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(54) Title: TOOTHBRUSH

(57) Abstract: Toothbrush comprising a handle and a head attached thereto, the head having a chamber defined by a deformable bristle-bearing surface at its top and opposite thereto a base, the sides of the chamber being defined by a perimeter of the brush head, the base comprising a cap which is independent from and attachable to the rest of the base.



WO 2006/012956 A2

TOOTHBRUSH

The present invention relates to a toothbrush comprising a head which has a chamber between a bristle-bearing surface and a base. The present invention also relates to a method
5 for making such a brush.

WO 2004/19801 discloses a toothbrush comprising a handle, a head secured to the handle, the head having a movable
10 portion and a fixed portion surrounding the movable portion, cleaning elements mounted in the fixed and movable portions, a resilient membrane extending between at least a portion of the area between the fixed and movable portions and the membrane being capable of flexing to alter its original
15 orientation during use of said toothbrush and then recovering to assume its original orientation randomly during use of said toothbrush.

WO 2004/14181 discloses a toothbrush comprising a handle, a
20 head secured to said handle, said head being in the form of a base having an upstanding wall to create a peripheral frame, a thin resilient membrane mounted to said frame, an open space between said membrane and said base' said membrane having an initial condition of non-use, said
25 membrane in said initial condition being convex to have an original dome-like shape, at least one cleaning element on said membrane extending away from head, and said membrane being capable of flexing to alter said original shape during use of said toothbrush and then recovering to said original
30 shape randomly during use of said toothbrush.

- 2 -

DE-U-201 19 808 (Javanbakhsh) discloses a toothbrush comprising a pair of inflatable sections. One of these is located beneath the bristle-bearing surface.

5 The present invention relates to a toothbrush comprising a handle and a head attached thereto, the head having a chamber defined by a deformable bristle-bearing surface at its top and opposite thereto a base, the sides of the chamber being defined by a perimeter of the brush head, the
10 base comprising a cap which is independent from and attachable to the rest of the base.

The head comprises a perimeter which supports the bristle-bearing face and also presents a recess to form the chamber
15 underneath said face. It is preferred that the perimeter is in the form of a wall which extends around the brush head and has upper and lower edges. A part of the bristle-bearing face is preferably attached to the upper edge of the perimeter and/or its inner surface.

20

In a further preferred embodiment the bristle-bearing surface comprises a flexible member. This may be in the form of rigid elements which are flexibly and resiliently linked to one another, for example, by a thinning in the rigid
25 material between lands of rigidity or by way of an elastomeric material such as the thermoplastic elastomers. Where a thermoplastic elastomer is used the bristles may be affixed to the head directly within the elastomer or, instead, and preferably, by anchoring into rigid receptacles
30 which themselves float within the elastomer. The rigid receptacles may be linked to one another to provide improved

- 3 -

rigidity or may be completely separate from one another to maximise flexibility.

In a further preferred embodiment the bristle-bearing surface comprises a flexible membrane which supports the bristle tufts. Preferably, the flexible membrane spans the head of the brush and is attached thereto at a rigid head periphery. Underneath the membrane is a chamber which is closed at its base by the cap.

10

The cap is attachable to the remainder of the head and by way of such attachment closes the chamber at its base. The attachment of the cap may be by mechanical means, e.g. a friction fit or click-fit. It may also be by chemical means, e.g. an adhesive. It may also be welded onto the head, e.g. by heat or sonic welding.

15

Preferably, the cap is transparent. This is even more desirable where the bristle-bearing surface of the brush comprises a flexible element since it permits the user to visually experience the flexibility of the head from underneath, and so without visual hindrance by the bristles but it also allows for improved processing since the bristles may be anchored by applying support underneath rigid floating blocks as the bristle tufts are anchored therein by a bristling machine. This is particularly advantageous when a flexible head is used since the only alternative would be to bristle each block before incorporation into the head. Thus, in a preferred embodiment the bristle-bearing surface comprises bristle tufts fixed thereto by anchor technology.

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- 4 -

In a further preferred embodiment and where a flexible membrane is used to impart flexibility to the brush head it is preferred that the bristle tufts are embedded in rigid receptacles which themselves are embedded in the membrane.

