

[DESCRIPTION]

[TITLE OF INVENTION]

TOOTHBRUSH

[Technical Field]

5 [0001]

The present invention relates to a toothbrush.

Priority is claimed on Japanese Patent Application No. 2020-214446, filed December 24, 2020, the content of which is incorporated herein by reference.

[Background Art]

10 [0002]

There are various types of toothbrush head part sizes according to user's preference and purpose. In terms of oral hygiene, a compact head “for carefully brushing each tooth” is generally suitable, but, for those who lack brushing techniques or who focus on quick and efficient brushing, a “wide-head type” toothbrush with a wide head part is provided that can simultaneously brush a cervical portion, a space between teeth, and a tooth surface (for example, Patent Document 1).

[0003]

This “wide-head type” toothbrush has a problem in that, although cleaning efficiency is high because a plurality of cleaning parts can be simultaneously brushed, the “cleaning accuracy” of each part, in particular, the cleaning of a gap portion, such as the space between the teeth and the cervical portion, is can be lacking. This is because bristle tips of the toothbrush touch a peripheral area other than an area to be brushed, and physical interference is likely to occur.

[Citation List]

25 [Patent Document]

[0004]

[Patent Document 1]

Japanese Unexamined Patent Application, First Publication No. 2016-13247

[Summary of Invention]

5 [Technical Problem]

[0005]

In a case in which a thin neck part is adopted for the “wide-head type” toothbrush in consideration of operability in an oral cavity, the center of gravity becomes unstable during brushing, resulting in bending of the neck part in a width direction or
10 twisting of the neck part in a circumferential direction around a long axis direction.

[0006]

The present invention has been made in consideration of the above points, and an object of the present invention is to provide a "wide-head type" toothbrush that can suppress bending of the neck part in the width direction or twisting of the neck part in the
15 circumferential direction around the long axis direction.

[Solution to Problem]

[0007]

According to one aspect of the present invention, there is provided a toothbrush including: a head part located on a distal end side in a long axis direction and having a
20 bristle-tufting surface; a grip part disposed on a rear end side with respect to the head part; and a neck part disposed between the head part and the grip part, in which the maximum length of the head part in a width direction parallel to the bristle-tufting surface and perpendicular to the long axis direction is 12 mm or more and 18 mm or less, the maximum length of the head part in a thickness direction perpendicular to the bristle-
25 tufting surface is 2 mm or more and 4 mm or less, the minimum length in the width

direction and the minimum length in the thickness direction of the neck part are 3 mm or more and 5 mm or less, in the head part, when a region from a distal end in the long axis direction to a first position located on a most rear end side where the length in the width direction is maximized is denoted by A, and a region from the first position to a second position at a boundary between the head part and the neck part is denoted by B, and, in the neck part, when a region from the second position to a third position which is at a distance corresponding to 65% of the length of the neck part in the long axis direction is denoted by C, and a region from the third position to a fourth position at a boundary between the neck part and the grip part which is at a distance corresponding to 35% of the length of the neck part in the long axis direction is denoted by D, a relationship of (a volume of the region D)/(a volume of the region C) ≥ 1.0 is satisfied, and at the fourth position, the maximum length in the width direction is greater than the maximum length in the thickness direction.

[0008]

15 In the toothbrush according to the aspect of the present invention, a relationship of (a volume of the region A)/(the volume of the region D) ≤ 0.60 is satisfied.

[0009]

In the toothbrush according to the aspect of the present invention, the volume of the region D is 1000 mm³ or more.

20 [0010]

In the toothbrush according to the aspect of the present invention, a relationship of (a sum of a volume of the region A and the volume of the region C)/(a sum of the volume of the region A, a volume of the region B, the volume of the region C, and the volume of the region D) ≤ 0.70 is satisfied.

25 [0011]

In the toothbrush according to the aspect of the present invention, the maximum length in the width direction at the fourth position is 11 mm or more, and a relationship of (the maximum length in the width direction at the fourth position) - (the maximum length in the thickness direction at the fourth position) ≥ 2 mm is satisfied.

5 [0012]

In the toothbrush according to the aspect of the present invention, a relationship of $1.5 \text{ mm} \leq (\text{the maximum length of the region A in the width direction}) - (\text{the maximum length in the width direction at the fourth position}) \leq 7 \text{ mm}$ is satisfied.

[0013]

10 In the toothbrush according to the aspect of the present invention, a relationship of (the maximum length in the thickness direction at the fourth position) - (the maximum length in the thickness direction at the third position) ≥ 3 mm is satisfied.

[0014]

In a toothbrush according to the aspect of the present invention, a relationship of
 15 (the maximum length in the thickness direction at the third position) - (an average value of the length in the thickness direction of the region A over the long axis direction) ≤ 2 mm is satisfied. The average value of the length in the thickness direction of the region A over the long axis direction is defined by a value represented by (the maximum value of the length in the thickness direction of the region A over the long axis direction + the
 20 minimum value of the length in the thickness direction of the region A over the long axis direction)/2.

[0015]

In the toothbrush according to the aspect of the present invention, in the region C, the maximum length in the thickness direction is 4.5 mm or less over the long axis
 25 direction, and a relationship of (the maximum length in the width direction at the third

position) - (the maximum length in the thickness direction at the third position) > 1 mm is satisfied.

[Advantageous Effects of Invention]

[0016]

5 According to the present invention, it is possible to provide a wide-head type toothbrush that can suppress bending of a neck part in a width direction or twisting of the neck part in a circumferential direction around a long axis direction.

[Brief Description of Drawings]

[0017]

10 FIG. 1 is a diagram showing an embodiment of the present invention, and is a front view of a toothbrush 1 as seen from a bristle-tufting surface 3a side.

FIG. 2 is a side view showing a configuration of the toothbrush 1.

FIG. 3 is a partially enlarged front view of a part of a head part 3 and a neck part 4.

