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(11)

**EP 1 260 152 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:

**27.11.2002 Bulletin 2002/48**

(51) Int Cl.7: **A46B 5/00**, A46B 7/04

(21) Application number: **01304518.2**

(22) Date of filing: **23.05.2001**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**

Designated Extension States:

**AL LT LV MK RO SI**

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(54) **Toothbrush**

(57) Replaceable head toothbrush comprising a reusable handle and a replaceable head, which head comprises a bristle-bearing portion and a first abutting surface, and wherein said reusable handle comprises a second abutting surface which abuts upon said first sur-

face when the replaceable head is fixed to the reusable handle, characterised in that at least one of the abutting surfaces comprises an elastomeric material.

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## Description

**[0001]** The present invention relates to a replaceable head toothbrush comprising a reusable handle and a replaceable head, which head comprises a bristle-bearing portion and a pin for fixing the brush head to said handle, said head also comprising a first abutting surface, and wherein said reusable handle comprises a cavity for receiving said pin and a second abutting surface which abuts upon said first surface.

**[0002]** Replaceable head toothbrushes are known in the art.

**[0003]** U.S. Patent 5,247,718 (Victorian) reports disposable bristles in the form of an insert snappable into and out of an aperture of a toothbrush head. An elongated U-shaped clip is hingedly connected to the head opposite the handle for maintaining the insert in a gripping relationship.

**[0004]** U.S. Patent 4,683,604 (Rueb) describes a toothbrush wherein the front end face of the handle has a flat projection receivable in a complementary socket within an adjacent end face of a detachable bristle carrier. The projection is integral with an arrowhead-shaped male detent. The latter is detachably snapped into a recess extending from the socket into that surface of the carrier from which the bristles extend.

**[0005]** U.S. Patent 3,081,783 (Miller) discloses a fountain type toothbrush having a brush head and a detachable hollow handle. A pressurized supply of toothpaste is carried within the handle. The head is formed in two parts, each being held in assembled relation by a dovetail connection. A neck portion at one end of the toothbrush head is provided with oppositely extending pins that engage bayonet slots formed within a matting recess of the handle. A problem with this arrangement is the difficulty in separating the head from the handle.

**[0006]** U.S. Patent 5,224,234 (Arsenault et al.) reports another type of replaceable toothbrush head. Along one end of the handle is a bristle assembly receptacle whose undersurface is dovetailed shaped to mate with a complementary shaped replaceable bristle assembly head. Retention is achieved via the dovetail groove and also a mating nib. The handle and bristle assembly head are secured to one another by friction and/or clamping action. Mere frictional and/or clamping engagement may often be insufficient to prevent undesirable separation when the toothbrush is in actual use.

**[0007]** A problem with replaceable toothbrushes is that the join between the handle and the head often provides an ideal breeding ground for bacteria, particularly since the brush is in contact with the mouth, which contains a particularly diverse microflora, and is wetted for use.

**[0008]** Another problem with replaceable head toothbrushes is that the join is often a weak point with respect to the structural integrity of the brush, particularly when the brush handle is used by several members of a family, for example, and the handle is detached from the head

on a regular basis.

**[0009]** Accordingly, the present invention provides a replaceable toothbrush according to claim 1.

**[0010]** Suitable elastomeric materials include thermoplastic vulcanate (TPV) which consists of a mixture of polypropylene and EPDM (ethylene propylene diene monomers) which is available as Santoprene (brand), described in US patent 5,393, 796 issued to Halberstadt et al, or Vyram (brand), another TPV consisting of a mixture of polypropylene and natural rubber, both Santoprene and Vyram (brands) being elastomers marketed by Advanced Elastomer Systems. Other suitable elastomers include Kraton, a brand of styrene block copolymer (SBC) marketed by Shell, and Dynaflex G 2706 (brand), a thermoplastic elastomer marketed by GLS Corporation and which is made with Kraton (brand) polymer. These and other suitable elastomers have, typically, a Shore A hardness of from about 13 to 94, preferably from 40 to 80 and with about 60 being a preferred hardness.

**[0011]** The elastomeric material may only be presented on one of the abutting surfaces, however, it may also be presented on both surfaces. Should the elastomeric material be presented on only the head section of the brush this has the advantage of a new elastomeric surface being usable when the heads are replaced. On the other hand, should the elastomeric material be present on the reusable handle this has the advantage of being able to manufacture replaceable heads without the more costly elastomeric material: the elastomeric material of the handle being reused for the next head section.

