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(54) Title: DUAL TOOTHBRUSH CONTAINING AN INTERDENTAL CLEANING UNIT

(57) Abstract: The subject of the invention is a multifunctional toothbrush, which contains several, possibly replaceable oral care implements such as a toothbrush, a dental floss fork. The individual possible embodiments of the invention may have: (i) replaceable head; (ii) replaceable bristle; (iii) the interdental cleaner may be removable or openable; (iv) the interdental cleaner may be in a case combined to it; (v) the dental floss fork may have multiple threads, branches, heads; (vi) interdental care may be provided by one or more dental broom(s); (vii) the dental broom may be with or without a stem.

## **Dual toothbrush containing an interdental cleaning unit**

### **Subject matter of the invention**

The subject matter of the invention is a toothbrush which has an interdental cleaning unit on its handle or on its head. The individual claims of the invention do not limit the invention exclusively to the area of oral care; the invention could also be applicable to the field of hand or nail cleaning, for example, or to the field of household cleaning, for example.

### **Background of the invention**

The goal was to develop an implement which integrates brushing the teeth and interdental cleaning in the same unit, in a manner that can make using an interdental cleaner a simple a routine activity for everyday users in addition to brushing their teeth, and so that the replaceable, i.e. consumable component of the implement can be replaced easily and routinely. Another goal was to ensure that the interdental cleaning component of the implement is protected from contamination as best as possible when not in use. An additional task was to ensure that the interdental cleaning component is both detachable, removable from and attachable to the implement. At the current level of technical progress, there are various types of toothbrushes and various types of interdental cleaning solutions known, but the goal resolved by the invention, the solution for which is described by the claims, is not provided by the current level of technical progress.

The invention is simple and, for that reason too, cost effective, but its complex solutions, while enabling simple and routine use, integrate the two elements of oral care, toothbrush and interdental cleaning, into a single unit, while – in line with the claims – the choice of the type of interdental cleaner to be integrated into the implement can be matched to the needs of individual market zones, thereby facilitating the optimisation of manufacturing and distribution tasks.

### **Summary**

The subject matter of the invention is a toothbrush which combines the brushing of teeth and interdental cleaning in an easy-to-use implement. Its two main parts are the toothbrush and the interdental cleaner. The interdental cleaner may be a dental floss fork or a dental broom, or any implement suitable for cleaning the gaps between the teeth. In addition to combining the toothbrush and the interdental cleaner, the invention has further advantages over separate implements for cleaning teeth and for interdental cleaning. When not in use, the interdental cleaning component of the implement can be hidden inside, e.g. folded into or pushed into the toothbrush, to protect it against contamination and to retain the appearance of a traditional toothbrush. As the interdental cleaning component wears out faster than the toothbrush, therefore the interdental cleaning components of the implement may be replaced using various technical solutions, e.g. snap closure.

The current level of technical progress is not aware of a similar solutions where the above functions are present simultaneously. Any of the known solutions may be used to attach the two main parts of the implement to each other so that they can still be moved in relation to each other, and replaced, including shape-based or snap closure, but even magnetic or electric attachment. The units may also be inherently attached to one another, able to move relative to one another but not detachable. Out of the known solutions, this can be implemented as rotation around an axis to open, linear movement along a curve, or even a free-moving solution. It may also be a combination of the above solutions, i.e. attachable and openable.

The main units of a possible embodiment of the multifunctional toothbrush as per the invention are: toothbrush; dental floss fork, consisting of: stem, two fork branches and the dental floss filament strung between them, and the spindle for moving and securing the unit.

The stem of the dental floss fork is a single oblong body, with two fork branches at one end, between which dental floss is strung tight enough to be suitable for interdental cleaning, while at the other end there is a spindle, which is perpendicular to the stem and is secured in the dedicated channel created in the handle of the toothbrush by snap closure, allowing folding out at 180°. A cavity suitable for accommodating the dental floss fork is created within the handle of the toothbrush. The dental floss fork can be folded into this cavity by rotating it around the spindle mentioned above. The cavity housing the folded-in dental floss fork can be covered by a cover on the handle designed for this purpose, which protects the dental floss fork from external impact and contamination when brushing one's teeth and during storage. Before brushing teeth, the user can open the cover, fold out the dental floss fork, which is fixed securely to the handle once the cover is folded back, and is thus suitable for cleaning the interdental spaces. A worn-out dental floss fork can be removed easily by hand after the cover is opened, and replaced with a new one. The handle and the cover are expediently made from the same body in a manner that the movement of the cover is made possible by the thinned, elastic material, expediently injection moulded plastic, but this does not restrict the production technology of the invention as this movement can be replaced by any other known solution which allows rotary or linear movement.

