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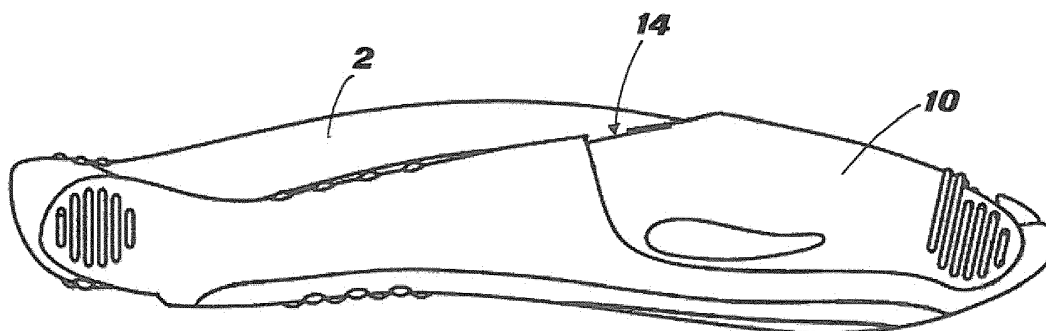
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(54) **Pocket foldable toothbrush**

(57) A foldable toothbrush is disclosed, of the type comprising a work portion (L), provided with a small head (1) carrying the bristles, projecting from a neck member (2), and a handle portion (P) having a spindle-shaped body (4), between said two portions a hinge portion (3, 5) being provided, apt to allow a mutual rotation according to an axis crosswise to the longitudinal axis of the tooth-

brush. The spindle-shaped body handle portion (4) is solid and has, towards a distal end, a main seat imprint (6) of a shape and depth suited to precisely house said small head (1), when the work portion (L) is folded on the handle portion (P) around said hinge (3, 5); further, only in proximity of said hinge (3, 5), the spindle-shaped body (4) of said handle portion (P) has a saddle-shaped seat imprint (6a) to partly house said neck (2).

Fig. 3



Description

Field of the invention

[0001] The present model relates to a pocket toothbrush, in particular a foldable toothbrush.

Background of the invention

[0002] As known, pocket toothbrushes are oral hygiene tools which are conceived - in terms of bulk or of layout - to be easily transported. In particular, pocket toothbrushes may take up alternatively an operating layout - suitable to be gripped by a user's hand to bring the cleaning head to reach the desired regions within the oral cavity - and a "compact" layout, suitable to protect the cleaning head (provided with cleaning bristles) from the outer environment and to reduce the overall bulk of the toothbrush, better suited to transport requirements during a trip (for example so as to be slipped into a pocket, a handbag, and so on).

[0003] The prior art has offered a number of different solutions. One type of particularly advantageous pocket toothbrush, which will be dealt with in the present application, substantially consists of two mutually hinged portions, a former handle-shaped and a latter comprising the cleaning bristles. Examples of this known art are disclosed for example in US 4,482,263, US 5,003,658, US 5,464,294, EP 20,268, GB 174, 874 and US 2,657,412. However, all these solutions have various drawbacks. Firstly, the two toothbrush components, due to construction requirements, have a shape and structure optimised in view of the folding thereof, to the overall detriment of toothbrush ergonomics in the open operating layout. As a matter of fact, it should be noted out that the consolidated approach in this sector is to conceive and design a small-sized container for the head portion equipped with bristles, to then adapt it also to the handle function: this approach inevitably produces poor results from the overall ergonomics point of view.

[0004] Hence these toothbrushes are often taken into consideration by users only in case they need to temporarily move from their domicile, but they are not tolerated in daily current use, which relegates these products to narrow markets.

[0005] Moreover, since all known solutions have large housing compartments for the head, the handle portion has a significant open cavity, with thin perimeter walls, which is unaesthetic and awkward to use.

[0006] Finally, the separate moulding of the various components and the subsequent assembling thereof are rather expensive - the separately moulded pieces must be reprocessed and assembled together - and in any case they never determine a final configuration with perfect coupling, because the pieces of the various production batches have differing tolerances which produce varying clearances. That implies either a difficult folding or, more easily, an unpleasant risk of accidental disassembling

(as it has been assembled, the known-art toothbrush can be disassembled into its components imparting modest traction). Moreover, the elements making up the hinge, or the engagement portion, between the two main toothbrush components, precisely because they are meant to be elastically deformed in order to accomplish the snap assembling thereof, are prone to breakage or yielding under stress, impairing toothbrush firmness.

Summary of the invention

[0007] The problem at the basis of the present invention is hence to overcome the drawbacks of the prior art, providing an improved pocket toothbrush, which can be manufactured economically, provides firm accurate coupling in the hinge area and is aesthetically pleasing and ergonomic in any condition of use, so as to be able to be used also regardless of the ability thereof to be folded.

[0008] These objects are achieved through the features mentioned in claim 1. The dependent claims describe preferred features of the invention.