15 FIG. 4 is a partially enlarged front view of a part of the head part 3 and the neck part 4.

[Description of Embodiments]

[0018]

Hereinafter, an embodiment of a toothbrush of the present invention will be
20 described with reference to FIGS. 1 to 4.

The following embodiment shows one aspect of the present invention, does not limit the present invention, and can be randomly changed within the scope of the technical idea of the present invention. In addition, in the following drawings, in order to make each configuration easy to understand, the scale and number of each structure
25 are different from those of the actual structure.

[0019]

In the following description, a side (side facing a bristle-tufting surface) of a head part 3, which will be described below, on which a bristle-tufting surface 3a is provided, is defined as a front surface side of a toothbrush 1, and a side of the head part 3 opposite to a side where the bristle-tufting surface 3a faces is defined as a back surface side of the toothbrush 1. In addition, a direction in which a handle body 2 extends will be described as a long axis direction, a direction parallel to the bristle-tufting surface 3a and orthogonal to the long axis direction will be described as a width direction of the toothbrush 1, and a direction orthogonal to the bristle-tufting surface 3a will be described as a thickness direction of the toothbrush 1. In addition, a side (head part 3 side) on which the head part 3 is provided in the long axis direction will be described as a distal end side, and a side (grip part 5 side) on which a grip part 5 is provided will be described as a rear end side, as appropriate.

[0020]

FIG. 1 is a front view of the toothbrush 1 as seen from the bristle-tufting surface 3a side.

FIG. 2 is a side view showing a configuration of the toothbrush 1. In FIG. 1, a brush 40 is not shown.

[0021]

As shown in FIGS. 1 and 2, the toothbrush 1 of the present embodiment includes the brush 40 and the handle body 2 made of a resin molded body formed in a long shape as a whole. As an example, the total length of the toothbrush 1 is 150 mm or more and 200 mm or less.

[0022]

The handle body 2 is made of a hard resin. The handle body 2 includes the

head part 3 located on the distal end side and having the bristle-tufting surface 3a, the grip part 5 disposed on the rear end side with respect to the head part 3, and a neck part 4 disposed between the head part 3 and the grip part 5. The toothbrush 1 can clean an inside of an oral cavity by the brush 40 having a plurality of bristle bundles (not shown) tufted on the bristle-tufting surface 3a of the head part 3.

[0023]

As the hard resin for forming the handle body 2, a resin having a flexural modulus (JIS7171) of 1000 MPa or more and 2800 MPa or less is an exemplary example, and, for example, a polypropylene (PP) resin, a polyacetal (POM) resin, a polybutylene terephthalate (PBT) resin, and the like are preferably used in consideration of strength.

[0024]

(Outer Contour Line Shape on Both Sides in Width Direction of Handle Body)

As shown in FIG. 1, in the toothbrush 1 of the present embodiment, when the handle body 2 is seen in the front view, outer contour lines on both sides in the width direction of the handle body 2 are formed in linear symmetry with respect to a center line located at the center in the width direction and extending in the long axis direction. Therefore, in the following description, the outer contour line on one side in the width direction (lower side in FIG. 1) will be described, and the description of the outer contour line on the other side (upper side in FIG. 1) will be omitted. Regarding a position of a curvature center of a curved region extending in an arc shape, a center side in the width direction with respect to the outer contour line is called an inner side, and a side opposite to the center in the width direction is called an outer side.

[0025]

The toothbrush 1 of the present embodiment has a first curved region E1 in which the length in the width direction of the head part 3 spreads in an arc shape from a

distal end of the head part 3 to the rear end side, a first linear region L1 that extends toward the rear end side from a rear end of the first curved region E1 to a first position P1 with a constant length in the width direction of the head part 3, a second linear region L2 in which the length in the width direction of the head part 3 decreases from the first position P1 to a second position P2 which forms a boundary between the head part 3 and the neck part 4, a third linear region L3 that extends toward the rear end side from the second position P2 with a constant length in the width direction of the neck part 4, a second curved region E2 that has a curvature center on the outer side and extends in an arc shape from a rear end of the third linear region L3 to the rear end side, a third curved region E3 that has a curvature center on the inner side and extends in an arc shape from a rear end of the second curved region E2 to the rear end side, and a fourth linear region L4 that extends from a rear end of the third curved region E3 to the rear end side with a constant length in the width direction of the grip part 5, in the outer contour line in the width direction of the handle body 2, when the handle body 2 is seen in the front view.

[0026]

(Outer Contour Line Shape on Front Surface Side of Handle Body)

As shown in FIG. 2, the toothbrush 1 of the present embodiment has a fifth linear region L5 that extends linearly to the rear end side continuously from the bristle-tufting surface 3a of the head part 3, a fourth curved region E4 that has a curvature center on the front surface side and extends in an arc shape toward the rear end side from a rear end of the fifth linear region L5 to a fourth position P4 where a vertex 51 having a protruding shape is provided and which is a boundary between the neck part 4 and the grip part 5, a fifth curved region E5 that has a curvature center on the front surface side and extends in an arc shape from the vertex 51 at the fourth position P4 to the rear end side, and a sixth linear region L6 that extends linearly to the rear end side from a rear end

of the fifth curved region E5, from the rear end side of the head part 3 toward the grip part 5 side in the outer contour line on the front surface side of the handle body 2 when the handle body 2 is seen from the side view.

[0027]

5 (Outer Contour Line Shape on Back Surface Side of Handle Body)

The toothbrush 1 of the present embodiment has a seventh linear region L7 that extends linearly to the rear end side from the distal end of the head part 3, a sixth curved region E6 that has a curvature center on the front surface side and extends in an arc shape from a rear end of the seventh linear region L7 to the rear end side, and an eighth linear
10 region L8 that extends linearly to the rear end side from a rear end of the sixth curved region E6, in the outer contour line on the back surface side of the handle body 2, when the handle body 2 is seen in the side view.