### **Brief description of the figures**

Certain possible embodiment examples and certain features of certain preferred solutions of the invention are described by referring to the following figures. In line with the rules inherent in this invention, the description of the possible embodiments serving as the basis of the figures should be interpreted in conjunction with the relevant drawings, which should be considered parts interpreting rather than limiting the full written description. The figure is the top view depiction of individual possible embodiments of the multifunctional toothbrush contemplated in the invention:

Fig. 1: with folded-out dental floss fork and open cover,

Fig. 2: with removable, two-headed dental floss fork and open cover,

- Fig. 3: with dental floss fork pushed linearly out from the head part,
- Fig. 4: with dental broom pushed linearly out from the handle part,
- Fig. 5: with a dental broom with a single stem and two branches, folded out from the handle part with rotary movement, with one of the branches folded out into the state designed for use,
- Fig. 6: with a dental broom with a single stem and three branches, folded out laterally from the handle part with rotary movement, with one of the branches folded out into the state designed for use,
- Fig. 7: with replaceable bristle.

### Detailed description

The following description of the preferred embodiments only serves as an example and does not in any way aim to limit the invention, its fields of application or its use. Words such as "attached", "appended", "combined", "affixed" as well as similar expressions and synonyms refer to a connection where the components are connected directly or indirectly to one another by a suitable technical solution, and are fixed or linked to one another by movable or fixed joints or connections, unless specifically indicated otherwise in the description. The individual features and advantages of the invention are illustrated by the embodiment examples. Consequently, the invention is clearly not limited by these embodiment examples, which illustrate certain non-limiting combinations of features existing on their own or in other combinations; the invention's field of application is defined by the claims enclosed.

Figures 1 to 7 depict only certain embodiments presented as preferred examples of the multi-functional toothbrush contemplated in the invention. In figure 1 the cavity 112 accommodating the dental floss fork 200, and its cover 111, are implemented in the toothbrush 100 handle 110, on the side opposite the bristle 101.

The ability to fold out the dental floss fork 200 is ensured by the spindle 220 located at the end of the dental floss fork 200 opposite the fork branches 210. The dental floss fork 200 can be folded into the cavity 112 implemented in the handle 110 by rotating it around this spindle 220. The cavity 112 is closed by the cover 111 implemented in the handle 101. The cover 111 may be partially or wholly removable and able to be secured to the handle 110, the manner in which this is implemented does not limit the scope of the invention. The spindle 220 associated with the cavity 112 implemented in the handle 110 allows the dental floss fork 200 to be rotated and also allows the removal and replacement of the dental floss fork 200, e.g. by snap closure or in any other manner.

The connection of the handle 110 and the dental floss fork 200 does not limit the scope of the invention. The movement of these two components with respect to each other when they are attached to each other may involve rotation or linear movement, or a combination of both. In figure 3, for example, the dental floss fork 200 can be pushed out from the head part 120 by linear movement. Any part of the toothbrush 100, either the handle 110 or the head 120 may be suitable for accommodating and storing the dental floss fork 200 or another interdental cleaning unit. The position and manner in which the dental floss fork 200 is combined with the toothbrush 100 does not limit the scope of the invention.

The dental floss fork 200 is essentially an oblong body, with fork branches 210 at one end, with dental floss 201 strung between them. In the event of the solution depicted in figure 2, the dental floss fork 200 and the handle 110 are not mechanically connected, at both ends of the oblong body of the dental floss fork 200 there are fork branches 210, between which dental floss 201 of different thickness may be strung, or the size of the fork branches 210 may also be different in order to allow effective cleaning of the interdental gaps.

The shape in which the dental floss fork 200 is implemented does not limit the scope of the invention.

Figures 4, 5 and 6 depict three different solutions, for the use of the dental broom 300, known as an alternative to dental floss fork 200, each as a preferred solution of the invention. In figure 4, the dental broom 300 is located at the end of the handle 110 opposite the bristle 101, and can be removed from the handle 110 by linear movement. In figure 5, similarly to figure 1, the dental broom 300 can be opened by rotating it, with the dental broom fixed to the broom spindle 312 by eyelets 311, for example.

The broom spindle 312 is projection created at one end of the broom stem 310, designed to engage eyelet 301 of the dental broom 300. This solution allows several dental brooms 300 of various thickness to be combined with the toothbrush 100. Figure 6 presents a solution where three dental brooms 300 are combined with the toothbrush 100. In this case the dental broom stem 310 opens up laterally with respect to the longitudinal axis of the stem 110. The geometric design of the dental broom 300 and of the toothbrush 100 or their position relative to each other do not limit the scope of the invention.