[0009] In particular, according to a first aspect of the invention, a foldable toothbrush is provided, comprising a work portion, provided with a bristled head projecting at the distal end of a neck element, and a spindle-shaped body handle portion, between said two portions a hinge portion being provided apt to allow a mutual rotation according to an axis transversal to the longitudinal axis of the toothbrush, wherein

said spindle-shaped body handle portion is solid and has, towards a distal end, a main seat imprint having a shape and depth suited to precisely house said head, when the work portion is folded on the handle portion around said hinge, and wherein

only in the proximity of said hinge portion, the spindle-shaped body of said handle portion has a saddle-shaped recess to house a part of said neck.

[0010] According to another aspect, the main seat imprint and the saddle-shaped recess are sized so that when said work portion is folded on the spindle-shaped body, bringing the bristled head into said main seat imprint and part of the neck into said saddle-shaped recess, determines with its back surface an arc profile connected to the handle profile.

[0011] According to a further aspect, the hinge portion consists of mutually engaged first hinge means integral with said work portion and second hinge means integral with said handle portion, said first hinge means and said second hinge means being obtained from mutually incompatible materials and overmoulded the ones on the others.

[0012] Preferably, said first hinge means are in the shape of a bulb with mutually opposite planar faces, run through by a central hole, apt to cooperate with a rotation pin being part of said second hinge means.

[0013] In particular, said second hinge means are in the shape of a fork with a pair of prongs between which said rotation pin extends.

[0014] Preferably, the handle portion and the work portion are made of different plastic materials and alternatively belonging either to the group of aromatic polyesters, polyamides homopolymers and copolymers, or to the group of polyolefins, vinyl polymers, polyacrylic and methacrylic polymers.

[0015] According to another aspect, with the main seat imprint for the housing of the bristled head there is associated a thin-walled, half-shell cover, forming a protection cover of said main seat imprint and of the head housed therein. Preferably, the free edge of said half-shell has a profile which matches the profile of said main imprint, so as to connect and determine a continuity of the outer surface of the handle.

[0016] According to a further aspect, the half-shell cover is engaged in rotation, through a snap coupling, with a distal end of said handle provided with retaining means. Preferably the half-shell cover furthermore has a widened cut-out which, when said work portion is folded on the spindle-shaped body, is run through by a portion of said neck. Advantageously the half-shell cover is made of clear or semi-clear material.

Brief description of the drawings

[0017] Further features and advantages of the toothbrush according to the invention will in any case be more evident from the following detailed description, given as an example and illustrated in the attached drawings, wherein:

- fig. 1 is a side elevation view of the toothbrush according to the invention with the head shown both in an open attitude of use, and in a quite closed attitude next to closing;
- fig. 2 is a top plan view of the toothbrush of fig. 1;
- figs. 3 and 4 are side elevation and top plan views, respectively, of the same toothbrush of figures 1 and 2, but in a closed attitude of non-use;
- figs. 3A and 4A are views similar to those of figs. 3 and 4 wherein the closing cover allows to see in transparency the bristled head;
- fig. 5 is an exploded side elevation view which shows the different component parts of the toothbrush according to the invention;
- fig. 6A is a top plan view of the sole handle part; and
- fig. 6B is a bottom plan view of the sole cover part (inner bottom side).

Detailed description of a preferred embodiment

[0018] As shown by the drawings, in particular fig. 5, a foldable or pocket toothbrush consists of a handle portion P, a work portion L, and of a cover portion C.

[0019] Work portion L comprises at a distal end a cleaning head 1 provided with bristles, which extends into a neck 2 which carries, at the other end thereof (proximal end) opposite to head 1, a bulb which defines first hinging

means 3.

[0020] Handle portion P in turn comprises a central spindle-like gripping body 4, which has at one proximal end second hinging means 5; in the distal end 7 region, handling body 4 has a main recess or seat imprint 6, forming the seat for the housing of head 1 in a closed-toothbrush attitude. It must be noted that main recess 6 extends only on distal end of handle 4: in particular, as clearly shown in fig. 6A, recess 6 extends by no more than half the length of handle 4.

[0021] Distal end 7 of handle P is shaped so as to allow also, as better described in the following, the engagement and hinging of a cover C.

[0022] The toothbrush according to the invention is made of plastic material, according to a preferred method which will be highlighted further on. In particular, the general trend of the lines and of the surfaces is fully similar to that of the lines and surfaces of a modern toothbrush with an ergonomic handle.

[0023] More precisely, in the embodiment shown, work portion L is moulded in a single piece, comprising head 1 and neck 2 which ends with said bulb making up first hinge means 3. Said hinge means are apt to rotatingly engage with said second hinge means 5, integral with handle portion P.

[0024] The two handle portion P and work portion L are mutually rotating around a rotation axis (crosswise to the main longitudinal axis of the toothbrush) determined by said first and second hinge means 3 and 5 which, by mutually coupling according to the method illustrated further on, do define a hinge portion of the two toothbrush parts L and P.