**[0012]** Preferably, the elastomeric material provides at least an edge to the at least one abutting surface, e.g. should the abutting surface be circular, the elastomeric material may provide the outer rim of the circle. The rest of the abutting surface may constitute the same material as the remainder of the brush, e.g. hard plastics materials such as polypropylene, acrylonitrile or another.

**[0013]** To improve the bonding of the elastomeric material to the abutting surface, the abutting surface may comprise a groove in which the elastomeric material sits. For example, should the elastomeric material constitute the rim of a circular abutting surface the abutting surface may comprise a groove around the rim to increase the surface area between the elastomer and the material making up the remainder of the surface.

**[0014]** It is also possible that the elastomeric material constitutes another region of the brush. For example, elastomeric materials may be used in the handle portion of the brush to improve the grip during use. This grip portion may therefore be contiguous with an elastomeric region on the abutting surface of the handle. This has the advantage that only one injection moulding step is necessary to provide these two elastomeric regions. Alternatively, where the elastomeric is used in the head abutting surface, the head may also comprise an elastomeric region, e.g. to impart flexibility to the head or to

surround the bases of certain bristle tufts. Accordingly, these regions may be contiguous with the elastomeric material in the abutting surface of the head so that a single injection moulding step may be employed to make both.

**[0015]** In a preferred embodiment the elastomeric region is proportioned such that when the head is fixed to the handle the elastomeric portion, no matter which abutting surface it is present, is deformed during fixing such that it is resiliently compressed between said two abutting surfaces. This assists in providing an improved connection between the two parts and helps ensure that no water invades the space there between and also helps maintain a strong link between said two sections even when the brush has been detached several times.

**[0016]** In another preferred embodiment at least one of the abutting surfaces comprises a protruding portion which protrudes from the abutting surface. This has the advantage of locating the compression of the elastomer at the edges of the abutting surfaces and reduces the chances that the elastomer provides too much resistance to compression that it is difficult for the manually disabled to fix the two sections of the brush together.

**[0017]** Particular embodiments according to the invention shall now be described with reference to the following figures in which:

Figure 1 is a side elevation of a brush according to the invention.

Figure 2 is also a side elevation of a brush according to the invention.

Figure 3 is a collection of embodiments of abutting surfaces according to the toothbrush of the invention.

Figure 4 is also a collection of embodiments of abutting surfaces according to the toothbrush of the invention.

**[0018]** In detail:

Figure 1 discloses a toothbrush comprising a reusable handle (1) and a replaceable head (2). The handle section comprises an abutting surface, which abuts upon a head section abutting surface having an elastomeric material (3).

Figure 2 discloses a toothbrush comprising a reusable handle (1) and a replaceable head (2). The head section comprises an abutting surface, which abuts upon a handle section abutting surface having an elastomeric material (3).

Figure 3 discloses four different types of abutting surface comprising an elastomeric material. Since the figure relates to particular types of elastomeric

material arrangements it is not relevant whether the abutting surface in question is on the head or the handle.

Figure 3a discloses either a handle or head section (1,2) which has an abutting surface which comprises a ridge around a perimeter. In this particular figure the elastomeric material is not shown since it would be later provided by moulding or otherwise. The ridge functions to provide an increase in surface area between the elastomer and the material of the handle/head.

In Figure 3b the elastomeric material (3) is present over the entire abutting surface and fills the ridges introduced in Figure 3a.

Figure 3c discloses a similar embodiment to 3b, however, the elastomeric material (3) only fills the ridges and would present a ring of elastomeric material on the abutting surface of either the handle or the head.

Figure 3d discloses similar embodiment to that of 3c, however, in this case the elastomeric material (3) protrudes from the abutting surface such that it is deformed when the two abutting surfaces are contacted with one another. This assists in providing a tight fit between the two sections.

Figure 4 discloses embodiments of the further abutting surface which abut upon the elastomeric abutting surface.

Figure 4a discloses a handle or head section (1,2) with an abutting surface having an elastomeric material (3) and the other of the head or handle (2,1) with a further abutting surface (4) having a protruding portion (4a) which protrudes from the further abutting surface (4).

Figure 4b discloses an alternative protruding portion in the form of a raised ridge around the further abutting surface.