The bristle 101 is basically a fixed element of the toothbrush 100, but as shown in figure 7, the worn out bristle 101 could be removable from the head of the toothbrush 100, and replaced.

The manner in which the bristle 101 is replaced does not limit the scope of the invention. The bristle 101 corresponds to the bristle part of known toothbrushes; structurally, it may be filamentous or spongy, but any structure suitable for dental care may be used, regardless of its material, as long as it is suitable for the function, including without limitation: nylon, polybutylene terephthalate. The elements of the invention may be produced by any suitable procedure, including without limitation: injection moulding, milling, 3D printing. They may be made of any material suitable for the function, including without limitation: polymers, composites, metals. Depending on the material used, these components may be made from a continuous block of material or may be assembled using suitable joining elements. The invention is clearly not limited by the material or manner of production used.

Following these lines of thought, innumerable technical solutions could be listed which all perform or replace these same functions. Although the description and drawings provided above show individual possible embodiments of this invention, it is obvious that numerous additions, changes and replacements may be made without deviating from the spirit and application of this invention as specified in this description. To professionals, it is obvious especially that the embodiments of this invention may have a different shape, structure or arrangement, may have different proportions and dimensions, and may have different elements, materials and components, without deviating from the spirit or essential features of the invention. The expert will appreciate that the invention can also be used with changes affecting various structural properties, arrangement, ratios, dimensions, materials, components or other properties which arise during the practical use of the invention and which can meet specific environment-related or

usage needs without deviating from the fundamental principles of this invention. The embodiments presented herein should therefore be considered to be of illustrative and non-limiting nature in all respects, as the field of application of the invention is determined by the claims and is not limited by the above description or by the embodiments.

## Claims

### My claims:

**1. Multifunctional oral care implement**, which contains the following: toothbrush; handle; a head combined with the handle; a bristle suitable also for the cleaning of teeth, combined with the head; interdental implements which can be combined with the handle or the head, namely dental floss fork, namely dental broom, namely toothpick; **wherein** the interdental implement comprises: (i) a dental floss fork with one or more branches; (ii) a dental floss fork with one or more heads; (iii) a dental broom or more dental brooms without a stem; (iv) a dental broom or several dental brooms with a stem; (v) a toothpick; (vi) the integration of the combination of dental floss fork and dental broom and toothpick on the handle or on the head or on the handle and the head.

2. The oral care system as per claim 1, **wherein** the combination of the interdental implement with the toothbrush in a detachable or fixed manner may be ensured by a case that may be combined with the toothbrush, which case the interdental implement may be combined with or which case the interdental implement may be placed into.

3. The oral care system as per claim 2, **wherein** the case may (i) encase the interdental implement in part or in whole, (ii) ensure the attachment or securing of the interdental implement to the toothbrush but not encase the interdental implement.

4. The oral care system as per claim 2, **wherein** the inside of the case encasing the interdental implement in part or in whole may be hollow or may be formed from a filling material; the shell of the case may be openable or may be open.

5. The oral care system as per claim 1, **wherein** the dental floss fork comprises at least a stem; at least a connecting part at the point where the stem attaches to the handle or to the head or to the case combinable with the handle or the head; the part of the stem longitudinally opposite the attached handle or head or case must end in at least an additional branch, with the branch of that part and the stem feature or with the branches of that part holding and securing between them the thread or wire strung between them.

6. The oral care system as per claim 5, **wherein** the thread or wire strung in a fixed manner between the branch and the stem feature or between the branches may be; (i) of a smooth surface or with surface features; (ii) hollow or solid; (iii) produced with any known manufacturing technology, from any known material.

7. The oral care system as per claim 5, **wherein** both ends of the stem end in at least one additional branch each or in more than one branches, with such branch and the stem feature or such branches holding and securing between them the thread or wire strung between them.

8. The oral care system as per claim 5, **wherein** the branches of the dental floss fork stem may be of the same or of different length.



9. The oral care system as per claim 1, **wherein** the dental broom: (i) comprises at least a connecting part at the point where it attaches to the handle or to the head or to the case combinable with the handle or the head; (ii) combined with a stem, the stem comprises at least a connecting part at the point where it attaches to the handle or to the head or to the case combinable with the handle or the head.

