, wherein the head is capable of rotating, upon the head being pressed against the teeth and/or gums of the user, in both the front and back direction in relation to the handle and the side to side direction in relation to the handle.

3. The toothbrush of claim 2, wherein the rotator is a ball and wherein a clearance exists between the ball and an inside wall of the socket enclosure.

4. The tooth brush of claim 1, wherein the rotator is a ball and wherein a clearance exists between the ball and an inside wall of the socket enclosure.

5. The toothbrush of claim 2, wherein a range of front and back motion of the head caused by the rotator is between approximately 20 rotational degrees and approximately 40 rotational degrees.

6. The toothbrush of claim 2, wherein a range of front and back motion of the head by the rotator is between approximately 20 rotational degrees and approximately 50 rotational degrees.

7. The toothbrush of claim 2, wherein a range of side to side motion of the head by the rotator is between approximately 20 rotational degrees and approximately 40 rotational degrees.

8. The toothbrush of claim 2, wherein a range of side to side motion of the head by the rotator is between approximately 10 rotational degrees and approximately 50 rotational degrees.

9. The toothbrush of claim 2, wherein the rotation of the head is sufficient to obviate a need for the user to turn the toothbrush manually.

10. The toothbrush of claim 1, wherein the neck is flexible.

11. A toothbrush designed to reduce an amount of manual rotation of the toothbrush performed by the user, comprising:
   a handle, the handle including a neck,
   a head including a bed and bristles extending from the bed,
   the head including a head extension, the head extension having a groove,
   a rotator integrally connected to and extending from the neck, the rotator having a first surface that is adjacent to and conforms to a shape of the groove,
   a flexible wire traversing the rotator from the first surface to a second surface, the wire attached to the head extension at the groove and attached to the rotator at the second surface,
   the head capable of rotating, upon the head being pressed against a teeth and/or gums of a user, in a front and back direction in relation to the handle and/or a side, to side direction in relation to the handle.

12. The toothbrush of claim 11, wherein the head is capable of rotating, upon the head being pressed against the teeth and/or gums of the user, in both the front and back direction in relation to the longitudinal axis and the side to side direction in relation to the longitudinal axis.

13. The toothbrush of claim 12, wherein the rotator is a ball and wherein a clearance exists between the ball and an inside wall of the socket enclosure.

14. The tooth brush of claim 11, wherein the rotator is a ball and wherein a clearance exists between the ball and an inside wall of the socket enclosure.

15. The toothbrush of claim 11, wherein a range of front and back motion of the head caused by the rotator is between approximately 20 rotational degrees and approximately 40 rotational degrees.
16. The toothbrush of claim 11, wherein a range of front and back motion of the head by the rotator is between approximately 10 rotational degrees and approximately 50 rotational degrees.

17. The toothbrush of claim 11, wherein a range of side to side motion of the head by the rotator is between approximately 20 rotational degrees and approximately 40 rotational degrees.

18. The toothbrush of claim 11, wherein a range of side to side motion of the head by the rotator is between approximately 10 rotational degrees and approximately 50 rotational degrees.

19. The toothbrush of claim 11, wherein the rotation of the head is sufficient to obviate a need for the user to turn the toothbrush manually.

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