[0025] In order to obtain a good folding and at the same time pleasing ergonomics of the device, according to a preferred embodiment, handle body 4 has a substantially spindle-like shape, with a generically elliptic section and tapering towards the ends; the greater crosswise thickness of the geometric figure which circumscribes the spindle falls in correspondence of recess area 6, where head 1 ends up being housed in the folded attitude.

[0026] Handle body 4, on the front side thereof - i.e. the side facing the same side as the bristles during use - opens with said main imprint or recess 6 and a seating imprint 6a shaped so as to house at least part of neck 2. As clearly visible in figs. 1 and 5, the proximal end portion of body 4 - which defines the second hinge means 5 - has a slight slope towards the front part, with respect to the longitudinal axis of handle 4. That causes in the side profile a saddle area 6a' (as clearly visible in fig. 5). Between the saddle area 6a' and the proximal end, handle body 4 has a deep recess 4' which defines a pair of end forks 7 and 8, between which a hinge pin 9 extends. For the best ergonomics of the foldable toothbrush, hinge pin 9 is preferably offset towards the front side with respect to the longitudinal axis x-x' of handle P.

[0027] Work portion L has a bristled head 1, from which a thin neck 2 extends, curved with respect to the working plane y-y' of the bristles. In particular, the neck curvature

is such as to arrange hinge bulb 3 offset towards the front side of the toothbrush, with respect to the work plane y-y' of the bristles. Such offsetting is by a few millimetres and is sufficient to bring head 1 to be housed in seat imprint 6 - in folded attitude - with neck 2 arranged in an aesthetically pleasant way (see figs. 3 and 3A) on the imprint 6a of handle 4.

[0028] In the hinge bulb 3 a hole 3a is provided with which hinge pin 9 of handle P is meant to couple - in the way described further on. For such purpose, hinge bulb 3 has a larger lateral dimension (in the direction of the hinge axis) than the remaining neck portion 2, with which it connects through a root area 2a.

[0029] Work portion L, once it has been caused to rotate about hinge means 3,5, in the direction shown by arrow F, may be folded on handle P in the way shown in figures 3 to 5, where bristled head 1 may be received into seat 6, neck 2 into imprint 6a and the root 2a of neck 2 between the two forks 7 and 8 of end recess 4'.

[0030] As clearly visible in the drawings, recess or seat imprint 6a has a depth varying along its length on the solid body 4 of the handle. As a matter of fact, imprint 6a is less deep in the proximity of the hinge portion 3, 5 and becomes progressively deeper, until opening into seat imprint 6, where also the handle body is bulkier and better able to receive the head 1 of work portion L.

[0031] More precisely, the depth of imprint 6a and of seat imprint 6 follows a similar profile to the thickness of work portion L: therefore it is less deep in the saddle 6a' where it simply accommodates neck 2 and it is instead deeper in seat imprint 6, where it must accommodate head 1.

[0032] As a result also the width of the imprint is not constant, but follows the perimeter profile of work portion L (as clearly visible in fig. 6A), narrowing between the proximal end of hinge 5 and the distal end portion provided with seat 6.

[0033] Thereby, once work portion L is folded onto handle P (figs. 3 and 3A) and occupies imprint 6, 6a, the overall outer surface of the folded toothbrush is generically continuous and imprint 6, 6a is substantially closed in a smooth manner by the same work portion L.

[0034] In order to allow a good closing of portion L on handle P, neck 2 departs from hinge portion 3, 5 with a thickness d which is substantially smaller than the corresponding thickness D of the grip in the proximity of hinge 3, 5. That allows, on the one hand, to fully receive the entire thickness d of neck 2 in saddle 6a' and, on the other hand, to obtain that the back profile of neck 2 - once the toothbrush has been closed again - remains about flush with the front surface of the handle, with the desired pleasant aesthetic effect, clearly noticeable in figs. 3 and 5.

[0035] The hinge is defined by the two parts on work portion L and on handle portion 6. First means 3 are in the shape of a bulb which has two parallel side surfaces run through perpendicularly by hinge hole 3a. Second means 5 are in the shape of a fork with prongs 7 and 8

between which rotation pin 9 extends. The two parallel surfaces of first means 3 are hence meant to abut and slide in rotation against similar inner surfaces of prongs 7 and 8.

[0036] When the two parts P and L are mutually coupled, bulb 3 is precisely housed, freely rotating, between the two prongs 7 and 8 of handle P; this coupling guarantees the side stability of the hinge portion. Furthermore, pin 9 is meant to freely rotate constraint and the rotation guiding.

[0037] Although it can be provided to manufacture handle P separately from work portion L, to then introduce bulb 3 between prongs 7 and 8, and finally to introduce a pin 9 from the outside, it is considered preferable, according to a further original aspect of the present invention, to obtain the entire hinge portion 3, 5 directly in a single co-moulding step of incompatible plastic materials.

[0038] Said latter is obtained by defining a first structural component - for example fork 7, 8 with corresponding body 4 integral therewith - of a first plastic material A, on top of which the second component is then overmoulded - for example bulb 3 with corresponding neck 2 - of a second material B incompatible with the first one.