10. The oral care system as per claim 9, **wherein** the dental broom is a component consisting of a rubbing surface combined with an axis starting from an end point of connection, where the rubbing surface may be: (i) the surface design of the material of the axis; (ii) combined with the material of the axis on the whole surface or at certain points of the surface by gluing, melting, welding, boring, lacing or by using any other known manufacturing technology.

11. The oral care system as per claim 9, **wherein** the dental broom combined with the stem is a part of the stem extended along its longitudinal axis, which is; (i) attached longitudinally to the stem in a fixed manner, or; (ii) is jack-knifing at one point of the stem; (iii) is implemented from the same material as the stem.

12. The oral care system as per claim 9, **wherein** one or more dental broom(s) of different sizes or of different materials or with different axis surface designs, combined with the stem, is/are attached to a given point on the stem or to a lateral or bilateral axis or pin combined with the stem: (i) in a detachable manner; (ii) in a rotatable manner.

13. The oral care system as per claim 12, **wherein** such detachable and rotatable attachment may be ensured by: ring; pin; threaded feature; any feature implemented by a known manufacturing method; with one or more geometrical bodies or geometries.

14. The oral care system as per claim 9, **wherein** when the dental broom moves with respect to the longitudinal central axis of the stem, the handle, the head or the case, depending on the design of the points of connection: (i) it moves along a pre-determined arc or arcs; (ii) it moves in any direction until impact; (iii) it cannot be fixed in a changed position; (iv) it can be fixed in a changed position, in a releasable manner.

15. The oral care system as per claim 5 and claim 9, **wherein** the attachment of the stem of the floss or of the dental broom or of the stem of the dental broom to the handle, to the head or to the case may be ensured by: a pin; a smooth or furrowed spindle, for which a matching negative geometrical feature, i.e. a borehole or channel must be implemented in the other half of the pair of attaching components.

16. The oral care system as per claim 15, **wherein** the design of the attachment involving a pin or spindle enables the stem of the floss or the dental broom or the stem of the dental broom to be opened out from the handle, the head or the case laterally or upwards or downwards with respect to the longitudinal central axis of the handle.

17. The oral care system as per claim 5 and claim 9, **wherein** the attachment and the opening of the stem of the floss or of the dental broom or of the stem of the dental broom may be

ensured by a rail implemented on the stem, the handle, the head or the case, and by a matching negative geometrical feature, on which joining surface the stem may be slid; (i) at both ends of the rail of the pair of geometrical features, while at one end of the negative geometrical feature matching the rail an arresting pawl and an arresting groove must be implemented.

18. The oral care system as per claim 5 and claim 9, **wherein** the attachment and opening of the stem of the dental broom or the stem of the floss may be ensured by one or more arms linking the stem to the handle, to the head or to the case, where such joints may be: (i) detachable; (ii) non-detachable.

19. The oral care system as per claim 5 and claim 9, **wherein** the securing of the dental floss fork or of the dental broom with or without a stem to the head or to the handle or to the case may be: (i) by snapping or getting stuck; (ii) after the securing is released, the dental floss fork or the dental broom with or without a stem comprises a separate unit of use which is independent from the head, the handle and the case.

20. The oral care system as per claim 9, **wherein** the dental floss fork or the dental broom with or without a stem may be: (i) part of the structure of the head; (ii) part of the structure of the handle; (iii) part of the structure of the separate case combined with the head or the handle.

21. The oral care system as per claim 1, **wherein**: (i) the bristle housing encasing and securing the filaments of the bristle combined with the head is part of the geometrical body of the head; (ii) the bristle housing encasing and securing the bristle filaments comprises a separate geometrical body that can be combined with the head.

22. The oral care system as per claim 21, **wherein** the bristle filaments are implemented as: wire or thread; with smooth surface or with surface features; and are produced by any known manufacturing technology, from any known material.

23. The oral care system as per claim 22, **wherein** certain bristle filaments or all filaments in the bristle housing may be made: (i) from materials harder or softer than the bristle filaments used for cleaning teeth; (ii) with a design thicker or thinner than that of the bristle filaments used for cleaning teeth; (iii) with or without a channel.

24. The oral care system as per claim 21, **wherein** the surface of the bristle housing may be: (i) smooth; (ii) furrowed towards any one or more points in space, in one or more layers; (iii) bulging outward at one or more points.

25. The oral care system as per claim 21, **wherein** the oral care component combined with the bristle housing may be a sponge or of a spongy structure.

