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(54) **ORAL HYGIENE DEVICE**

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(57) **ABSTRACT**

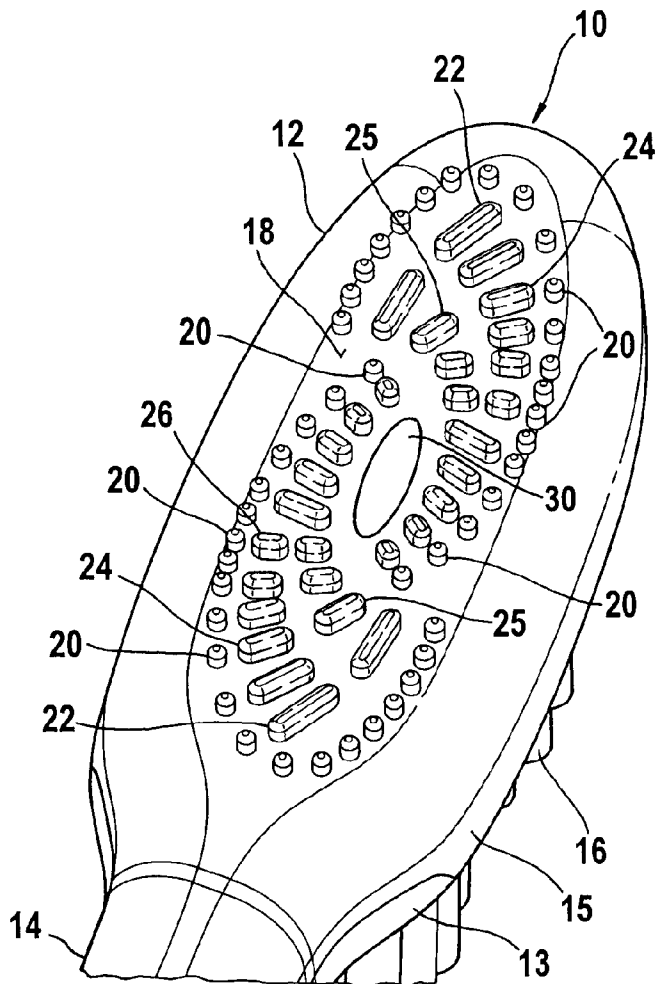
An oral hygiene device includes a handle, a head coupled to the handle, a substantially planar base disposed on the head, and a plurality of cleaning elements projecting from the base. The plurality of cleaning elements are characterized by at least two different geometries, and at least some of the plurality of cleaning elements are generally oblong cleaning bars. Adjacent cleaning elements define at least one channel that extends in a direction generally transverse to a longitudinal direction of at least some of the oblong cleaning bars.

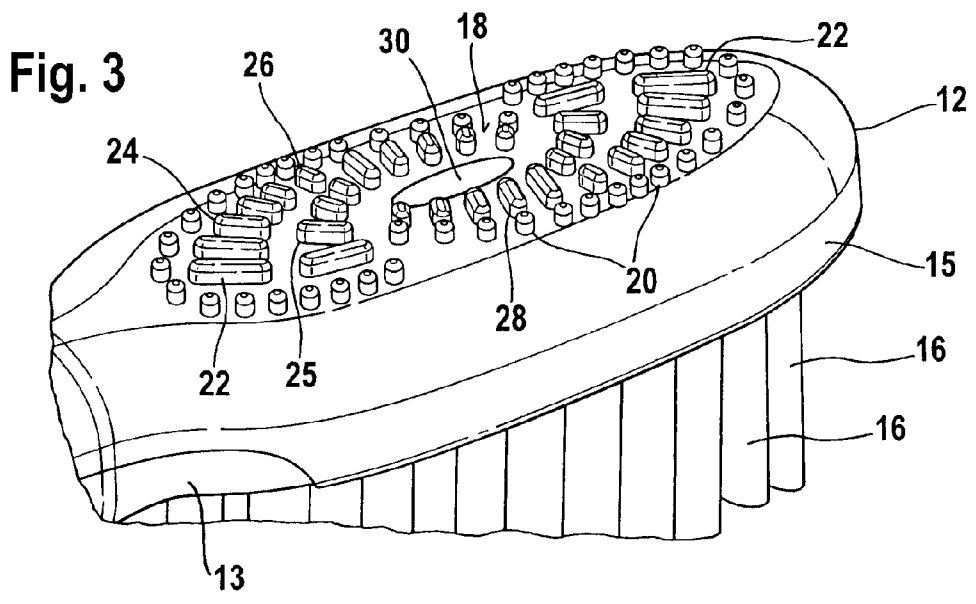
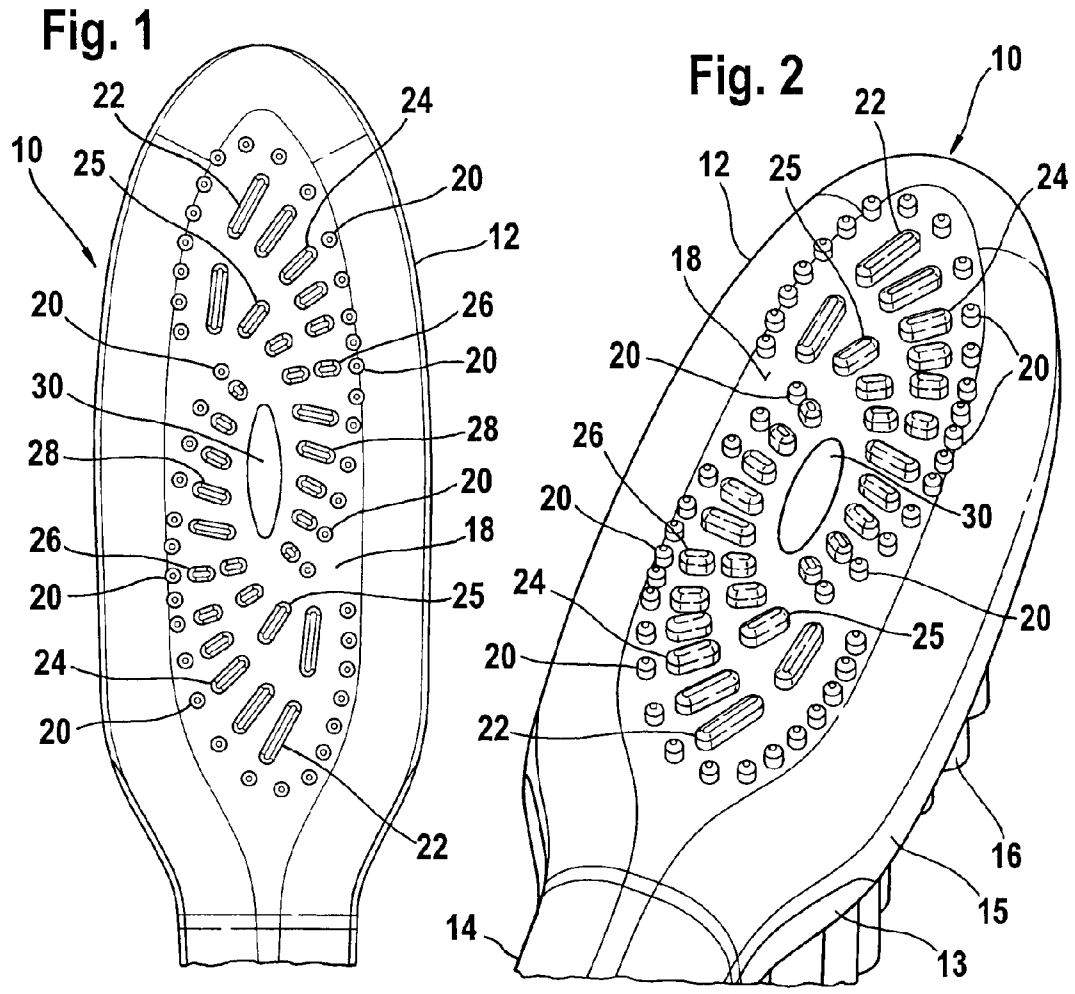
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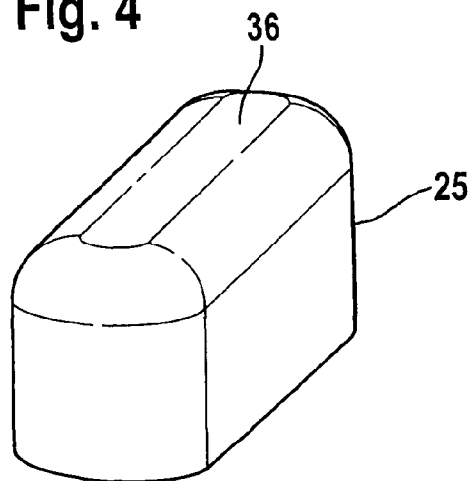
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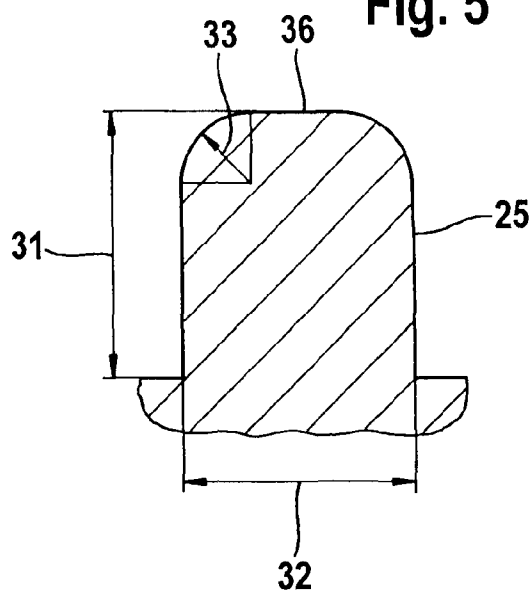