[0039] One of the components can in turn be overmoulded with other area of elastomeric material 4a provided on body 4.

[0040] In other words, the two materials A and B are chosen according to melting temperatures and nature, such as to lead to no joining between the parts, but instead such as to allow to accomplish a precise coupling (to the benefit of the regularity of the rotation movement) which is extremely firm (to the benefit of the safety of use).

[0041] The term "incompatible" is used here to indicate that a first material does not weld or does not bind with - due to physical or chemical characteristics - a second material. That implies both a non-affinity between the materials, and a sufficient difference of melting temperatures to prevent one from deforming the other. The assembly of handle P and work portion L as a unitary complex, already assembled in the two subsequent moulding steps, without further mounting operations is hence obtained. In addition thereto, the coupling of the first 3 and of the second 5 hinging means is precisely obtained and hence allows a regularity of rotation and the firm holding over time of the mutual connection of these two parts.

[0042] As material A, a plastic material from the group of aromatic polyesters (for example PC polycarbonate, PET Polyethylenteraphthalate, PBT Polybutylenteraphthalate), homopolymer and copolymer polyamides (for example PA6, PA66, PA12) may be used, which all have a relatively high melting point (for example above 215-225°C), while as material B plastic materials of the polyolefin group (for example PE-LD, PE-HD, PP homopolymer and copolymer), vinyl polymers (for example polymers of styrol homopolymer such as PS or MS; polystyrene copolymers such as SAN or ABS; vinyl chloride polymers such as PVC), polyacrylic and methacrylic polymers (for example PMMA, methacrylate-(acrylonitr-

yl)-buthadien-styrene copolymer) may be employed, which have a relatively low melting point (for example below 185-195°C). As a result, upon moulding, material B will have a temperature insufficient to cause the part previously formed out of material A to melt, ensuring that the connection does not warp.

[0043] Preferably the process provides to first mould work portion L in the shape illustrated in fig. 5, possibly also bristling it in, and then proceeding to overmoulding the structural component of handle P. In this second step, prongs 7 and 8 and pin 9 are formed by exploiting as counter-mould directly the lateral surfaces of bulb 3 and the very hole 3a, which hence ensures a remarkable manufacturing precision and in any case a free rotation of the parts (because made of incompatible materials which do not bond).

[0044] Thereby hinge 3, 5 is consolidated in a secure manner and involuntary disassembling is no longer possible.

[0045] Through an accurate design of the moulds, considering also the shrinking rates of each material, it is then possible to obtain the minimum desired play between the first and the second hinging means so as to achieve a pleasant folding operation of the toothbrush, that is, with evenness of rotation, but without excessive crosswise clearances, which would be unpleasant.

[0046] In order to establish a travel end of work portion L in the rotation direction opposite to arrow F - so as to keep the toothbrush open and aligned during use - a projection or abutment cam 2b is provided at the bottom of bulb 3. This abutment element is meant to come into contact with a shoulder defined between the two prongs 7 and 8, so as to determine the open travel end position of the toothbrush.

[0047] According to a preferred embodiment, seat imprint 6, in correspondence of the housing area of the bristle tufts in the collapsed condition, has an array of through-holes or through-slits (not shown), which serve to let water droplets percolate which may possibly drip from the bristle tufts and end up on the seat imprint bottom. Thereby the housing of the head and of the corresponding bristles is always kept dry, avoiding sanitary problems.

[0048] Finally, completing the above-described toothbrush structure, a cover element is preferably provided, overall referred to by C.

[0049] This element consists of a thin-walled half-shell 10, preferably made of clear or semi-clear material, which is meant to form a protection cover of the cavity 6 seat bristled head 1.

[0050] Half-shell cover C, at a first end, has two flaps 11 and 12, between which a small pin-shaped bridge 13 extends. Correspondingly, at the distal end of handle 4 a terminal protuberance 7 is provided, in which a seat 7a for pin 13 is practised, in the shape of a slit ending in a widening with a diameter corresponding to that of pin 13.

[0051] At the opposite end, half-shell 10 has a widened cut-out 14, for the function better described here in the

following.

[0052] The free edge 15 of half-shell 10, which is the lower edge in the drawing of fig. 5, has a profile which precisely matches the profile 6b of the seat 6 of handle P.

[0053] With a cover C thus formed an easy mounting of the same on the handle is possible: as a matter of fact, it is sufficient to insert pin 13 in the slit-shaped seat 7a of the end 7 of handle P and, with a slight force-fitting, to snap-push this pin into the widened central hole of slit 7a.

[0054] Pivoting around the axis of this pin 13, cover C can then shift from the closed position, shown in fig. 3, to the open position shown in fig. 1 (open attitude), or vice versa. In the closed position, work portion L is folded on handle portion P, bristled head 1 is found inside seat imprint 6 and the connecting portion of neck 2 runs through cut-out 14; the shaped edge 15 of half-shell 10 matches perfectly the edge of seat imprint 6, accomplishing a continuity of the lateral surface and of the overall geometric figure of the handle.