26. The oral care system as per claim 21, **wherein** the geometrical feature of the separate bristle housing, when attached to the matching negative geometrical feature implemented in the head, hitches or gets stuck, with such geometrical feature being: (i) one or more transversal or longitudinal grooves; (ii) a nest; (iii) one or more pins; (iv) one or more spindles, which may be

furrowed or threaded on the surface, in this case the inside of the negative geometrical feature must be designed to match the surface design of the spindle.

27. The oral care system as per claim 1, **wherein** the combination of the head with the handle may comprise: (i) a single geometrical body; (ii) two or more geometrical bodies that can be detached from and attached to one another, with the attachment of such geometrical bodies being ensured by engaging a geometrical feature on one of the connecting surfaces with a matching negative geometrical feature on the other connecting surface, either directly or via an intermediary component.

28. The oral care system as per claim 5, claim 9, claim 21 and claim 27, **wherein** the attachment of the detachable case to the handle or the head, as well as the attachment of the head to the handle may be ensured by, and the geometrical feature ensuring the attachment of the bristle housing may be replaced by, a pair of attaching components; oppositely charged or with pairs of pores; of full or surface-only structural design; of identical or opposite geometrical design, such as: an adherent surface, Velcro, magnet or any detachable joining material produced using any known manufacturing technology.

29. The oral care system as per claim 1, **wherein** the elastic deflection rigidity of the head may be weakened in the section between the bristle combined with the head and the point of attachment or transition between the head and the handle: by reducing the diameter; by implementing grooves; by weakening the material; or via any known manufacturing technology.

30. The oral care system as per claim 1, **wherein** the body geometry thereof may expand or contract by breaks or bends towards any single or multiple points in space from the longitudinal central axis of the handle, and may take on any regular or irregular geometric or figurative body geometry.

31. The oral care system as per claim 1, **wherein** the toothpick is / the toothpicks are: (i) located in one or more cavities implemented in the head, the handle or the case; (ii) combined with the head or the handle or the case, in an openable or detachable manner; (iii) contained in a case that can be combined with the handle, the head or the case in a detachable or fixed manner.