5 Preferably, these rigid receptacles protrude through the membrane in order to maximise their bonding to the membrane. Further, this arrangement within the membrane also allows for the rigid receptacles to rock within the membrane without the interface between the receptacle and the
10 membrane being compromised and the receptacle coming loose. Preferably, the rigid receptacles are shaped such that they have a greater surface area underneath the membrane than
above it. This also assists in stabilising the receptacle within the membrane during rocking. When the receptacle is
15 rocked, one side of it is forced upwards. This applied pressure to the membrane from below in such a way that the membrane is less likely to split from the receptacle when being pulled away from the membrane.

20 In a further preferred embodiment the bristle-bearing surface is domed away from the chamber. In this embodiment it is envisaged that the chamber may possible be defined by the dome shape and that there is no recess formed by the reminder of the head.

25

The chamber in the brush head may be filled with any fluid such as air, water, gel, etc. Further, the chamber may be pressurised to above or below atmospheric pressure in order to impart certain flexibility profiles to the head.

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- 5 -

In a second aspect the invention provides a method for making a toothbrush comprising the steps of:

(a) moulding the brush head and handle from a rigid plastic material, the head having a rigid perimeter defining the outer dimensions of the head;

(b) moulding rigid receptacle either individually or in groups, where the receptacles are moulded in groups they are optionally separated before further processing;

(c) moulding a flexible membrane around the receptacles and joining said receptacles to the perimeter of the head;

(d) supporting each receptacle from below during affixing bristles to the receptacles;

(e) applying a cap to the base of the head to close a chamber formed beneath the bristle-bearing flexible membrane.

In an alternative method there is provided the steps of:

(a) moulding a brush head, handle and a plurality of rigid receptacles from a rigid plastic material, said rigid receptacle being moulded in at least one group with the receptacles being flexibly and resiliently linked to one another by virtue of a thinning in the rigid material there between, the head having a rigid perimeter defining the outer dimensions of the head and the rigid receptacles defining the bristle-bearing surface of the head;

- 6 -

(b) supporting each receptacle from below during affixing bristles to the receptacles;

(c) applying a cap to the base of the head to close a
5 chamber formed beneath the bristle-bearing surface of
flexibly and resiliently mounted rigid receptacles.

Embodiments according to the invention are now referred to
in the following non-limiting drawings in which,

10

Figure 1 is a cross-sectional view of an embodiment of the
invention;

Figure 2 is a perspective view of a toothbrush and cap;

15

Figure 3 is a plan view of the cap in a toothbrush
embodiment;

Figure 4 is a cross-sectional end on view of an embodiment
20 according to the invention; and

Figure 5 is a cross-sectional end on view of an embodiment
according to the invention.

25 In detail, figure 1 shows a toothbrush head (1) comprising a
bristle-bearing surface made of an elastomeric membrane (2)
with bristles (3) fixed therein by way of rigid receptacles
(4). Beneath the bristle-bearing surface is a chamber (5)
which is filled with air. At the base of the head (2) is an
30 aperture (6) which can be closed with the cap (7). The cap

- 7 -

(7) is transparent enabling the user to see the flexibility of the brush segments from underneath.

Figure 2 shows a brush head (1) defined by a perimeter wall (8) and having bristle-bearing surface (2) seen from underneath. The cap (7) is shown detached from the head but is fixable to the head as shown.

Figure 3 shows a brush head as described in figures 1 and 2 but seen from below and with the cap (7) attached. The bottom surfaces of the rigid receptacles (4) can be seen through the cap (7):

Figure 4 shows a cross-sectional end-on view of an embodiment of the invention. The bristle-bearing surface (2) is a flexible membrane spanning the brush head and being attached to the side walls (8) of the rigid perimeter of the head. The flexible member (2) is domed. Beneath the flexible member (2) is a chamber (5). The base of the head is also pierced to allow for attachment of a cap (not shown) with which to fully define the chamber (5).

Figure 5 shows an alternative embodiment to that shown in Figure 4. The flexible bristle-bearing surface (2) comprises an array of rigid bristle support members (9) located between grooves (10) which provide flexibility.

Figure 6 shows a rigid receptacle (4) suspended in a flexible membrane (2). Also shown is a bristle tuft (11) formed from stapling an anchor (12) within a rigid receptacle.

- 8 -

Figure 7 shows how a rigid receptacle such as that shown in figure 6 rocks about its axis when the brush is used.

Further, the rigid receptacle comprises a supporting flange (13) beneath the membrane.