In addition, the straight lines and curves of the outer contour line shape in the toothbrush 1 described above are one aspect, and, for example, the second linear region
15 L2, the third linear region L3, and the like may be a curve or a combination of a curve and a straight line, and the outer contour line shape is not limited to the above description.

[0028]

(Head Part)

20 The head part 3 is a portion for brushing the inside of the oral cavity with the plurality of bristle bundles, and has a substantially rectangular shape having an arc shape in the front view, with rounded corners, as shown in FIG. 1. In the present embodiment, the boundary between the head part 3 and the neck part 4 is an end point of a curve forming a corner cut from the neck part 4 side in a front view shape of the head part 3,
25 that is, a second position P2 at which a bending direction of the curve forming the corner

cut changes.

[0029]

The head part 3 has the bristle-tufting surface 3a on the front surface side. A plurality of bristle-tufting holes 6 are arranged side by side on the bristle-tufting surface 3a. A shape and a hole diameter of the bristle-tufting holes 6 are not particularly limited, and in FIG. 1, as an example, the bristle-tufting holes 6 that are circular in the front view and have the same diameter are shown. A plurality of rows (10 rows FIG. 2) in which the plurality of bristle-tufting holes 6 (3 to 7 in FIG. 2) are arranged at intervals in the width direction corresponding to the length of the head part 3 in the width direction are provided at intervals in the long axis direction. The bristle bundles constituting the brush 40 are tufted in the bristle-tufting holes 6.

[0030]

The bristle bundle is tufted into each of the bristle-tufting holes 6 by bundling a plurality of bristles (filaments), folding the bristles in half, and driving them into the bristle-tufting holes 6 with a metal retaining tool (not shown) called an anchor interposed therebetween. The shape of the head part 3 is not particularly limited, and for example, the bristle-tufting surface 3a on the front surface side and a surface on the back surface side form flat and parallel surfaces with each other.

[0031]

The maximum length in the width direction of the head part 3 is preferably 12 mm or more and 18 mm or less, for example. The head part 3 of the present embodiment is of a so-called wide-head type. By providing the wide-head type head part 3, a contact area with each part of the teeth can be gained, and the teeth can be brushed efficiently since a plurality of teeth can be brushed.

[0032]

The maximum length in the thickness direction of the head part 3 is preferably 2 mm or more and 4 mm or less, and more preferably 2.5 mm or more and 3.5 mm or less, for example. The head part 3 of the present embodiment is a so-called thin head. By providing the thin head part 3, even with the wide-head type head part 3, operability to the back teeth can be improved, and performance of cleaning the back teeth can be improved.

[0033]

In the present embodiment, in the head part 3, a region from the distal end in the long axis direction to the first position P1 on the most rear end side where the length in the width direction is maximized is denoted by A, and a region from the first position P1 to the second position P2 at the boundary between the head part 3 and the neck part 4 is denoted by B.

[0034]

In a case in which the outer contour portion of the head part 3 in the front view is an ellipse or the like, and a position located on the most rear end side where the length in the width direction is maximized is not on the rear end side with respect to the center in the long axis direction of the head part 3, the position can be a position in the long axis direction of an edge portion on the rear end side of the bristle-tufting hole 6 in a row located on the most rear end side, out of rows with the largest number of the bristle-tufting holes 6 arranged in the width direction.

[0035]

In the head part 3, a ratio of the total volume of the bristle-tufting holes 6 (total hole volume) to a resin volume of a bristle-tufting region connecting an outer edge portion of the bristle-tufting hole 6 located on the most outer circumferential side is preferably 1:2.5 or more.

By setting the ratio of the total volume of the bristle-tufting holes 6 to the resin volume of the bristle-tufting region to 1:2.5 or more, The resin amount of the bristle-tufting region becomes larger with respect to the bristle-tufting hole 6, and the head part 3 becomes rigid, so that warpage and deflection in use of the head part 3 can be suppressed even though the head part is a wide-head type and a thin head type.

[0036]

The maximum length of the head part 3 in the long axis direction is preferably 25 mm or more. By setting the maximum length of the head part 3 in the long axis direction to 25 mm or more, a thin region becomes longer, and it becomes easy to brush a deep part of the back teeth. In addition, it is possible to suppress excessive lengthening of the neck part 4, so that the neck part 4 can be brushed without excessive flexure.

[0037]

(Neck Part)

The neck part 4 is a portion that is disposed between the grip part 5 and the head part 3 and that connects the grip part 5 and the head part 3. The boundary between the neck part 4 and the grip part 5 is the fourth position P4 where the fourth curved region E4 and the fifth curved region E5 intersect in the side view. That is, it is a position where the vertex 51 having a protruding shape is formed connecting to the fourth curved region E4 and the fifth curved region E5 having the curvature center on the outer side.

The boundary between the neck part 4 and the grip part 5 when there is no vertex having a protruding shape or when it is not visible is defined as a position where the curvature center switches in the thickness direction in the side view. When this position cannot be identified, the boundary is defined as a position of switching from a hard resin to a different resin, for example, a soft resin such as an elastomer. When this position cannot be identified, the boundary is defined as a position of 75 mm from the

distal end of the head part 3 to the rear end side.

[0038]

In the neck part 4, from the second position P2, which is the boundary with the head part 3, toward the grip part 5, a region where the outer contour line is formed by the third linear region L3 in the front view shown in FIG. 1 is constant and has the minimum width. The width of the neck part 4 gradually increases from the minimum width in a region from the rear end of the third linear region L3 to the fourth position P4 that is the rear end of the third curved region E3 where the outer contour line is connected via the second curved region E2.

10 [0039]

The minimum length in the width direction of the neck part 4 is preferably 3 mm or more and 5 mm or less, and more preferably 3.5 mm or more and 4.5 mm or less.

The minimum length in the thickness direction of the neck part 4 is preferably 3 mm or more and 5 mm or less. The neck part 4 of the present embodiment is of a so-called slim-neck type. By setting the minimum length in the width direction and the minimum length in the thickness direction of the neck part 4 to 3 mm or more and 5 mm or less, the operability to the back teeth can be improved even with the wide-head type head part 3, and performance of cleaning the back teeth can be improved.

