TOOTH BRUSHING SYSTEM

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Appl. No.:   12/436,201
Filed:      May 6, 2009

Related U.S. Application Data
Provisional application No. 61/051,488, filed on May 8, 2008.

ABSTRACT
A tooth brushing system adapted to simultaneously clean a set of maxilla teeth or a set of mandible teeth. The system comprises a vibration inducer, a controller for the vibration inducer, a power source and a handle adapted to enclose the vibration inducer, the controller for the vibration inducer and the power source. The system further comprises a plurality of brushes adapted to simultaneously contact the set of maxilla teeth or the set of mandible teeth, a vibration isolation plate integral with the handle and a vibration transfer plate connected to the vibration inducer and the plurality of brushes and releasably connected to the vibration isolation plate, wherein the handle is adapted to be effectively held within a hand of a user and the vibration isolation plate is adapted to isolate vibration from the set of maxilla teeth or the set of mandible teeth not contacted by the plurality of brushes.
TOOTH BRUSHING SYSTEM
CROSS-REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] The invention broadly relates to tooth brushes, more specifically to a tooth brush having a plurality of brushes, and even more particularly to a tooth brushing system having a plurality of brushes in the form of a U-shaped tray arranged to simultaneously clean the entire set of maxilla teeth or the entire set of mandible teeth.

BACKGROUND OF THE INVENTION

[0003] Regular brushing of teeth is important to maintain the oral and general health of an individual. Able body individuals typically use conventional manual or electric toothbrushes. Many individuals, such as the elderly and disabled, do not have the ability to regularly brush their teeth with conventional toothbrushes. The teeth of many of these individuals are not regularly or effectively brushed by themselves, while for others, health care workers are responsible for brushing their teeth. It is difficult and time consuming for the health care workers to brush the teeth of their patients using conventional toothbrushes. Moreover, some children have difficulty grasping traditional toothbrush handles and manipulating the tooth brush to effectively clean their teeth due to their smaller and less dexterous hands. In view of the foregoing, it should be apparent that for the aforementioned reasons and for a variety of other reasons, traditional tooth brushes present issues that preclude good dental hygiene.

[0004] In view of some elderly and disabled person’s inability to regularly and/or properly brush their teeth, those people may experience tooth decay, gum disease and other issues. Similarly, children and able body individuals who fail to perform sufficient and/or correct brushing also experience tooth decay, gum disease and other issues.

[0005] Similar health benefits are provided to animals by proper oral hygiene, and in addition to the difficulties described above relative to people cleaning their teeth, it is also extremely difficult to clean the teeth of animals. For example, dogs and cats are typically unwilling to permit a person to brush their teeth. The greater the length of time required clean the animal’s teeth, the less likely that it will be possible to complete the cleaning. Thus, using a conventional manual or electric toothbrush, which is capable of cleaning only a single tooth at a time, typically results in the incomplete cleaning of the animal’s teeth.

[0006] Many devices have been created in an attempt to facilitate effective and proper cleaning of teeth, for example, the devices described in U.S. Pat. Nos. 4,011,616; 4,237,574; 5,337,435; 6,223,376; 6,353,956; and, 7,082,638. Each of the devices disclosed in these patents suffers from defects and/or shortcomings that renders them ineffective, such as complexity of design, difficulty of operation, inability to properly sanitize after use, etc.

[0007] As can be derived from the variety of devices and methods directed at teeth cleaning, many means have been contemplated to accomplish the desired end, i.e., good dental hygiene including but not limited to minimization of tooth decay and gum disease. Heretofore, tradeoffs between ease of use, effectiveness and cost of manufacture were required. Thus, there is a long-felt need for a tooth brushing system that can effectively clean an entire upper or lower set of teeth simultaneously and that is easy to use and inexpensive to manufacture. Moreover, there is a long-felt need for a tooth brushing system that can be used by health care workers to clean the teeth of patients or used by individuals such as elderly, disabled or children to clean their own teeth, where these individuals have a disability that makes it difficult to use or an inability to effectively use a conventional tooth brush. Furthermore, there is a long-felt need for a tooth brushing system that can be used by veterinarians and pet owners that facilitates the efficient and effective cleaning of an animal’s teeth.