5

Figures 8-12 show the steps involved in making a toothbrush according to the second aspect of the invention. In Figure 8 is shown a perimeter frame (8) defining the outer limits of the brush head. The head is shown in cross-section looking
10 end-on. The handle is not shown but it contiguous with the head. The perimeter (8) provides a support for the bristle-bearing surface and also for the cap, both of which are applied later.

15 In Figure 9 is shown the rigid receptacles (4) after being moulded. These may have been moulded individually or in a group with the receptacles being separated if moulded in a group.

20 In Figure 10 is shown a flexible membrane (2) moulded around the receptacles and fixing them to the perimeter (8). This forms a trampoline-like structure where the receptacles can be depressed into the chamber underneath the membrane during brushing.

25

In Figure 11 is shown a support (14) supporting a rigid receptacle (4) during affixing of a bristle tuft (11) with an anchor (12). Each receptacle may be tufted in turn or in groups depending on the size of the support (14).

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- 9 -

Figure 12 shows the cap (7) being applied to the base of the head thereby closing off the chamber which is formed beneath the membrane (2) and above the cap (7).

- 10 -

CLAIMS

1. Toothbrush comprising a handle and a head attached thereto, the head having a chamber defined by a deformable bristle-bearing surface at its top and opposite thereto a base, the sides of the chamber being defined by a perimeter of the brush head, the base comprising a cap which is independent from and attachable to the rest of the base.
2. Toothbrush according to claim 1, wherein the bristle-bearing surface comprises a flexible membrane with bristle tufts attached thereto.
3. Toothbrush according to claim 2, wherein the bristle tufts are fixed into rigid supports which are dispersed within the structure of the flexible membrane.
4. Toothbrush according to claim 3, wherein the rigid supports protrude through the membrane.
5. Toothbrush according to any preceding claim, wherein the cap is transparent or translucent such that the bristle-bearing surface can be perceived there through.
6. Toothbrush according to any preceding claim, wherein the bristles are fixed to the brush head by anchor technology.
7. A method for making a toothbrush comprising the steps of:

- 11 -

(a) moulding a brush head and handle from a rigid plastic material, the head having a rigid perimeter defining the outer dimensions of the head;

5 (b) moulding rigid receptacles either individually or in groups, where the receptacles are moulded in groups they are optionally separated before further processing, the rigid receptacles comprising a receptacle base and a sleeve for supporting affixed bristles;

10

(c) moulding a flexible membrane around the receptacles and joining said receptacles to the perimeter of the head;

15 (d) supporting a receptacle in a direction opposite to the direction of bristle affixation and then fixing bristles into said receptacles;

(e) applying a cap to the base of the head to close a
20 chamber formed beneath the bristle-bearing flexible membrane.

8. A method for making a toothbrush comprising the steps of:

25 (a) moulding a brush head, handle and a plurality of rigid receptacles from a rigid plastic material, said rigid receptacle being moulded in at least one group with the receptacles being flexibly and resiliently linked to one another by virtue of a thinning in the rigid material
30 there between, the head having a rigid perimeter defining the outer dimensions of the head and the rigid

- 12 -

receptacles defining the bristle-bearing surface of the head;

5 (b) supporting each receptacle from below during affixing bristles to the receptacles;

(c) applying a cap to the base of the head to close a chamber formed beneath the bristle-bearing surface of flexibly and resiliently mounted rigid receptacles.

10

1/3

Fig.1.

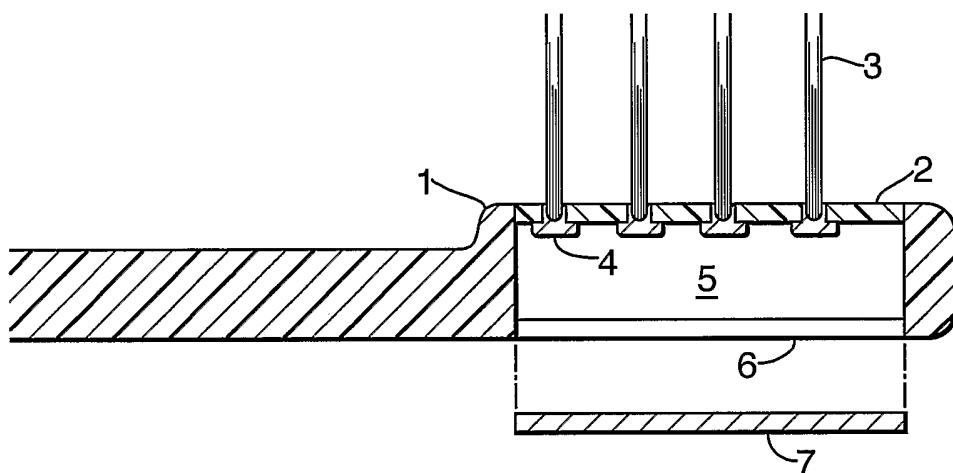


Fig.2.

