

DESCRIPTION

Title of Invention

TOOTHBRUSH

5

TECHNICAL FIELD

[0001]

The present invention relates to a toothbrush.

10 Priority is claimed on Japanese Patent Application No. 2017-175906, filed on September 13, 2017, the content of which is incorporated herein by reference.

BACKGROUND ART

[0002]

15 It is important to remove plaque in the oral cavity by brushing with a toothbrush for the prevention of dental caries and periodontal disease. Conventionally, various toothbrushes have been suggested to enhance the plaque removal effect. For example, by making a head portion of a toothbrush thinner and a neck portion slimmer, it is possible for bristles to reach the back of back teeth (throat side of the back teeth), which

20 is difficult to reach with a normal toothbrush. Patent Document 1 discloses a toothbrush having a thinned head portion and excellent operability in the oral cavity.

Citation List

Patent Literature

25 [0003]

[Patent Document 1] Japanese Unexamined Patent Application, First
Publication No. 3387591

DISCLOSURE OF INVENTION

5 Technical Problem

[0004]

On the other hand, regarding a toothbrush for children, it is primarily required that a child unfamiliar with brushing can safely brush teeth with an easy mind, in addition to a plaque removal effect. However, the technical development of

10 toothbrushes for children aimed at improving an operability of the toothbrush in the oral cavity has not progressed as much as toothbrushes for adult.

[0005]

The present invention has been made in view of problems of the related art, and an object of the present invention is to provide a toothbrush that can obtain good

15 operability in the oral cavity of children.

Solution to Problem

[0006]

A toothbrush in the present invention includes a bristle-implanting portion including a plurality of bristle bundles, and a handle body having a head portion in which the bristle-implanting portion is provided on a bristle-implanting surface, a neck portion, and a handle portion, in which in a front view, a length of the neck portion is 15 mm to 35 mm, a total length of the head portion and the neck portion is 28 mm to 68 mm, and a width of the neck portion is 4 mm to 6 mm, in which in a side view, a thickness of the
20 head portion is 2 mm to 4 mm, in which in the front view, a distance between a position
25

of a ridge of a finger rest portion and a second position which is shifted by 20 mm toward the handle portion side from a first position located on a boundary between the neck portion and the head portion, is 4 mm to 22 mm, and in which a difference in thickness in the side view between the second position and the position of the ridge of the finger rest portion is 3 mm to 9 mm.

[0007]

The toothbrush in the present invention may have a configuration in which a relationship between a width of the neck portion in the front view and a thickness of the neck portion in the side view is set such that a change amount of the thickness is always equal to or greater than that of the width in a section from the first position to the second position as going toward a rear end.

The toothbrush in the present invention may have a configuration in which a magnitude relationship between the width and the thickness of the neck portion is reversed toward the second position from the first position.

[0008]

The toothbrush in the present invention may have a configuration in which a surface on the bristle-implanting surface side of the neck portion forms a linear shape along a straight line connecting a first point which is a center of a thickness of a tip of the head portion in the side view and a second point which is a center of the thickness in the side view at center position in a length direction of the handle portion in the front view.

[0009]

The toothbrush in the present invention may have a configuration in which a surface on the bristle-implanting surface side of the neck portion forms a linear shape along a straight line connecting a first point which is a center of a thickness of a tip of the head portion in the side view and a third point which is a center of a thickness of a rear

end of the handle portion in the side view.

[0010]

The toothbrush in the present invention may have a configuration in which the handle body includes a first finger rest portion convex toward the bristle-implanting surface side in the handle portion near the neck portion and a second finger rest portion convex toward a back surface side opposite to the bristle-implanting surface, in which in the side view, the first finger rest portion is formed at an intersection of a first curved surface having a center of curvature on the neck portion side on the bristle-implanting surface side and a second curved surface having a center of curvature on the handle portion side on the bristle-implanting surface side, and in which in the side view, the second finger rest portion is formed at an intersection of a fourth curved surface having a center of curvature on the neck portion side on the bristle-implanting surface side and a fifth curved surface having a center of curvature on the handle portion side on the back surface side.

[0011]

The toothbrush in the present invention may have a configuration in which in the front view, the first finger rest portion is formed such that a first ridge which is formed at the intersection of the first curved surface and the second curved surface is curved in a convex shape toward the neck portion, and in which in a back view, the second finger rest portion is formed such that a second ridge which is formed at the intersection of the fourth curved surface and the fifth curved surface is curved in a convex shape toward the neck portion side.

[0012]

The toothbrush in the present invention may have a configuration in which in the front view, a width in a length direction of the neck portion is constant.

[0013]

The toothbrush in the present invention may have a configuration in which a material of the handle body is a polypropylene resin.

[0014]

5 The toothbrush in the present invention may have a configuration in which at least a part of the handle body is covered with a soft resin.

The toothbrush in the present invention may have a configuration in which a total length of the handle body is 110 mm to 170 mm.

10 Advantageous Effects of Invention

[0015]

According to the invention, a toothbrush that can obtain good operability in an oral cavity of children can be provided.

15 BRIEF DESCRIPTION OF DRAWINGS

[0016]

FIG. 1 is a perspective view showing an overall configuration of a toothbrush 1 of the present embodiment.

FIG. 2 is a front view showing an overall configuration of a toothbrush 1 of the
20 present embodiment.

FIG. 3A is a side view showing an overall configuration of a toothbrush 1 of the present embodiment.

FIG. 3B is an enlarged side view showing a main portion of FIG. 3A.

FIG. 4 is a back view showing an overall configuration of a toothbrush 1 of the
25 present embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0017]

Hereinafter, a toothbrush according to an embodiment of the present invention
5 will be described.

In the following FIGS, scales of dimensions may be different depending on
components in order to make each component easier to see.

[0018]

First, a toothbrush 1 of the present invention will be described.

