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(54) **TOOTHBRUSH**

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(76) Inventors: **Jaroslav Flek Jr., Praha (CZ);**  
**Jaroslav Flek Sr., Velvary (CZ)**

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Correspondence Address:  
**K. Karel Lambert**  
**P.O. Box 4063**  
**Renton, WA 98057 (US)**

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(57) **ABSTRACT**

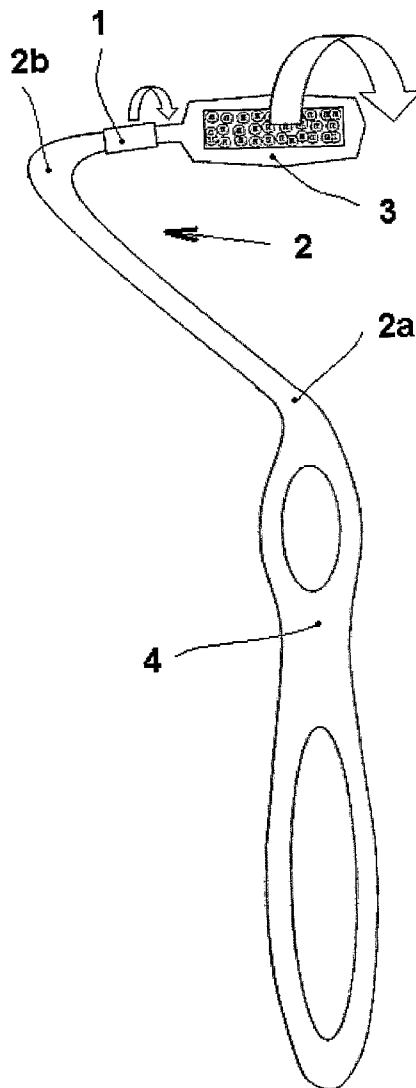
A toothbrush comprises a head (3) and a handle (4) where the head (3) is situated substantially perpendicularly to the longitudinal axis of the handle (4) namely by bristles directed substantially in a right angle to the plane in which the longitudinal axis of the handle (4) lies, whereby a neck (2) is arranged between the handle (4) and the head (3). The neck (2) is arranged in the form of a capital S, whereby the extension of the longitudinal axis of the handle (4) passes at least through the projection of the head (3) into the above said plane of the longitudinal axis of the handle (4) or in its proximity.