[0040]

20 The length from the first position P1 located on the most rear end side where the length in the width direction of the head part 3 is maximized to the second position P2 located on the most distal end side where the length in the width direction of the neck part 4 is minimized is preferably 9.0 mm or less.

By setting the length from the first position P1 to the second position P2 to 9.0 mm or less, the width of the rear end side of the head part 3 sharply converges, and the

25

length at which the neck part 4 becomes a narrowest part can be reduced to improve the operability.

[0041]

(Grip Part)

5 The grip part 5 is a portion to be gripped by a user and is formed in a long columnar shape.

 The grip part 5 has a constant length in the width direction from the fourth position P4 of the boundary with the neck part 4 toward the rear end side in the side view shown in FIG. 1.

10 [0042]

 In the side view shown in FIG. 2, the thickness of the grip part 5 gradually decreases from the fourth position P4 of the boundary with the neck part 4 toward the rear end side, to an end portion on the rear end side of the fifth curved region E5 where the fifth curved region E5 in the outer contour line in the front surface side has the

15 maximum value at the fourth position P4 and the grip part 5 has the minimum thickness.

 The length of the grip part 5 in the thickness direction is constant on the rear end side with respect to the end portion on the rear end side of the fifth curved region E5.

[0043]

 The grip part 5 has, for example, a finger contact portion 50 on which the thumb
20 abuts, on the front surface side. In the side view, the finger contact portion 50 is formed in an end portion on the rear end side of the fifth curved region E5 that is a curved surface having a concave shape toward the back surface side as it advances from the vertex 51 toward the rear end side. Since the finger contact portion 50 is provided with the curved surface having a concave shape, fitness can be obtained when the finger
25 contact portion 50 is pressed to the back surface side.

[0044]

Since the finger contact portion 50 has the vertex 51 having a protruding shape and a flat shape, adjustment is performed to prevent excessive flexure in the thickness direction, and propagation of flexure from the neck part 4 to the grip part 5 can be suppressed.

In addition, by providing the vertex 51 having a protruding shape, it is possible to ensure a large wall thickness on the front surface side of the grip part 5, and to suppress the propagation of flexure from the neck part 4 to the grip part 5 by preventing excessive flexure in the thickness direction and imparting moderate flexibility to the grip part 5 side.

[0045]

The length in the long axis direction from the distal end of the head part 3 to the end portion on the distal end side (fourth position P4) of the finger contact portion 50 is preferably 77 mm or more and 90 mm or less.

By setting the length in the long axis direction from the distal end of the head part 3 to the end portion on the distal end side of the finger contact portion 50 to 77 mm or more and 90 mm or less, the distal end side with respect to the end portion on the distal end side of the finger contact portion 50 becomes sufficiently longer, and it becomes easy to reach the deep part of the back teeth.

[0046]

The length in the long axis direction from the narrowest part (second position P2) of the neck part 4 to the end portion on the distal end side (fourth position P4) of the finger contact portion 50 is preferably 52 mm or more and 70 mm or less.

By setting the length in the long axis direction from the narrowest part of the neck part 4 to the end portion on the distal end side of the finger contact portion 50 to 52

mm or more and 70 mm or less, the neck part 4 becomes sufficiently longer, and it becomes easy to reach the deep part of the back teeth.

[0047]

From the neck part 4 to the rear end of the grip part 5, it is preferable that, on
5 either of the back surface side or the front surface side in the thickness direction, a distance in the thickness direction between a back surface of the head part 3 and a back surface of the grip part 5 or a distance in the thickness direction between a front surface (bristle-tufting surface 3a) of the head part 3 and a front surface of the grip part 5 is 2.5 mm or less and a cross-sectional shape perpendicular to the long axis direction is wide
10 and flat, and that, on the other of the back surface side or the front surface side in the thickness direction, the thickness from the neck part 4 to the finger contact portion 50 gradually increases.

As a result, the thickness from the neck part 4 to the finger contact portion 50 increases in one direction, so that flexure is less likely to occur and a firm brushing
15 comfort can be obtained even with the long neck part 4. In addition, since a difference in a position in the thickness direction position between the neck part 4 and the grip part 5 is small, it becomes easy to brush a target position in the oral cavity. In addition, a position of the end portion on the rear end side of the third linear region L3 is preferably within ± 15 mm in the long axis direction from the third position P3, which will be
20 described below.

[0048]

In a case in which this configuration is adopted, it is preferable that the thickness rapidly increases by, for example, 5 to 10 mm in a region from a position located on the most rear end side where the length in the width direction of the neck part 4 is minimized
25 to the end portion on the distal end side of the finger contact portion 50. In addition, it

is preferable that the back surface of the head part 3 and the back surface of the grip part 5 or the front surface of the head part 3 and the front surface of the grip part 5 are parallel to each other. As a result, force transferred from the grip part 5 to the head part 3 is applied to the teeth in the same vector, so that a firm brushing comfort can be obtained and the operability can be improved.

[0049]

It is preferable that the grip part 5 has a length of 9.0 mm or more in the thickness direction and a length of 10 mm or more in the width direction, has a region of constant thickness and width of 80 mm or more, and is made only of a hard resin, and it is more preferable that the grip part 5 has a region of constant thickness and width of 90 mm or more and 120 mm or less.

When the region of the grip part 5 where the thickness and width are constant is less than 80 mm, the grip part cannot be held with the entire palm and is not stable. When the region of the grip part 5 where the thickness and width are constant exceeds 120 mm, a point to be gripped is not fixed, and the center of gravity is not stable when gripped on the rear end side. By setting the thickness and width of the grip part 5 within the above ranges and by forming the grip part 5 only from a hard resin, flexure is less likely to occur, the grip part 5 can be firmly gripped, and a firm brushing comfort can be obtained.

