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(54) **Tooth-brush having a head with a variable bending angle**

Zahnbürstekopf mit einem veränderlichen Biegewinkel

Brosse à dents dont la tête à un angle de pliage variable

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Description

The present invention relates to a toothbrush provided with a bristle-carrying head mounted on the handle via a hinge which is flexible, i.e. capable of assuming any angle during use.

Toothbrushes normally comprise a substantially straight handle part which extends into a head part which is also straight and on which the cleaning bristles are mounted. In the most well-known arrangements the head part is aligned with the handle part. This arrangement has been adopted with satisfactory results for very many years, despite the fact that it is not particularly suitable - since it creates a few problems during use - for cleaning the deep-lying zones located behind the molars of the teeth.

In order to overcome this problem it is known that for some time so called "angular " toothbrushes have been available commercially, said toothbrushes having in fact a head which is bent at an angle with respect to the axes of the handle. This angle - which to a certain extent imitates the shape of a dental mirror - is intended to facilitate cleaning of the convex parts of the teeth and of the zones located behind the molars and the incisors. These toothbrushes, however, are less suitable for cleaning the front part of the teeth and in fact are generally unsuitable for cleaning the concave zones of the teeth.

More recently so called "flexible" toothbrushes have also been proposed, i.e. toothbrushes having the handle, or at least a part of the handle, which is able to flex in the direction of its length. Toothbrushes of this type are described for example in DE-C1-39 23 495, DE-C2-42 23 697, DE-C1-42 22 931, DE-GM-89 03 911 and EP-A2-0.371.293. This flexibility, however, is intended - as clearly stated in DE-C1-39 23 495 - to allow the cleaning pressure on the teeth to be controlled more easily so as avoid damaging the latter. For this reason, the flexing or hinging zone is located at a middle point along the handle and in particular in a zone where the thumb of the hand rests during use, i.e. in a zone situated outside the mouth during use of the brush: only in this way, in fact, is the user able to sense exactly how much the brush is flexing and consequently how great the cleaning pressure is.

All of these known brushes, therefore, do not achieve the aim which is that of the invention, namely that of facilitating cleaning of all the parts of the teeth. This problem, however, is dealt with in the document WO-92/17092, which proposes a brush consisting of a handle and a bristle-carrying head, the latter being mounted in a flexible and yielding manner on an end-piece of the handle which surrounds or respectively is surrounded by the head, the latter therefore being able to perform an oscillating movement with respect to the end-piece.

This brush, however, has at least the following drawbacks:

- on the one hand its functional capability is limited; in fact, in view of the type of assembly proposed, the bristle-carrying head is able to perform a very limited oscillating movement with respect to the end-piece of the handle. If this were not so, there would be the risk that the tip of the end-piece of the handle (in particular in variants where this end-piece is surrounded by the body of the head) could, in certain conditions, project outside the head such that it risks bruising the teeth and the gums. Consequently, as this oscillating movement is limited, the brush is unsuitable for cleaning the deeper-lying zones of the teeth, located behind the molars;
- on the other hand, during use, it does not guarantee very hygienic conditions; in fact, it has interstices between the rigid end-piece and the oscillating head where undesirable and not easily removable deposits may form, giving rise to drawbacks from the hygiene point of view;
- finally it is complicated and hence costly to manufacture and, moreover, its life is limited on account of the use of a delicate component such as the oscillating pivot of the bristle-carrying head.

The aim of the present invention is to propose a toothbrush which overcomes the drawbacks of all the known brushes mentioned above and which, in particular, via a structure which is simple and economic to manufacture and practical and perfectly hygienic to use, makes it possible to perform cleaning of any part of the teeth, i.e. both the concave and convex front part and internal parts as well as the deeper-lying parts located behind the molars. This aim is achieved via the characteristic features indicated in the characterising part of Claim 1.

More particularly, said hinge is formed by an assembly of two flexible, thin, side bridge-pieces, made as one piece with the handle and the head and constituting the main element for joining and connecting together the latter, and by a mass of elastomeric filling material injected into the space between said bridge-pieces and constituting the secondary joining element.

Via this structure, therefore, a brush is obtained, in which the bristle-carrying head is elastically yielding, at a variable angle with respect to the handle, about said hinging axis, while it remains perfectly rigid with respect to the handle in a direction perpendicular to said axis.