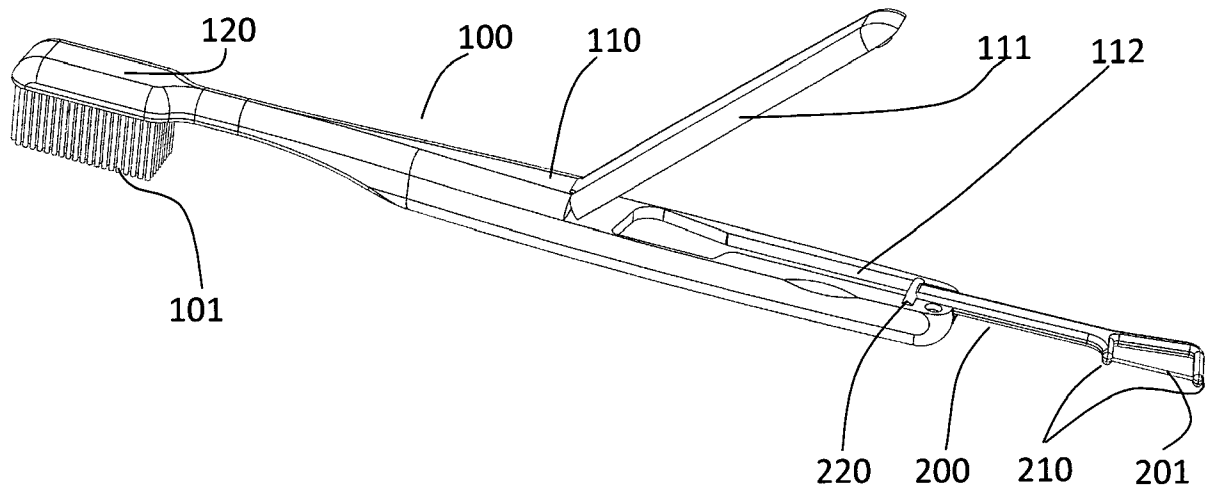


FIG. 1

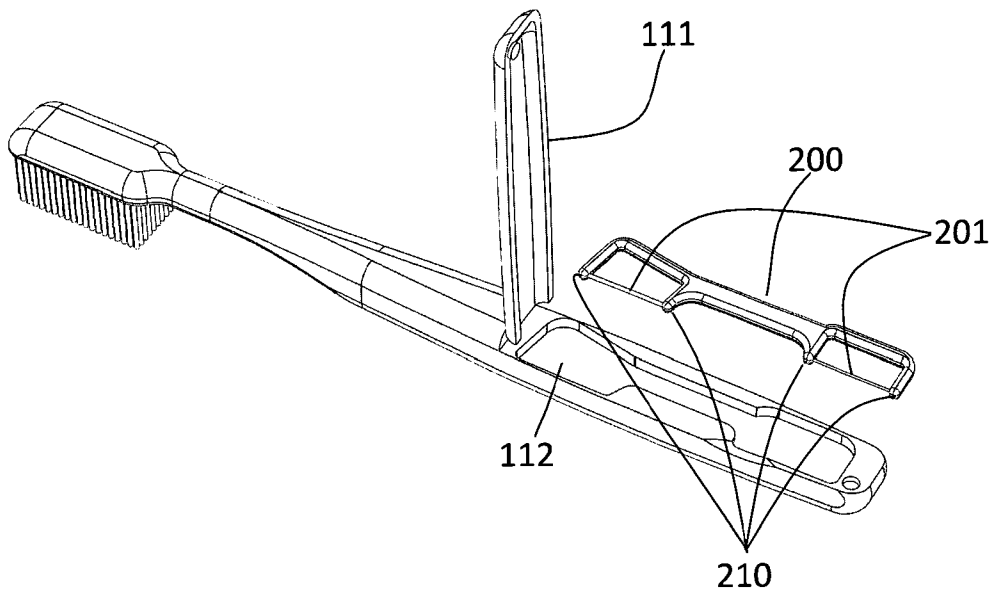


FIG. 2

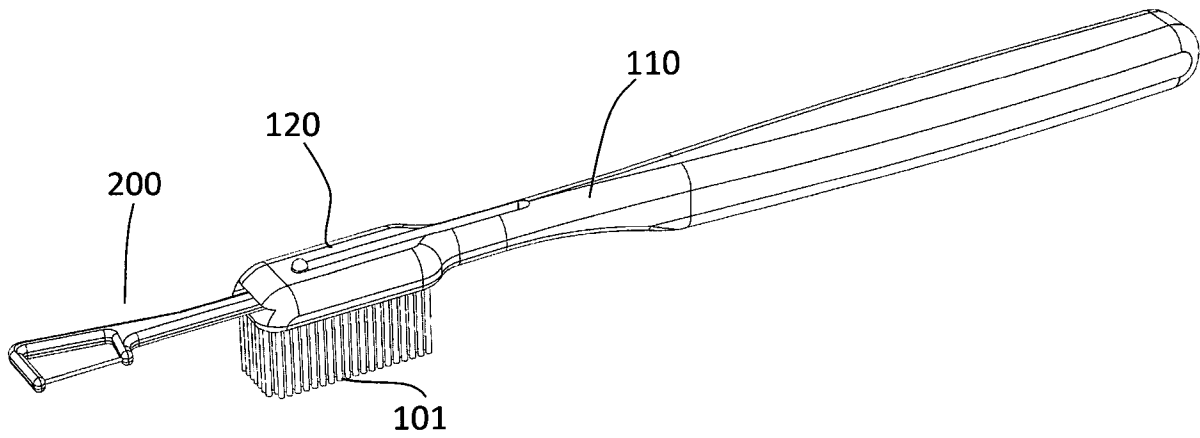


FIG. 3

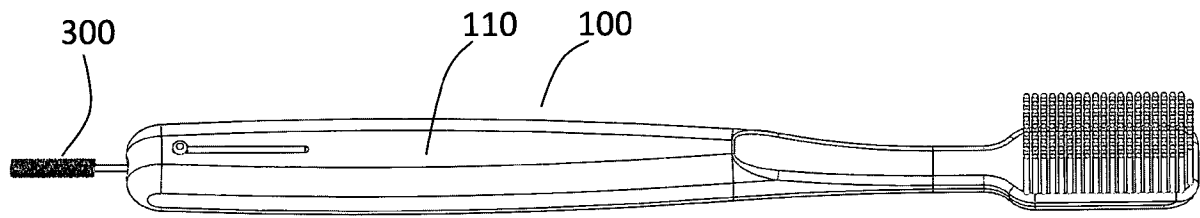


FIG. 4

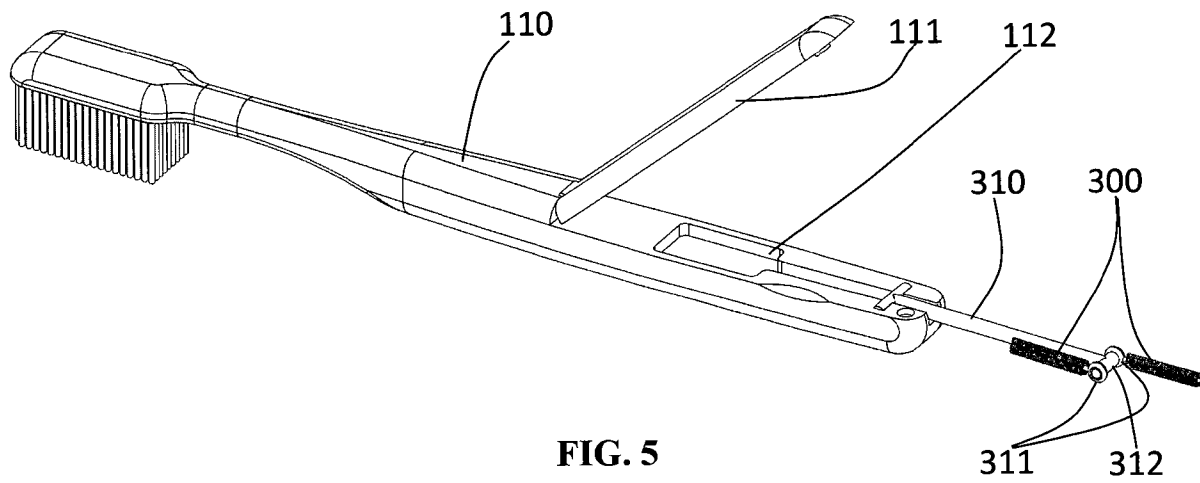


FIG. 5

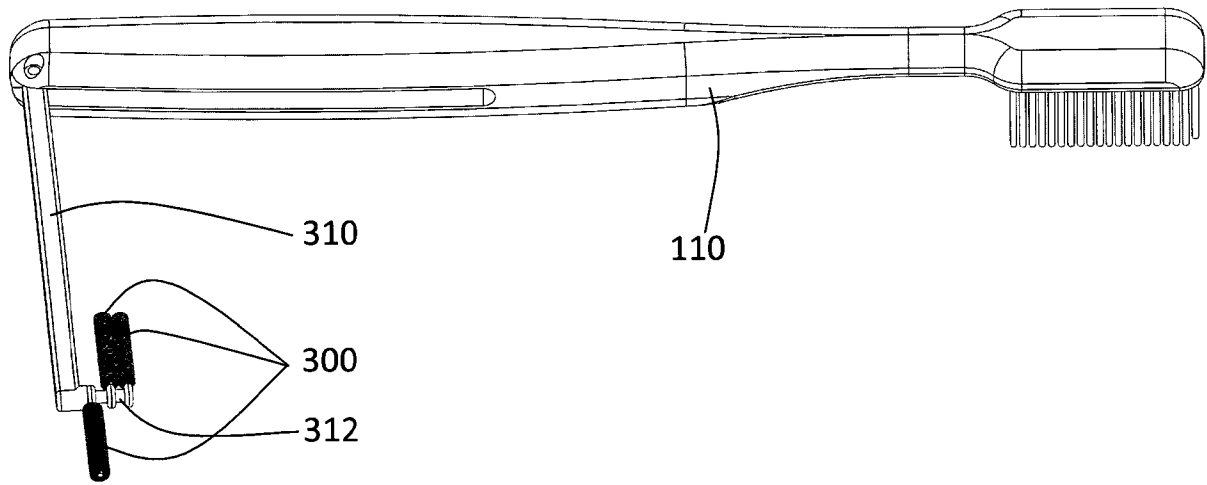


FIG. 6

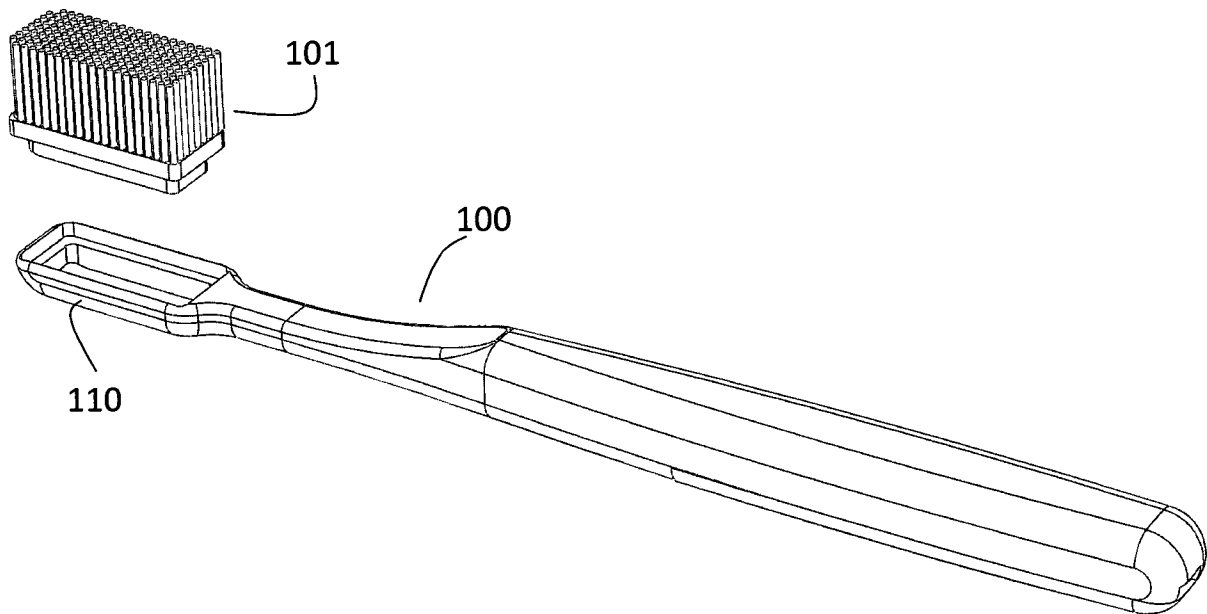


FIG. 7

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/HU 2015/000061

A. CLASSIFICATION OF SUBJECT MATTER				
<i>A46B 9/00 (2006.01)</i>				
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)				
A46B 9/00, A61C 15/04, 17/00				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
Espacenet, DWPI				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	US 2004/0187887 A1 (NANCY RUTH BECKMAN) 30.09.2004, fig. 1-6	1-31		
Y	US 2010/0269280 A1 (SCOTT THOMAS) 28.10.2010, fig. 1, 2	1-31		
Y	US 4204294 A (ROBERT J. HALVERSON) 27.05.1980, col. 3, lines 1-10, fig. 1-3	1-31		
Y	US 5735298 A (HARIO MAYNE et al.) 07.04.1998, claims, fig. 1-9, 14-16	2-4, 28		
Y	WO 2005/020837 A2 (GWEN, PATRICK) 10.03.2005, abstract, fig. 1-6	2-4, 28		