[0050]

It is preferable that the length in the long axis direction of the grip part 5 from the distal end of the finger contact portion 50 to the rear end of the grip part 5 is 80 mm or more and 120 mm or less, and that the total length of the handle body 2 is 150 mm or more and 200 mm or less, as described above.

By setting the lengths of the grip part 5 and the handle body 2 within the above

ranges, the toothbrush can be held firmly and a firm brushing comfort can be obtained, and ease of grip and accessibility to the oral cavity can be ensured by sufficiently ensuring the total length.

[0051]

5 (Region A to Region D)

As shown in FIG. 1, in the neck part 4, when a region from the second position P2 to the third position P3 which is at a distance corresponding to 65% of the length of the neck part 4 in the long axis direction is denoted by C, and a region from the third position P3 to the fourth position P4 at the boundary between the neck part 4 and the grip part 5 which is at a distance corresponding to 35% of the length of the neck part 4 in the long axis direction is denoted by D, it is preferable that a relationship of (a volume of the region D)/(a volume of the region C) $\geq$ 1.0 is satisfied, and it is more preferable that a relationship of (the volume of the region D)/(the volume of the region C) $\geq$ 1.5 is satisfied.

15 [0052]

By making (the volume of the region D)/(the volume of the region C) $\geq$ 1.0, that is, by setting the volume of the region D located on the rear end side of the neck part 4 to equal to or more than the volume of the region C located on the distal end side of the neck part 4, the base on the grip part 5 side of the neck part 4 can be strengthened to suppress flexure and twisting while ensuring the advantage of the operability in the oral cavity on the distal end side of the neck part 4.

[0053]

The volume of each of the regions A to D was calculated by multiplying an area in the front view of each of the regions A to D by an area in the side view and dividing the resultant by the length in the long axis direction.

[0054]

The length in the width direction at the third position P3 of the end portion on the rear end side of the region C is preferably 6.7 mm or less.

By setting the length in the width direction at the third position P3 to 6.7 mm or less, a thin region continues from the second position P2 at the boundary between the neck part 4 and the head part 3 to the third position P3, so that the operability can be ensured.

[0055]

A value represented by (the maximum length in the width direction of the region C)/(the maximum length in the thickness direction of the region C) throughout the long axis direction of the region C is preferably 1.0 or more and 1.8 or less.

By setting the value represented by (the maximum length in the width direction of the region C)/(the maximum length in the thickness direction of the region C) to 1.0 or more and 1.8 or less throughout the long axis direction of the region C, the neck part 4 in the wide-head type toothbrush 1 is made wide to prevent twisting.

[0056]

A position where the length in the width direction is larger by 1 mm with respect to the second position P2 as a starting point of the region C is preferably located on the finger contact portion 50 side with respect to a position which is at a distance corresponding to 40% of the length of the neck part 4 in the long axis direction with the starting point of the region C as a reference, and more preferably located on the finger contact portion 50 side with respect to a position which is at a distance corresponding to 50% of the length of the neck part 4 in the long axis direction.

Since the position where the length in the width direction is longer by 1 mm is located on the finger contact portion 50 side with respect to the position which is at a

distance corresponding to 40% of the length of the neck part 4 in the long axis direction, the narrow region with the small length in the width direction exists longer, so that the operability can be improved.

[0057]

- 5 At the fourth position P4 which is the end portion on the rear end side of the region D, the maximum length in the width direction is preferably greater than the maximum length in the thickness direction.

At the fourth position P4, the maximum length in the width direction is larger than the maximum length in the thickness direction, so that the shape can be flattened in
10 the width direction.

[0058]

The volume of the region D is preferably 1000 mm^3 or more, and more preferably 1300 mm^3 or more.

- By setting the volume of the region D to 1000 mm^3 or more, the volume of the
15 base of the neck part 4 becomes sufficiently large, and flexure and twisting can be suppressed.

[0059]

- The maximum length in the width direction at the fourth position P4 which is the end portion on the rear end side of the region D is preferably 11 mm or more, and
20 satisfies a relationship of (the maximum length in the width direction at the fourth position P4) - (the maximum length in the thickness direction at the fourth position P4) $\geq$ 2 mm.

- By setting the maximum length in the width direction at the fourth position P4 which is the end portion on the rear end side of the region D to 11 mm or more, and
25 satisfying the relationship of (the maximum length in the width direction at the fourth

position P4) - (the maximum length in the thickness direction at the fourth position P4) $\geq$ 2 mm, the base of the neck part 4 is wide, so that bending in the width direction and twisting of the neck part 4 can be suppressed.

[0060]

- 5 In addition, a relationship of $1.5 \text{ mm} \leq$ (the maximum length of the region A in the width direction) - (the maximum length in the width direction at the fourth position P4) $\leq 7 \text{ mm}$ is preferably satisfied.

When (the maximum length of the region A in the width direction) - (the maximum length in the width direction at the fourth position P4) is less than 1.5 mm, it is not applied as the wide-head type head part 3, or the base of the neck part 4 becomes abnormally wide and the feeling of use is impaired. When (the maximum length of the region A in the width direction) - (the maximum length in the width direction at the fourth position P4) exceeds 7 mm, an effect of suppressing the twisting is reduced.

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[0061]

- 15 In addition, a relationship of (the maximum length in the thickness direction at the fourth position P4) - (the maximum length in the thickness direction at the third position P3) $\geq 3 \text{ mm}$ is preferably satisfied.

By satisfying the relationship of (the maximum length in the thickness direction at the fourth position P4) - (the maximum length in the thickness direction at the third position P3) $\geq 3 \text{ mm}$, the difference in thickness can be increased in the region D of the neck part 4. Therefore, it is possible to suppress the propagation of the flexure in the thickness direction to the grip part 5. Accordingly, the rapid increase in thickness of the neck part 4 in the short region D makes it possible to suppress the twisting while ensuring the advantage of the operability.

