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(54) Title: ERGONOMIC TOOTHBRUSH**(57) Abstract**

A toothbrush blank (10) comprising a handle (11), a head (12) and a neck (13). The handle (11) has an upper and lower surface (14, 15). The average spacing between the upper and lower surfaces (14, 15) being from 5 to 15 mm and the average spacing between the two side surfaces (16, 17) being from 10 to 16 mm. The handle (11) has a length of at least 100 mm and is provided at its end adjacent the neck (13) with a pair of digit abutments (19, 21). One digit abutment (19) extends upwardly from the upper surface (14) and the other downwardly from the lower surface (15). Each abutment presents an arcuate surface facing away from the neck and having a radius of curvature of from 10 to 15 mm. The upper digit abutment rising above the upper surface (14) by at least 3 mm. The head (12) has upper and lower surfaces (24, 25) and two side surfaces (26, 27) and an end surface (28) which is arcuate and smoothly merges into the side surfaces. A longitudinal axis of the neck is inclined to that of each of the handle and the head, the angle between the upper surface of the head and the upper surface of neck is less than 180°. The dotted line (29) represents the partline of the blank from which the toothbrush (10) is formed. It can be seen that in respect of the handle (11) the partline (29) lies parallel to the plan of the handle (11) and just above its lower surface (15). This means that the part of the handle (11) moulded by a lower part of a suitable mould (not shown) is the lower surface (15) and the radiused edges of the sides (16 and 17). The head (12) by contrast lies with its upper surface (24) just above the plane (29) of the partline. In this case an upper mould part defines only the upper surface (24) and the radiused edges of sides (26 and 27) of the head (12). The neck (13) is inclined relative to the plane (29) of the partline.

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ERGONOMIC TOOTHBRUSH

Background of the Invention

1. Field of the Invention

The present invention relates to a toothbrush blank
5 and a method for its formation by injection moulding.
More particularly the invention relates to an ergonomic
toothbrush blank of the type having a handle, a head and a
neck intermediate the handle and the head and in which the
neck is inclined relative to both the handle and the head.

10 2. Prior Art

Toothbrushes having a handle, a head and a neck are
ubiquitous. It is also well known to incline the neck
relative to both the handle and the head in order to
improve the aesthetics and/or the function of the brush.
15 In such brushes the head and the handle are generally of
an essentially planar form. They may lie in parallel
planes or in inclined planes but obviously cannot lie in
the same plane in view of the fact they are both inclined
relative to the neck which normally has a straight
20 longitudinal axis.

Such toothbrushes are normally formed by implanting
bundles of bristles in to the head of the toothbrush blank
formed by the injection moulding of a suitable synthetic
plastics material. The plastics material in a molten
25 condition is injected under pressure into the cavity of an
injection moulding tool or mould. The tool is formed in
two parts which together define the cavity and abut along
a surface generally referred to as the parting surface.
These surfaces define a line, called the partline, around
30 the moulded article which reflects the line at which the
parting surfaces intersect with the cavity.

Blanks for toothbrushes where the head and the handle
are both inclined to the neck have been made in moulds in
which the parting surfaces are non-planar. There is a
35 substantial disadvantage in having a non-planar parting
surface as it means that any wear in the mould can only be

compensated for by a complex reworking of the mould. By contrast, in moulds having a planar partline it is usually possible to refurbish the mould by re-grinding the planar parting surfaces.

5 Summary of the Invention

 In a first aspect, the present invention consists in a toothbrush blank comprising:

 an elongate handle,

 a head, and

10 a neck intermediate the handle and the head;

 the handle having an upper and a lower surface and two side surfaces the average spacing between the upper and lower surfaces being from 5 to 15 mm and the average spacing between the two side surfaces being from 10 to 15
15 16 mm, the handle having a length of at least 100 mm and being provided at its end adjacent the neck with a pair of digit abutments one extending upwardly from the upper surface and the other extending downwardly from the lower surface, each abutment presenting an arcuate surface
20 facing respectively upwardly and downwardly and away from the neck, each arcuate surface having a radius of curvature of from 10 to 15 mm, the digit abutment on the upper side of the handle having a height above the upper surface of at least 3 mm;

25 the head having an upper surface and a lower surface, two side surfaces and an end surface, the end surface being arcuate and smoothly merging into the side surfaces;

 a longitudinal axis of the neck being inclined to that of each of the handle and the head, the angle between the
30 upper surface of the head and an upper surface of the neck being less than 180°.