10 FIG. 1 is a perspective view showing an overall configuration of the toothbrush
1 of the present embodiment. FIG. 2 is a front view in a front view showing the overall
configuration of the toothbrush 1 of the present embodiment. FIGS. 3A and 3B are side
views in a side view showing the overall configuration of the toothbrush 1 of the present
embodiment. FIG. 4 is a back view in a back view showing the overall configuration of
15 the toothbrush 1 of the present embodiment.

Here, an upper surface of a head portion 2 provided with a bristle-implanting
portion 11 is referred to as a bristle-implanting surface 2a. As shown in FIG. 3A, a
virtual plane K configuring the bristle-implanting surface 2a is defined as a horizontal
XY plane, a direction in which a handle body 5 is extended as a whole is defined as an X-
20 axis direction, and a direction orthogonal to the X-axis is defined as a Y-axis direction.
A normal direction of the bristle-implanting surface 2a is defined as a Z-axis direction.
In the following description, a dimension in the Y-axis direction of each member is
referred to as a width of the member, a dimension in the Z-axis direction of each member
is referred to as a thickness of the member, and a dimension in the X-axis direction of
25 each member is referred to as a length of the member.

The “front view” in FIG. 2 is a diagram in which the bristle-implanting surface 2a side of the toothbrush 1 is viewed from the + Z-axis direction. The “side views” in FIGS. 3A and 3B are diagrams in which the toothbrush 1 is viewed from the –Y-axis direction. The “back view” in FIG. 4 is a diagram in which a back surface 2b opposite to the bristle-implanting surface 2a in the toothbrush 1 is viewed from the –Z direction.

[0019]

(Toothbrush 1)

As shown in FIG. 1, the toothbrush 1 of the present embodiment includes a bristle-implanting portion 11, a head portion 2 provided with the bristle-implanting portion 11, a neck portion 3 extended from a base end side of the head portion 2, and a handle portion 4 extended from a base end side of the neck portion 3. That is, the head portion 2, the neck portion 3, and the handle portion 4 are integrally formed. Hereinafter, a portion in which the head portion 2, the neck portion 3, and the handle portion 4 are integrated is referred to as a handle body 5.

15 [0020]

(Handle Body 5)

The handle body 5 is integrally formed in a long shape as a whole, and can be manufactured by injection molding using a resin as a material, for example. As configuration materials of the handle body 5, polypropylene (PP), polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polycyclohexylene dimethylene terephthalate (PCT), polyacetal (POM), polyethylene naphthalate (PEN), polystyrene (PS), acrylonitrile-butadiene-styrene resin (ABS), cellulose propionate (CP), polyarylate, polycarbonate, acrylonitrile-styrene copolymer resin (AS), and the like are included. Among these resin materials, it is preferable to use materials such as POM, PBT, or PEN from the viewpoint that a strength is high and the head portion is easily thinned.

[0021]

In particular, polypropylene is generally higher in versatility, easier to process, and lower in cost, but has lower flexural elastic modulus than resins such as polyacetal. For example, a flexural elastic modulus (JIS·K7171) of polyacetal is approximately 2500 MPa, while a flexural elastic modulus of polypropylene is approximately 1500 to 2000 MPa. Therefore, conventionally, polypropylene has been materials difficult to use as materials of a toothbrush having a thin head portion and a slim neck portion.

However, resins having a relatively low flexural elastic modulus of polypropylene or the like can also be used by adopting the shape of the toothbrush of the present embodiment described later.

[0022]

In the present embodiment, the flexural elastic modulus (JIS·K7171) of the configuration materials of the handle body 5, particularly the neck portion 3, is preferably 1000 MPa to 2800 MPa, more preferably 1200 MPa to 2500 MPa, and further more preferably 1500 MPa to 2000 MPa.

[0023]

In the above resins, one resin may be used alone, or two or more resins may be used in combination. Furthermore, in the handle body 5, a part or a whole of the handle portion 4 may be covered with a soft resin. Since the part or the whole of the handle portion 4 is covered with the soft resin, in a case where a user grasps the handle portion 4, fit feeling of hands is improved, and a gripped finger can be prevented from slipping. As the soft resin, for example, preferably a resin having a shore A of 90 or less, and more preferably a resin having a shore A of 10 to 40 are used. Examples of such a soft resin include elastomer resins such as polyolefin-based elastomers, styrene-based elastomers, polyester elastomers, and polyurethane-based thermoplastic elastomers, and the like, and

silicones, and the like. In a case where flexible resins such as the elastomer are used, for example, polyolefin is preferable, and polypropylene is more preferable from the viewpoint of enhancing adhesive property.

[0024]

5 The toothbrush 1 of the present embodiment is configured assuming a toothbrush used by, for example, a child aged 3 to 9 years. As shown in FIG. 2, an entire length L5 of the handle body 5 can be determined in consideration of operability and the like of a user. The entire length L5 of the handle body 5 is, for example, about 110 mm to 170 mm.

10 [0025]

(Head Portion 2)

As shown in FIG. 3A, the head portion 2 includes a flat plate portion 2A having a bristle-implanting surface 2a and a back surface 2b that are parallel to each other in a thickness direction, and an extending portion 2B extended from one end side of the flat
15 plate portion 2A.

[0026]

As shown in FIG. 2, the head portion 2 is formed in a flat sheet shape in which the length direction of the handle body 5 is longitudinal and in a front view, a top portion is cut off with a curve. A plurality of bristle-implanting holes 2h is formed in the
20 bristle-implanting surface 2a of the head portion 2. A bristle bundle 7 (FIG. 1) in which bristles are bundled is implanted in the bristle-implanting holes 2h, and a bristle-implanting portion 11 (FIG. 1) made of a plurality of bristle bundles is formed.