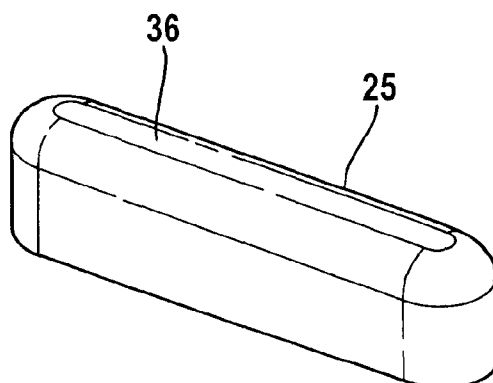
**Fig. 4**



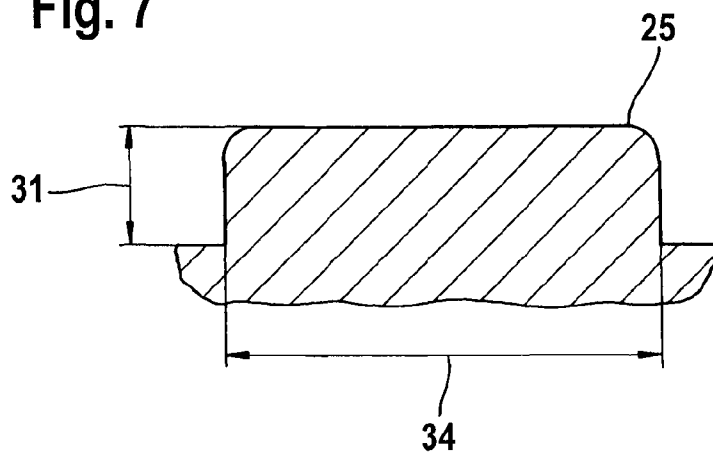
**Fig. 5**



**Fig. 6**



**Fig. 7**



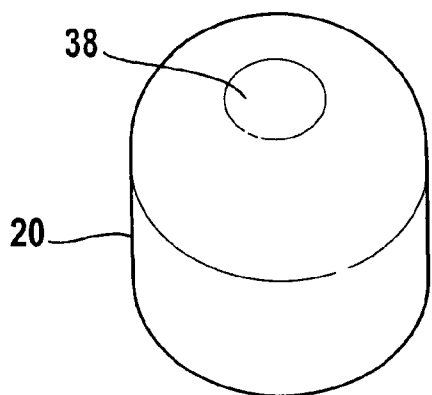


Fig. 8

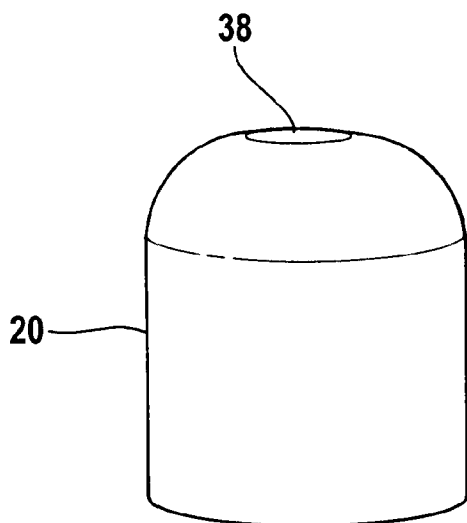


Fig. 9

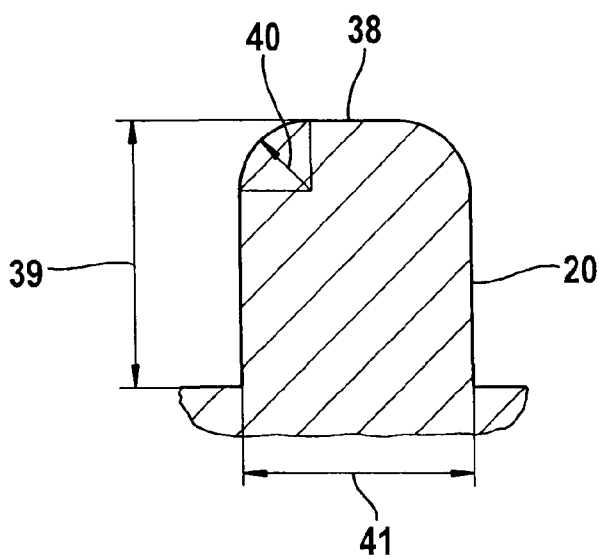
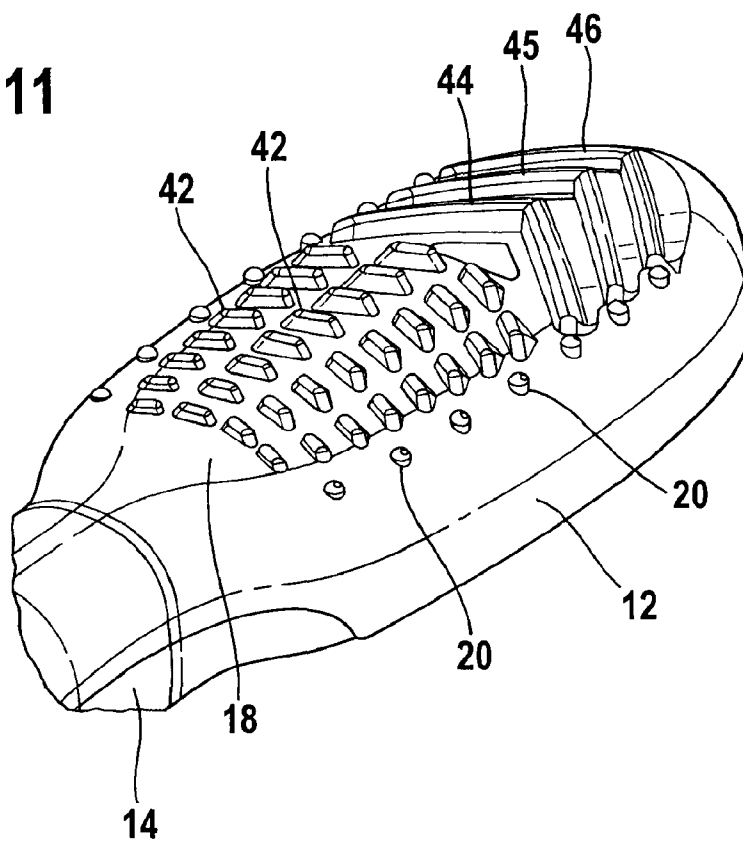
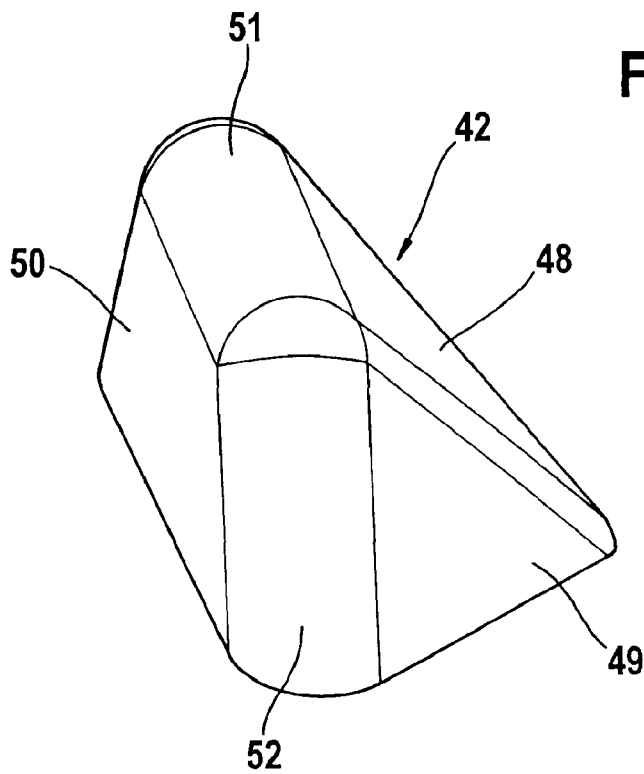


