[0046]

As a method for implanting the bristle bundle 5, in addition to a flat wire implantation method for implanting the bristle bundle 5 of the brush described above into each of the bristle implantation holes 7 by folding the bristle bundle 5 in half and arranging the flat wire at the portion folded in half, a thermal fusion method for press-fitting a lower end of the bristle bundle 5 into a molten resin to be the head part 4 and fixing it, an in-mold method for heating the lower end of the bristle bundle 5 to form a molten mass and then filling a cavity of a mold with the molten resin to mold integrally with the head part 4, and the like can be used.

[0047]

As illustrated in Fig. 3, a width W of the head part 4 is preferably 6 to 16 mm, more preferably 8 to 15 mm, and still more preferably 10 to 12 mm. If the width W is an upper limit or less, it is possible to cause the head part 4 to approach confined places such as the back teeth without causing discomfort due to vibration. When the width W of the head part 4 is reduced, the discomfort caused by the vibration of the head part 4 is reduced. Furthermore, if the width W is a lower limit or more, a sufficient amount of bristle bundles 5 can be implanted. Thus, it is possible to secure the feeling of cleaning the back teeth or the like. In addition, even if the head part 4 vibrates, it is possible to cause the brush to firmly touch a cleaning portion and it is possible to perform stable oral cavity cleaning.

[0048]

As illustrated in Fig. 3, a length V of the head part 4 is preferably 20 to 35 mm, and more preferably 20 to 30 mm. If the length V is an upper limit or less, the displacement of the distal end of the head due to the vibration of the head part 4 is not large, which leads to a reduction in discomfort. Furthermore, if the length V is a lower

1B in this embodiment is provided, the present invention is not necessarily limited to such a constitution. In some cases, a constitution in which the bristled surface 4a of the head part 4 is continuously (straightly) connected to the front surface 3a of the neck part 3 can be also provided.

[0063]

Also, the head part 4 is provided to be inclined with respect to the neck part 3 from the back surface side toward the front surface side. That is to say, in the replacement brush 1B in this embodiment, as illustrated in Fig. 2, an axis line T1 of the head part 4 parallel to the bristled surface 4a (an extension line of the extension line L3) is inclined toward the front surface side with respect to the axis line T2 (an extension line along a central axis of the shaft hole) of the neck part 3 parallel to an attachment/detachment direction with respect to the handle part 2.

[0064]

In this case, an angle (hereinafter referred to as an "inclination" of the head part 4) α formed between the axis line T1 of the head part 4 and the axis line T2 of the neck part 3 is preferably 1 to 5°, and more preferably 2 to 4°. Thus, it is possible to prevent the back surface 4b of the head part 4 from coming into contact with the oral cavity tissue (such as the inside of the cheek) as well as to improve the feeling of cleaning the back teeth and the back side of the teeth.

[0065]

On the other hand, if the inclination α of the head part 4 is less than 1°, the above-described effect is insufficient as well as the vibration from the brush main body 1A is easily transmitted to the head part 4. Thus, a vibration width in a direction perpendicular to that of the bristled surface 4a increases and discomfort due to vibration at the time of using is promoted. On the other hand, if the inclination α of the head part

second bristle bundle 5b positioned on a rearmost end (a base end) side of an outer bristled region S2 which will be described later.

[0069]

The vibration minimizing part 8 prevents excessive vibration in a direction perpendicular to that of the bristled surface 4a of the head part 4.

Also, the vibration minimizing part 8 can increase the strength of a connection portion between the head part 4 and the neck part 3 while keeping the above-described thickness of the head part 4 on the back surface 4b side thin. Thus, it is possible to reduce discomfort due to vibration while preventing the back surface 4b of the head part 4 from coming in contact with the oral cavity tissue (such as the inside of the cheek).

[0070]

As illustrated in Fig. 5, the bristled surface 4a of the head part 4 includes a central bristled region S1 formed by arranging a plurality of bristle implantation holes 7 in a central portion side by side in a length direction of the head part 4 and an outer bristled region S2 formed by arranging the plurality of bristle implantation holes 7 on both sides of the central bristled region S1 side by side in the length direction of the head part 4.