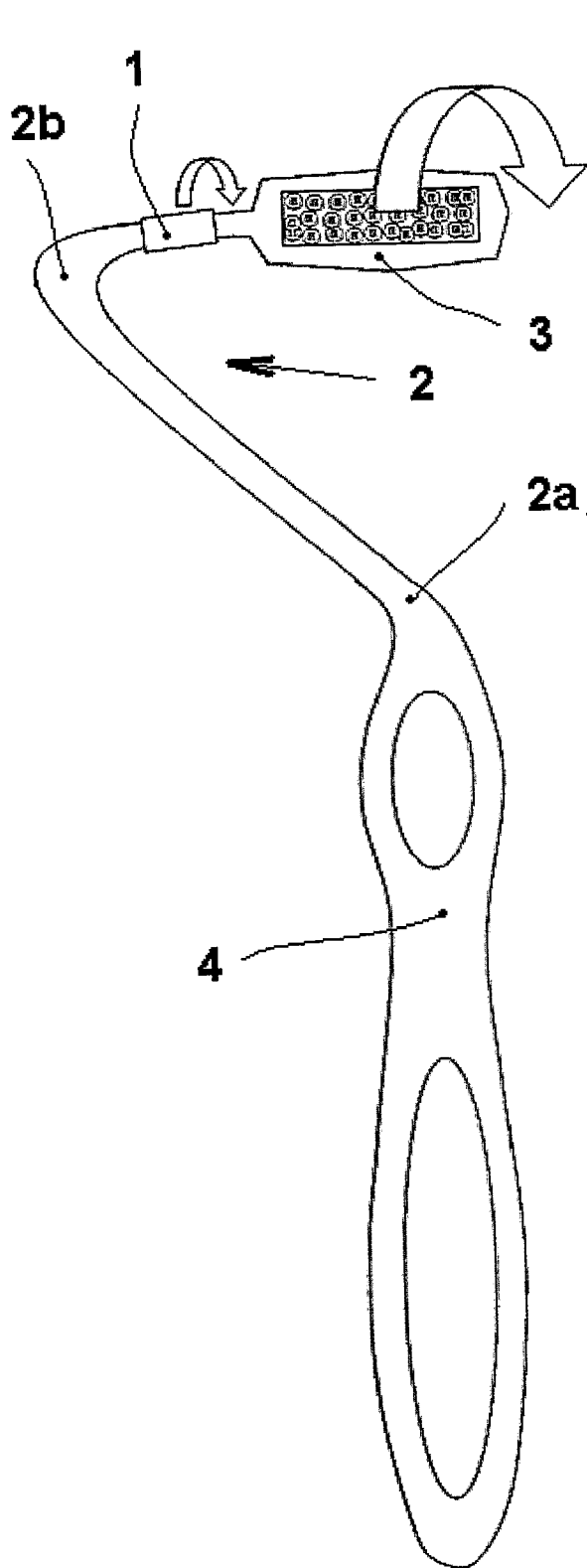
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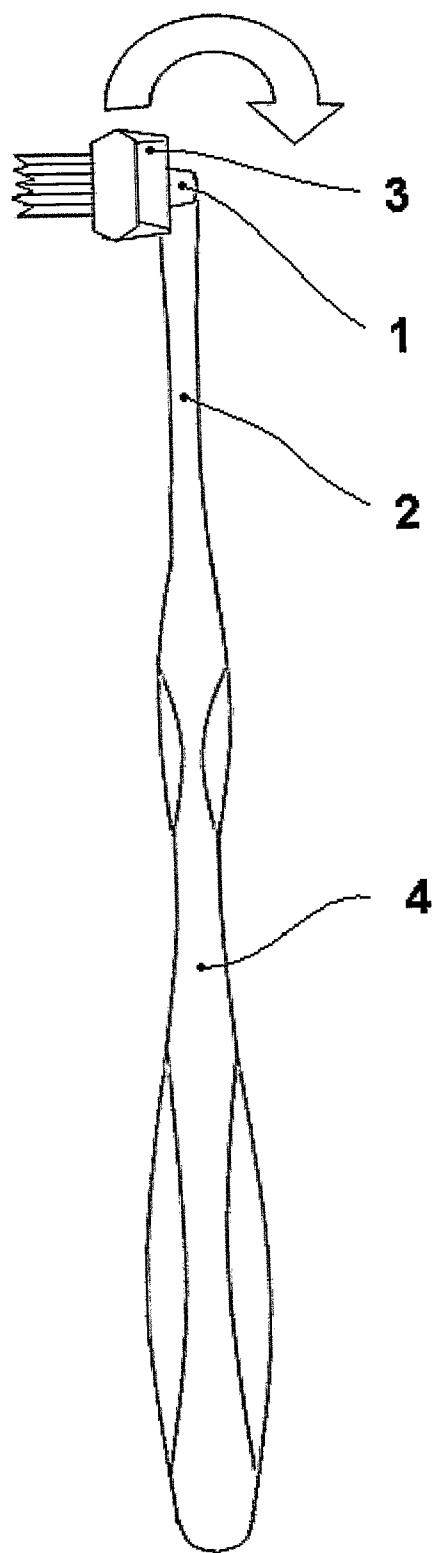
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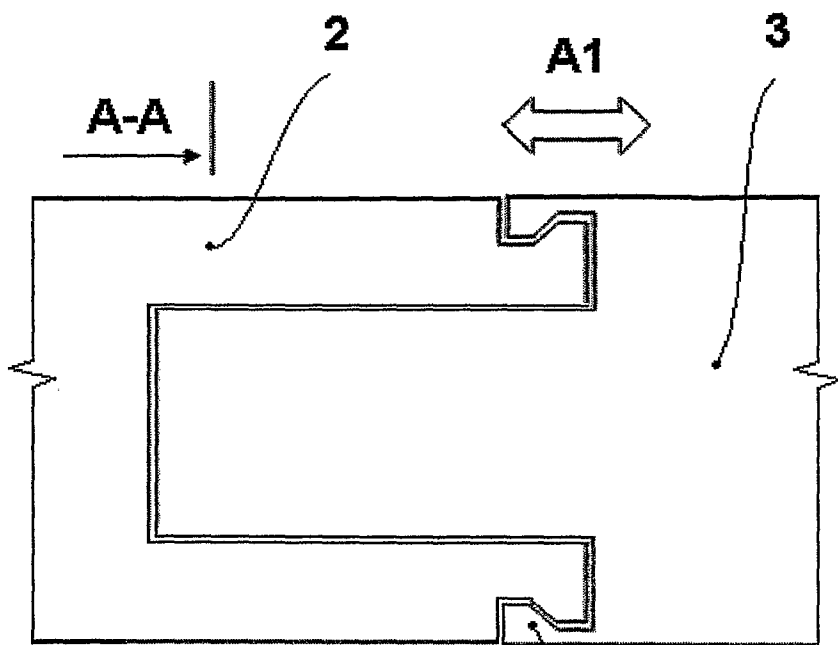




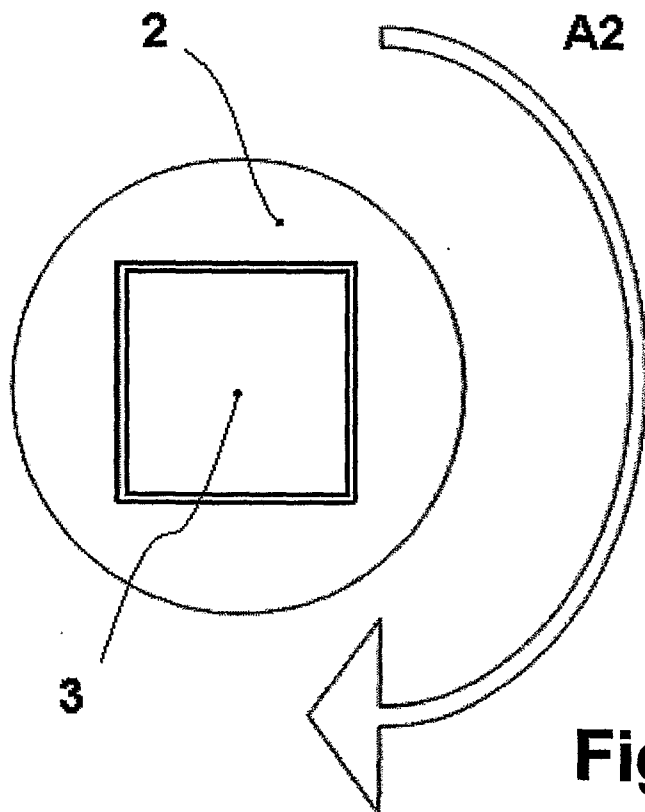
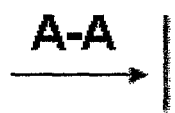
**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**