[0027]

In the front view, the head portion 2 has a shape that extends outward in the
25 width direction from the tip of the head portion 2 toward the neck portion 3, and then

extends with the same width, and then narrows inward in the width direction, and reaches a boundary (first position S1) with the neck portion 3. A length (head length) L2 shown in FIG. 2 indicates a length from the tip of the head portion 2 to the first position S1, which is the boundary with the neck portion 3.

5 [0028]

In the present embodiment, in a front view shape of the head portion 2, the first position S1 is an end point of a curve that forms a corner cut in the neck portion 3 side, that is, a position where a flexural direction of the curve that forms the corner cut changes. That is, the first position S1, which is a boundary between the head portion 2
10 and the neck portion 3, is a position which changes from a curve or a straight line forming both edges that the width of the corner cut in the neck portion 3 side of the head portion 2 is narrowed to a curve or a straight line that the width is widened or a straight line that the width is constant, in the front view.

Further, in a case of a toothbrush in which the width of the neck portion 3
15 increases toward the handle portion 4 in the front view, the first position S1 coincides with the position where the width is the narrowest in the head portion 2 and the neck portion 3 in the front view.

[0029]

A dimension of the head portion 2 is determined in consideration of
20 characteristics such as operability in the oral cavity.

In a case where the length L2 of the head portion 2 is too long, operability in the oral cavity is easily impaired and in a case where the length L2 is too short, the number of the bristle bundle 7 (FIG. 1) to be implanted is too small, and cleaning effect is easily impaired. For this reason, it is preferable that the length L2 of the head portion 2 is, for
25 example, 13 mm to 35 mm. In addition, in FIG. 2 and FIG. 3A, the illustration of the

bristle-implanting portion 11 is omitted.

As shown in FIG. 2, in a case where the width (head width) W2 of the head portion 2 in the direction intersecting with the length direction of the handle body 5 is too wide, operability in the oral cavity is reduced, and in a case where the width W2 is too narrow, the number of the bristle bundle 7 to be implanted is too small, and cleaning effect is easily impaired. For this reason, it is preferable that the width W2 of the head portion 2 is, for example, 5 mm to 13 mm.

As shown in FIG. 3A, as the thickness of the head portion 2 is thinner, operability in the oral cavity can be improved. However, in a case where the thickness is too thin, a strength of the head portion 2 tends to be insufficient. For this reason, the thickness (head thickness) T2 of the head portion 2 can be determined in consideration of configuration materials of the handle body 5, a flexural elastic modulus, and the like. The thickness T2 of the head portion 2 is preferably 2.0 mm to 4.0 mm, and more preferably 2.5 mm to 3.5 mm.

[0030]

As shown in FIG. 2, the shape of the bristle-implanting holes 2h is not particularly limited, and may be a circle such as a perfect circle or an ellipse, or a polygon such as a triangle or a square. The number of bristle-implanting holes 2h is not particularly limited, and is preferably, for example, about 10 to 60. In the present embodiment, as an example, a row in the most tip side has two holes arranged in the width direction, the second row from the tip side has three holes, and a row in the most rear end side has three holes. In center portions, three rows of four holes are formed side by side.

[0031]

A diameter of the bristle-implanting holes 2h is determined according to the

thickness of the bristle bundle 7 shown in FIG. 1, and is preferably, for example, 1 mm to 3 mm. An arrangement pattern of the bristle-implanting holes 2h is not particularly limited, and may be any arrangement patterns such as a so-called a lattice shape or a zigzag shape.

5 [0032]

As the bristles configuring the bristle bundle 7, bristles (taper bristle) of which the diameter gradually decreases toward a bristle tip, bristles (straight bristle) of which outer diameters are almost the same except a rounded portion of the bristle tip are included. As materials of the bristles, polyamide such as 6-12 nylon or 6-10 nylon,
10 polyester such as PET, PBT, polytrimethylene terephthalate (PTT), PEN, polybutylene naphthalate (PBN), polyolefin such as PP, and synthetic resin materials such as olefin-based elastomers and styrene-based elastomers can be used as an example. In these resin materials, one material may be used alone, or two or more materials may be used in combination. Further, the bristles may have a multi-core structure having a core portion
15 and a sheath portion having at least one or more layers and provided on the outside of the core portion.

[0033]

A cross-sectional contour of the bristles is not particularly limited, and may be, for example, a circle such as a perfect circle or an ellipse, a polygon such as a triangle, a
20 square, a pentagon, or a hexagon, a star, a three-leaf clover, or a four-leaf clover, or the like.

[0034]

The thickness of the bristles is not particularly limited, and may be, for example, 3 mil to 11 mil (1 mil = 1/1000 inch = 0.025 mm) in a case where the cross-sectional
25 contour is a circle. The bristle bundle may be configured with bristles having entirely

the same thickness, or may be combined with two or more bristles having different thicknesses. The bristle length is preferably 6 mm to 13 mm.

[0035]

(Neck Portion 3)

5 The neck portion 3 integrally connects the head portion 2 and the handle portion 4.

In the present embodiment, in the front view shown in FIG. 2, the neck portion 3 indicates a length that is extended from the first position S1 toward the handle portion 4 with the same width or widening and then extending further at a third position S3 with
10 the handle portion 4, that is, a length L3 from the first position S1 to the third position S3.

In a front view, the third position S3 is an end point of the straight line forming both edges of the portion where the width of the neck portion 3 is the same or widening, or a position where a flexural direction of the curve forming both edges of the widening
15 portion changes.

[0036]

Since the neck portion 3 touches the lips in a case where the head portion 2 is inserted in an oral cavity of children, the length (neck length) L3 of the neck portion 3 is preferably 15 mm to 35 mm, more preferably 20 mm to 30 mm.

20 Further, a total length (L2 + L3) of the head portion 2 and the neck portion 3 is preferably 28 mm to 68 mm, more preferably 30 mm to 65 mm, and further more preferably 33 mm to 61 mm in consideration of the length from the child's lips to the back teeth.