[0055] In the open position, cover C is caused to rotate into direction A (see fig. 1) to leave seat imprint 6 free, so that neck 2 may be moved upwards, rotating according to arrow B to cause head 1 to come out of seat imprint 6 and to finally bring work portion L into the final position, itself also shown in the same fig. 1. After neck 2 and head 1 have reached this position, cover C may be closed again, to give continuity to the portion of handle P and allow an easy grip by the hand using the toothbrush. In substance, handle body 4 is closed and completed both by work portion L and by cover C; said cover is opened to rotate work portion L into working attitude, but is subsequently closed again to give back continuity and ergonomics to handle 4 during the use thereof. Therefore, the distance between the two hinge pins 9 and 13 is smaller than the sum of the overall lengths of work portion L and of cover C, so that the respective rotations bring work portion L to partially penetrate cover C, through cut-out 14, and hence to determine a general smooth connection of the surfaces which is aesthetically pleasant.

[0056] However, it is understood that the invention must not be considered limited to the special arrangement illustrated above, which represents only an exemplifying embodiment thereof, but that a number of variants are possible, all within the reach of a person skilled in the field, without departing from the scope of protection of the invention, as defined by the following claims.

[0057] In particular, although not explicitly illustrated, the application of bristles onto head 1 can be performed in any desired way, either before or after the coupling of handle portion P with work portion L, without that affecting in any way the main teaching provided here. For example, the application of the bristles may occur with traditional technology, with small metal anchors, or with the known "in-molding" technology.

[0058] Again, the special profile of the handle, as it appears in the accompanying drawings, or the choice of the combinations of materials may be varied at will.

Claims

1. Foldable toothbrush, comprising a work portion (L), provided with a bristled head (1) projecting at the distal end of a neck member (2), and a handle portion (P) having a spindle-shaped body (4), between said two portions a hinge portion (3,5) being provided apt to allow a mutual rotation according to an axis cross-wise to the longitudinal axis of the toothbrush, **characterised in that** said spindle-shaped handle portion (4) is solid and has, towards a distal end, a main seat imprint (6) of a shape and depth suited to precisely house said head (1), when the work portion (L) is folded on the handle portion (P) around said hinge (3, 5), and **in that** only in the proximity of said hinge portion (3, 5), has the spindle-shaped, body (4) of said handle portion (P) a saddle.
5
2. Toothbrush as claimed in claim 1), wherein said main seat imprint (6) and said saddle-shaped recess (6a) are sized so that when said work portion (L) is folded on the spindle-shaped body (4), bringing the bristled head (1) into said main seat imprint (6) and part of the neck (2) into said saddle-shaped recess (6, 6a), it determines with its back surface an arc-shaped profile smoothly connected to the profile of the handle (P).
10
3. Toothbrush as claimed in any one of the preceding claims, wherein said hinge portion (3, 5) consists of mutually engaged first hinge means (3) integral with said work portion (L) and second hinge means (5) integral with said handle portion (P), said first hinge means (3) and said second hinge means (5) being obtained from mutually incompatible materials and overmoulded the ones on the others.
15
4. Toothbrush as claimed in claim 3), wherein said first hinge means are in the shape of a bulb (3) with mutually opposite flat faces, run through by a central hole (3a), apt to cooperate with a rotation pin (9) being part of said second hinge means (5).
20
5. Toothbrush as claimed in claim 4), wherein said second hinge means (5) are in the shape of a fork with a pair of prongs (7, 8) between which said rotation pin (9) extends.
25
6. Toothbrush as claimed in any one of claims from 3) to 5), wherein said handle portion (P) and said work portion (L) are made of different plastic materials and alternatively belonging to the group of aromatic polyesters, homopolymer and copolymer polyamides, or to the group consisting of polyolefin, vinyl polymers, polyacrylic and methacrylic polymers.
30
7. Toothbrush as claimed in any one of the preceding claims, wherein said main seat imprint (6) housing the bristled head (1) is associated with a half-shell cover (10), forming a protection cover of said main seat imprint (6) and of the head (1) housed therein.
35
8. Toothbrush as claimed in claim 7, wherein the free edge of said half-shell (10) has a profile which matches the profile (6b) of said main seat imprint (6), so as to connect and determine a continuity of the outer surface of the handle (P).
40
9. Toothbrush as claimed in claim 7, wherein said half-shell cover (10) is engaged in rotation, through a snap coupling, with a distal end (7) of said handle provided with retaining means (7a).
45
10. Toothbrush as claimed in claim 7, 8 or 9, wherein said half-shell cover (10) furthermore has a widened cut-out (14) which, when said work portion (L) is folded on the spindle-shaped body (4), is run-through by a portion of said neck (2).
50
11. Toothbrush as claimed in any one of claims from 7 to 10, wherein said half-shell cover (10) is made of clear or semi-clear material.
55