[0071]

In this embodiment, for example, the central bristled region S1 is formed by three rows of bristle implantation holes 7 arranged in a central portion of the bristled surface 4a in the length direction of the head part 4 among the plurality of bristle implantation holes 7 arranged on the bristled surface 4a of the head part 4 side by side in a staggered manner. On the other hand, a pair of outer bristled regions S2 are formed on both sides of the central bristled region S1 by two rows of bristle implantation holes 7 arranged side by side in the length direction of the head part 4.

[0072]

As illustrated in Fig. 6, a bristle bundle 5 (hereinafter referred to as a “first bristle bundle 5a”) constituted of tapered-shaped brushes (hereinafter referred to as “first taper bristles”) whose diameters decrease toward bristle tips is implanted in each of the bristle implantation holes 7 of the central bristled region S1. On the other hand, bristle bundles 5 (hereinafter referred to as “second bristle bundles 5b”) constituted of tapered-shaped brushes (hereinafter referred to as “second taper bristles”) having distal end diameters smaller than those of the first taper bristles are implanted in the bristle implantation holes 7 of the outer bristled region S2.

[0073]

Also, the second bristle bundles 5b are implanted in bristle implantation holes 7a and 7b positioned on a distal end side and a rear end side of the central bristled region S1. Thus, the second bristle bundles 5b implanted on the distal end side and the rear end side of the central bristled region S1 and the second bristle bundles 5b implanted in the outer bristled region S2 are arranged on the bristled surface 4a of the head part 4 to surround the periphery of the first bristle bundles 5a implanted in the central bristled region S1. That is to say, the plurality of second bristle bundles 5b implanted in the outer bristled region S2 and an outer circumferential bristled region S3 in which the plurality of second bristle bundles 5b are implanted to be arranged around the central bristled region S1 side by side in a circumferential direction of the head part 4 are provided on the bristled surface 4a of the head part 4.

[0074]

In addition, a bristling density of the first bristle bundles 5a implanted in the central bristled region S1 is set higher than a bristling density of the second bristle bundles 5b implanted in the outer bristled region S2. The “bristling density” mentioned

herein is a value obtained by [a total sum of areas of bristle implantation holes]÷[a bristled area], the "total sum of areas of bristle implantation holes" is a value obtained by adding areas of the bristle implantation holes 7 forming bristled regions S1 and S2, and the "bristled area" is based on "JIS S 3016-1995" and is represented by an area of a surrounding region obtained by connecting an outer portion of the bristle implantation holes 7 positioned on outer circumferences of the bristled regions S1 and S2 using a straight line.

[0075]

In this embodiment, a tooth surface is efficiently brushed using the first bristle bundles 5a in the central bristled region S1 having a bristling density higher than that of the outer bristled region S2 and including the first taper bristles having the distal end diameter larger those of the second taper bristles, and it is possible to reduce the intensity of the vibration transmitted to the gums at the time of toothbrushing and it is possible to reduce discomfort due to vibration in the oral cavity by implanting the second bristle bundles 5b formed of the second taper bristles having a bristling density smaller than that of the central bristled region S1 and having a distal end diameter smaller than those of the first taper bristles in the outer bristled region S2 which relatively easily comes into contact with the gums.

[0076]

Also, since the first bristle bundles 5a in the central bristled region S1 having the high bristling density are constituted of the first taper bristles having a distal end diameter larger than those of the second taper bristles, the strength of a bristle waist due to the first bristle bundles 5a produces good vibration transmission, and it is possible to improve the feeling of cleaning due to vibration.

[0077]

second bristle bundles 5b serving as a cushion.

[0080]

Therefore, it is possible to improve the cleaning performance of the tooth surface and the comfort of contacting the gums by setting a bristle length difference t_2-t_1 between the first bristle bundles 5a in the central bristled region S1 and the second bristle bundles 5b in the outer bristled region S2 described above preferably in the range of 0.5 to 3.0 mm, more preferably in the range of 0.5 to 2.0 mm, and still more preferably in the range of 0.5 to 1.0 mm.