The ratio (%) of the length L3 of the neck portion 3 to the entire length (total
25 length) L5 of the handle body 5 is preferably 5.5% to 31%, more preferably 8% to 24%,

and further more preferably 10% to 20%.

[0037]

In the following description, a point at the center of the tip of the head portion 2 in the thickness direction (Z direction) in the side view shown in FIG. 3A is defined as a first point A1, and a point at the center of the handle portion 4 in the front view shown in FIG. 2 and in the thickness direction (Z direction) of the handle portion 4 in the length direction (X direction) and the width direction in the side view shown in FIG. 3A is defined as a second point A2. In addition, a point at the center of the rear end of the handle portion 4 in the thickness direction (Z direction) in the side view shown in FIG. 3A is defined as a third point A3.

[0038]

In the side view shown in FIG. 3A, in the neck portion 3, a part of a surface 3a on the bristle-implanting surface 2a side is linear. Specifically, a part of the surface 3a of the neck portion 3 on the bristle-implanting surface 2a side is linearly formed, for example, along a virtual straight line L1 connecting the first point A1 and the second point A2. Alternatively, it is linearly formed along a virtual straight line L2 connecting the first point A1 and the third point A3. Alternatively, it is linearly formed along a virtual straight line L3 connecting the first point A1, the second point A2, and the third point A3.

At this time, the surface 3a of the neck portion 3 does not always coincide with any of the straight lines L1, L2, and L3, and only needs to be located within an allowable range set in the thickness direction (Z direction) of the toothbrush 1 with the straight lines L1, L2, and L3 as centers. In the present embodiment, it is preferable that the allowable range is, for example, a range of about ± 1 mm above and below the straight lines L1, L2, and L3 in the thickness direction (Z direction) of the toothbrush 1 respectively.

[0039]

Therefore, since a part of the surface 3a of the neck portion 3 on the bristle-implanting surface 2a side is formed along the straight line, even in a case where the infant is unfamiliar with brushing, a force from the handle portion 4 at the time of brushing can be transmitted to the bristle-implanting surface 2a side of the head portion 2 without waste, and an operability in the oral cavity is improved.

[0040]

As shown in FIG. 3A, the surface 3a of the neck portion 3 on the bristle-implanting surface 2a side extends toward the handle portion 4 and is continued over a first curved surface 4a1 forming a first finger rest portion 9A.

[0041]

Furthermore, a back surface 3b of the neck portion 3 extends toward the handle portion 4 side and is continued over a fourth curved surface 4b1 forming a second finger rest portion 9B.

15 [0042]

[Width W of Neck Portion 3]

As shown in FIGS. 2 and 4, the neck portion 3 of the present embodiment has the same width W in the length direction from the first position S1 to the third position S3, but may have a larger diameter. By setting the width W of the neck portion 3 to the same dimension, the head portion 2 can be reached without greatly opening the mouth at the time of brushing the back teeth.

The smaller the width W of the neck portion 3 is, the higher the operability in the oral cavity can be. However, in a case where the width W is too narrow, the strength of the neck portion 3 tends to be insufficient. For this reason, the width W of the neck portion 3 can be determined in consideration of configuration materials of the handle

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body 5, a flexural elastic modulus, and the like. The width W of the neck portion 3 in the present embodiment is preferably 4.0 mm to 6.0 mm, and more preferably 4.5 mm to 5.5 mm.

[0043]

5 [Thickness of Neck Portion 3]

As shown in FIG. 3A, a cross-sectional shape intersecting of the neck portion 3 in the length direction gradually changes from the head portion 2 side of the neck portion 3 toward the handle portion 4 side, and a magnitude relationship between the width and thickness of the neck portion 3 is reversed in the length direction.

10 That is, assuming that a position shifted by 10 mm toward the handle portion 4 side from the first position S1 is defined as a fourth position S4, and a position shifted by 20 mm toward the handle portion 4 side from the first position S1 is defined as a second position S2. In this case, the neck portion 3 has such a shape that the thickness rapidly increases from the first position S1 to the fourth position S4 and the second position S2, and then gradually increases toward the handle portion 4 side. The width W of the neck portion 3 is preferably smaller and slimmer than the thickness T, and the neck portion 3 has a shape in which the thickness increases toward the handle portion 4 side and a cross-sectional area increases. As a result, even in a case where the head portion 2 is thin and the neck portion 3 is short, the neck portion 3 is slim and strong.

20 [0044]

In the present embodiment, as shown in FIGS. 2 and 3A, at the first position S1 which is a boundary between the head portion 2 and the neck portion 3, as shown in Table 1, the first width W1 is larger than a first thickness T1 ($W1 > T1$), and has a wide cross-sectional shape.

25 Further, as shown in FIGS. 2 and 3A, at the second position S2 which is a

position shifted by 20 mm toward the handle portion 4 side from the first position S1, as shown in Table 1, the second thickness T2 is larger than the second width W2 ($W2 < T2$), and has a thicker cross-sectional shape.

Further, as shown in FIGS. 2 and 3A, at a fourth position S4 which is a position shifted by 10 mm toward the handle portion 4 from the first position S1, the fourth width W4 is equal to the fourth thickness T4 ($W4 = T4$).

[0045]

Specifically, the thickness of the first position S1 is 4 mm, the thickness of the fourth position S4 is 5 mm, and the thickness of the fourth position S4 is 1.25 times thicker than the thickness of the first position S1. In addition, the thickness of the second position S2 is 5.6 to 5.8 mm, and the thickness of the second position S2 is 1.12 to 1.16 times thicker than the thickness of the fourth position S4. The thickness changes more gradually than the change from the first position S1 to the fourth position S4. Therefore, the thickness of the neck portion 3 increases toward the handle portion 4 side from the head portion 2 side, but a proportion of the increase in the thickness is not constant.