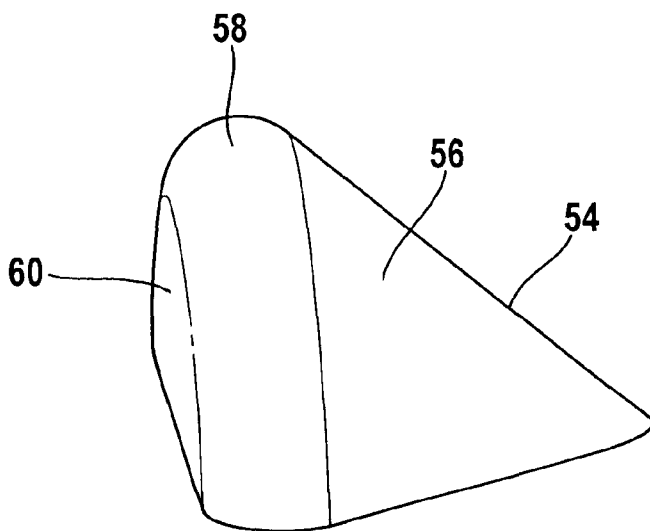
Fig. 10

**Fig. 11**

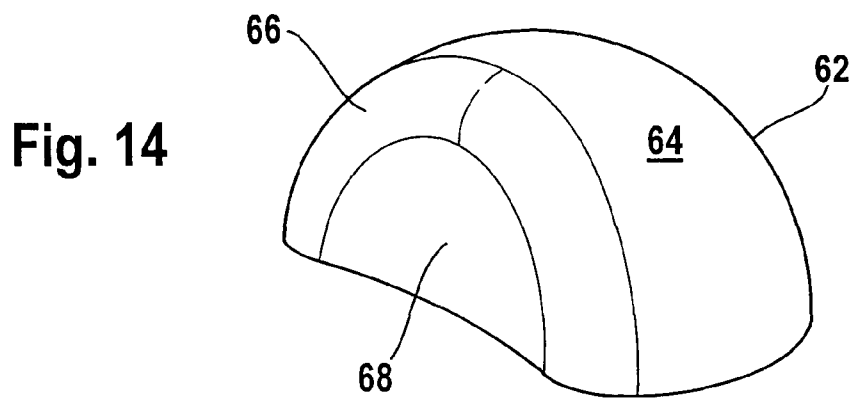


**Fig. 12**

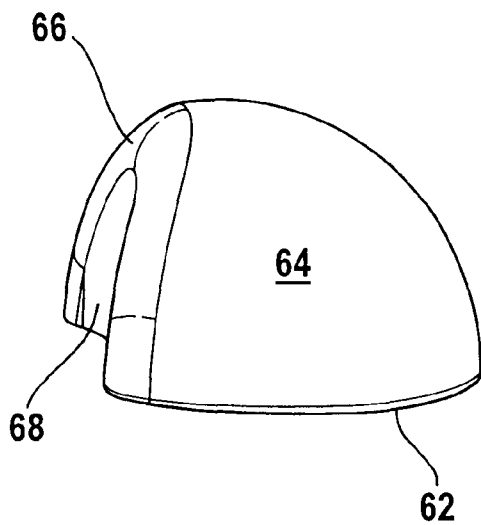




**Fig. 13**

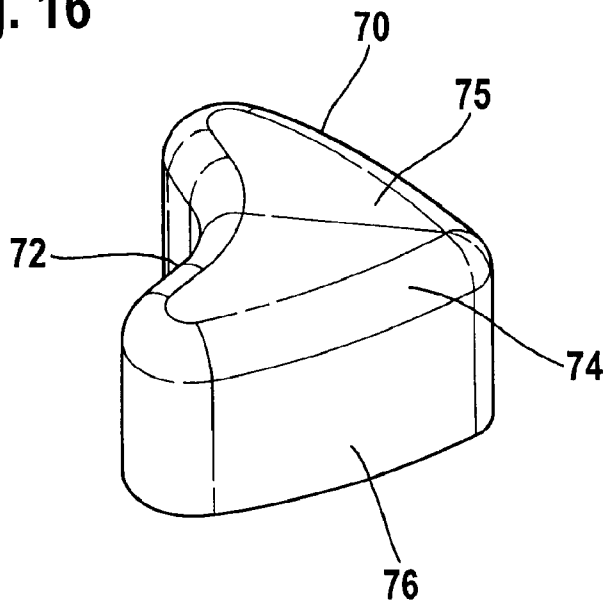


**Fig. 14**

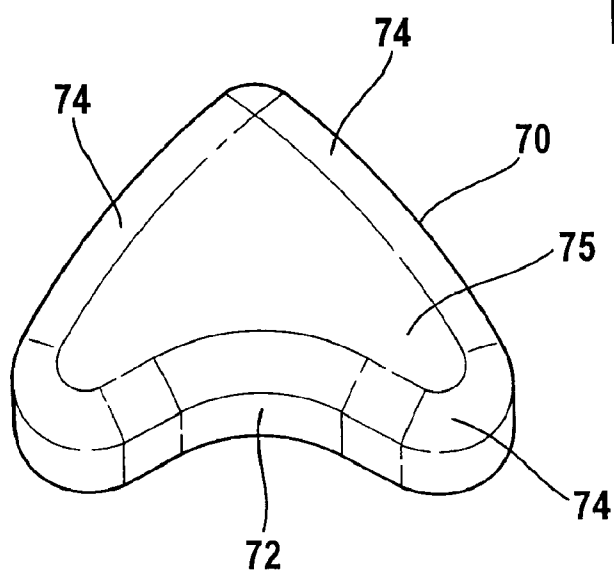


**Fig. 15**

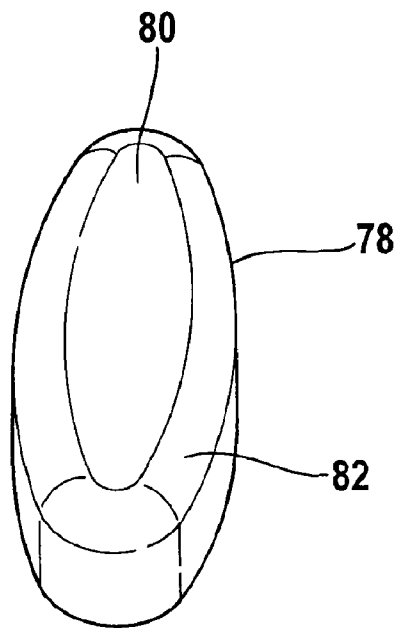
**Fig. 16**



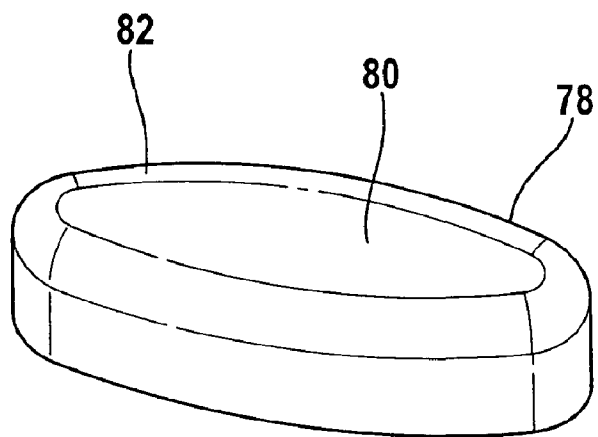