Further characteristic features and advantages of the brush according to the invention, however, will emerge more clearly from the detailed description which follows of a preferred embodiment thereof provided by way of example and illustrated in the accompanying drawings, in which:

Figures 1 and 2 are two plan views of the brush according to the invention, from the front side, where the bristles are mounted, and rear side, respectively;

Figure 3 is a side view, on a larger scale, of the head of the said brush with the associated hinging point on the handle; and

Figure 4 is a view similar to that of Figure 3 showing different angles of the bristle-carrying head.

As shown, the brush comprises in a known manner a handle 1 and a head 2 on which the bristles 3 are mounted. According to the present invention, the head 2 and the handle 1 are made of a relatively rigid plastic material and are joined together via a flexible hinge.

The axis of this hinge is arranged in a plane parallel to the plane of the head on which the bristles are fixed and is oriented perpendicularly with respect to the longitudinal axis of the brush. In this way the head has in practice a variable angle with respect to the handle.

Such a flexible hinge consists, according to the preferred embodiment shown in the drawings, of an assembly of two moderately flexible, thin, side bridge-pieces 1a - formed as one piece with the handle 1 and the head 2 and constituting the main element for joining and connecting together the latter - and of a mass 4 of elastomeric filling material injected into the space between the bridge-pieces (indicated by a broken line in the drawings).

According to the invention the assembly consisting of handle, head and bridge-pieces is made of a relatively rigid plastic material; consequently, the handle and the head are rigid and only the bridge-pieces, owing to their thin cross-section, are flexible. This flexibility is then controlled via the greater or lesser yielding capability of the mass 4 of elastomeric filling material.

With this structure, in fact, an easy and correct brush action is obtained, owing to the fact that:

- the handle is rigid and allows a good gripping action, and the head is rigid and provides a good bearing surface;
- as a result of the flexible hinge it is possible, on the one hand, and in particular during the movement of the brush in a horizontal direction along the arch of the teeth, to vary the angle of the head so as to follow the curvature of the teeth, while on the other hand, during the vertical movement of the brush parallel to the length of the teeth, the head is able to closely follow the movement of the handle.

More precisely, as shown in Figure 4, the head 2 of the brush is able to assume different angles I, II, III, with respect to the handle, during use, so as to facilitate cleaning of both the concave surfaces and convex surfaces of the teeth. Moreover, since the rest position of the head 2, indicated by I, is naturally angled, the brush according to the invention is particularly suitable also for cleaning of the deep-lying zones located behind the molars.

According to an additional feature of the invention, the handle 1 and the head 2, as well as the bridge-pieces 1a, are made of a material having a chemical affinity with the material constituting the filling mass 4, such that it is possible to provide a lasting and stable bond between these elements by means of simple two-stage injection moulding, without the addition of any binder. For example, it is possible to use polypropylene for the handle part 1, head 2 and bridge-pieces 1a, while the filling mass 4 will consist of a polyolefin-based elastomeric material. Other suitable materials may readily occur to a person skilled in the art.

Preferably moreover, by appropriately choosing the hardness of the elastomeric material of the mass 4, it will be possible to grade the rigidity of the "hinge" according to the intended use of the brush (soft, medium or hard; for adults or for children).

It is understood, however, that the particular configuration illustrated above represents only one example of the present invention and that any other technically equivalent constructional variant, which may occur to a person skilled in the art, in particular as regards the constitution of the hinge and the materials with which it is made, must be regarded as falling within the protective scope of the invention itself.

Claims

1. Toothbrush of the type comprising a rigid support handle (1) and a bristle-carrying head (2) in the form of a flat body from which the bristles (3) project perpendicularly, said head (2) being joined to the end of the handle (1) via a flexible hinge, which is formed in part of a semirigid, elastic, plastic material and in part of a soft elastomeric material characterized in that
said flexible hinge is formed by the combination of

   - two flexible, thin, side-bridge pieces (1a) made of semirigid plastic material, formed in one piece with the handle (1) and the flat body of the head (2) and constituting the main element for joining and connecting together these latter, said two side-bridge pieces (1a) determining an oscillating axis arranged in a plane essentially parallel to the plane of the bristle-carrying head and oriented perpendicularly with respect to the longitudinal axis of the brush so that the bristle-carrying head is elastically yielding, at a variable angle with respect to the handle, about said hinging axis, while it remains perfectly rigid with respect to the handle in a direction perpendicular to said axis, and
   - a filling mass (4) of soft elastomeric material injected into the space between said side-bridge pieces and forming a stable linkage with these latter, said filling mass constituting a secondary joining and connecting element.