BRIEF SUMMARY OF THE INVENTION

[0008] A tooth brushing system has been developed including a U-shaped mouthpiece having a vibrating or reciprocating inner brush tray with bristles and an outer base tray that is generally isolated from the movement of the brush tray. The brush tray is seated in the base tray by resilient mounts that may also align the brush tray in the base tray. The resilient mounts allow the brush tray to be easily removed for replacement or cleaning. The base tray includes a front handle housing a battery, motor and gearing system to vibrate or reciprocate the brush tray. The handle and optionally the base tray may be stored on a battery recharging mount while the brush tray is separately soaked or cleaned.

[0009] The present invention broadly comprises a tooth brushing system adapted to simultaneously clean a set of maxilla teeth or a set of mandible teeth. The system includes a vibration inducer, a controller for the vibration inducer, a power source and a handle adapted to enclose the vibration inducer, the controller for the vibration inducer and the power source. The system further includes a plurality of brushes adapted to simultaneously contact the set of maxilla teeth or the set of mandible teeth, a vibration isolation plate integral with the handle and a vibration transfer plate connected to the vibration inducer and the plurality of brushes and releasably connected to the vibration isolation plate, wherein the handle is adapted to be effectively held within a hand of a user and the vibration isolation plate is adapted to isolate vibration from the set of maxilla teeth or the set of mandible teeth not contacted by the plurality of brushes.

[0010] In some embodiments, the vibration inducer is vibrationally isolated from the handle. In other embodiments, the vibration inducer includes a motor arranged to rotate an asymmetric mass, while in still other embodiments, the vibration inducer includes an ultrasonic transducer. In still yet other embodiments, the controller for the vibration inducer includes an on/off switch, and in some embodiments, the power source includes at least one primary battery or at least one secondary battery. In other embodiments, the handle includes a generally T-shape.

[0011] In further embodiments of the present invention, the plurality of brushes includes a U-shaped set of bristles, and the U-shaped set of bristles has a generally U-shaped cross-section, a generally V-shaped cross-section or combinations thereof.

[0012] In other embodiments, the vibration transfer plate is connected to the vibration isolation plate via at least one vibration damping means, and in some of these embodiments,
the at least one vibration damping means is selected from the group consisting of: a spring, a bumper, a post and combinations thereof. In yet other embodiments, the vibration transfer plate further includes at least one bite stop, and in still yet further embodiments, the vibration transfer plate further includes a plurality of mounting features arranged to releasably secure the plurality of brushes in a plurality of locations.

[0013] In some embodiments, the vibration isolation plate includes a plurality of posts. In such embodiments, the plurality of posts are arranged to releasably engage the vibration transfer plate. In yet other embodiments, the vibration transfer plate further includes at least one rail adapted to receive the plurality of brushes and wherein a position of each of the plurality of brushes is modified by one or more of the following steps: moving each of the plurality of brushes along a length of the at least one rail; rotating each of the plurality of brushes about the at least one rail; moving each of the plurality of brushes about laterally relative to the at least one rail; bending at least a portion of the at least one rail upwardly or downwardly; and, bending at least a portion of the at least one rail laterally. In some of these embodiments, the position of each of the plurality of brushes is modified automatically in response to contact between the plurality of brushes and the set of teeth to be cleaned. In still yet other embodiments, the vibration isolation plate is releasably secureable to the handle and the vibration isolation plate secured to the handle form an integral assembly. In yet another embodiment, the present invention tooth brushing system further includes means for adjusting a length of the plurality of brushes, at least one of the plurality of brushes is secured to the vibration isolation plate via a vibration damping connector and an integral assembly including the vibration inducer, the controller for the vibration inducer, the power supply, at least two of the plurality of brushes and the vibration transfer plate. In this embodiment, the integral assembly is disposed within the handle and the means for adjusting a length of the plurality of brushes is adapted to modify a position of the integral assembly within the handle thereby modifying a distance between the at least one of the plurality of brushes secured to the vibration isolation plate and the at least two of the plurality of brushes of the integral assembly.

[0014] It is a general object of the present invention to provide a tooth brushing system that can be effectively used by a variety of different types of users to clean their teeth and thereby minimize tooth decay and gum disease.