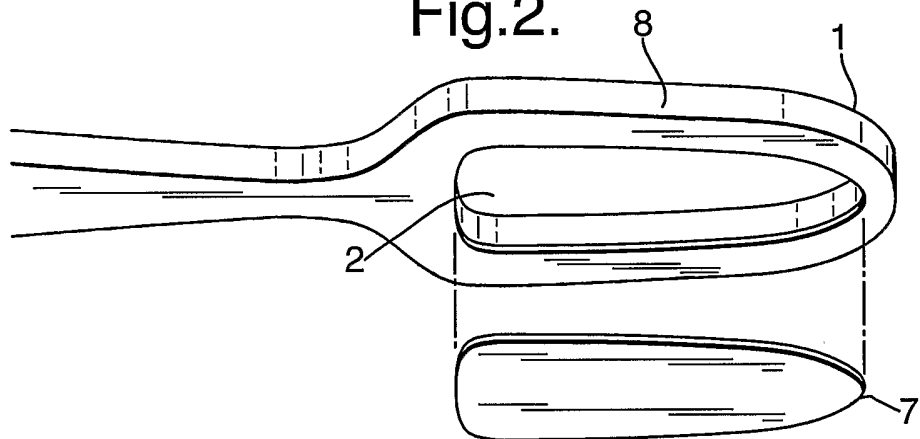
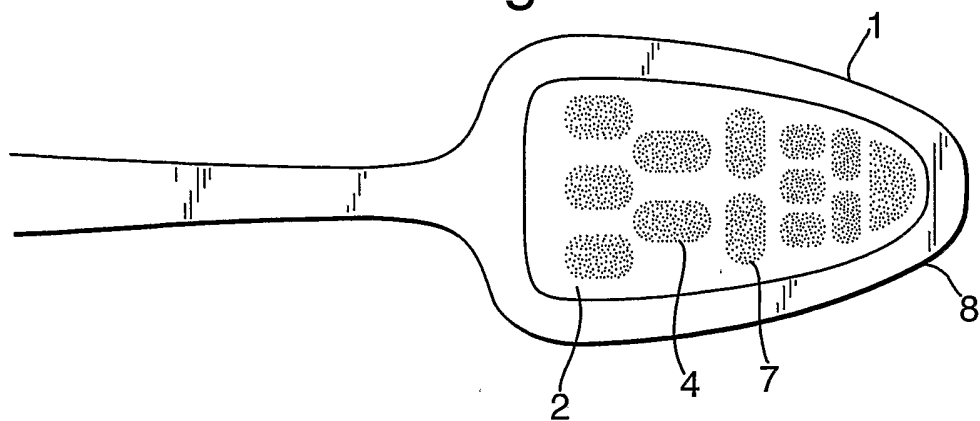


Fig.3.



2/3

Fig.4.

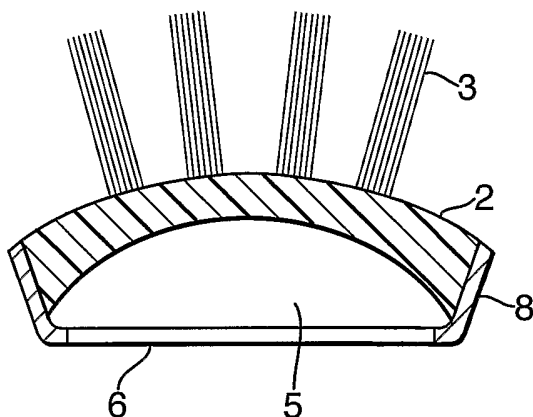


Fig.5.