**Fig. 17**



**Fig. 18**



**Fig. 19**





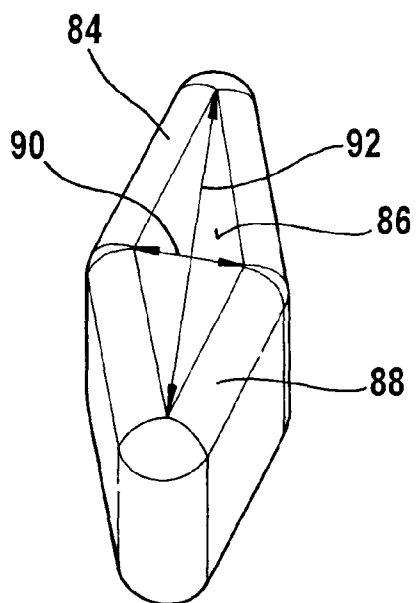


Fig. 20

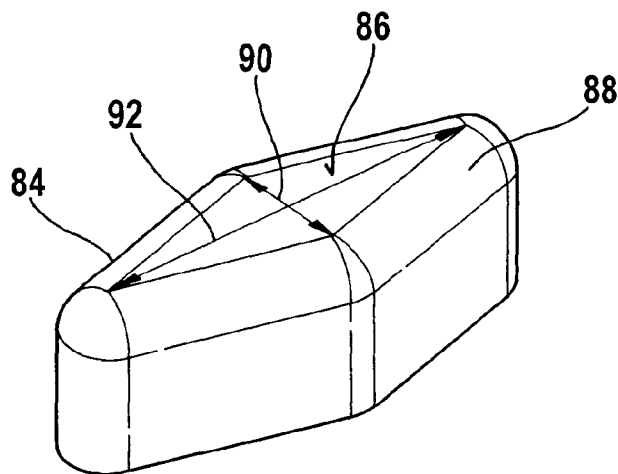


Fig. 21

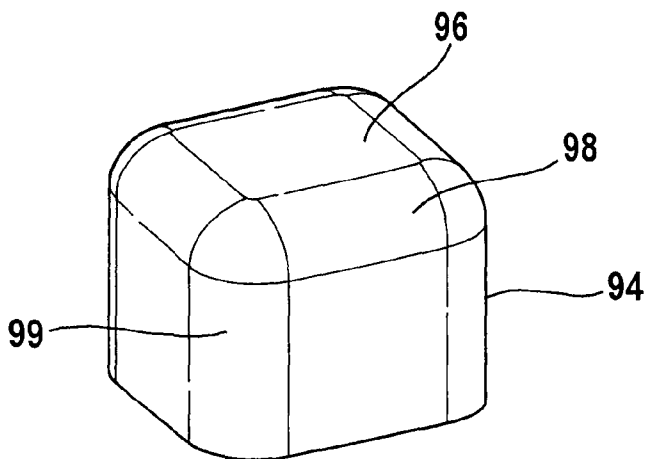


Fig. 22

Fig. 23

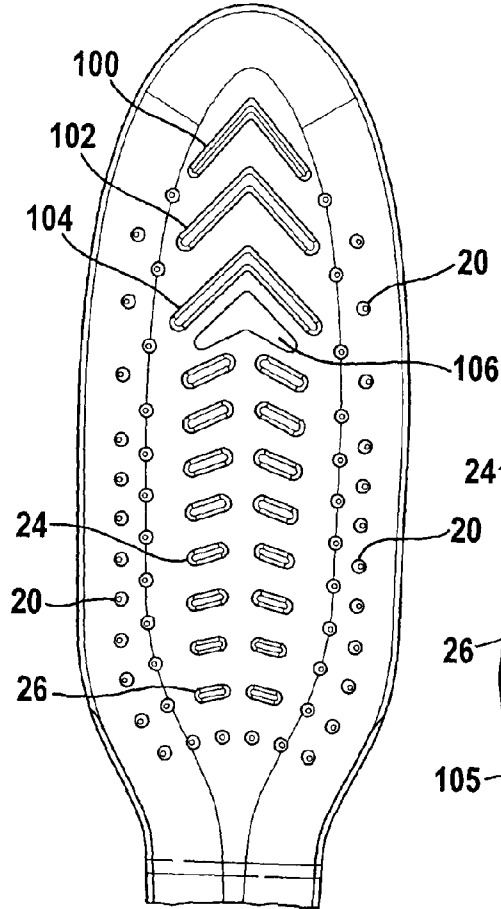


Fig. 24

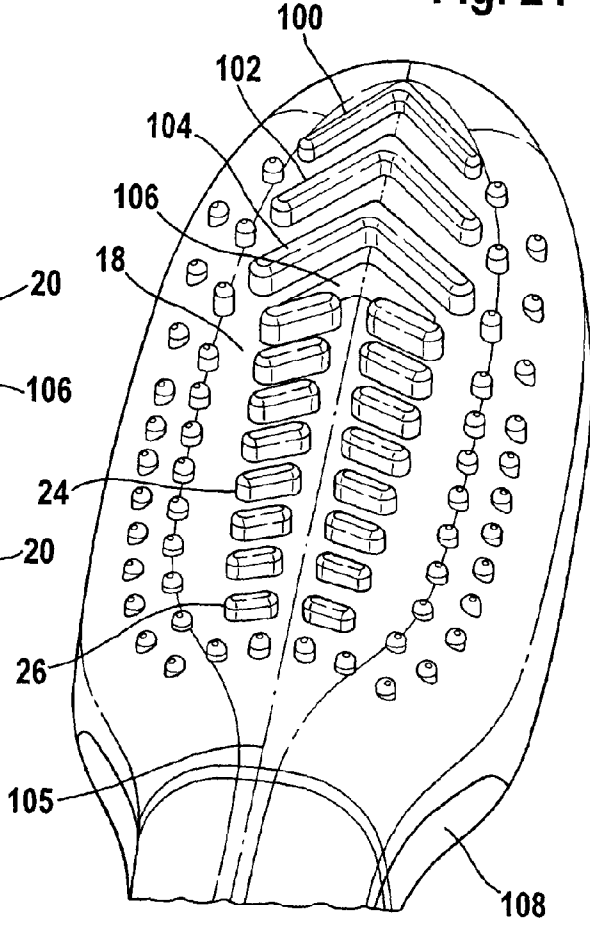
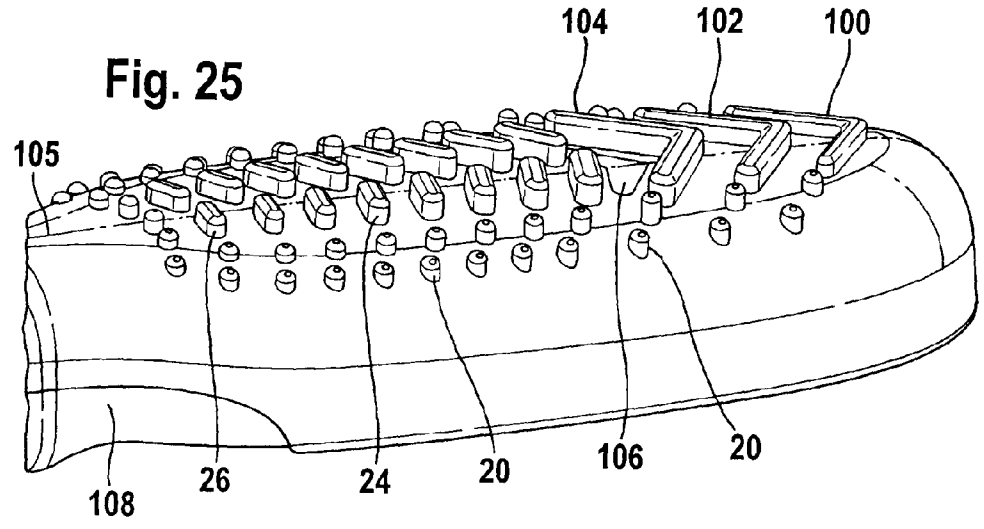
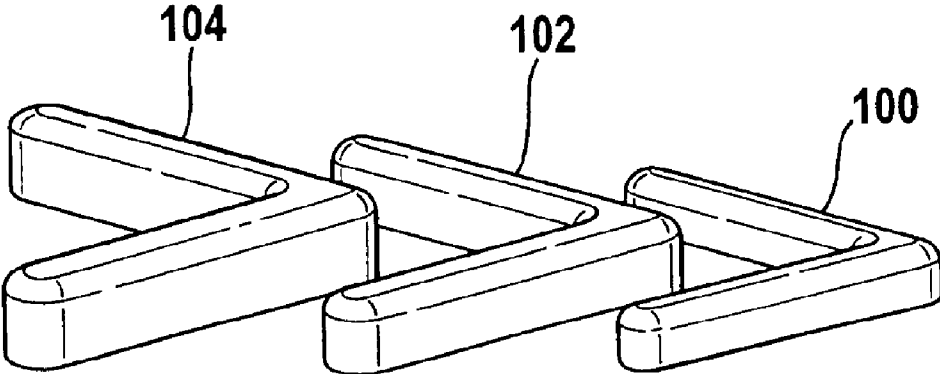
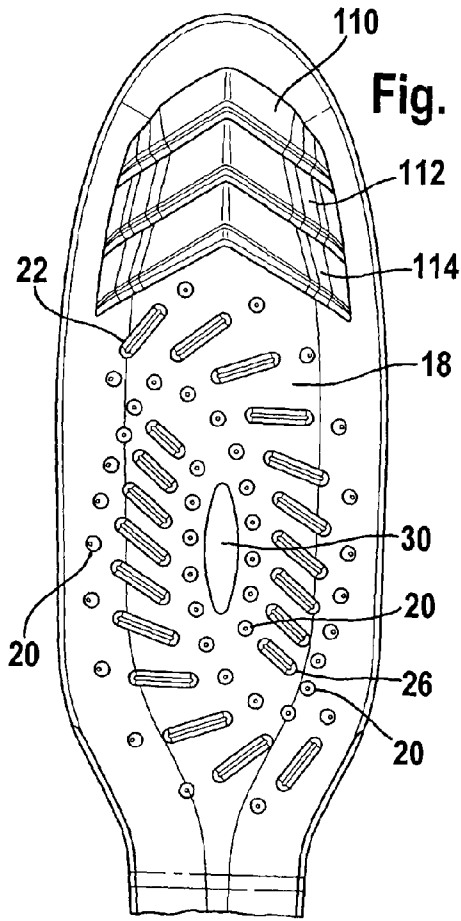