[0015] It is another general object of the present invention to provide a tooth brushing system that can be used by health care workers to clean the teeth of patients or can be used by individuals such as elderly, disabled or children to clean their own teeth, where these individuals have a disability that makes it difficult to use or an inability to effectively use a conventional tooth brush.

[0016] It is yet another general object of the present invention to provide a tooth brushing system that can simultaneously clean the entire set of maxilla teeth or the entire set of mandible teeth.

[0017] It is a further general object of the present invention to provide a tooth brushing system that is easy to use and inexpensive to manufacture.

[0018] These and other objects and advantages of the present invention will be readily appreciable from the following description of preferred embodiments of the invention and from the accompanying drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The nature and mode of operation of the present invention will now be more fully described in the following detailed description of the invention taken with the accompanying drawing figures, in which:

[0020] FIG. 1 is a perspective view of an embodiment of the present invention tooth brushing system;

[0021] FIG. 2 is a partial cross-sectional view of an embodiment of the present invention tooth brushing system positioned with the mouth of a person;

[0022] FIG. 3 is an exploded perspective view of another embodiment of the present invention tooth brushing system;

[0023] FIG. 4 is front perspective view of yet another embodiment of the present invention tooth brushing system;

[0024] FIG. 5 is an enlarged front elevational view of a portion of the tooth brushing system shown in FIG. 4;

[0025] FIG. 6 is a perspective view of another embodiment of the present invention tooth brushing system having a partial cut-away handle;

[0026] FIG. 7 is a front elevational view of the tooth brushing system shown in FIG. 6 having a portion of the vibration isolation plate removed;

[0027] FIG. 8 is a perspective view of an embodiment of a vibration transfer plate used in the tooth brushing system shown in FIG. 6;

[0028] FIG. 9 is a partial perspective view of yet another embodiment of the present invention tooth brushing system;

[0029] FIG. 10 is a perspective view of an embodiment of a charging station for use with the present invention tooth brushing system;

[0030] FIG. 11 is a perspective view of another embodiment of a charging station for use with the present invention tooth brushing system; and,

[0031] FIG. 12 is a side elevational view of yet another embodiment of the present invention tooth brushing system.

DETAILED DESCRIPTION OF THE INVENTION

[0032] At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or functionally similar, structural elements of the invention. While the present invention is described with respect to what is presently considered to be the preferred aspects, it is to be understood that the invention as claimed is not limited to the disclosed aspects.

[0033] Furthermore, it is understood that this invention is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only, and is not intended to limit the scope of the present invention, which is limited only by the appended claims.

[0034] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this invention belongs. Although any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the invention, the preferred methods, devices, and materials are now described.

[0035] An embodiment of the present invention comprises tooth brushing system 100 adapted to simultaneously clean a
set of maxilla teeth 102 or a set of mandible teeth 104. The set of teeth may be that of user 106, i.e., the person using system 100 brushing their own teeth, may be that of a person having their teeth brushed by another, e.g., a patient having their teeth brushed by a health care worker, or may be that of an animal having its teeth brushed by a veterinarian or pet owner. Tooth brushing system 100 comprises vibration inducer 108, controller 110 for vibration inducer 108, power source 112 and handle 114 adapted to enclose vibration inducer 108, controller 110 and power source 112. System 100 further comprises plurality of brushes 116 adapted to simultaneously contact the entire set of maxilla teeth 102 or the entire set of mandible teeth 104. Vibration transfer plate 118 connected to vibration inducer 108 and plurality of brushes 116 and vibration isolation plate 120 connected to vibration transfer plate 118. In some embodiments of system 100, handle 114 is adapted to be effectively held within hand 122 of user 106, e.g., a health care worker, a child, an elderly person, etc., and vibration isolation plate 120 is adapted to isolate vibration from set of maxilla teeth 102 or set of mandible teeth 104 not contacted by plurality of brushes 116.