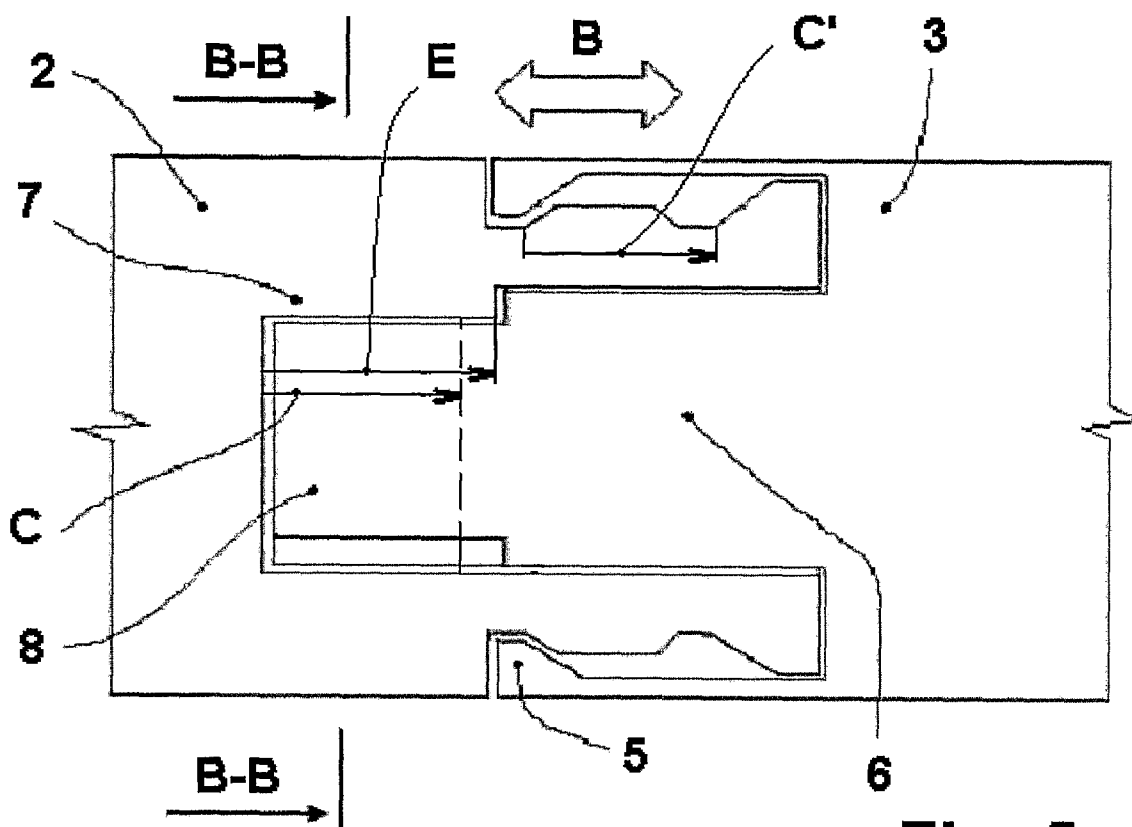
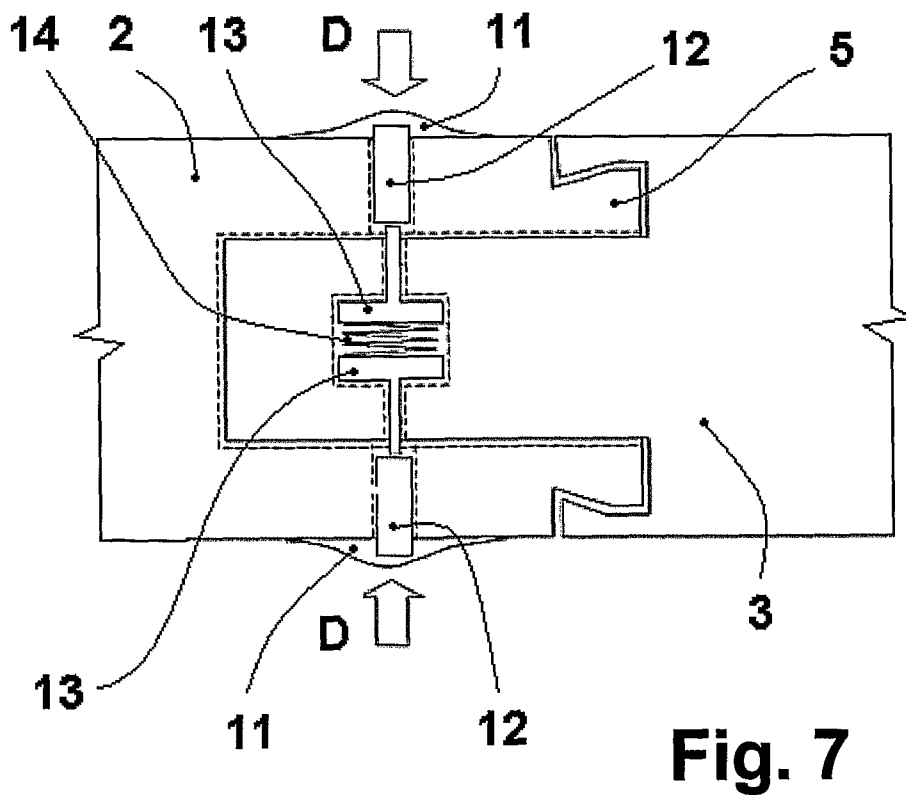
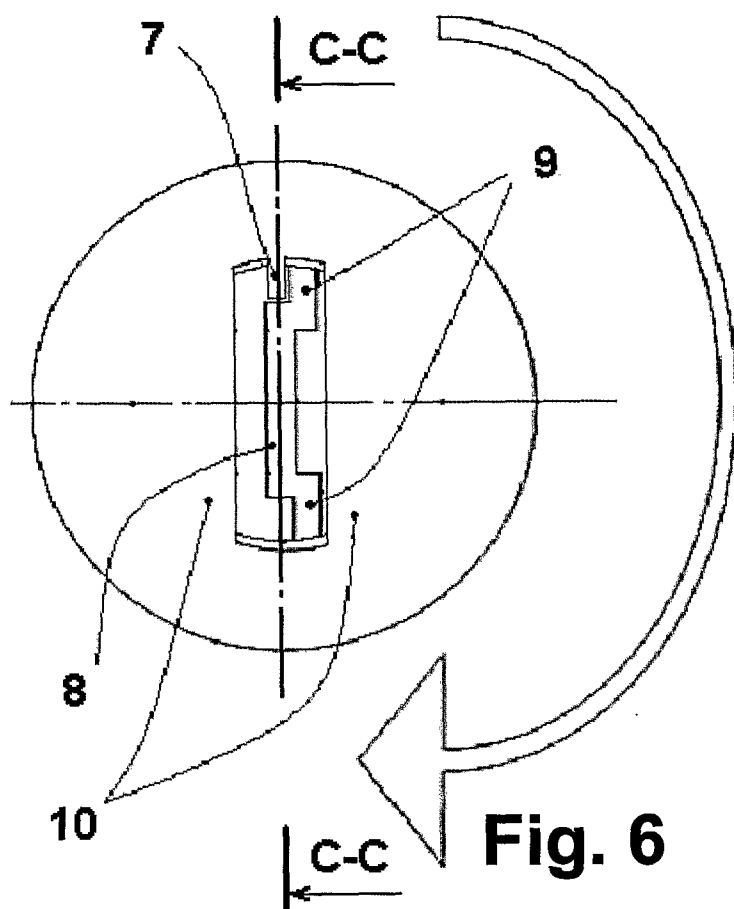