[0046]

In this way, as the thickness is gradually increased toward the handle portion 4 side from the head portion 2 side in the length direction of the neck portion 3, the neck portion 3 can easily transmit a force to the head portion 2 without being excessively bent at the time of brushing, so that brushing can be performed stably.

In addition, with the neck portion 3 having the above-described configuration, a width of a portion which touches mouth during a use becomes slimmer than the thickness, so that the handling of the toothbrush 1 in the oral cavity is improved.

Furthermore, since the thickness of the portion which touches mouth during a

use becomes thicker than the width, it is difficult to break even in a case where the child bites the neck portion 3 strongly. Even in a case where the head portion 2 is made thin, the strength of the neck portion 3 can be secured.

[0047]

5 The first thickness T1 which is a minimum thickness of the neck portion 3 can be determined in consideration of the configuration materials of the handle body 5, conditions such as bend elastic modulus, and the like. The first thickness T1 of the neck portion 3 is preferably 3.0 mm to 4.5 mm, and more preferably 3.5 mm to 4.3 mm.

 Further, a maximum thickness of the neck portion 3 is preferably, for example,
10 4.5 mm to 7.0 mm, and more preferably 5.0 mm to 6.5 mm.

[0048]

 In the toothbrush 1 of the present embodiment, the head portion 2 is thin, and the operability in the oral cavity behind the back teeth is improved. Further, by increasing the thickness for the width of the neck portion 3 from the head portion 2 side
15 to the handle portion 4 side, excessive flexural of the neck portion 3 during use can be suppressed while corresponding to the thinness of the head portion 2. For this reason, the position of the head portion 2 does not shift too much at the time of brushing by gripping the handle portion 4, so that even a child, the bristle bundle 7 can be firmly applied to a tooth surface. Therefore, the toothbrush 1 can be properly grasped and
20 brushed by a child.

[0049]

(Handle Portion 4)

 As shown in FIG. 2, FIG. 3A and FIG. 4, the handle portion 4 includes the first finger rest portion 9A and the second finger rest portion 9B respectively formed on the
25 front and back sides near the neck portion 3, and a gripping portion 6 formed

continuously over the first finger rest portion 9A and the second finger rest portion 9B.

As shown in FIG. 2, in a front view, the length (handle length) L4 of the handle portion 4 is a distance from the end point of the straight line forming the both edges of the portion where the width of the neck portion 3 is the same or widening, or the third position S3 where the flexural direction of the curve forming both edges of the widening portion changes to the rear end. The length L4 of the handle portion 4 is preferably 80 mm to 110 mm in accordance with the size of the hand of the child who is the user.

The ratio ($L4 / L3$) of the length L4 of the handle portion 4 for the length L3 of the neck portion 3 is preferably 2.5 to 12.0, more preferably 3.0 to 7.0, and further more preferably 3.5 to 5.5 or less.

[0050]

As shown in FIG. 2, FIG. 3A and FIG. 4, the first finger rest portion 9A convex toward the bristle-implanting surface 2a side and the second finger rest portion 9B convex toward the back surface 2b side are formed in the handle portion 4.

[0051]

(Finger Rest Portion 9A)

In the side view shown in FIG. 3A, the first finger rest portion 9A is formed at a portion where a concave first curved surface 4a1 having a center of curvature near the neck portion 3 on the bristle-implanting surface 2a side, and a concave second curved surface 4a2 having a center of curvature near the handle portion 4 on the bristle-implanting surface 2a side intersect.

As shown in FIG. 3B, the first finger rest portion 9A is convexly formed with the concave first curved surface 4a1, the concave second curved surface 4a2, and a convex third curved surface 4a3 having a center of curvature on the back surface 2b side opposite to the bristle-implanting surface 2a at a portion where the curved surface 4a1

and the curved surface 4a2 intersect, on the bristle-implanting surface 2a side. Here, a straight line connecting a position P1 of the first curved surface 4a1 where the curvature changes and a position P2 of the second curved surface 4a2 where the curvature changes is referred to as an imaginary line J. The first finger rest portion 9A has a desired height in a direction in which a perpendicular G for the imaginary line J extends, and has a convex shape on the bristle-implanting surface 2a side shown in FIG. 3A. As an example, a ridge where the first curved surface 4a1 and the second curved surface 4a2 intersect is formed at a position where the distance from the imaginary line J is the largest.

In addition, in the ridge formed at the intersection of the first curved surface 4a1 and the second curved surface 4a2, a first ridge 8A having a curve shape as shown in FIG. 2 is formed over the width direction of the handle portion 4. In the front view shown in FIG. 2, the first finger rest portion 9A has the first ridge 8A having an arc contour convexly curved toward the neck portion 3. In a front view, a distance between the second position S2 and the first ridge 8A is preferably 4 mm to 22 mm, more preferably 5 mm to 18 mm, and further more preferably 6 mm to 15 mm. A difference in thickness between the second position S2 and the first ridge 8A in a side view is preferably 3 mm to 9 mm, more preferably 3 mm to 8 mm, and further more preferably 4 mm to 7 mm.

In addition, in a plan view, in a case where the first ridge 8A is curved and the position in the X-axis direction (length direction) changes, the distance between the second position S2 and the first ridge 8A is defined by the shortest distance between the second position S2 and the first ridge 8A. In addition, in a case where there is no clear a curved surface formed by intersecting the curved surface on the neck portion 3 side and the curved surface on the handle portion 4 side, for example, in a front view, the

curvature changes at a joint between the neck portion 3 and the handle portion 4, and a curve configuring the handle portion 4 or a position connected to a straight line can be set as a position corresponding to the above-described first ridge.