Fig. 25

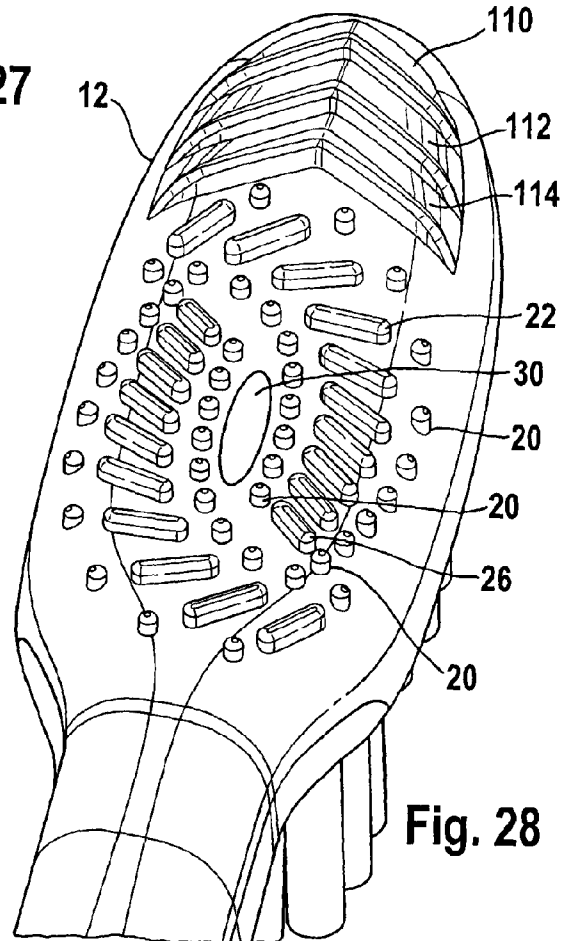




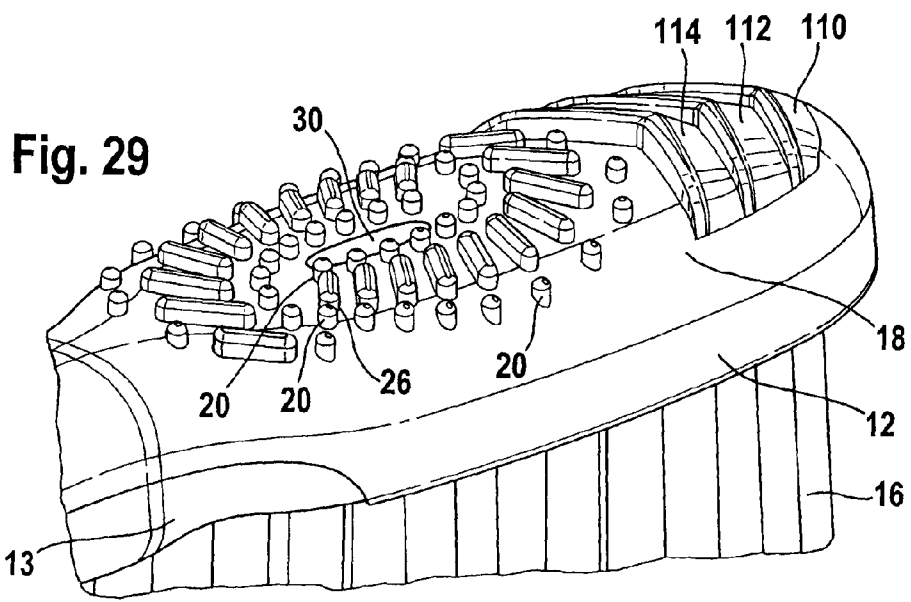
**Fig. 26**



**Fig. 27**



**Fig. 28**



**Fig. 29**

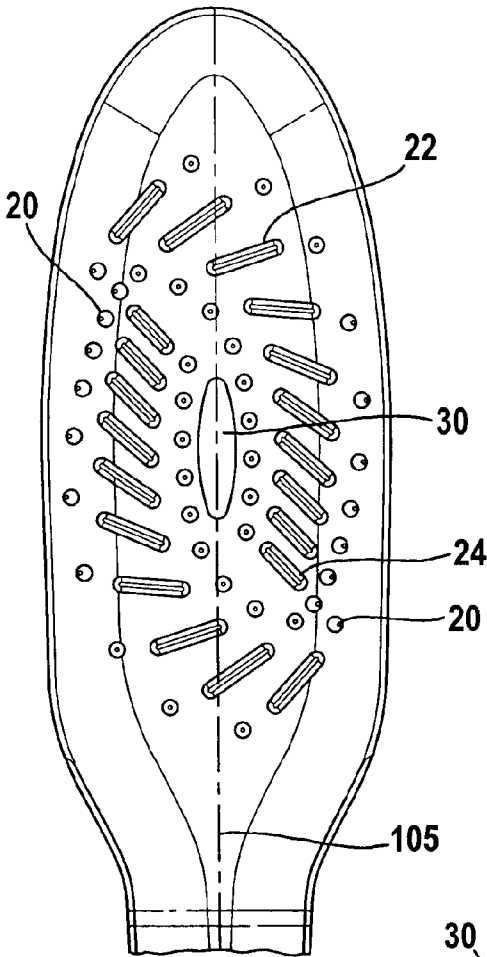