Figure 4c discloses an alternative protruding portion in the form of a raised ridge around the further abutting surface. The ridge in this embodiment having an inclined surface which assists in providing a less severe deforming effect on the elastomeric material when the two abutting surfaces are contacted with one another. This helps to maintain the life span of the section, particularly important if it is on the reusable handle portion.

**Claims**

1. Replaceable head toothbrush comprising a reusable handle and a replaceable head, which head comprises a bristle-bearing portion and a first abutting surface, and wherein said reusable handle comprises a second abutting surface which abuts upon said first surface when the replaceable head is fixed to the reusable handle, **characterised in that** at least one of the abutting surfaces comprises an elastomeric material. 5 10
2. Replaceable toothbrush according to claim 1, wherein the elastomeric material forms an edge of the at least one of the abutting surfaces such that when the head is fixed to the handle the elastomeric material is elastically compressed against the other abutting surface. 15
3. Replaceable toothbrush according to claim 1 or 2, wherein at least one of the abutting surfaces comprises a protruding portion which protrudes from the abutting surface and compresses the elastomeric material when the replaceable head is fixed to the reusable handle. 20 25

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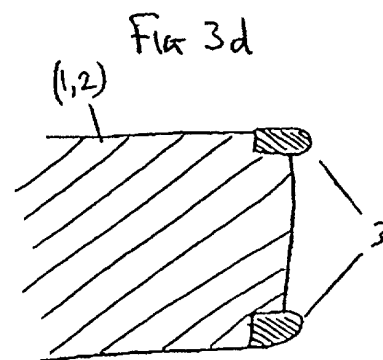
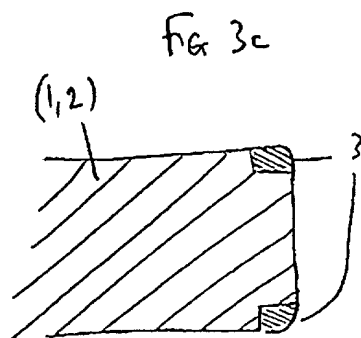
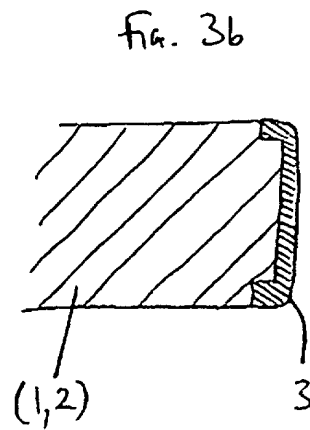
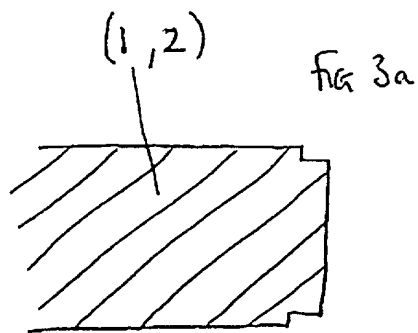
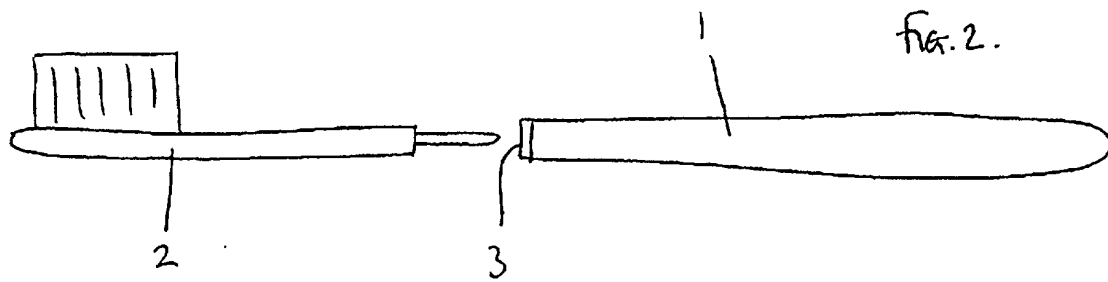
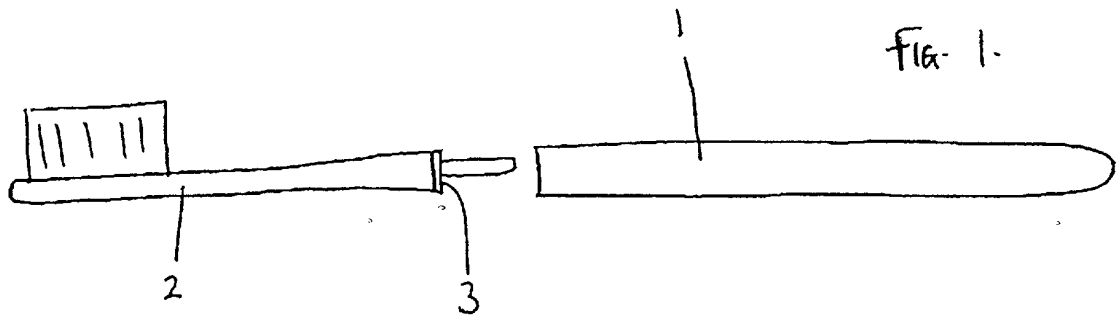