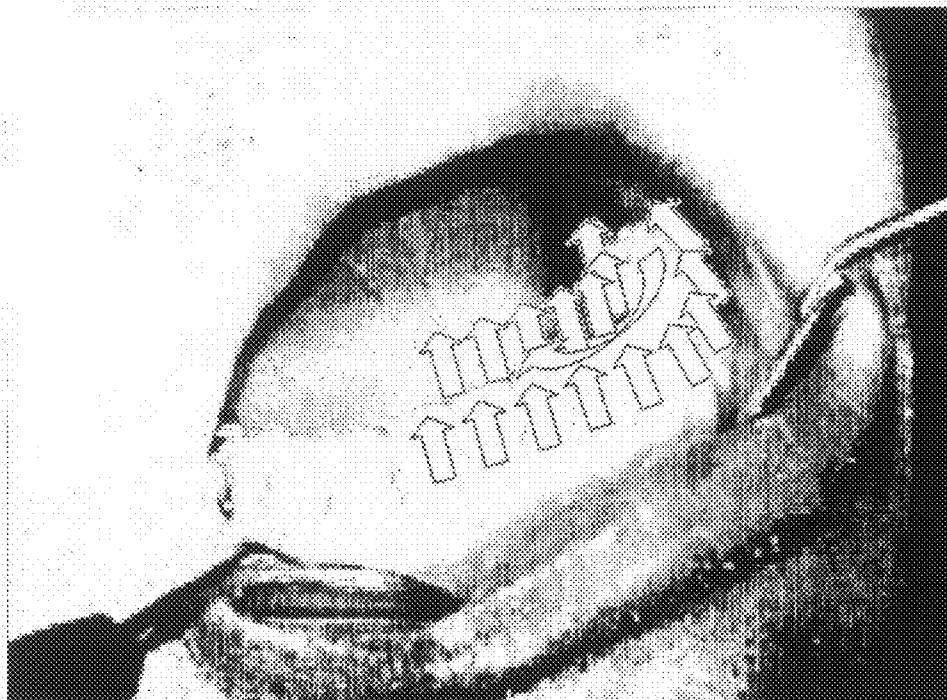
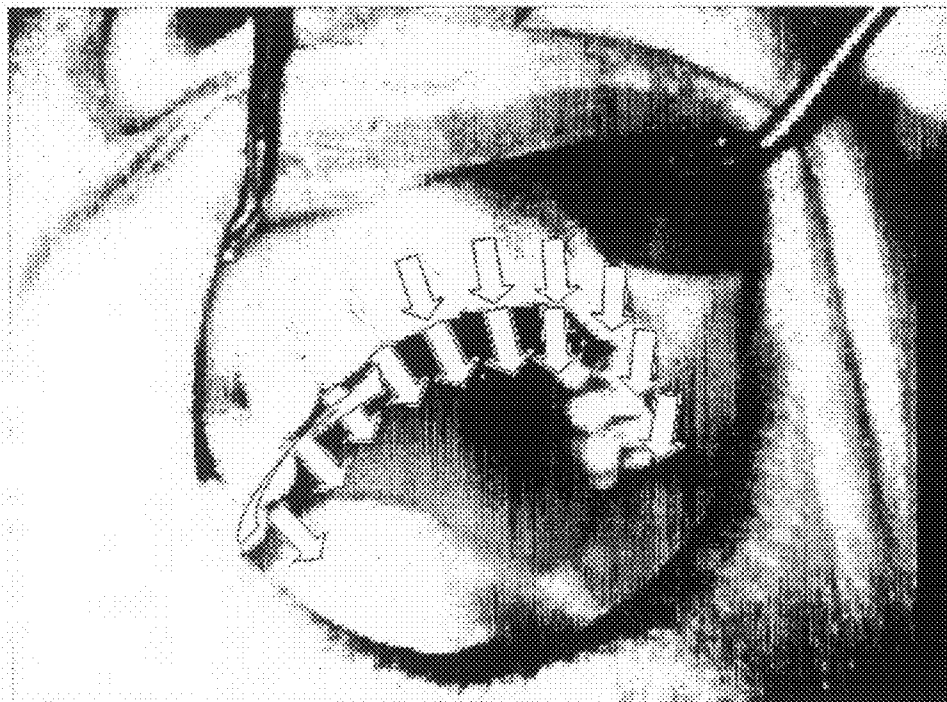