Therefore, in a case where the toothbrush 1 is used for a child having a small
5 mouth, considering that the neck portion 3 is short but narrowed to the rear end, and that it is a thick handle portion 4 from the tip that can be grasped no matter where you grasps, a stress is easily concentrated in terms of strength, and an operability is easily affected in a case where the neck portion 3 and the handle portion 4 are connected at a short distance. However, in the present embodiment, as described above, the strength of the
10 neck portion 3 and the operability can be improved by setting the difference between the distance between the second position S2 and the first ridge 8A in the front view, and the difference of the thickness between the second position S2 and the position of the first ridge 8A in the side view in an appropriate range.

[0052]

15 (Second Finger Rest Portion 9B)

In the side view shown in FIG. 3A, the second finger rest portion 9B is formed at a portion where a convex fourth curved surface 4b1 having a center of curvature near the neck portion 3 on the bristle-implanting surface 2a side, and a concave fifth curved surface 4b2 having a center of curvature near the handle portion 4 on the back surface 2b
20 side opposite to the bristle-implanting surface 2a intersect.

As shown in FIG. 3B, the second finger rest portion 9B is formed by two Rs, that is, the convex fourth curved surface 4b1 and the concave fifth curved surface 4b2, and has a convex shape on the back surface 2b side.

In addition, at the intersection of the fourth curved surface 4b1 and the fifth
25 curved surface 4b2, a second ridge 8B as shown in FIG. 4 is formed over the width

direction of the handle portion 4. The second finger rest portion 9B has the second ridge 8B having an arc contour convexly curved toward the neck portion 3.

[0053]

As shown in FIGS. 3A and 3B, protrusion amount of the first finger rest portion 9A and the second finger rest portion 9B are different from each other. Since the first finger rest portion 9A is formed of two concave curved surfaces having a center of curvature on the bristle-implanting surface 2a side, the intersection of the first curved surface 4a1 and the second curved surface 4a2 is protruded largely outward in the thickness direction.

10 [0054]

Since the second finger rest portion 9B is formed by the convex fourth curved surface 4b1 whose center of curvature is located on the bristle-implanting surface 2a side and the concave fifth curved surface 4b2 whose center of curvature is located on the back surface 2b side, the intersection of the fourth curved surface 4b1 and the fifth curved surface 4b2 is not protruded so much outward in the thickness direction. As can be seen from FIG. 3A, in a case where the bristle-implanting surface 2a of the toothbrush 1 is in a horizontal posture, the second finger rest portion 9B does not protrude outside the back surface 3b of the neck portion 3 in the thickness direction (Z direction).

[0055]

20 Since the protrusion amount of the second finger rest portion 9B is smaller than that of the first finger rest portion 9A, the second finger rest portion 9B hardly touches the lips during operation in the oral cavity. On the other hand, by ensuring a sufficient the protrusion amount of the first finger rest portion 9A, the finger is guided to the first finger rest portion 9A such that the finger sticks to the first finger rest portion 9A.

25 The user holds the handle portion 4 such that the thumb and the index finger are

respectively applied to the first finger rest portion 9A and the second finger rest portion 9B, and thereby slip of the finger is prevented, and the toothbrush 1 can be operated stably. Since the inside of the first joint of the thumb easily contacts the first finger rest portion 9A, and the flank side of the second joint of the index finger easily contacts the second finger rest portion 9B, accurate positioning is possible even for children who are unfamiliar with brushing and thus, a stability at the time of gripping the handle portion 4 is enhanced.

[0056]

As shown in FIGS. 2 and 4, the width of the gripping portion 6 gradually increases, then decreases, and then increases again from the finger rest portion 9A and the finger rest portion 9B sides toward the rear end of the gripping portion 6. It gradually becomes thicker toward the rear end. The above-described diameter expansion and diameter reduction may be repeated two to four times. In addition, the thickness of the gripping portion 6 gradually increases and then decreases from the finger rest portion 9A and finger rest portion 9B sides toward the rear end of the gripping portion 6.

As shown in FIGS. 2 and 4, in the front view, a minimum width $W6_{min}$ (FIG. 4) of the gripping portion 6 is smaller than a maximum width $W9_{max}$ (FIG. 4) of the finger rest portion 9A and the finger rest portion 9B, and the maximum width $W6_{max}$ (FIG. 4) of the gripping portion 6 is larger than the maximum width $W9_{max}$ (FIG. 4) of the finger rest portion 9A and the finger rest portion 9B.

[0057]

Here, the maximum width $W9_{max}$ of the finger rest portion 9A and the finger rest portion 9B is preferably 12.5 mm to 16.5 mm, and more preferably 13.5 mm to 15.5 mm.

Further, the maximum width W6 max of the gripping portion 6 is preferably 18.0 mm to 22.0 mm, more preferably 19.0 mm to 21.0 mm.

Further, the minimum width W6 min of the gripping portion 6 is preferably, for example, 8.0 mm to 13.0 mm, more preferably 9.0 mm to 12.0 mm.

- 5 Further, the thickness of the gripping portion 6 is preferably 7.0 mm to 15 mm. As long as the size is within the above range, the child having a small hand can grasp firmly.

[0058]

- A recess portion 6A that is recessed inward in the width direction is formed on
10 the side surface on both sides in the width direction at the tip portion that is the minimum width W6 min of the gripping portion 6. For example, the user can touch the middle finger to the recess portion 6A, and the child can firmly grasp the handle portion 4, so that the user can easily brush teeth. In addition, it is also possible to hold the handle portion 4 such that the thumb and the forefinger are applied to each of the recess portion
15 6A. Therefore, for example, even in a case where the toothbrush 1 is turned sideways and side surfaces of the teeth are brushed, the operation can be stably performed.