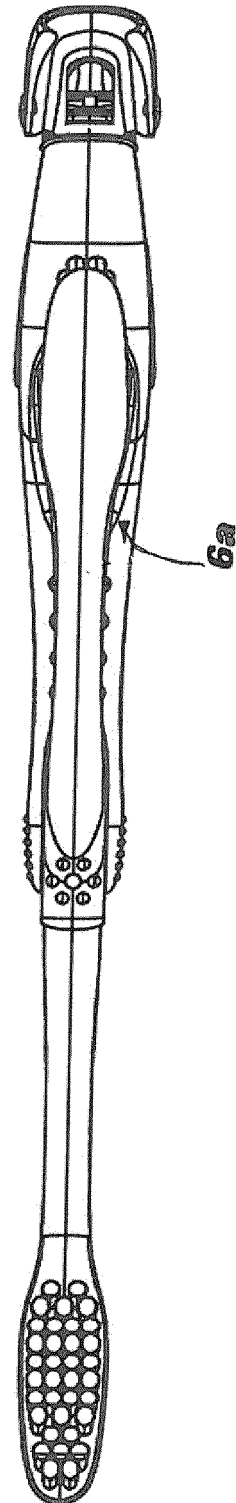
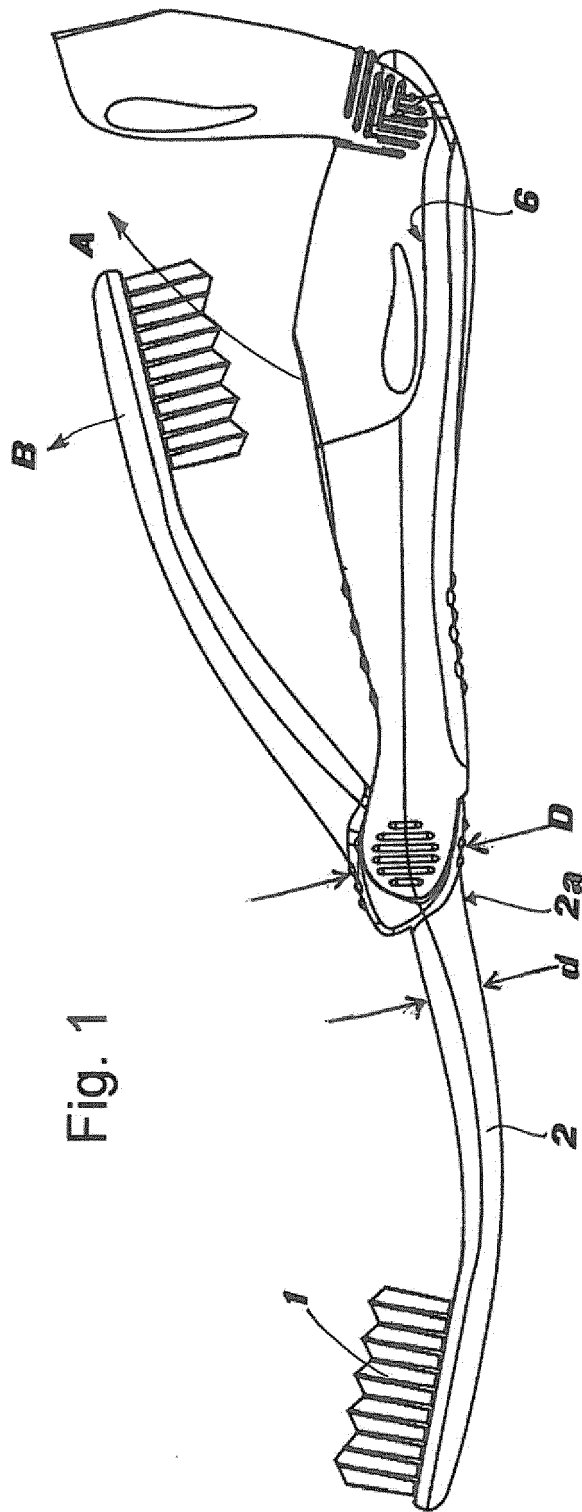