 The handle is preferably of substantially constant rectangular cross sections throughout a substantial portion of its length being bounded by substantially
35 planar upper and lower surfaces and substantially planar side surfaces. The end of the handle distal to the head

is preferably bounded by a smoothly arcuate end surface. A hole is most preferably formed in the handle adjacent that end. The hole preferably extends through the full thickness of the handle and has an axis substantially
5 normal to its upper and lower surfaces.

The end of the handle adjacent to the neck is provided with the digit abutments as described above. The side of each abutment opposite to the arcuate surface is preferably shaped to merge smoothly into a respective
10 upper or lower surface of the neck.

The handle design as defined above is a comfortable design which facilitates its use by adults and children. The handle's length, width, thickness and the digit abutments are such that whatever the orientation of the
15 head, the handle promotes a precise controlled grip.

The head is preferably of substantially constant rectangular cross sections throughout its length being bounded by substantially planar upper and lower surfaces and substantially planar side surfaces. The head
20 preferably possesses bristles that extend from the upper surface of the head substantially normal to that surface. Individual bristles or tufts of bristles may be otherwise angled relative to the upper surface head if so desired. The upper surface of the head preferably lies in a plane
25 parallel to that of the upper surface of the handle. Most desirably the upper surface of the head and the lower surface of the handle are substantially co-planar.

The neck is preferably of a smaller cross-sectional area than either the handle or the head as this
30 facilitates a user's lips sealing around the toothbrush and prevents dribbling of saliva. Conveniently the neck is of a constant square or rectangular cross-section along a substantial part of its length intermediate its ends. The end portions of the neck are preferably shaped to
35 merge smoothly into the head and handle respectively of the toothbrush. The longitudinal axis of the neck is

angled relative to the corresponding axis of the handle and of the head.

The included angle between the upper surface of the head and the corresponding surface of the neck is less
5 than 180° , more preferably between 140° and 175° and most preferably between 160° to 170° .

The dual angle neck as described above allows the back teeth to be cleaned without stretching the corners of the mouth. This increases comfort and promotes a more
10 effective brushing action. The dual angle neck also aligns the head with the handle axis. This facilitates controlled brushing of all tooth surfaces with the wrist in a neutral position. This in turn, increases control and accuracy of placement which has significant advantages
15 when cleaning the user's teeth or those of a child or disabled adult.

When the displacement of the plane of the head relative to that of the handle is sufficient and the digit abutments are of sufficient length the brush may be rested
20 on a surface with the bristles pointing either upwardly or downwardly without any part of the head, or the bristles, touching the surface. This has positive implications for the hygiene of the toothbrush.

The rounded end of the head combined with the smooth
25 transition from the head to the neck minimises the risk of injury. For the same reason, all edges of the toothbrush should be generously radiused.

In a second aspect, the present invention consists in a blank for a toothbrush comprising an elongate
30 substantially planar handle, a substantially planar head and an elongate neck intermediate the handle and the head having a substantially linear longitudinal axis, the longitudinal axis of the neck being inclined to the plane of each of the handle and the head, the blank being
35 characterised in that the relative lengths of the handle, the head and the neck and the angles therebetween are so

selected that there is a plane that passes through side edges of the handle, the head and the neck and which coincides with the partline on the blank.

5 In this second aspect the invention further consists in a mould for moulding a blank for a toothbrush according to the second aspect of this invention and having a first mould part and a second mould part, the first and second mould parts meeting together along a planar parting surface and defining a cavity for moulding a toothbrush
10 blank according to the second aspect of this invention.