Fig. 4

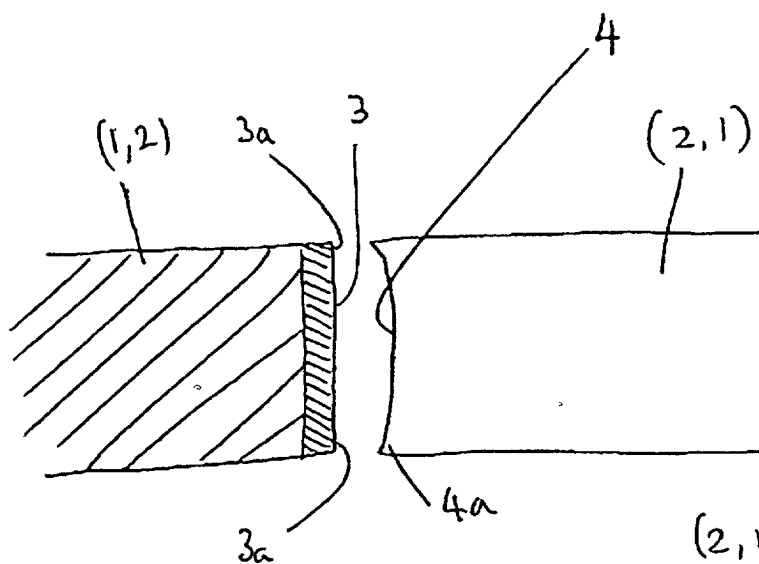


Fig. 4a.

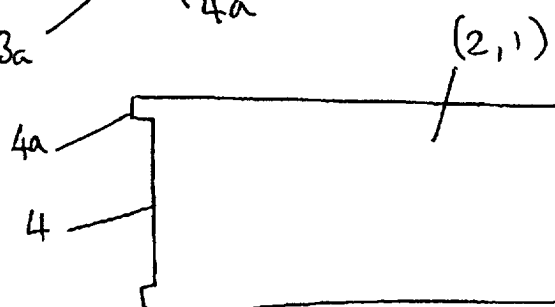


Fig. 4b.

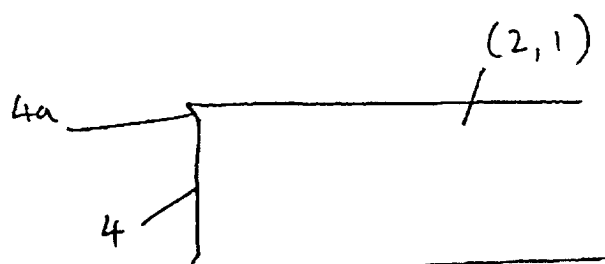


Fig. 4c.



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# EUROPEAN SEARCH REPORT

Application Number  
EP 01 30 4518

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                                                      |                                                                                                                                                                                                                                                                              |                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Category                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                        | Relevant to claim                                                                                                                                                                                                                                                            | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| X                                                                                                                                                                                                                                                      | DE 297 02 508 U (BUERSTENFABRIK EBNAT KAPPEL AG) 14 May 1998 (1998-05-14)<br>* page 4, line 34-37 - page 5, line 1-32; figures 1,2 * | 1-3                                                                                                                                                                                                                                                                          | A46B5/00<br>A46B7/04                         |
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| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                      |                                                                                                                                                                                                                                                                              |                                              |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                           |                                                                                                                                      | Date of completion of the search<br>12 October 2001                                                                                                                                                                                                                          | Examiner<br>van Bilderbeek, H.               |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                      | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                              |

EPO FORM 1503/03/82 (P04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 01 30 4518

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12-10-2001

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