2. Toothbrush according to Claim 1, in which the han-

dle (1), the head (2) and the bridge-pieces (10) are made of a material having a chemical affinity with the material constituting the filling mass (4) of elastomeric material.

3. Toothbrush according to Claim 1, in which the rigidity of the hinge, depending on the intended use of the brush (soft, medium or hard; for adults or for children), is determined mainly by the hardness of the elastomeric material of the filling mass (4).

4. Toothbrush according to any one of Claims 1 to 3, in which the assembly consisting of handle (1), head (2) and bridge-pieces (1a) is made of polypropylene, while the filling mass (4) consists of a polyolefin-based elastomeric material.

Patentansprüche

1. Zahnbürste von der Art mit einem festen Haltegriff (1) und mit einem Borsten tragenden Kopf (2) in Form eines flachen Körpers, von dem die Borsten (3) senkrecht vorragen, wobei der Kopf (2) mit dem Ende des Griffs (1) über ein nachgiebiges Gelenk verbunden ist, das teilweise aus einem halbfesten, elastischen Kunststoffmaterial und teilweise aus einem weichen elastomeren Material besteht,
dadurch gekennzeichnet daß,
das flexible Gelenk aus einer Kombination gebildet ist aus

   - zwei flexiblen, dünnen, eine Seitenbrücke bildenden Stücken (1a), die aus einem halbfesten Kunststoffmaterial bestehen, das einstückig dem Griff (1) und dem flachen Körper des Kopfs (2) ausgebildet ist und das Hauptelement zum Anlenken und Verbinden der Letztgenannten miteinander bildet, wobei die beiden eine Seitenbrücke bildende Stücke (1a) eine Schwingungsachse definieren, die in einer Ebene angeordnet ist, welche im wesentlichen parallel zu der Ebene des die Bürsten tragenden Kopfes verläuft und senkrecht zu der Längsachse der Bürste derart ausgerichtet ist, daß der die Borsten tragende Kopf unter einem variablen Winkel zu dem Handgriff um die Gelenkachse elastisch nachgiebig ist, während er zu dem Handgriff in einer Richtung senkrecht zu der Achse vollständig fest bleibt, und

   - einer Füllmasse (4) aus einem weichen elastomeren Material, das in dem Raum zwischen den die Seitenbrücke bildenden Stücken eingespritzt ist und eine stabile Verbindung mit diesen bildet, wobei die Füllmasse ein sekundäres Anlenk- und Verbindungselement bildet.

2. Zahnbürste nach Anspruch 1, bei der der Handgriff (1), der Kopf (2) und die Brücke bildenden Stücke (10) aus einem Material bestehen, das eine chemische Affinität zu dem Material, das die Füllmasse (4) des elastomeren Materials bildet, hat.

3. Zahnbürste nach Anspruch 1, bei dem die Festigkeit des Gelenks in Abhängigkeit von der beabsichtigten Verwendung der Bürste (weich, mittel oder hart, für Erwachsene oder für Kinder) hauptsächlich durch die Härte des elastomeren Materials der Füllmasse (4) bestimmt wird.

4. Zahnbürste nach einem der vorangehenden Ansprüche 1 bis 3, bei dem die aus dem Handgriff (1), dem Kopf (2) und den die Brücken bildenden Stücken (1a) besteht, aus Polypropylen gemacht ist, während die Füllmasse (4) aus einem auf Polyolefin basierenden elastomeren Material besteht.

Revendications

1. Brosse à dents du type comportant un manche rigide (1) de support et une tête (2) portant des soies sous la forme d'un corps plan duquel les soies (3) font saillie perpendiculairement, ladite tête (2) étant reliée à l'extrémité du manchon (1) par l'intermédiaire d'une articulation flexible, qui est formée en partie d'une matière plastique semi-rigide, élastique, et en partie d'une matière élastomérique molle,
caractérisée en ce que
ladite articulation flexible est formée par la combinaison de

   - deux pièces flexibles et minces (1a) formant ponts latéraux, constituées d'une matière plastique semi-rigide, réalisées d'une seule pièce avec le manche (1) et le corps plat de la tête (2) et constituant l'élément principal pour joindre et relier entre eux ces derniers, lesdites deux pièces (1a) formant ponts latéraux déterminant un axe d'oscillation situé dans un plan essentiellement parallèle au plan de la tête portant les soies et orienté perpendiculairement à l'axe longitudinal de la brosse, afin que la tête portant les soies cède élastiquement, sous un angle variable par rapport au manche, autour dudit axe d'articulation, tout en restant parfaitement rigide par rapport au manche dans une direction perpendiculaire audit axe, et
   - une masse (4) de remplissage de matière élastomérique molle injectée dans l'espace entre lesdites pièces formant ponts latéraux en formant une liaison stable avec ces dernières, ladite masse de remplissage constituant un élément de jonction et de liaison secondaire.