Brief Description of the Drawings

Fig. 1 is an upper plan view of a toothbrush according to the preferred embodiments of the present invention;

15 Fig. 2 is a side elevational view of the toothbrush of Fig 1, and

Fig. 3 is an end elevational view of the toothbrush of Fig. 1 from the handle end.

Preferred Embodiment of the Invention

20 The toothbrush 10 comprises a handle 11, a head 12 and a neck 13. The handle 11 is 100 mm long (distance A) and is of constant rectangular cross-section along substantially all of its length. The handle is bounded by an upper surface 14, a lower surface 15 and side surfaces 16 and 17. The upper and lower surfaces 14 and 15 lie in
25 parallel planes spaced apart by 5 mm (distance C) while the side surfaces 16 and 17 are also in parallel planes spaced apart by 10 mm (distance B). The end of the handle distal to the neck 13 is bounded by a smoothly arcuate end surface 18 that merges smoothly into the side surfaces 16
30 and 17.

The end of the handle 11 adjacent to the neck 13 is provided with a pair of digit abutments 19 and 21. The abutment 19 is on the upper surface 14 of the handle 11 while the abutment 21 is on the lower side. In use, the
35 abutment 19 will normally be engaged by the thumb and the abutment 21 by the side of the index finger. It is to be

understood, however, that some users may hold the brush in other ways. The abutments 19 and 21 are each formed with an arcuate surface (respectively 22 and 23) which is each of a radius of 12 mm (dimension D). The surfaces 22 and 23 are the surfaces which will be engaged by the user's digits and face away from the neck and outwardly of the handle 11. Each of the abutments 19 and 21 has a height of 5 mm (distance E).

The neck 13 is essentially rectangular in cross-section along a substantial part of its length intermediate its ends. The cross-sectional dimension of the neck are smaller than those of the head or the handle being 5 mm wide (dimension H) and 7 mm deep. The ends of the neck merge smoothly into the head and the handle respectively.

The neck 13 has a longitudinal axis that is inclined to those of the handle 11 and the head 12 such that the head 12 is offset from the handle 11 as will be hereinafter described.

The head 12 has the same cross-sectional dimensions as the handle 11 and similarly has parallel upper and lower surfaces 24 and 25 and parallel side surfaces 26 and 27. An array of tufts of bristles extend from the upper surface 24 and are aligned with their axis normal to the plane of that surface. The upper surface 24 makes an angle of 170° with the neck. The length of the neck is approximately 35 mm and the angle is such that the upper surface 24 of the head 12 and the lower surface 15 of the handle 11 are substantially co-planar. The head 12 is 28 mm long and terminates in an arcuate end surface 28 that merges smoothly into the side surfaces 26 and 27.

The dotted line 29 represents the partline of the blank from which the toothbrush 10 is formed. It can be seen that in respect of the handle 11 the partline 29 lies parallel to the plane of the handle 11 and just above its lower surface 15. This means that the part of the handle

11 moulded by a lower part of a suitable mould (not shown) is the lower surface 15 and the radiused edges of the sides 16 and 17. The head 12 by contrast lies with its upper surface 24 just above the plane 29 of the partline.

5 In this case an upper mould part defines only the upper surface 24 and the radiused edges of sides 26 and 27 of the head 12. The neck 13 is inclined relative to the plane 29 of the partline.

10 The angle G is limited by the length of the neck 13 and the thickness C of the handle 11 and head 12. If the length of the neck 13 is shortened or the thickness C increased then the angle G can be reduced without having to depart from planar parting surfaces in the mould.

15 It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as
20 illustrative and not restrictive.

CLAIMS:

1. A toothbrush blank comprising:
an elongate handle,
a head, and
5 a neck intermediate the handle and the head;
the handle having an upper and a lower surface and two
side surfaces the average spacing between the upper and
lower surfaces being from 5 to 15 mm and the average
spacing between the two side surfaces being from 10 to
10 16 mm, the handle having a length of at least 100 mm and
being provided at its end adjacent the neck with a pair of
digit abutments one extending upwardly from the upper
surface and the other extending downwardly from the lower
surface, each abutment presenting an arcuate surface
15 facing respectively upwardly and downwardly and away from
the neck, each arcuate surface having a radius of
curvature of from 10 to 15 mm, the digit abutment on the
upper side of the handle having a height above the upper
surface of at least 3 mm;
20 the head having an upper surface and a lower surface,
two side surfaces and an end surface, and the end surface
being arcuate and smoothly merging into the side surfaces;
a longitudinal axis of the neck being inclined to that
of each of the handle and the head, the angle between the
25 upper surface of the head and an upper surface of the neck
being less than 180° .
2. A toothbrush as claimed in claim 1 in which the handle
is of substantially constant rectangular cross-section
throughout a substantial portion of its length and is
30 bounded by substantially planar upper and lower surfaces
and substantially planar side surfaces.
3. A toothbrush blank as claimed in claim 1 in which the
upper surface of the head and the lower surface of the
handle are substantially co-planar.
- 35 4. A toothbrush blank as claimed in claim 1 in which the
head is of substantially constant rectangular cross-

section throughout its length and is bounded by substantially planar upper and lower surfaces and substantially planar side surfaces.

5 5. A toothbrush blank as claimed in claim 1 in which the head includes bristles that extend from the upper surface of the head substantially normal to that surface.

6. A toothbrush blank as claimed in any one of the preceding claims in which the neck has a smaller cross-sectional area than either the handle or the head.

10 7. A toothbrush blank as claimed in claim 6 in which the neck is of a constant square or rectangular cross-section along a substantial part of its length intermediate its ends.

15 8. A toothbrush blank as claimed in claim 1 wherein the angle between the upper surface of the head and the corresponding surface of the neck is between 140° and 175° , preferably between 160° to 170° .

20 9. A blank for a toothbrush comprising an elongate substantially planar handle, a substantially planar head and an elongate neck intermediate the handle and the head having a substantially linear longitudinal axis, the longitudinal axis of the neck being inclined to the plane of each of the handle and the head, the blank being characterised in that the relative lengths of the handle,
25 the head and the neck and the angles therebetween are so selected that there is a plane that passes through side edges of the handle, the head and the neck and which coincides with the partline on the blank.

30 10. A mould for moulding a blank for a toothbrush as claimed in claim 10, the mould comprising a first mould part and a second mould part, the first and second mould parts together meeting along a planar parting surface and defining between them a cavity for moulding the toothbrush blank.

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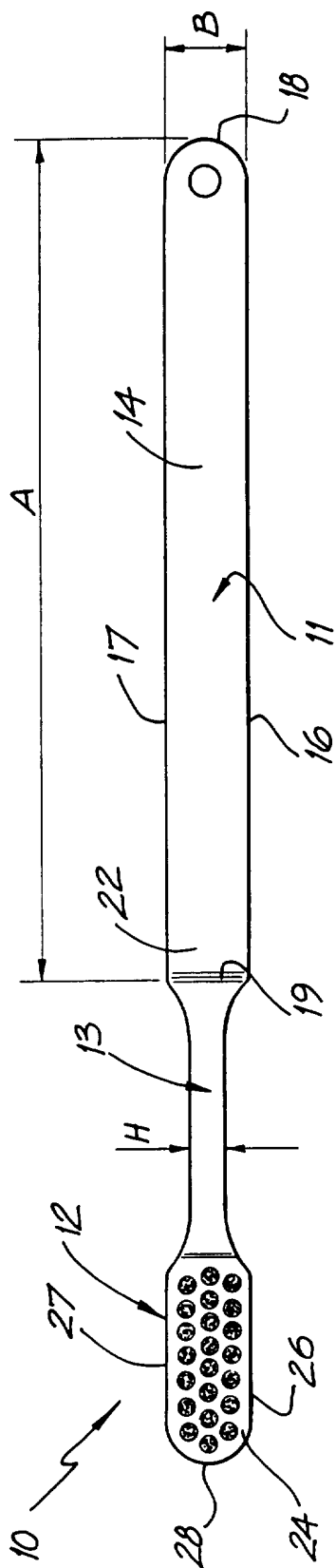