[0081]

Also, in this embodiment, it is possible to achieve a good balance between the cleaning performance of the tooth surface and the cleaning performance in gaps between the teeth by setting the distal end diameter of the first taper bristles to 40 to 80 μm and setting the distal end diameter of the second taper bristle to 5 to 30 μm Furthermore, it is possible to achieve both cleaning of the tooth surface and reduction of discomfort due to vibration.

[0082]

In addition, in this embodiment, it is desirable that a plurality of bristle implantation holes 7 constituted of at least two rows or more of bristle implantation holes 7 be provided in the central bristled region S1 side by side in the length direction of the head part 4. Thus, by implanting two rows or more of first bristle bundles 5a in the central bristled region S1 in the length direction of the head part 4, it is possible to obtain a sufficient plaque removing ability against the tooth surface and a sufficient cleaning feeling through vibration using the first bristle bundles 5a.

[0083]

Furthermore, in this embodiment, when it is assumed that the bristling density of

Although the above-described constitution in which the second bristle bundles 5b are implanted in the bristle implantation holes 7a and 7b positioned on the distal end side and the rear end side of the central bristled region S1 is provided in this embodiment, a constitution in which the first bristle bundles 5a are implanted instead of the second bristle bundles 5b may be provided. Furthermore, the first bristle bundles 5a and the second bristle bundles 5b are not limited to the above-described constitution using the tapered bristles and any brushes such as straight bristles having a constant diameter toward bristle tips can be used for the first bristle bundles 5a and the second bristle bundles 5b.

[0087]

As described above, in the electric toothbrush 1 including the replacement brush 1B in this embodiment, by reducing the thickness of the head part 4, it is possible to obtain an excellent feeling of the back teeth being cleaned and it is possible to prevent excessive vibration caused by reducing the thickness of the head part 4. Thus, it is possible to reduce discomfort due to vibration in the oral cavity.

[0088]

The present invention is not necessarily limited to the above-described embodiment and various changes can be made without departing from the gist of the present invention.

For example, the arrangement of the bristle bundles 5 on the bristled surface 4a is not necessarily limited to the constitution illustrated in Figs. 5 and 6 described above and can be changed as appropriate.

[0089]

For example, in another arrangement example illustrated in Fig. 7, a central bristled region S1 is formed of three rows of bristle implantation holes 7 arranged side by

side in the length direction of a head part 4 in a central portion of a bristled surface 4a among the plurality of bristle implantation holes 7 arranged in the bristled surface 4a of the head part 4 side by side in a staggered manner. On the other hand, a pair of outer bristled regions S2 are formed of one row of bristle implantation holes 7 arranged side by side in the length direction of the head part 4 are on both side of the central bristled region S1.

[0090]

Also, a diameter of each of the bristle implantation holes 7 in the outer bristled region S2 is larger than a diameter of each of the bristle implantation holes 7 in the central bristled region S1. Thus, as illustrated in Fig. 8, a bristle bundle diameter of a second bristle bundle 5d implanted in each of the bristle implantation holes 7 in the outer bristled region S2 is larger than a bristle bundle diameter of a first bristle bundle 5c implanted in each of the bristle implantation holes 7 in the central bristled region S1.

[0091]

Furthermore, a bristle length of the first bristle bundle 5c is longer than a bristle length of the second bristle bundle 5d. Taper bristles can be used for the first bristle bundles 5c and the second bristle bundles 5d. The first bristle bundle 5c and the second bristle bundle 5d are not limited to the above-described constitution using the taper bristles and any brushes such as straight bristles having a constant diameter toward bristle tips can be used for the first bristle bundle 5c and the second bristle bundle 5d.

[0092]

In addition, although not illustrated in the drawings, a constitution in which the plurality of second bristle bundles 5d implanted in the outer bristled region S2 and the outer circumferential bristled region having the plurality of second bristle bundles 5d implanted in the head part 4 arranged side by side in the circumferential direction to