[0059]

- Further, on a side surface of a portion of the gripping portion 6 that gradually becomes thicker toward the rear end side, the recess portion 6A, a plurality of curved
20 surfaces that are continuous with the recess portion 6A and that are convexly curved outward in the width direction, and a plurality of dimple portions are formed between the curved surfaces are formed. Since the curved surface and the dimple portion are alternately present in the length direction of the gripping portion 6, the finger of the user is guided to the dimple portion naturally, and a grip feeling increases. Therefore, even a
25 child with a weak grip can hold it stably. In addition, since the entire handle portion 4 is

thick and has no corners, even a small child's hand can be grasped firmly.

[0060]

The toothbrush 1 of the present embodiment is manufactured according to a conventionally known manufacturing method of a toothbrush. For example, a hard
 5 resin is injected into a die to form the handle body 5. Next, the toothbrush 1 is obtained by implanting the bristle bundle 7 on the bristle-implanting surface 2a of the obtained handle body 5. As a method of implanting the bristle bundle 7, for example, a flat line type implanting method in which the bristle bundle 7 is planted by folding the bristle
 bundle 7 in half and putting a flat line sandwiched therebetween into the bristle-
 10 implanting holes 2h, a thermal fusion-bonding method in which the lower end of the bristle bundle 7 is pressed into a molten resin to be the bristle-implanting portion 11 and fixed, and a in-mold method in which a molten resin is injected into a die to form the bristle-implanting portion 11 after heating the lower end of the bristle bundle 7 and forming a molten lump, and the like are included.

15

EXAMPLES

[0061]

Hereinafter, the present invention will be described in detail with reference to examples. However, the present invention is not limited to the following examples, and
 20 can be implemented with appropriate modifications within the scope of the gist.

The materials used in the example are as follows.

<Handle body 5> • Polypropylene

<Bristle bundle 7> • PBT

[0062]

25 According to the specifications shown in Table 1, the toothbrushes of examples

1 and 2 and comparative examples 1 to 8 were manufactured by an injection molding method for the toothbrushes shown in FIGS. 1 to 4.

The dimensions of each toothbrush are as shown in Table 1.

[0063]

5 [Evaluation of Operability in Oral Cavity]

An expert obtained a 4-step answer on the good operability of the toothbrush 1 at the time of brushing the entire dentition evenly using the child's jaw model. The operability was evaluated with the following criteria based on the average score of 10 persons, with 4 points of “very good”, 3 points of “good”, 2 points of “somehow good”,
10 and 1 point of “bad”.

○(circle mark): 2.5 points or more

Δ(triangle mark): 1.5 or more and less than 2.5 points

×(cross mark): less than 1.5 points

[0064]

[table 1]

	Total Length L5(mm)	Head Width W2(mm)	Head Thickness T2(mm)	Head Length L2(mm)	Neck Length L3(mm)	Head Length + Neck Length L2+L3(mm)	Handle Length L4(mm)
Example 1	145	10.9	3.0	25.5	21.7	47.2	97.8
Example 2	160	11.2	3.0	30.0	25.9	55.9	104.1
Comparative Example 1	143	8.5	4.5	22.3	21.5	43.8	99.2
Comparative Example 2	162	10.7	4.5	25.0	24.0	49.0	113.0
Comparative Example 3	180	10.5	3.0	35.0	36.0	71.0	109.0
Comparative Example 4	160	10.5	3.0	35.0	36.0	71.0	89.0
Comparative Example 5	145	10.9	3.0	25.5	21.7	47.2	97.8
Comparative Example 6	145	10.9	3.0	25.5	21.7	47.2	97.8
Comparative Example 7	160	11.2	3.0	30.0	25.9	55.9	104.1
Comparative Example 8	160	11.2	3.0	30.0	25.9	55.9	104.1

	Position S1		Position S2 (+20mm)		Ratio of Neck Length to Total Length L3/L5(%)		Ratio of Handle Length to Neck Length L4/L3(%)		Distance(mm) from Position of Neck Start Point + 20mm to Finger Rest Ridge		Thickness Difference(mm) in the Same Section	Evaluation
	Width W1(mm)	Thickness T1(mm)	Width W2(mm)	Thickness T2(mm)	Ratio of Neck Length to Total Length L3/L5(%)		Ratio of Handle Length to Neck Length L4/L3(%)		Distance(mm) from Position of Neck Start Point + 20mm to Finger Rest Ridge		Thickness Difference(mm) in the Same Section	Evaluation
Example 1	5.0	4.0	5.0	5.8	15.0	15.0	4.5	4.5	6.9	6.9	4.0	○
Example 2	5.0	4.0	5.0	5.6	16.2	16.2	4.0	4.0	12.0	12.0	5.4	○
Comparative Example 1	4.5	5.0	4.5	5.4	15.0	15.0	4.6	4.6	10.5	10.5	4.3	△
Comparative Example 2	5.0	5.0	5.0	5.1	14.8	14.8	4.7	4.7	19.0	19.0	4.5	△
Comparative Example 3	4.0	4.0	4.5	5.0	22.0	22.0	3.0	3.0	16.2	16.2	4.1	×
Comparative Example 4	4.0	4.0	4.5	5.0	22.5	22.5	2.5	2.5	16.2	16.2	4.1	△
Comparative Example 5	5.0	4.0	5.0	5.8	15.0	15.0	4.5	4.5	6.9	6.9	10.0	△
Comparative Example 6	5.0	4.0	5.0	5.8	15.0	15.0	4.5	4.5	6.9	6.9	2.0	△
Comparative Example 7	5.0	4.0	5.0	5.6	16.2	16.2	4.0	4.0	26.0	26.0	5.4	×
Comparative Example 8	5.0	4.0	5.0	5.6	16.2	16.2	4.0	4.0	3.0	3.0	5.4	×

[0065]

As can be seen from Table 1, the toothbrushes of examples 1 and 2 provide good operability in an oral cavity of children.