[0036] It should be appreciated that there are a variety of embodiments of plurality of brushes 116. For example, plurality of brushes 116 comprise a plurality of brush segments 124 wherein interface 126 arranged between each respective segment 124 permits the modification of the overall shape of plurality of brushes 116 thereby permitting matching its overall shape to the shape of the user’s set of teeth, e.g., set of maxilla teeth 102 or set of mandible teeth 104. Similarly, in an alternate embodiment of the present invention, i.e., tooth brushing system 128, plurality of brushes 130 comprise a plurality of brush segments 132 wherein interface 134 arranged between each respective segment 132 permits the modification of the overall shape of plurality of brushes 130 thereby permitting matching its overall shape to the shape of the user’s set of teeth. Additionally, in this alternate embodiment, the overall length of plurality of brushes 130 may be modified by removing as many segments 132 as is necessary to match the overall length of the user’s set of teeth. It should be appreciated that in a preferred embodiment of the present invention, plurality of brushes 116 and 130 are formed from a flexible material, e.g., silicon. It should be further appreciated that that the foregoing arrangements of plurality of brush segments, being flexibly interconnected, are capable of automatically repositioning themselves according to the orientation of each respective tooth of the set of teeth being cleaned, e.g., a brush segment aligned with a tooth reorients itself according to the interaction between this tooth, having a rotational and/or angular position, and the segment. The general shape of the bristles arranged about plurality of brushes 116 and 130 and the manual reorientation of the plurality of brush segments are discussed infra.

[0037] System 100 comprises handle 114. Similarly, system 128, which is also arranged to simultaneously clean a set of maxilla teeth 102 or a set of mandible teeth 104, comprises handle 136. Depending on the arrangement of vibration inducer 108, it may be advantageous to vibrationally isolate vibration inducer 108 from handle 114 or 136. For example, system 128 comprises vibration damping material 138 arranged between vibration inducer 108 and handle 136. Damping material 138 may be formed of any material that is capable of damping vibration originating from vibration inducer 108, for example, silicon, natural rubber, etc. Such an arrangement of vibration isolation will increase user comfort while the present invention tooth brushing system is in use. Thus, the vibration will be used to clean the contacted teeth and not to fatigue the user’s hand. Moreover, the present invention may include a handle comprising a generally T-shape, e.g., handle 139. It should be appreciated that the shape of the handle will aid in the use of the present invention tooth brushing system in that the handle provides means by which user 106 may grasp the device and that some embodiments of the handle may be more easily grasped by some uses versus grasping other handles, e.g., some users may easily grasp handles 114 or 136 having sizes larger than traditional tooth brushes and some users may easily grasp handle 139 having a generally T-shape. Moreover, the handle may extend directly forward of the vibration isolation or transfer plates, such that the respective plates and handle are co-planar. Alternatively, the handle may extend outward at an angle relative to the plates and therefore may be suitable for a health care provider to hold the present invention tooth brushing system while positioning the plurality of brushes in the mouth of a patient.

[0038] The present invention may include one of a variety of different vibration inducing means, and several of these vibration inducing means are discussed herein but are not intended to limit the scope of the claims to only these types of vibration inducing means as a variety of other means are also possible. For example, system 100 comprises ultrasonic transducer 140, while system 128 comprises motor 142 arranged to rotate asymmetric mass 144. Depending on the needs of user 106 and/or the person or animal having their teeth cleaned, one vibration inducer may be more appropriate than another. Transducer 140 can provide ultrasonic vibration which is beneficial under some cleaning conditions, while motor 142 can provide vibrations having fewer cycles per unit time which is beneficial under different cleaning conditions. Controller 110 is arranged to control the frequency at which transducer 140 or motor 142 vibrates, and such controller includes the necessary electronic components to affect such control. Controller 110 may also provide a timer arranged to control how long the vibration inducer 108 provides vibration and/or may include on/off switch 145 whereby system 100 or system 128 may be turned on or off. In view of the foregoing, one of ordinary skill in the art will recognize that plurality of brushes 116 and 130 move in a vibrating and/or reciprocating manner to simultaneously brush and clean an entire set of teeth.