Fig. 5





**Fig. 8**



**Fig. 9**

**TOOTHBRUSH**

## TECHNICAL FIELD

[0001] The present invention relates to the manual cleaning of teeth; more specifically, to a toothbrush comprising a head and a handle whereby the head is situated substantially perpendicularly to the longitudinal axis of the handle, namely by bristles directed substantially in a right angle to the plane in which the longitudinal axis of the handle lies, whereby a neck is arranged between the handle and the head.

## BACKGROUND ART

[0002] Generally, any dental practitioner will confirm that the most frequent bad habit of people in cleaning their teeth is that they do not clean their teeth by vertical motions, but rather in the manner implied by the classic brush shape (i.e. in a horizontal direction). Cleaning teeth in this way is less effective for the gums due to the impact of the brush retreat, particularly in the area of incisors, such that the tooth necks is bared increasing the likelihood of periodontal disease.

[0003] One of the most effective preventative actions to stave off the onset of periodontal disease is the massage of gums in the direction from the root of the tooth to its point. Such massage vitalizes the muscle tissue of gums and increases their resistance. With the classic toothbrush, such motion is not ergonomic and almost impossible to achieve given the hasty cleaning of teeth and lack of focused concentration typical of the everyday user.

[0004] For these reasons, long-standing efforts have been made to locate the head of the brush perpendicularly to the handle so as to enable teeth cleaning in a vertical direction together with gum massage if appropriate. Such solutions are known from a number of documents, for example from CS 253 318 B1, DE-AS 1 185 147, DE 32 28 946 A1, DE 100 03 536 A1, EP 1 057 426 A1, FR 2 583 963 A1, GB 484 331 B1, GB 2 366 719 A, U.S. Pat. No. 6,094,768 B1, WO 84/01700.

[0005] Likely it is also known from FR 2 621 792 to locate the brush head provided with bristles around the head at an angle of 60° and able to rotate in relation to the axis of the handle.

[0006] DE 34 23 400 A1 describes a brush with a head located perpendicularly to the handle, the bristles being situated in the plane of the brush whereby the head is offset from the handle to enable the easy application of toothpaste.

[0007] From the prior art, an arrangement is also known where the head is connected to the brush handle by means of a rotatable, positioning coupling. In addition to certain of the above-cited documents, such solutions are disclosed in for example DE 34 25 940 A1, FR 1 569 196, FR 2 446 617 A and WO 95/01113.

[0008] From the document SI 20186 is known a toothbrush with an unsymmetrical handle position, which solves the problem of how to increase its ergonomics by changing the structure. The handle axis is directed at a certain angle to the brush head axis of symmetry. Thus, the handle occupies a position where the brush head is displaced by a simple movement along its axis in the direction of tooth gaps to clean them effectively. The head is exchangeable in such a way that its bearing in the centre of gravity can be mounted to an axis on a holder. Both, the bearing and the axis are connected by mutual click allowing simultaneously the head to remain flexible and aligned uniformly against teeth. After fixing, it can be adjusted for the left-hand or right-hand application.

[0009] Further, DE 94 19 778 U1 discloses a known cleaning device for the mouth cavity which however does not provide for simple overcoming said disadvantages and problems.

## DISCLOSURE OF THE INVENTION

[0010] The object of the present invention, with respect to the above-cited prior art, is to provide a simple and reliable means to facilitate a healthy method of teeth-cleaning which would enable easy manufacture, operation, reliability, and optimal cleaning even of the marginal teeth with a minimum of effort.

[0011] This object is achieved by providing a toothbrush comprising a head and a handle where the head is situated substantially perpendicularly to the longitudinal axis of the handle, namely by bristles directed substantially in a right angle to the plane in which the longitudinal axis of the handle lies, whereby a neck is arranged between the handle and the head. According to the invention the neck is arranged in the form of capital S, whereby the extended longitudinal axis of the handle passes at least through the projection of the head into the above said plane of the handle longitudinal axis or in its proximity.

An advantageous embodiment includes a rotatable joint associated with the head to enable its turning, advantageously through 180 degrees. Another advantageous embodiment consists in the joint disposed between the head and the neck, or on the neck close to the head. According to another advantageous embodiment, the axis of the head and the neck lie in the same plane. Preferably, the head lies in the same plane as the axis of the handle and the neck. More preferably, the head is inclined in respect to the plane of axis of the handle and the neck into the bristles side at an angle up to 15 degrees, preferably at an angle 10 degrees, whereby the inclination point lies between the head and the joint.

[0012] According to another advantageous embodiment, the upper portion of the neck includes, with respect to the handle axis, an angle of 75 to 90 degrees, advantageously at 90 degrees.

[0013] According to another advantageous embodiment, the lower portion of the neck forms with the axis of the handle an angle of 70 to 45 degree, preferably at 60 degrees.

[0014] According to still another embodiment, the distance between the upper arch and the handle is 1.5-2.5 times, preferably two times the length of the head.

[0015] According to another advantageous embodiment, the distance between the lower arch and the handle is 1.0-2.5 times, preferably two times the length of the head.

[0016] According to another advantageous embodiment, the joint consists of a dismountable system of tongue and groove whereby the tongue has a square or rectangular cross-section and the mutual blocking and fixing of the head on the neck is carried out by means of a catch in the form of an O-ring.