[0066]

5 According to the toothbrush 1 shown in each of the embodiments described above, good operability can be obtained in an oral cavity of children. In addition, it is possible to properly brush areas that are difficult to be brushed in the oral cavity by adapting a toothbrush shape in accordance with the growth of a child.

[0067]

10 Although the preferred embodiments according to 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 such examples. It is clear for those skilled in the art to be able to conceive various changes or modifications within the scope of the technical idea described in claims. It is understood that these naturally belong to
15 the technical scope of the present invention.

[0068]

For example, it is possible to improve a slip preventing effect and a design by appropriately designing a shape of the handle portion, a coating shape of the soft resin, an exposure shape of the soft resin, and the like.

20

Industrial Applicability

[0069]

The present invention is applicable to a toothbrush.

25 Reference Signs List

[0070]

	1	TOOTHBRUSH
	2	HEAD PORTION
	2a	BRISTLE-IMPLANTING SURFACE
5	2b	BACK SURFACE
	3	NECK PORTION
	3a	SURFACE
	4	HANDLE PORTION
	5	HANDLE BODY
10	6	GRIPPING PORTION
	7	BRISTLE BUNDLE
	8A	FIRST RIDGE
	8B	SECOND RIDGE
	9A	FIRST FINGER REST PORTION
15	9B	SECOND FINGER REST PORTION
	11	BRISTLE-IMPLANTING PORTION
	4A1	FIRST CURVED SURFACE
	4A2	SECOND CURVED SURFACE
	4B1	FOURTH CURVED SURFACE
20	4B2	FIFTH CURVED SURFACE
	A1	FIRST POINT
	A2	SECOND POINT
	A3	THIRD POINT
25	S1	FIRST POSITION (BOUNDARY BETWEEN HEAD PORTION AND NECK PORTION)

S2 SECOND POSITION (POSITION SHIFTED BY 20 MM TOWARD
HANDLE PORTION 4 SIDE FROM FIRST POSITION S1)

S3 THIRD POSITION (BOUNDARY BETWEEN NECK PORTION 3
AND HANDLE PORTION 4)

5 L1, L2, L3 VIRTUAL STRAIGHT LINE

L2 LENGTH OF HEAD PORTION 2

L3 LENGTH OF NECK PORTION 3

L4 LENGTH OF HANDLE PORTION 4

T2 THICKNESS OF HEAD PORTION 2

10 W1 FIRST WIDTH

W2 SECOND WIDTH

CLAIMS

What is claimed is:

1. A toothbrush comprising:

a bristle-implanting portion including a plurality of bristle bundles; and

5 a handle body having a head portion in which the bristle-implanting portion is provided on a bristle-implanting surface, a neck portion, and a handle portion,

wherein in a front view,

a length of the neck portion is 15 mm to 35 mm,

a total length of the head portion and the neck portion is 28 mm to 68 mm, and

10 a width of the neck portion is 4 mm to 6 mm,

wherein in a side view,

a thickness of the head portion is 2 mm to 4 mm,

wherein in the front view,

a distance between a position of a ridge of a finger rest portion and a second

15 position which is shifted by 20 mm toward the handle portion side from a first position located on a boundary between the neck portion and the head portion, is 4 mm to 22 mm, and

wherein a difference in thickness in the side view between the second position and the position of the ridge of the finger rest portion is 3 mm to 9 mm.

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2. The toothbrush according to claim 1,

wherein a relationship between a width of the neck portion in the front view and a thickness of the neck portion in the side view is set such that a change amount of the thickness is always equal to or greater than that of the width in a section from the first
25 position to the second position as going toward a rear end.

3. The toothbrush according to claim 2,

wherein a magnitude relationship between the width and the thickness of the neck portion is reversed toward the second position from the first position.

5

4. The toothbrush according to any one of claims 1 to 3,

wherein a surface on the bristle-implanting surface side of the neck portion forms a linear shape along a straight line connecting a first point which is a center of a thickness of a tip of the head portion in the side view and a second point which is a center of the thickness in the side view at center position in a length direction of the handle portion in the front view.

10

5. The toothbrush according to any one of claims 1 to 3,

wherein a surface on the bristle-implanting surface side of the neck portion forms a linear shape along a straight line connecting a first point which is a center of a thickness of a tip of the head portion in the side view and a third point which is a center of a thickness of a rear end of the handle portion in the side view.

15

6. The toothbrush according to any one of claims 1 to 5,

wherein the handle body includes a first finger rest portion convex toward the bristle-implanting surface side in the handle portion near the neck portion and a second finger rest portion convex toward a back surface side opposite to the bristle-implanting surface,

20

wherein in the side view, the first finger rest portion is formed at an intersection of a first curved surface having a center of curvature on the neck portion side on the

25

bristle-implanting surface side and a second curved surface having a center of curvature on the handle portion side on the bristle-implanting surface side, and

wherein in the side view, the second finger rest portion is formed at an intersection of a fourth curved surface having a center of curvature on the neck portion side on the bristle-implanting surface side and a fifth curved surface having a center of curvature on the handle portion side on the back surface side.

7. The toothbrush according to claim 6,

wherein in the front view, the first finger rest portion is formed such that a first ridge which is formed at the intersection of the first curved surface and the second curved surface is curved in a convex shape toward the neck portion, and

wherein in a back view, the second finger rest portion is formed such that a second ridge which is formed at the intersection of the fourth curved surface and the fifth curved surface is curved in a convex shape toward the neck portion side.

15

8. The toothbrush according to any one of claims 1 to 7,

wherein, in the front view, a width in a length direction of the neck portion is constant.

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9. The toothbrush according to any one of claims 1 to 8,

wherein a material of the handle body is a polypropylene resin.

10. The toothbrush according to any one of claims 1 to 9,

wherein at least a part of the handle body is covered with a soft resin.

25

11. The toothbrush according to any one of claims 1 to 10,
wherein a total length of the handle body is 110 mm to 170 mm.