[0039] The present invention comprises power source 112 wherefrom vibration inducer 108 and controller 110 receive power. Power source 112 may comprise at least one primary battery 146 or alternatively at least one secondary battery 148. It should be appreciated that the term “primary battery” is intended to mean a battery that can produce current immediately on assembly, e.g., zinc-carbon or alkaline batteries, and that the term “secondary battery” is intended to mean a battery that must be charged prior to use, e.g., nickel-cadmium, nickel metal hydride or lithium-ion batteries. It should be further appreciated that power source 112 may comprise a transformer plugged directly into an electrical outlet and arranged to provide power to vibration inducer 108 and controller 110, and that such variations are within the spirit and scope of the claimed invention.

[0040] Plurality of brushes 116 and 130 show two embodiments of bristle arrangements for use with the present invention tooth brushing system. Plurality of brushes 116 comprises a U-shaped set of bristles 150, and the overall set of
bristles 150 comprises a generally U-shaped cross-section (See Fig. 3). Alternatively, plurality of brushes 130 comprises a U-shaped set of bristles 154, and the overall set of bristles 154 comprises a generally V-shaped cross-section (See Fig. 7). Furthermore, bristles 150 and 154 may be coated with tooth paste or other tooth cleaning compound and may be formed from any material suitable and safe for use in cleaning teeth, e.g., nylon.

[0041] The present invention tooth brushing system further comprises a vibration transfer plate. The vibration transfer plate may take a variety of forms, for example, vibration transfer plates 118 and 158. In some embodiments, e.g., system 100, vibration transfer plate 118 forms the means by which bristles 150 is connected to vibration inducer 108, i.e., bristles 150 is attached to plurality of brushes 116 which also forms vibration transfer plate 118 and in turn vibration transfer plate 118 is connected to vibration inducer 108. In other embodiments, e.g., system 128, vibration transfer plate 158 acts as an interface between plurality of brushes 130 and vibration inducer 108, i.e., bristles 154 are connected to plurality of brushes 130, which is in turn connected to vibration transfer plate 158, and which is itself in turn connected to vibration inducer 108. In the former embodiment, vibration transfer plate 118 is connected to vibration isolation plate 120 via at least one vibration damping means 160, while in the latter embodiment, vibration transfer plate is connected to vibration isolation plate 162 via at least one damping means 164. It should be appreciated that in each embodiment at least one damping means 160 and 164 may be selected from a group of suitable damping means; however the group discussed infra in not considered limiting and the at least one damping means may be formed by any suitable material. In some embodiments, the at least one damping means may comprise spring 166, may comprise bumper 168 or alternatively may comprise post 170. Furthermore, a combination of damping means may also be included, for example, several springs in combination with several posts, and such variations are within the spirit and scope of the claimed invention. It should be appreciated that the various damping means provide lower and lateral support to the vibration transfer plate and allow the vibration transfer plate to move in a vibrating and reciprocating manner to brush a set of teeth on which the present invention is applied. Thus, the damping means isolate the vibration isolation plate from the vibration and reciprocal movement of the vibration transfer plate. The damping means may also be used to align plurality of brushes 116 with vibration isolation plate 120. In such embodiments, the damping means, e.g., springs 166, may be seated in openings or recesses 171. By seating the damping means in the openings or recesses, plurality of brushes 116 can be reliably aligned in vibration isolation plate 120.

[0042] Additionally, in some embodiments, the vibration transfer plate may further comprise a plurality of mounting features, e.g., slots 172, arranged to releasably secure the plurality of brushes in a plurality of locations. Thus, it will be apparent to one having ordinary skill in the art that the position of plurality of brushes 130 may be modified by altering the location of connecting posts 174 within slots 172, thereby permitting user 106 to position plurality of brushes 130 in the most comfortable position based on the shape of the respective set of teeth being cleaned.

[0043] In some embodiments, the vibration transfer plate, e.g., vibration transfer plate 156, may include at least one bite stop 176. Bite stops 176 are arranged to limit the depth within the bristles, and therefore the plurality of brushes, that user 106, or the person or animal having their teeth cleaned, may position their teeth. Thus, without any special training or skill level, user 106 can properly align the plurality of brushes relative to her teeth or another’s teeth thereby maximizing the effectiveness of the present invention tooth brushing system.