[0017] Alternatively, according to another advantageous embodiment, the joint may consist of a connection with a longitudinal motion of the head which is provided with a tongue of circular cross-section whereby the tongue has a bearing element, the neck is provided with a groove having a circular cross-section at its outer end and having a fixing portion at its inner end which portion comprises a stop which is disposed parallel to the axis of the joint and projects inside the groove; and, in order to prevent longitudinal motion of the head, the joint is provided with a catch in the form of an

O-ring. Preferably, both the opposite edges of the bearing element are provided with offset abutment surfaces disposed symmetrically along the axis of the joint, whereby the catch has two steps.

[0018] According to another alternative, the joint may include a fixing mechanism where the head is connected to the neck of the brush by a tongue-groove system of circular cross-section whereby the fixing mechanism passes through the tongue and the groove at a right angle with respect to the rotation axis and the joint (1) is secured by a catch in the form of an O-ring. Preferably, the fixing mechanism comprises opposite pistons disposed perpendicularly to the axis of the joint, the outer face of said pistons being engaged by tumblers whereby the pistons are pre-stressed by at least one spring.

[0019] According to another preferred embodiment, the tongue is provided with a bearing element and the groove at its end with a stop whereby the tongue and the groove are disposed parallel to the axis of the joint and the stop projects into the groove to ensure the engagement with the bearing element.

[0020] The toothbrush (hereinafter referred to also as the "S-force") according to the present invention is unique in its neck shape which suggests a letter S, or the top of a fire hook. This shape enables cleaning of the surfaces of the 4 to 8 molar teeth which otherwise would be to a great extent inaccessible. Moreover, the "S-force" is equipped with a joint for the turning of the brush head by 180 degrees including its fixing in the end positions. The combination of these two features provides for comfortable but primarily very effective cleaning of all tooth areas, i.e. their front part, their rear part, and the masticating surfaces of molars.

[0021] The "S-force" utilizes an absolutely standard brush head and a standard handle. At a shop counter anybody would recognize it at first sight as a toothbrush. Although rather curved, it is in all other respects clearly a toothbrush.

[0022] Nevertheless, the "S-force" cannot be confused with any other toothbrush since, unlike other toothbrushes available in today's market, its shape is noticeably different and unmistakable.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention is explained in more detail by way of examples of its embodiments illustrated in the accompanying drawings wherein:

[0024] FIG. 1 is a front view of the toothbrush according to the invention;

[0025] FIG. 2 is a side view of the toothbrush according to the invention of FIG. 1;

[0026] FIG. 3 is a longitudinal sectional view of a first embodiment of a dismountable joint between the head and neck of the toothbrush;

[0027] FIG. 4 is a sectional view of the head and neck of the toothbrush along a plane A-A of FIG. 3;

[0028] FIG. 5 is a longitudinal sectional view of the head and neck of the toothbrush provided with a sliding structure according to a second embodiment along a plane B-B of FIG. 4;

[0029] FIG. 6 is a sectional view of the joint between the head and neck of the brush along the plane B-B of FIG. 5;

[0030] FIG. 7 is a longitudinal sectional view of the joint-fixing mechanism without longitudinal motion pursuant to the third embodiment;

[0031] FIG. 8 shows the process of cleaning teeth situated on the left side below with the tooth brush held in the left position; and

[0032] FIG. 9 shows the process of cleaning the upper teeth with the toothbrush held in the left position.

#### DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0033] FIG. 1 shows an "S-force" toothbrush with a head 3, in the right-hand position. This front view shows that the longitudinal axis of the handle 4 intersects approximately with the centre of the brush head 3. Such arrangement is advantageous in reducing the rotation of the toothbrush in cleaning teeth as a result of non-coaxial forces exerted on the brush head 3. A shift of the brush head 3 outside this axis is generally also possible.

[0034] Further, it appears from FIG. 1 that the neck 2, i.e. an intermediate part between the handle 4 and the brush head 3, is formed like the working part of a poker. In other words, into the shape of a capital "S" having two opposite-directed arches 2a, 2b. In this preferred embodiment the entire neck 2 is situated in the same plane as the handle 4 whereby the head 3 lies substantially in this same common plane. In other words, the bristles are disposed substantially perpendicularly to this plane. Although both the arches 2a, 2b may be of the same or similar size, in the preferred embodiment the lower arch 2a provides for a declination of the lower part of the handle 4 at an angle of 70 to 45 degrees, preferably at about 60 degrees from the axis of the handle 4 at the point at which the handle 4 passes into the lower part of the neck 2. The upper arch 2b located between both parts of the neck 2 provides for the positioning of the upper part of the neck 2 at an angle of approximately 75 to 90 degrees, preferably at about 90 degrees with respect to the axis of the handle 4.

[0035] As to the dimensional proportions, the upper arch 2b is located at a distance corresponding to 1.5 to 2.5 (preferably two times) the length of the brush head 3 whereby the distance between the lower arch 2a and the head 3 is about 1.0 to 2.5 times the length of the head 3.

[0036] The actual dimensioning of the size of the arches 2a, 2b, the neck 2, the length of head 3 and the thickness of the neck 2 will depend on the individual age groups for which the brush is designed, the choice and location of the joint 1, the hardness of the brush, dimensions and shape of individual parts of the brush, and so on.

[0037] FIG. 2 shows that, in the illustrated preferred embodiment of the brush, both the handle 4 and the neck 2 are situated in one plane which enables a comfortable grip on the brush from both sides, i.e. with the head 3 either in the left-hand position or in the right-hand position. The head 3 is then located close to this plane or directly in this plane, as the case may be. More preferably, the head 3 is inclined in respect to the plane of axis of the handle 4 and the neck 2 in the direction of bristled side of the head 3 at an angle up to 15 degrees, preferably at an angle 10 degrees. It means in cleaning position towards teeth and to the left according to FIG. 2. The inclination point lies between the head 3 and the joint 1. FIGS. 1 and 2 show such an arrangement of the joint 1 between the neck 2 and the head 3 where the head 3 may be turned from the right position to the left position through 180 degrees.