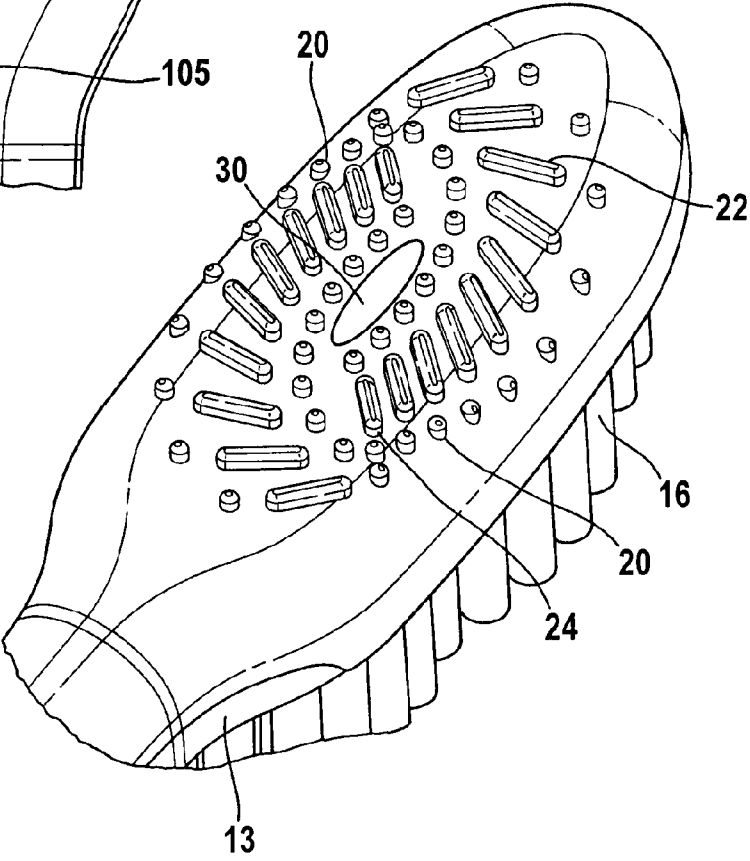
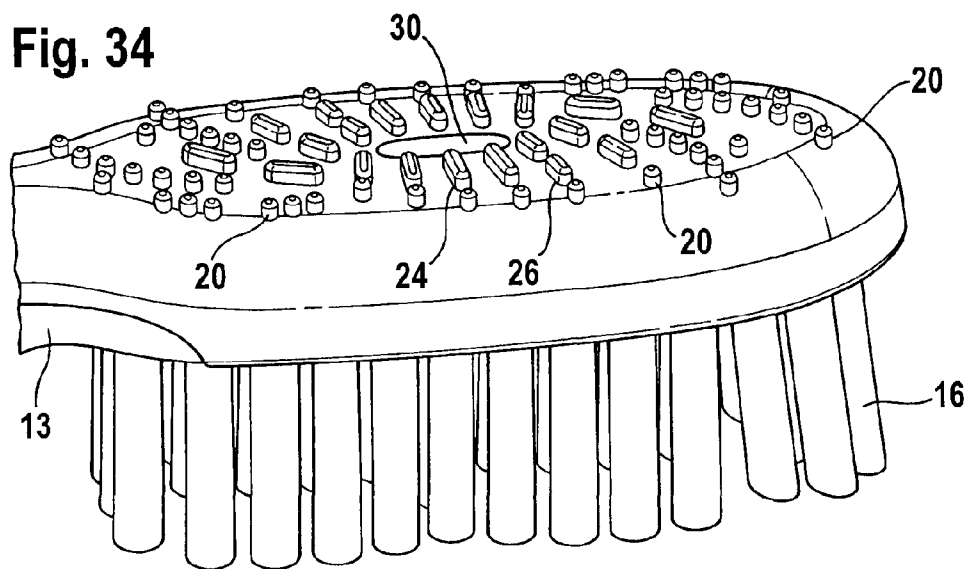
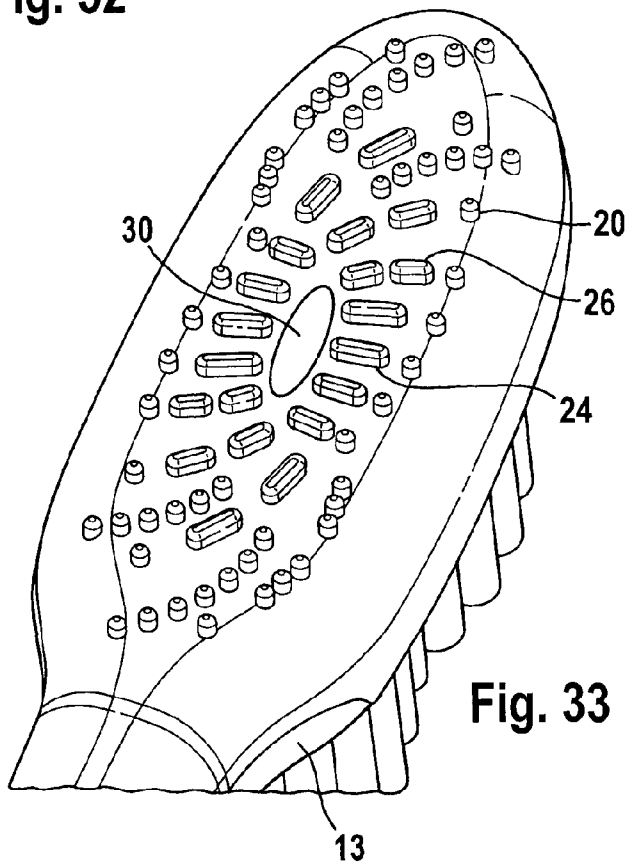
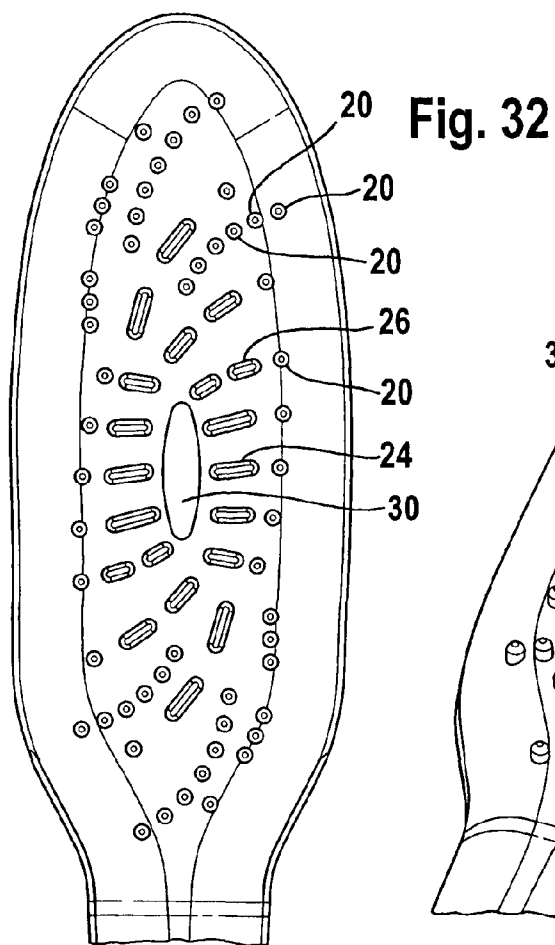
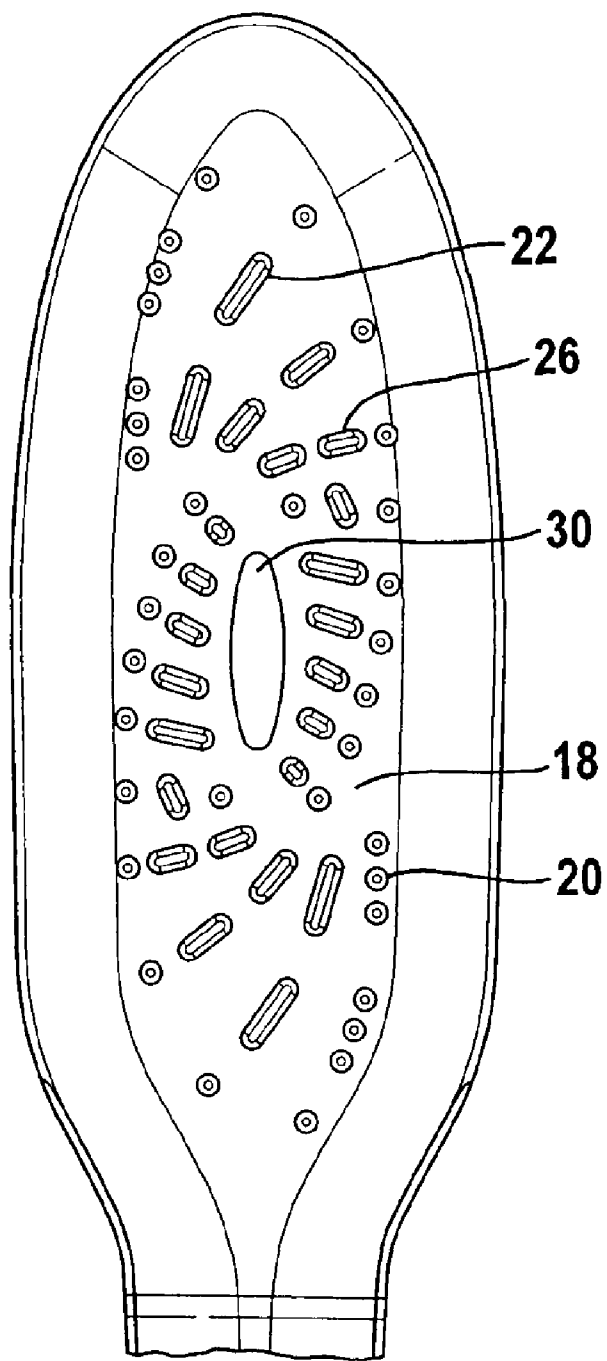