[0044] As can be seen in the figures, the present invention may include different embodiments of the vibration isolation plate, e.g., vibration isolation plates 120 and 162. In the embodiment shown by system 100, vibration isolation plate 120 is integrally formed, e.g., molded, with handle 114 and is therefore stationary relative to handle 114, while in the embodiment shown by system 128, vibration isolation plate 162 is releasably secure to handle 136 via releasable locking means, e.g., locking tabs within openings, variable shaped slots having complimentary posts disposed therein, etc. Vibration isolation plate 162 further comprises a plurality of posts, i.e., posts 170. Posts 170 and vibration isolation plate 162 may be formed from a compliant material which also provides vibration isolation characteristics, for example, silicon. It should be appreciated from the figures that the plurality of posts 170 are arranged to releasably engage with vibration transfer plate 158. Thus, as user 106 uses the embodiment shown in system 128, the set of teeth to be cleaned are in contact with the vibrating plurality of brushes 130, while the set of teeth not being cleaned are in contact with the non-vibrating vibration isolation plate 162. This isolation of the mouth and non-brushed set of teeth provides comfort to user 106 and avoids unnecessary irritation of the mouth and teeth. It should be appreciated that the vibration isolation plate may further include bite pads on the surface opposite the vibration transfer plate, and the bite pads may be formed from a deformable material thereby increasing the isolation of vibration transmitted to the teeth not being cleaned.

[0045] A further embodiment of the present invention tooth brushing system is shown in Fig. 9. Tooth brushing system 180 comprises handle 182 having vibration isolation plate 184 fixedly secured thereto. Vibration isolation plate 184 includes vibration damping means, e.g., pads 186, arranged to minimize the amount of vibration transferred from vibration transfer plate 188 to vibration isolation plate 184. In this embodiment, vibration transfer plate 188 comprises rails 190 and 192; however, it should be appreciated that vibration transfer plate 188 may comprise only one rail or alternatively may comprise more than two rails, and such variations are within the spirit and scope of the claimed invention. Vibration is transferred via connection 194 to vibration transfer plate 188, from vibration transfer plate 188 to plurality of brushes 196 and subsequently to the teeth being cleaned by plurality of brushes 196. As can be seen in the figure, plurality of brushes 196 comprises brush elements 198 having substantially V-shaped cross-sections and brush elements 200 having substantially U-shaped cross-sections, and further includes bite stop 202. Each of brush elements 198 and 200 includes bristles 204; however, for clarity bristles 204 have been shown in only one of the brush element.

[0046] In this embodiment, rails 190 and 192 are adapted to receive brush elements 198 and 200 and the position of each respective brush element 198 and 200 may be independently modified. For example, the position of either type of brush element may be modified by: moving the brush elements along the length of rails 190 and 192, i.e., moved according to bi-directional arrow 206; rotating the brush elements about rails 190 and 192, i.e., rotated according to bi-directional
arrow 208; moving the brush elements about laterally relative to rails 190 and 192, i.e., moving according to bi-directional arrow 210; bending rails 190 and 192 upwardly or downwardly, i.e., bending according to bi-directional arrow 212; and/or, bending rails 190 and 192 laterally, i.e., bending according to bi-directional arrow 214. It should be appreciated that rails 190 and 192 may be formed from a number of different materials, e.g., spring steel or plastic, and that the foregoing modification of brush element position may occur manually, e.g., a user physically moves the position of the respective brush elements, or the respective brush elements may move in response to the interaction of the teeth being cleaned and the complimentary brush elements as described supra.

[0047] It should be further appreciated that removal of the plurality of brushes allows for replacement and/or cleaning of the plurality of brushes. The plurality of brushes may be cleaned by being soaked in a cleaning fluid that also applies a tooth cleaning composition to the brushes. Similarly, the plurality of brushes may be soaked between brushings and removed from a soaking container for use in the present invention tooth brushing system.

[0048] In addition to the aforementioned vibration inducers, it should be appreciated that the present invention may also include other means of imparting vibration from the vibration inducer to the plurality of brushes. For example, the vibration inducer may further comprise rotary transmission or gearing 216 and linkage 218 coupling transmission or gearing 216 to plurality of brushes 116. The rotation of transmission or gearing 216 is converted by linkage 218 to a reciprocating or vibratory motion that drives the movement of plurality of brushes 116. Linkage 218 may be a reciprocating shaft extending through the handle and pivotally attached to the front of plurality of brushes 116. Further, linkage 218 may include frame 220 that extends beneath plurality of brushes 116 and supports brushes 116, similar to the embodiment including vibration transfer plate 158.