FIG. 1

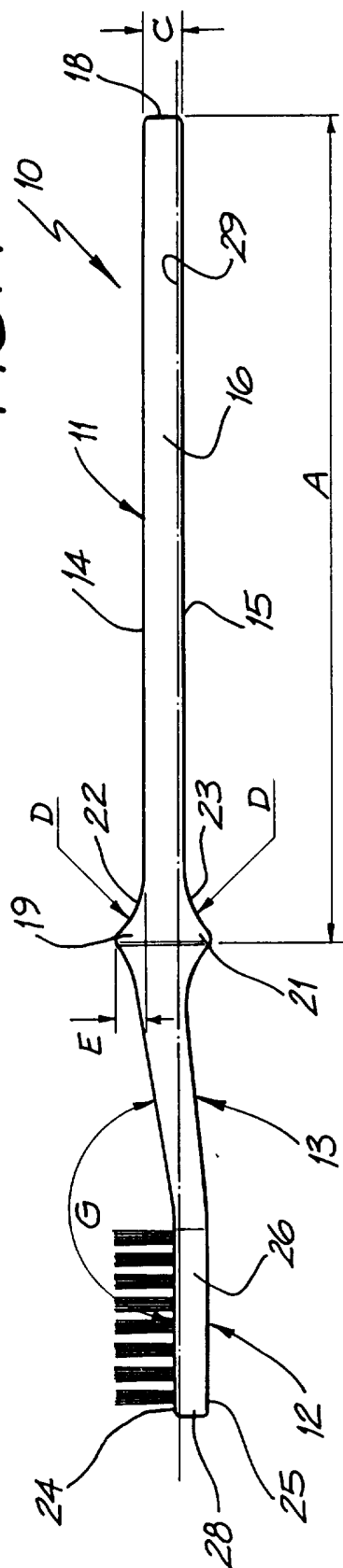


FIG. 2

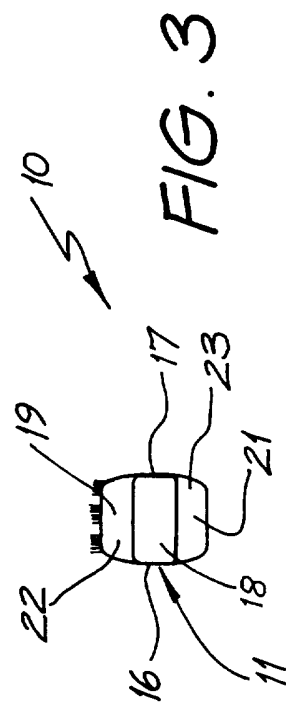


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 95/00584

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: A46B 5/02 B29C 45/26 B29L 31:42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁶: AS ABOVE and A46B 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: AS ABOVE and A46B 5/00

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94/01018 A1 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 20 January 1994 Figures	1,4,5,7
A	US 5 323 504 (McCUSKER) 28 June 1994 Figures	1-8
A	WO 94/05183 A1 (JORDAN) 17 March 1994 Figures	9,10



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Date of the actual completion of the international search

6 December 1995

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INTERNATIONAL SEARCH REPORT

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 92/15225 A1 (PROCTER & GAMBLE COMPANY) 17 September 1992 Figures	1-8
A	WO 91/19438 A1 (HUMPHRIES) 26 December 1991 Figures and Page 6	1-8
A	EP 0 310 482 A1 (POITEVIN) 5 April 1989 Figures	1-10
A	AU 76081/81 A (EARLE) 5 August 1982 Figures	1-8

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No.
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Patent Document Cited in Search Report				Patent Family Member			
WO	94/01018	DE	4222931	ES	1025223		
US	5323504	AU	582098	BR	8907758	JP	4502116
		WO	9004938				
WO	94/05183	DE	4229152				
WO	92/15225	AU	13528/92	BR	9205715	CA	2105160
		EP	573514	JP	7500737	NZ	241793
		US	5105499				
WO	91/19438	AU	642750	CA	2064828	EP	487697
		JP	5501221	NZ	238565	US	5465450
EP	0310482	FR	2620915				
END OF ANNEX							