Fig. 2

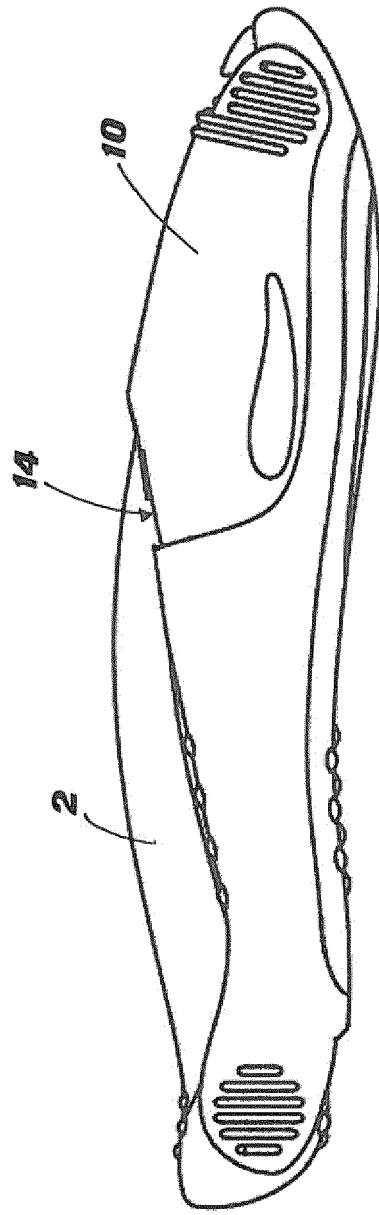


Fig. 3

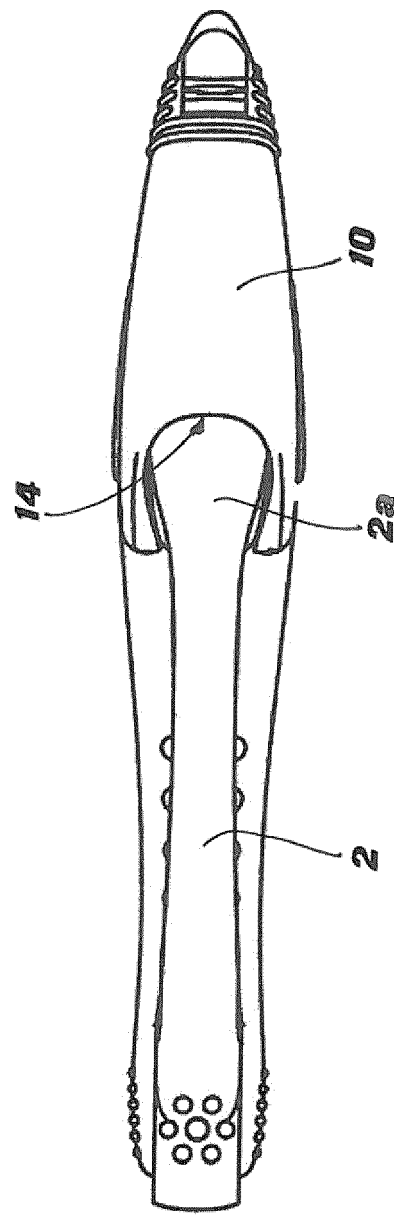


Fig. 4

Fig. 3A

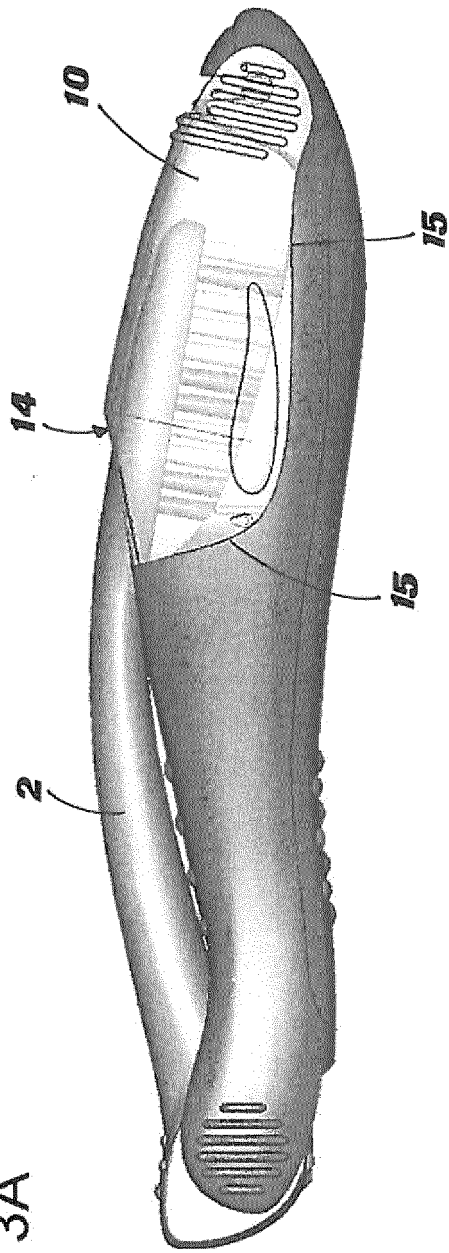


Fig. 4A

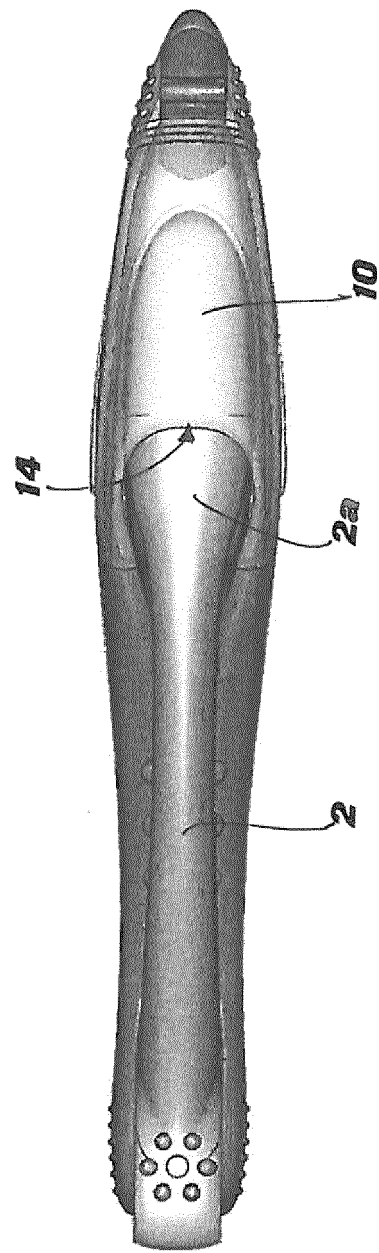


Fig. 6A