[0049] In addition to the above described embodiments, the present invention may further comprise mount and battery charger 222 or 224, which may include a generally inverted U-shaped saddle 226 arranged to receive the U-shaped portion of the present invention tooth brushing system, or may include recessed portion 228 arranged to receive base 230 of handle 114. Conductive contacts 232 on the U-shaped portion of the present invention engage conductive contacts 234 on charger 224, when the U-shaped portion is seated within saddle 226. Similarly, conductive contacts 236 on base 230 engage conductive contacts 238 on charger 222, when base 230 is seated within recessed portion 228. Chargers 222 and 224 receive electrical power via electrical power cord 240. The engagement of the contacts 232 with 234 and contacts 236 with 238 allows power source 112 in handle 114 to be recharged, e.g., recharging secondary batteries 148. In addition to the foregoing arrangements of recharging systems, it should be appreciated that other recharging systems may also be incorporated within the present invention, e.g., inductive chargers or a transformer plugged directly into the handle, and such charging systems are within the spirit and scope of the claimed invention. Housing 242 of mount and charger 222 or 224 may have a simple form such as the rectangular housing shown in FIG. 10 or a decorative form such as the tooth shaped housing shown in FIG. 11.

[0050] It has been further contemplated that the length of the plurality of brushes may be modified differently than described in the embodiments supra. FIG. 12 shows a side elevation view of yet another embodiment of the present invention tooth brushing system, i.e., tooth brushing system 244. Tooth brushing system 244 comprises vibration inducer 246, a controller (not shown) for vibration inducer 246, a power source (not shown) and handle 248. The controller and power source has been left out of FIG. 12 for clarity; however, it should be appreciated that the arrangement of such components is similar to the embodiments of the present invention described above. System 244 further comprises plurality of brushes 250, vibration isolation plate 252 and vibration transfer plate 254. It should be appreciated that the nature of operation of the foregoing components is similar to their respective functions set forth above. System 244 further comprises integral assembly 256 which includes vibration inducer 246, the controller (not shown) for vibration inducer 246, the power supply (not shown), at least two of plurality of brushes 250, e.g., brushes 250a, 250b and 250c, and vibration transfer plate 254. Integral assembly 256 is disposed within handle 248. Furthermore, at least one of plurality of brushes 250, e.g., brush 250d, is secured to vibration isolation plate 252 via vibration damping connector 258. Vibration damping connector 258 may be formed from any material suitable for damping vibration transmitted from vibration transfer plate 254 to vibration isolation plate 252, e.g., silicone or natural rubber, and such variations are within the spirit and scope of the claimed invention. System 244 further comprises means for adjusting length 260 of plurality of brushes 250, e.g., the combination of knob 262, threaded post 264 and threaded hole 266. In this embodiment, as knob 262 is rotated, threaded post 264 is also rotated and the interaction of the threads of threaded post 264 with the threads of threaded hole 266 causes integral assembly 256 to move within handle 248 according to the directions shown by bi-directional arrow 268. As integral assembly 256 moves back and forth, vibration transfer plate 254 is permitted to move past brush 250d, as vibration damping connector 258 is disposed within slot 270. Thus, slot 270 is formed within vibration transfer plate 254 in substantially the same direction as bi-directional arrow 268. In view of the foregoing, it should be apparent that the means for adjusting length 260 is adapted to modify the position of integral assembly 256 within handle 248 thereby modifying the distance between the at least one of plurality of brushes 250 secured to vibration isolation plate 252, e.g., brush 250d, and the at least two of plurality of brushes 250 of integral assembly 256, e.g., brushes 250a, 250b and 250c. It should be appreciated that although the means for adjusting length 260 is depicted as the combination of knob 262, threaded post 264 and threaded hole 266, other embodiments are also possible, e.g., a post having periodic grooves disposed along its length and a spring detent within handle 248 arranged to releasably secure the post at various positions by interacting with the respective grooves, and such variations are within the spirit and scope of the claimed invention.