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25 [0062]

Regarding the region A in the head part 3 and the region D in the neck part 4, it is preferable to satisfy a relationship of $(\text{a volume of the region A})/(\text{a volume of the region D}) \leq 0.60$, and more preferable to satisfy a relationship of $(\text{a volume of the region A})/(\text{a volume of the region D}) \leq 0.40$. The volume of the region A excludes the volume of the bristle-tufting holes 6 (total hole volume).

By setting $(\text{the volume of the region A})/(\text{the volume of the region D}) \leq 0.60$, the volume of the head part 3 can be made smaller than the volume of the neck part 4 on the rear end side. Therefore, by setting $(\text{the volume of the region A})/(\text{the volume of the region D}) \leq 0.60$, the rear end side of the neck part 4 can be strengthened to suppress the flexure and twisting while ensuring the advantages of efficient brushing and operability by the thin wide head.

[0063]

Regarding the regions A and B in the head part 3 and the region C in the neck part 4, it is preferable to satisfy a relationship of $0.7 \leq (\text{the volume of the region A})/[(\text{a volume of the region B}) + (\text{the volume of the region C})] \leq 1.0$. The volume of the region B excludes the volume of the bristle-tufting holes 6 (total hole volume).

By satisfying the relationship of $0.7 \leq (\text{the volume of the region A})/[(\text{the volume of the region B}) + (\text{the volume of the region C})] \leq 1.0$, the volume of region A is smaller than the sum of the volume of the region B and the volume of the region C, so that the operability can be ensured.

[0064]

It is preferable to satisfy a relationship of $(\text{the maximum length in the thickness direction at the third position P3}) - (\text{the average value of the length in the thickness direction of the region A over the long axis direction}) \leq 2 \text{ mm}$. The average value of the length in the thickness direction of the region A over the long axis direction is defined by

a value represented by (the maximum value of the length in the thickness direction of the region A over the long axis direction + the minimum value of the length in the thickness direction of the region A over the long axis direction)/2.

By satisfying the relationship of (the maximum length in the thickness direction at the third position P3) - (the average value of the length in the thickness direction of the region A over the long axis direction) ≤ 2 mm, the thickness of 65% of the distal end side (head part 3 side) of the head part 3 to the neck part 4 does not change greatly, so that the operability can be improved.

[0065]

It is preferable that, in the region C, the maximum length in the thickness direction is 4.5 mm or less over the long axis direction, and that a relationship of (the maximum length in the width direction at the third position P3) - (the maximum length in the thickness direction at the third position P3) > 1 mm is satisfied.

By making the region C have the maximum length in the thickness direction of 4.5 mm or less over the long axis direction, and satisfying the relationship of (the maximum length in the width direction at the third position P3) - (the maximum length in the thickness direction at the third position P3) > 1 mm, the neck part 4 is wide and flexure in the width direction and twisting of the neck part 4 can be suppressed while ensuring the advantage of the operability in the part up to the base of the neck part 4.

[0066]

It is preferable to satisfy a relationship of (a sum of the volume of the region A and the volume of the region C)/(a sum of the volume of the region A, the volume of the region B, the volume of the region C, and the volume of the region D) ≤ 0.70 , and more preferable to satisfy a relationship of $0.20 \leq$ (the sum of the volume of the region A and the volume of the region C)/(the sum of the volume of the region A, the volume of the

region B, the volume of the region C, and the volume of the region D) ≤ 0.50 .

By satisfying the relationship of (the sum of the volume of the region A and the volume of the region C)/(the sum of the volume of the region A, the volume of the region B, the volume of the region C, and the volume of the region D) ≤ 0.70 , the ratio of a twisting-inducing region to the entire handle body 2 can be reduced, which makes it possible to prevent the twisting.

[0067]

FIG. 3 is a partially enlarged front view of a part of the head part 3 and the neck part 4.

As shown in FIG. 3, in the front view, an angle α on the smaller side, out of intersection angles between a line segment S1 connecting a point P11 on one side edge of the head part 3 located on the most rear end side where the length in the width direction of the head part 3 is maximized and a point P12 located on the most distal end side where the length in the width direction of the neck part 4 is minimized, and a line segment S2 connecting points on both side edges of the head part 3 located on the most rear end side where the length in the width direction of the head part 3 is maximized, is preferably 40° or more and 60° or less.

By setting the intersection angle α between the line segment S1 and the line segment S2 to 40° or more and 60° or less, the width of the rear end side of the head part 3 sharply converges, and the length at which the neck part 4 becomes the narrowest part can be reduced to improve the operability.

[0068]

As shown in FIG. 3, in the front view, an angle β on the smaller side, out of intersection angles between a line segment S3 connecting the point P11 on one side edge of the head part 3 located on the most rear end side where the length in the width

direction of the head part 3 is maximized and a point P13 located on the most rear end side where the length in the width direction of the neck part 4 is minimized, and a line segment S2 connecting points on both side edges of the head part 3 located on the most rear end side where the length in the width direction of the head part 3 is maximized, is preferably 75° or more and 85° or less.

By setting the intersection angle β between the line segment S3 and the line segment S2 to 75° or more and 85° or less, the length at which the neck part 4 becomes the narrowest part can be ensured, and the operability can be improved.

[0069]

FIG. 4 is a partially enlarged front view of a part of the head part 3 and the neck part 4.

As shown in FIG. 4, in the front view, an angle γ on the smaller side, out of intersection angles between a line segment S4 connecting a point P14 on one side edge of the head part 3 located on the most distal end side where the length in the width direction of the head part 3 is maximized and the point P12 located on the most distal end side where the length in the width direction of the neck part 4 is minimized, and a line segment S5 connecting points on both side edges of the head part 3 located on the most distal end side where the length in the width direction of the head part 3 is maximized, is preferably 70° or more and 80° or less.

By setting the intersection angle γ between the line segment S4 and the line segment S5 to 70° or more and 80° or less, the head part 3 has a long region in which the thickness is thin, which makes it easy to brush the deep part of the back teeth.