Fig. 30

Fig. 31







**Fig.35**

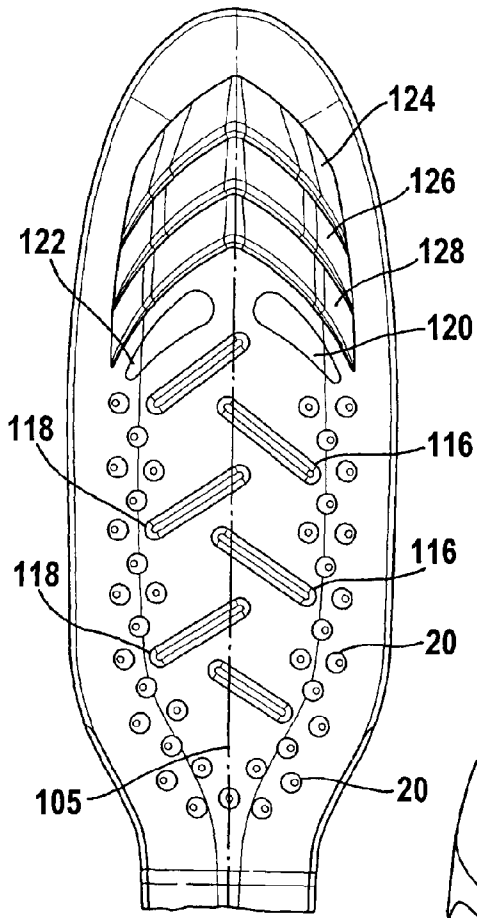


Fig. 36

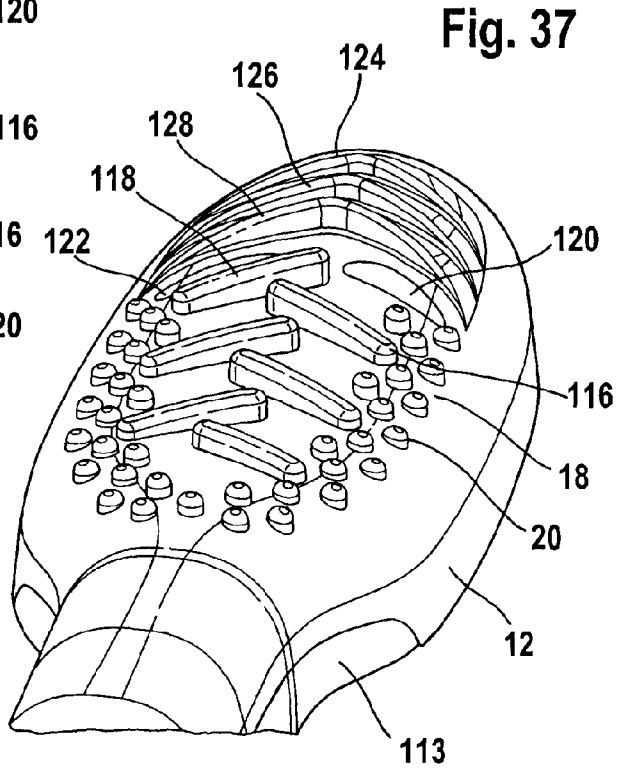
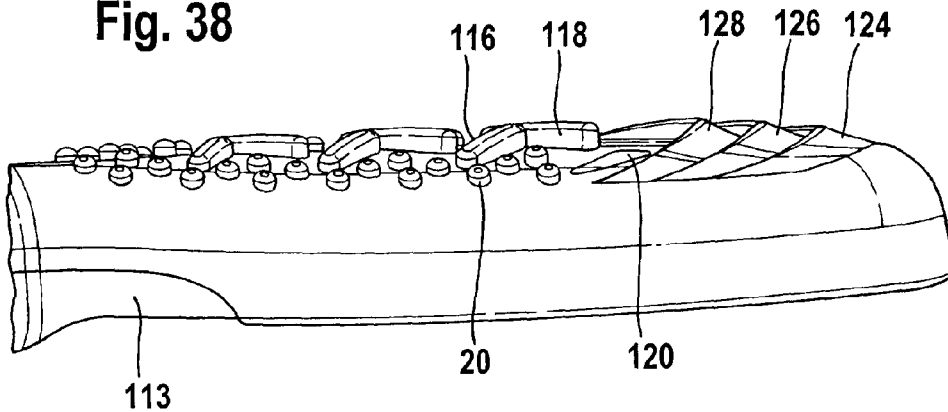