Y	RU 31769 U1 (IVANOV IGOR VALERIEVICH) 27.08.2003, claims, fig. 1	4, 14		
Y	US 5097852 A (TZUNG-I WU) 24.03.1992, abstract, fig. 14	5-8, 15-19, 28		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.				
* Special categories of cited documents: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">           "A" document defining the general state of the art which is not considered to be of particular relevance            "E" earlier document but published on or after the international filing date            "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)            "O" document referring to an oral disclosure, use, exhibition or other means            "P" document published prior to the international filing date but later than the priority date claimed         </td> <td style="width: 50%; border: none;">           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention            "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone            "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art            "&amp;" document member of the same patent family         </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search		Date of mailing of the international search report		
18 April 2016 (18.04.2016)		12 May 2016 (12.05.2016)		
Name and mailing address of the ISA/RU: Federal Institute of Industrial Property, Berezhkovskaya nab., 30-1, Moscow, G-59, GSP-3, Russia, 125993 Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37		Authorized officer  V. Vasilieva  Telephone No. (495)531-64-81		

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/HU 2015/000061

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2187899 A (ISABELLE HENNE) 23.01.1940, fig. 8, 9, 13	6
Y	US 4880382 A (LPA LES PRODUITS ASSOCIES) 14.11.1989, col. 3 - col. 4, lines 1-25, fig. 1-6	9-20, 27, 28
Y	US 1495675 A (S.T. COLT) 27.05.1924, p. 1, fig. 1-3	17
Y	US 1661200 A (S. SPITZ) 06.03.1928, p. 2, fig. 1, 2	18, 21-26
Y	US 2876477 A (G.G. STEWART) 10.03.1959, col. 3, fig. 3-7	22-23
Y	US 3939522 A (SHIMIZU HIROMICHI) 24.02.1976, abstract, fig. 1-8	25
Y	WO 2012/120014 A1 (GLAXOSMITHKLINE CONSUMER HEALT et al.) 13.09.2012, abstract, fig. 1, 3, 4	29
Y	US 2284217 A (R.H. LIEBERTHAL) 26.05.1942, col. 1, lines 35-55, fig. 4	31