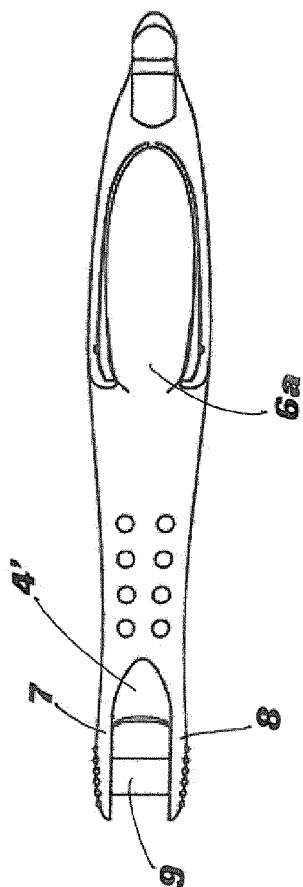


Fig. 6B

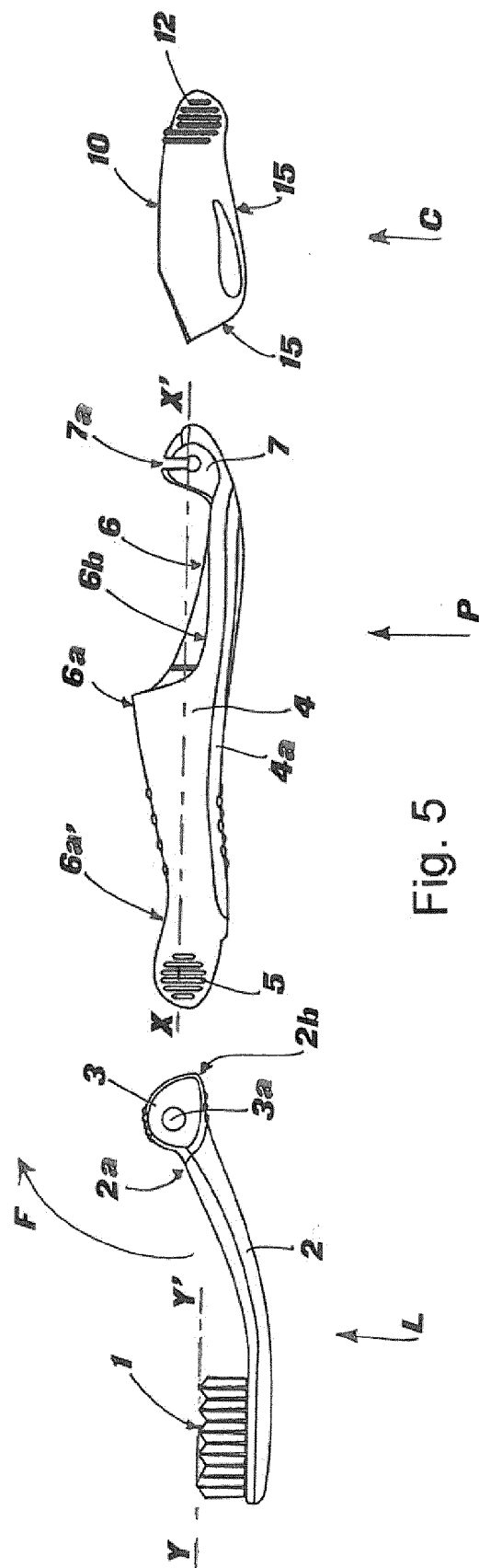
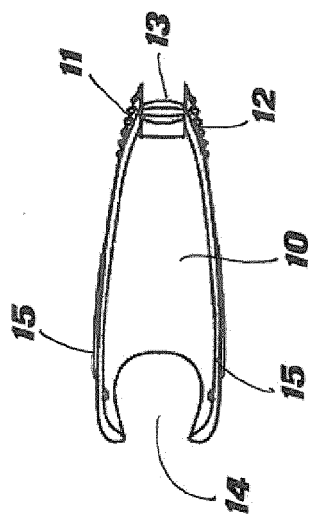


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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