[0070]

As shown in FIG. 4, in the front view, an angle Δ on the smaller side, out of intersection angles between a line segment S6 connecting the point P14 on one side edge

of the head part 3 located on the most distal end side where the length in the width direction of the head part 3 is maximized and the point P13 located on the most rear end side where the length in the width direction of the neck part 4 is minimized, and a line segment S5 connecting points on both side edges of the head part 3 located on the most
5 distal end side where the length in the width direction of the head part 3 is maximized, is preferably 80° or more and 85° or less.

By setting the intersection angle Δ between the line segment S6 and the line segment S5 to 80° or more and 85° or less, the head part 3 has a long region in which the thickness is thin, which makes it easy to brush the deep part of the back teeth. In
10 addition, it is possible to suppress excessive lengthening of the neck part 4, so that the neck part 4 can be brushed without excessive flexure.

[0071]

As described above, in the toothbrush 1 of the present embodiment, it is possible to provide a wide-head type toothbrush that can suppress bending in the width direction
15 of the neck part 4 or twisting of the neck part 4 in the circumferential direction around the long axis direction.

[0072]

[Examples]

Hereinafter, the effects of the present invention will be made more apparent by
20 Examples. The present invention is not limited to the following examples, and can be appropriately modified and implemented without changing the gist thereof.

[0073]

(Examples 1 to 9 and Comparative Examples 1 and 2)

In this example, samples of toothbrushes of Examples 1 to 9 and Comparative
25 Examples 1 and 2 were prepared according to the specifications shown in [Table 1]

below.

Each part of the toothbrush in each example had dimensions shown in Table 1.

A polypropylene (PP) resin was used as the hard resin of the handle body.

[0074]

- 5 In each of the samples of Examples 1 to 9 and Comparative Examples 1 and 2, the maximum length in the width direction of the head part was set to 15.0 mm, the length in the thickness direction of the head part was set to constant 3.0 mm, the maximum length in the width direction of the neck part was set to 4.0 mm, and the maximum length in the thickness direction of the neck part was set to 4.0 mm.

10 [0075]

[Evaluation Method]

- A specialized panel of 10 people cleaned the inside of the oral cavity with a sample of a toothbrush of each example, and performed evaluation on "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting"
- 15 using the following criteria. The following evaluations were made based on an average score of the specialized panel of 10 people. A case in which the average score of the specialized panel of 10 people is 5.5 points or more was evaluated as "A (very good)", a case in which the average score is 4.0 points or more and less than 5.5 points was evaluated as "B (good)", a case in which the average score is 3.0 points or more and less
- 20 than 4.0 points was evaluated as "C (not bad)", and a case in which the average score is less than 3.0 points was evaluated as "D (bad)".

[0076]

(1) Difficulty in Flexure in Width Direction

[Evaluation Criteria]

- 25 7 points: Very difficult to flex.

6 points: Pretty difficult to flex.

5 points: Slightly difficult to flex.

4 points: Neither applies.

3 points: Slightly flexible, but acceptable.

5 2 points: Pretty flexible.

1 point: Extremely flexible.

[0077]

(2) Feeling of being able to Brush Firmly without Twisting

7 points: Can be brushed firmly without twisting at all.

10 6 points: Can be brushed firmly with almost no twisting.

5 points: Can be brushed firmly without twisting too much.

4 points: Neither applies.

3 points: Slightly twisted and cannot be brushed firmly, but acceptable.

2 points: Pretty twisted and cannot be brushed firmly.

15 1 point: Extremely twisted and cannot be brushed firmly.

[0078]

[Table 1]

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Comparative Example 1	Comparative Example 2	
Volume of region A (mm ³)	900	900	500	330	900	900	350	900	650	900	900	
Volume of region B (mm ³)	50.0	50.0	50.0	50.0	50.0	50.0	400.0	50.0	150.0	50	50.0	
Volume of region C (mm ³)	400	400	840	840	1000	1300	500	400	800	500	400	
Volume of region D (mm ³)	400	600	840	840	1000	1300	500	400	1650	400	400	
Width of end portion on rear end side of region D (mm)	10.5	11.0	11.5	11.5	12.0	12.5	11.0	11.0	12.5	10.5	10.0	
Thickness of end portion on rear end side of region D (mm)	10.0	10.0	10.5	10.5	11.0	11.5	10.0	9.0	10.5	10.0	10.5	
Volume of region D/volume of region C	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	2.1	0.8	1.0	
Relationship between width and thickness of end portion on rear end side of region D	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width > thickness	Width < thickness	
Volume of region A/volume of region D	2.25	1.50	0.60	0.39	0.90	0.69	0.70	2.25	0.39	2.25	2.25	
Sum of volumes of regions A and C/sum of volumes of regions A, B, C, and D	0.74	0.67	0.60	0.57	0.64	0.62	0.49	0.74	0.45	0.76	0.74	
Width - thickness of end portion on rear end side of region D (mm)	0.5	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	0.5	-0.5	
Difficulty in flexure in width direction	Grade	3.0	5.5	3.5	4.8	4.5	5.0	3.5	4.5	6.0	2.0	1.5
	Evaluation	C	A	C	B	B	B	C	B	A ⁺	D	D
Feeling of being able to brush firmly without twisting	Grade	3.0	5.5	3.5	4.8	5.0	5.5	3.2	3.3	6.0	2.0	2.3
	Evaluation	C	A	C	B	B	A	C	C	A ⁺	D	D

[0079]

As shown in [Table 1], in the toothbrush samples of Examples 1 to 9, in which the maximum length of the head part in the width direction is 12 mm or more and 18 mm or less, the maximum length of the head part in the thickness direction is 2 mm or more and 4 mm or less, the minimum length in the width direction and the minimum length in the thickness direction of the neck part is 3 mm or more and 5 mm or less, the relationship of (the volume of the region D)/(the volume of the region C) ≥ 1.0 is satisfied, and the maximum length in the width direction at the fourth position which is the position of the end portion on the rear end side of the region D is greater than the maximum length in the thickness direction, favorable evaluation was obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