2. Brosse à dents selon la revendication 1, dans

laquelle le manche (1), la tête (2) et les pièces (10) formant ponts sont constitués d'une matière ayant une affinité chimique avec la matière constituant la masse (4) de remplissage en matière élastomérique.

3. Brosse à dents selon la revendication 1, dans laquelle la rigidité de l'articulation, suivant l'utilisation prévue de la brosse (souple, médium ou dure) ; pour adultes ou pour enfants), est déterminée principalement par la dureté de la matière élastomérique de la masse (4) de remplissage.

4. Brosse à dents selon l'une quelconque des revendications 1 à 3, dans laquelle l'ensemble constitué du manche (1), de la tête (2) et des pièces (1a) formant ponts est réalisé en polypropylène, tandis que la masse (4) de remplissage est constituée d'une matière élastomérique à base de polyoléfine.

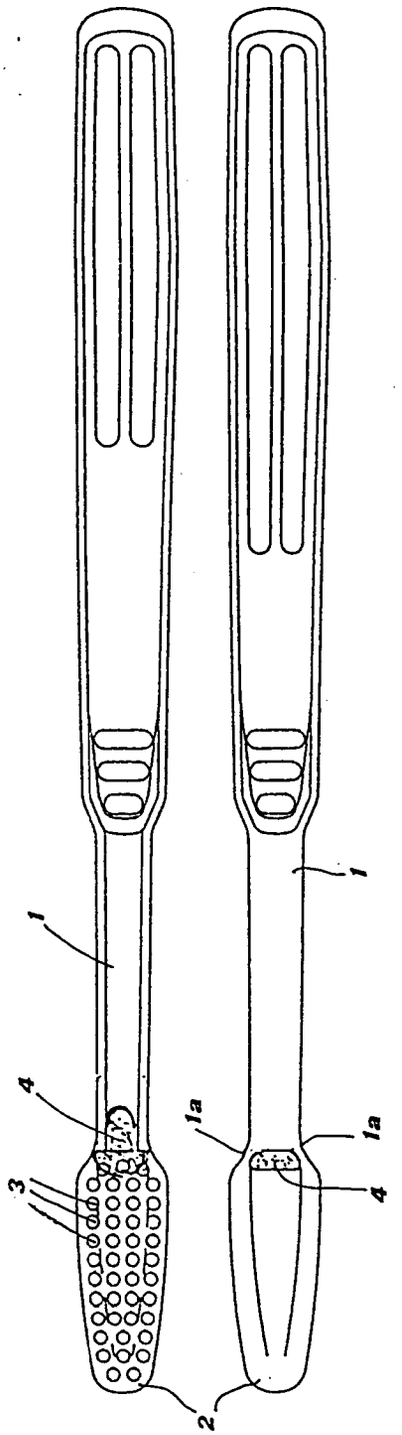

FIG.1

FIG.2

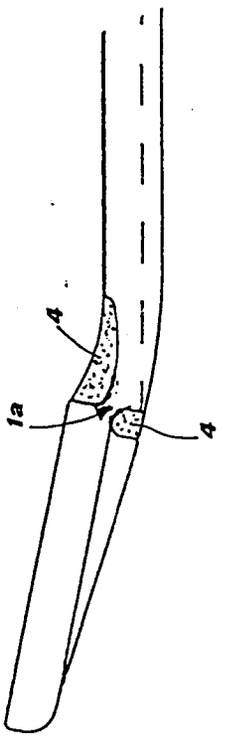

FIG.3

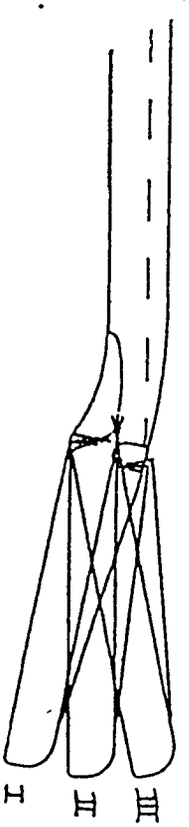

FIG.4