**[0038]** The following three detailed embodiments of the joint 1 represent a very important part of the present solution, which however does not limit the scope of the present solution.

**[0039]** In the first embodiment, according to FIGS. 3 and 4, the joint 1 is arranged as a dismountable connection between the head 3 and the neck 2 of the brush. The head 3 and the neck 2 are connected by the tongue and groove system. The tongue has a quadrate or, more appropriately, rectangular cross-section. The rectangular cross-section enables the head 3 to be fixed on the neck 2 in two 180 degree mutually turned positions only. The blocking/fixing of the head 3 on the neck 2 is secured by a catch 5 in the form of an O-ring. When the turn of the head 3 in the direction of arrow A2 by 180 degrees is required, the O-ring will be released by pulling the head 3 to the right in the direction of the arrow A1 (FIG. 3). This means that the head 3 is separated from the neck 2. The head 3 is turned in the direction of arrow A2 by the required angle which may be for some applications even 90 degrees. Thereafter, the head 3 is secured by pressing it to the left in the direction of arrow A1 and by pushing back the flexible O-ring catch 5. This embodiment is very simple and easy to implement technically.

**[0040]** A second embodiment of the joint 1 according to FIG. 5 and 6 may be interpreted as a joint with a "longitudinal sliding motion of the brush head 3". Here, the head 3 is provided with a tongue 6 showing a circular cross-section at its inner end. The outer end of this tongue 6 is fitted by a flat bearing element 8. Both opposite edges of the bearing element 8 are provided with offset stop surfaces 9 situated symmetrically along the axis of the joint 1. The neck 2 has a groove of circular cross-section at its outer end. At its inner end, a fixing portion 10 is provided. This portion comprises a stop 7 which is disposed parallel to the axis of the joint 1 and projects in the inside of the groove. The fixing portion 10 of the groove has a substantially rectangular cross-section (see FIG. 6) at a length C. At the end of the stop 7, the cross-section of the tongue 6 is transformed from the flattened shape of the bearing element 8 into a circular cross-section.

**[0041]** The longitudinal sliding motion of the head 3 is again prevented on the principle of the catch 5. In this embodiment, the catch 5 also has the form of an O-ring but is carried out as a two-step catch which may take two positions enabling the head 3 to be longitudinally moved with respect to the neck 3 over a distance C'.

**[0042]** For turning the head 3 it is first displaced to the left in the direction of the arrow B (FIG. 5) over a distance C', for example by about 5 mm. Thus, the flat bearing element is released from the flattened fixing portion 10 but still remains in the range of the stop 7. This position is secured in that the length E of the stop 7 is greater than the distance C' at which the head 3 is shifted. The distance C' is at least equal, advantageously a bit greater than the length C of the fixing portion 10. The head 3 is turned by 180 degrees in the direction of the arrow shown in FIG. 6 and abuts its opposite stop surface 9 to the stop 7. Thereafter, the bearing element 8 is inserted back into the fixing portion 10 in the direction of the arrow B to the left. In the working position of the brush, the bearing element 8 of the tongue 6 engages the stop 7 and is fixed at the flattened fixing portion 10 of the groove.

**[0043]** This second embodiment of the joint is more complicated from the technical aspect, but more effective for the user of the brush.

**[0044]** A third embodiment of the joint 1 according to FIG. 7 may be interpreted as a "fixing mechanism joint without sliding motion" since this joint 1 enables only the turning of the head 3. In this case, the head 3 is again connected to the brush neck 2 by the principle of tongue and groove. As in the second embodiment of the joint 1, the tongue 6 and the groove are of circular cross-section. A fixing mechanism passes through the tongue 6 and the groove along the rotation axis. If the projecting rubber surfaces 11 are pressed by two fingers in the direction of arrows D, the pistons 12 urge the tumblers 13 into the body of the tongue 6. Then, the brush head 3 may be turned through 180 degrees. After releasing the projecting surfaces 11, the tumblers fix the head 3 in all directions by means of a spring 14. In this case, the catch 5 is non-dismountable and enables the turning of the head 3 on its longitudinal axis only. This third embodiment of the joint 1 is most technically challenging and requires the use of high-quality materials in consideration of the small space in which the joint 1 is to be built (i.e. of an axial support).

**[0045]** To a person skilled in the art, it will be obvious that certain features of the joints 1 may be mutually combined. For example, the third embodiment may be completed by a stop 7 which is utilized in the second embodiment. Other combinations are also possible.

**[0046]** As to the materials used, it is possible to utilize a suitable plastics and/or a metal, depending on the stress of particular parts of the brush, specifically the joints 1.

**[0047]** The process of cleaning the teeth is absolutely identical for both positions of the brush head 3, i.e. for the left-hand or right-hand positions.

**[0048]** FIG. 8 shows the motions that may be used for effective cleaning of teeth on the lower-left side. The outer part is cleaned by upward motions from the down position whereby the brush handle 4 is directed downward. The inner sides of the teeth are also cleaned by upward motions from the down position, although here the brush handle 4 is pointed upward. The "chewing surfaces" are cleaned in a horizontal direction (as the horizontal arrow directs), whereby the brush handle 4 is also held in the horizontal position.

**[0049]** FIG. 9 shows what motions are necessary to clean the upper teeth effectively. The outer part of the front teeth and those on the left side are cleaned by motions from the top downward, whereby the handle 4 is pointed downward. The front inner sides and right upper sides are cleaned by turning the handle 4 in the hand also by a motion from the top downwards, whereby the handle 4 is again directed downward. The teeth "chewing surfaces" on the upper right side are cleaned in the horizontal direction as indicated by the horizontal arrow, whereby the handle 4 is also held in the horizontal position.