[0080]

In addition, in the toothbrush samples of Examples 3, 4, and 9, in which the relationship of (the volume of the region A)/(the volume of the region D) ≤ 0.60 is satisfied, favorable evaluation was obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

[0081]

In addition, in the toothbrush samples of Examples 5 to 6 and 9, in which the volume of the region D is 1000 mm³ or more, favorable evaluation was obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

[0082]

In addition, in the toothbrush samples of Examples 2 to 7 and 9, in which the relationship of (the sum of the volume of the region A and the volume of the region

C)/(the sum of the volume of the region A, the volume of the region B, the volume of the region C, and the volume of the region D) ≤ 0.70 is satisfied, favorable evaluation was obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

5 [0083]

In addition, in the toothbrush samples of Examples 8 and 9, in which the maximum length in the width direction at the fourth position is 11 mm or more and the relationship of (the maximum length in the width direction at the fourth position) - (the maximum length in the thickness direction at the fourth position) ≥ 2 mm is satisfied, favorable evaluation was obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

[0084]

From the above results, the toothbrush sample of Example 9 received particularly favorable evaluation for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting", followed by the toothbrush samples of Examples 2 and 6, which received better evaluation.

[0085]

On the other hand, in Comparative Example 1 in which the relationship of (the volume of the region D)/(the volume of the region C) ≥ 1.0 is not satisfied, and in Comparative Example 2 in which the maximum length in the width direction at the fourth position which is the position of the end portion on the rear end side of the region D is smaller than the maximum length in the thickness direction, favorable evaluation was not obtained for both "difficulty in flexure in width direction" and "feeling of being able to brush firmly without twisting".

25 [0086]

Although preferred embodiments of the present invention have been described above with reference to the accompanying drawings, it goes without saying that the present invention is not limited to the examples. The variety of shapes, combinations, and the like of the individual constituent members described in the above-described examples are examples, and a variety of modifications are permitted based on design requirements and the like without departing from the gist of the present invention.

[Industrial Applicability]

[0087]

The present invention can be applied to the toothbrush.

10 [Reference Signs List]

[0088]

1: Toothbrush

3: Head part

3a: Bristle-tufting surface

15 4: Neck part

5: Grip part

6: Bristle-tufting hole

[CLAIMS]

What is claimed is:

[Claim 1]

A toothbrush comprising:

5 a head part located on a distal end side in a long axis direction and having a bristle-tufting surface;

a grip part disposed on a rear end side with respect to the head part; and

a neck part disposed between the head part and the grip part,

10 wherein a maximum length of the head part in a width direction parallel to the bristle-tufting surface and perpendicular to the long axis direction is 12 mm or more and 18 mm or less,

a maximum length of the head part in a thickness direction perpendicular to the bristle-tufting surface is 2 mm or more and 4 mm or less,

15 a minimum length in the width direction and a minimum length in the thickness direction of the neck part are 3 mm or more and 5 mm or less,

in the head part, when a region from a distal end in the long axis direction to a first position located on a most rear end side where a length in the width direction is maximized is denoted by A, and a region from the first position to a second position at a boundary between the head part and the neck part is denoted by B, and, in the neck part,

20 when a region from the second position to a third position which is at a distance corresponding to 65% of a length of the neck part in the long axis direction is denoted by C, and a region from the third position to a fourth position at a boundary between the neck part and the grip part which is at a distance corresponding to 35% of the length of the neck part in the long axis direction is denoted by D, a relationship of (a volume of the region D)/(a volume of the region C) $\geq$ 1.0 is satisfied, and

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at the fourth position, a maximum length in the width direction is greater than a maximum length in the thickness direction.

[Claim 2]

The toothbrush according to Claim 1,

5 wherein a relationship of $(\text{a volume of the region A})/(\text{the volume of the region D}) \leq 0.60$ is satisfied.

[Claim 3]

The toothbrush according to Claim 1 or 2,

wherein the volume of the region D is 1000 mm^3 or more.

10 [Claim 4]

The toothbrush according to any one of Claims 1 to 3,

wherein a relationship of $(\text{a sum of a volume of the region A and the volume of the region C})/(\text{a sum of the volume of the region A, a volume of the region B, the volume of the region C, and the volume of the region D}) \leq 0.70$ is satisfied.

15 [Claim 5]

The toothbrush according to any one of Claims 1 to 4,

wherein the maximum length in the width direction at the fourth position is 11 mm or more, and

a relationship of $(\text{the maximum length in the width direction at the fourth position}) - (\text{the maximum length in the thickness direction at the fourth position}) \geq 2 \text{ mm}$ is satisfied.

[Claim 6]

The toothbrush according to any one of Claims 1 to 5,

20 wherein a relationship of $1.5 \text{ mm} \leq (\text{a maximum length of the region A in the width direction}) - (\text{the maximum length in the width direction at the fourth position}) \leq 7$

mm is satisfied.

[Claim 7]

The toothbrush according to any one of Claims 1 to 6,
 wherein a relationship of (the maximum length in the thickness direction at the
 5 fourth position) - (a maximum length in the thickness direction at the third position) ≥ 3
 mm is satisfied.

[Claim 8]

The toothbrush according to any one of Claims 1 to 7,
 wherein a relationship of (a maximum length in the thickness direction at the
 10 third position) - (an average value of a length in the thickness direction of the region A
 over the long axis direction) ≤ 2 mm is satisfied.

[Claim 9]

The toothbrush according to any one of Claims 1 to 8,
 wherein, in the region C, a maximum length in the thickness direction is 4.5 mm
 15 or less over the long axis direction, and
 a relationship of (a maximum length in the width direction at the third position) -
 (a maximum length in the thickness direction at the third position) > 1 mm is satisfied.