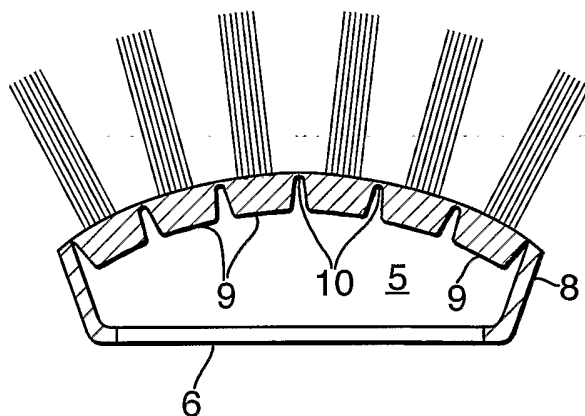


Fig.6.

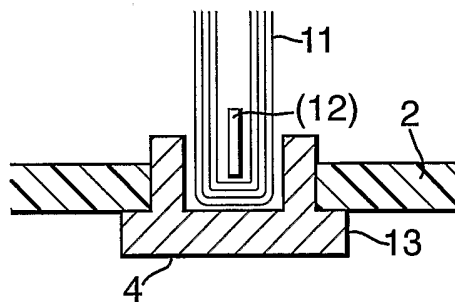
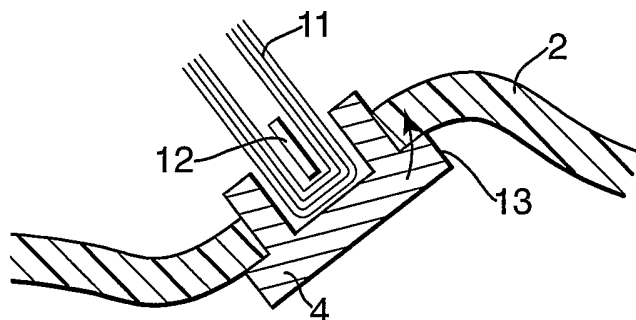


Fig.7.



3/3

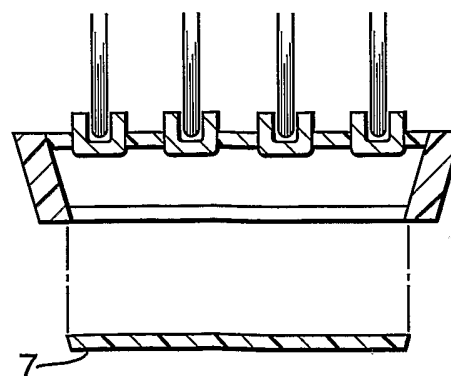
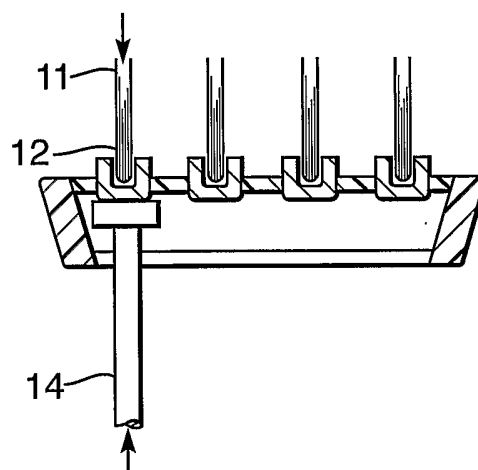
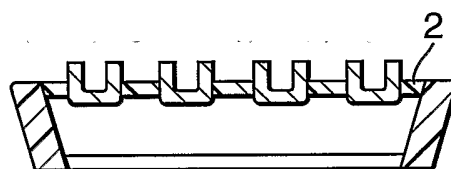
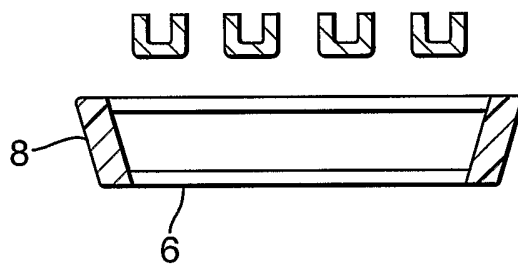
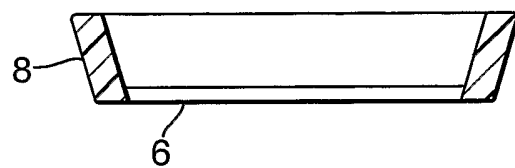


Fig.8.