**[0050]** The cleaning of teeth by the brush head 3 on the right-hand side is entirely identical except for reversing the positioning given in the previous paragraph.

**[0051]** The above-described cleaning procedure provides the most advantageous approach when the handle 4 and the neck 2 of the brush are situated preferably in one plane which enables a grip on the brush from both sides, i.e. with the head 3 in the left position or with the head 3 in the right position. Such an arrangement enables simple manufacture and easy handling when using the brush.

**[0052]** The above-described method of cleaning teeth also underlines the importance of the presented solution for turn-

ing the brush head by 180 degrees at the place of the joint 1 accompanied with the fixing thereof in both the end positions.

LIST OF REFERENCE CHARACTERS

- [0053] 1 joint
- [0054] 2 neck
- [0055] 2a lower arch
- [0056] 2b upper arch
- [0057] 3 head
- [0058] 4 handle
- [0059] 5 catch
- [0060] 6 tongue
- [0061] 7 stop
- [0062] 8 bearing element
- [0063] 9 stop surface
- [0064] 10 fixing portion
- [0065] 11 projecting surface
- [0066] 12 piston
- [0067] 13 tumbler
- [0068] 14 spring
- [0069] A1 arrow
- [0070] A2 arrow
- [0071] B arrow
- [0072] C length
- [0073] C' distance
- [0074] D arrow
- [0075] E length

1. A toothbrush comprising a head (3) and a handle (4), whereby a hook-shaped neck (2) is arranged between the handle (4) and the head (3), the head (3) is situated substantially perpendicularly to the longitudinal axis of the handle (4) and bristles of the head (3) are directed substantially perpendicularly to the plane in which the longitudinal axis of the handle (4) lies, characterized in that the extension of the longitudinal axis of the handle (4) passes at least through the projection of the head (3) into the above said plane of the longitudinal axis of the handle (4) or in its proximity, whereby a rotatable joint (1) is associated with the head (3) to enable its turning, advantageously through 180 degrees, so as to adjust the head (3) into another position with respect to the handle (4).

2. (canceled)

3. A toothbrush according to claim 1, characterized in that the joint (1) is arranged between the head (3) and the neck (2), or on the neck (2) near the head (3).

4. A toothbrush according to claims 1 or 3, characterized in that the axis of the handle (4) and the neck (2) lie in the same plane.

5. A toothbrush according to claim 4, characterized in that the head (3) lies in the same plane as the axis of the handle (4) and the neck (2).

6. A toothbrush according to claim 4, characterized in that the head (3) is inclined in respect to the plane of axis of the handle (4) and the neck (2) in the direction of bristled side of the head (3) at an angle up to 15 degrees, preferably at an angle 10 degrees, whereby the inclination point lies between the head (3) and the joint inclination point lies between the head (3) and the joint (1).

7. A toothbrush according to claim 1, characterized in that the upper portion of the neck (2) is inclined in respect to the axis of the handle (4) in an angle in the range of 75 to 90 degrees, preferably 90 degrees.

8. A toothbrush according to claim 1, characterized in that the lower portion of the neck (2) forms with the axis of the handle (4) an angle in the range of 70 to 45 degrees, preferably 60 degrees.

9. A toothbrush according to claim 1, characterized in that the distance between the upper arch (2a) and the handle (4) is 1.5-2.5 times, preferably two times the length of the head (3).

10. A toothbrush according to claim 1, characterized in that the distance between the lower arch (2b) and the head (3) is 1.0-2.5 times, preferably two times the length of the head (3).

11. A toothbrush according to claim 1, characterized in that the joint (1) consists of a dismountable system of tongue and groove, whereby the tongue (6) has a square or rectangular cross-section and the mutual blocking and fixing of the head (3) on the neck (2) is carried out by means of a catch (5) in the form of an O-ring.

12. A toothbrush according to claim 1, characterized in that the joint (1) is formed by a connection with a longitudinal motion of the head (3) which is provided with a tongue (6) of circular cross-section, whereby the tongue (6) has a bearing element (8), the neck (2) is provided with a groove having a circular cross-section at its outer end and having a fixing portion (10) at its inner end, which portion (10) comprises a stop (7) which is disposed parallel to the axis of the joint (1) and projects inside the groove; and in order to prevent longitudinal motion of the head (3) the joint (1) is provided with a catch (5) in the form of an O-ring.

13. A toothbrush according to claim 12, characterized in that both the opposite edges of the bearing element (8) are provided with offset abutment surfaces (9) disposed symmetrically along the axis of the joint (1), whereby the catch (5) has two steps.

14. A toothbrush according to claim 1, characterized in that the joint (1) is arranged as a fixing mechanism where the head (3) is connected to the neck (2) of the brush by a tongue-groove system of circular cross-section, whereby the fixing mechanism passes through the tongue (6) and the groove at a right angle with respect to the rotation axis and the joint (1) is secured by a catch (5) in the form of an O-ring.

15. A toothbrush according to claim 14, characterized in that the fixing mechanism comprises opposite pistons (12) disposed perpendicularly to the axis of the joint (1), the outer face of said pistons (12) being engaged by tumblers (13) whereby the pistons (12) are pre-stressed by at least one spring (14).

16. A toothbrush according to claim 14 or 15, characterized in that the tongue (6) is provided with a bearing element (8) and the groove is provided with a stop (7) at its end, whereby the tongue (6) and the groove are disposed parallel to the axis of the joint (1) and the stop (7) projects into the groove to ensure the engagement with the bearing element (8).

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