[0051] Thus, it is seen that the objects of the present invention are efficiently obtained, although modifications and changes to the invention should be readily apparent to those having ordinary skill in the art, which modifications are intended to be within the spirit and scope of the invention as claimed. It also is understood that the foregoing description is illustrative of the present invention and should not be considered as limiting. Therefore, other embodiments of the present invention are possible without departing from the spirit and scope of the present invention.
What I claim is:
1. A toothbrushing system adapted to simultaneously clean a set of maxilla teeth or a set of mandible teeth, said system comprising:
   a vibration inducer;
   a controller for said vibration inducer;
   a power source;
   a handle adapted to enclose said vibration inducer, said controller for said vibration inducer and said power source;
   a plurality of brushes adapted to simultaneously contact said set of maxilla teeth or said set of mandible teeth;
   a vibration isolation plate integral with said handle; and,
   a vibration transfer plate connected to said vibration inducer and said plurality of brushes and releasably connected to said vibration isolation plate, wherein said handle is adapted to be effectively held within a hand of a user and said vibration isolation plate is adapted to isolate vibration from said set of maxilla teeth or said set of mandible teeth not contacted by said plurality of brushes.
2. The toothbrushing system of claim 1 wherein said vibration inducer is vibrationally isolated from said handle.
3. The toothbrushing system of claim 1 wherein said vibration inducer comprises a motor arranged to rotate an asymmetric mass.
4. The toothbrushing system of claim 1 wherein said vibration inducer comprises an ultrasonic transducer.
5. The toothbrushing system of claim 1 wherein said controller for said vibration inducer comprises an on/off switch.
6. The toothbrushing system of claim 1 wherein said power source comprises at least one primary battery or at least one secondary battery.
7. The toothbrushing system of claim 1 wherein said handle comprises a generally T-shape.
8. The toothbrushing system of claim 1 wherein said plurality of brushes comprises a U-shaped set of bristles, said U-shaped set of bristles comprising a generally U-shaped cross-section, a generally V-shaped cross-section or a combination thereof.
9. The toothbrushing system of claim 1 wherein said vibration transfer plate is connected to said vibration isolation plate via at least one vibration damping means.
10. The toothbrushing system of claim 9 wherein said at least one vibration damping means is selected from the group consisting of: a spring, a bumper, a post and combinations thereof.
11. The toothbrushing system of claim 1 wherein said vibration transfer plate further comprises at least one bite stop.
12. The toothbrushing system of claim 1 wherein said vibration transfer plate further comprises a plurality of mounting features arranged to releasably secure said plurality of brushes in a plurality of locations.
13. The toothbrushing system of claim 1 wherein said vibration isolation plate comprises a plurality of posts, said plurality of posts arranged to releasably engage said vibration transfer plate.
14. The toothbrushing system of claim 1 wherein said vibration transfer plate further comprises at least one rail adapted to receive said plurality of brushes and wherein a position of each of said plurality of brushes is modified by one or more of the following steps: moving each of said plurality of brushes along a length of said at least one rail; rotating each of said plurality of brushes about said at least one rail; moving each of said plurality of brushes about laterally relative to said at least one rail; bending at least a portion of said at least one rail upwardly or downwardly; and, bending at least a portion of said at least one rail laterally.
15. The toothbrushing system of claim 14 wherein said position of each of said plurality of brushes is modified automatically in response to contact between said plurality of brushes and said set of teeth to be cleaned.
16. The toothbrushing system of claim 1 wherein said vibration isolation plate is releasably securable to said handle and said vibration isolation plate secured to said handle form an integral assembly.
17. The toothbrushing system of claim 1 further comprising:
   means for adjusting a length of said plurality of brushes; at least one of said plurality of brushes is secured to said vibration isolation plate via a vibration damping connector; and,
   an integral assembly comprising said vibration inducer, said controller for said vibration inducer, said power supply, at least two of said plurality of brushes and said vibration transfer plate, wherein said integral assembly is disposed within said handle and said means for adjusting a length of said plurality of brushes is adapted to modify a position of said integral assembly within said handle thereby modifying a distance between said at least one of said plurality of brushes secured to said vibration isolation plate and said at least two of said plurality of brushes of said integral assembly.

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