Fig. 37

Fig. 38





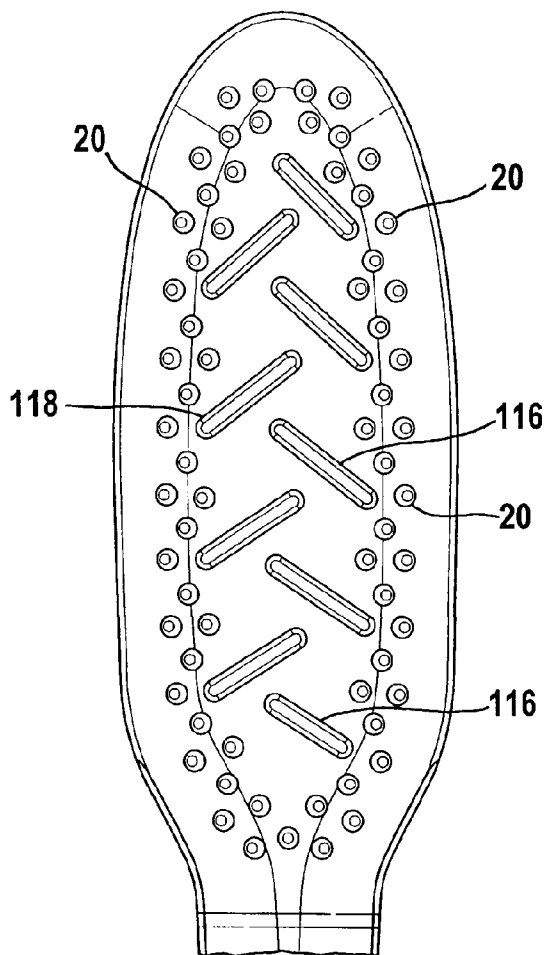
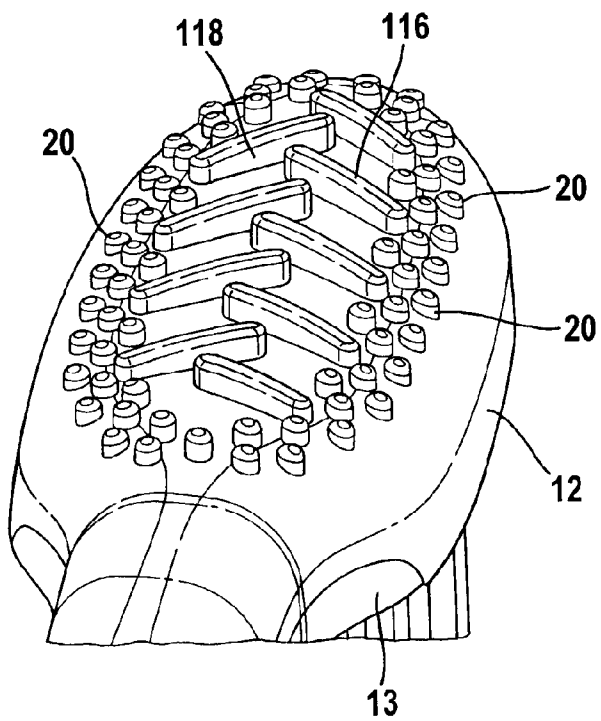


Fig. 39

Fig. 40



**ORAL HYGIENE DEVICE**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This application is the national stage of International Application No. PCT/EP2007/004921, filed Jun. 4, 2007, which claims priority under 35 U.S.C. §119(a) to German Application No. 10 2006 025 825.8 filed Jun. 2, 2006.

**TECHNICAL FIELD**

[0002] This invention relates to an oral hygiene device.

**BACKGROUND**

[0003] Some oral hygiene devices include a toothbrush which is configured to be combined with a tongue cleaner. A plurality of projecting elements, such as, for example, longitudinally formed tongue scraper elements and individual, discrete stud-shaped protrusions, are arranged on a rear surface of the toothbrush head on the side facing away from the toothbrush bristles.

[0004] In some instances, the tongue scraper elements extending in a transverse direction across the rear side of the brush head are manufactured from a relatively hard material, such as, for example, polypropylene, whereas the discrete protrusions are preferably formed from a relatively soft material, such as a thermoplastic elastomer.

[0005] The longitudinally formed tongue scraper elements, which are formed from a hard material, have sidewalls which may have different inclinations relative to the base area, in order to thus provide a relatively aggressive scraping action when the user moves the head portion of the oral hygiene device along the surface of the tongue.

[0006] The surface of a tongue typically has a diversity of different elevations and depressions, such as filiform papillae, fungiform papillae, foliate papillae and circumvallate papillae. The differently formed papillae with different geometries are not homogeneous, being instead arranged preferably in different surface sections on the surface of the tongue.

[0007] The above-described cleaning structures generally do not make sufficient allowance for this complex and irregular condition of the tongue surface which is to be cleaned. Furthermore, the structure and form of the cleaning elements are designed primarily for the removal of tongue plaque and deposits from the surface which is to be cleaned.

[0008] Such cleaning structures which produce a good cleaning action usually have a high density of individual cleaning elements and projections, which however can be cleaned only with great difficulty and insufficiently following usage of the oral hygiene device. The cleaning aspect of the oral hygiene device itself is thus insufficiently taken into account. However, this is of great importance, particularly if the device is used repeatedly, as bacteria or other deposits can remain on the oral hygiene device.

**SUMMARY**

[0009] One aspect of the invention features an oral hygiene device that includes a handle, a head coupled to the handle, a substantially planar base disposed on the head, and a plurality of cleaning elements projecting from the base. In some implementations, the plurality of cleaning elements are characterized by at least two different geometries, and at least some of the plurality of cleaning elements are generally oblong cleaning bars. Adjacent cleaning elements may define at least one

channel that extends in a direction generally transverse to a longitudinal direction of at least some of the oblong cleaning bars.

[0010] Another aspect of the invention features a tongue-scraper toothbrush that includes a toothbrush having bristles on a front side of the toothbrush and a plurality of cleaning elements disposed on a back side of the toothbrush. The plurality of cleaning elements may define one or more channels between the cleaning elements, and at least some of the cleaning elements may be cleaning bars that are angled relative to a longitudinal axis of the handle of the toothbrush.

[0011] Another aspect of the invention features an oral hygiene device that includes a handle, a head extending from the handle, and a tongue scraper disposed on a side of the head. The tongue scraper may have a plurality of cleaning bars disposed on opposite sides of a channel defined by the plurality of cleaning bars, and a longitudinal axis of each of the plurality of cleaning bars may be generally perpendicular to the channel.

[0012] The present invention relates, in some embodiments, to an oral hygiene device having a handle portion and a head portion on which a substantially plane base area is provided. A plurality of cleaning elements which project substantially perpendicularly or at least at an inclined angle to the base area is provided on this base area, said cleaning elements having at least two different geometries.

[0013] At least some of these cleaning elements are formed as oblong cleaning bars which extend in a plane parallel to the base area. Furthermore, at least one channel is provided which extends in a direction transverse to the longitudinal direction of cleaning bars and is formed from spaces between directly adjacent cleaning elements. The channel serves to carry away deposits which have been picked up by the oral hygiene device from the surface of the tissue which is to be cleaned. At the same time, such a channel extending transversely to the cleaning bars enables simple and more effective cleaning of the oral hygiene device after use.

[0014] The formation of at least one channel which extends transversely to the cleaning bars is advantageous in particular for a uniform distribution of deposits over the base area of the oral hygiene device and thus enables a more effective utilization of the entire cleaning area. Because the cleaning bars are crossed in a transverse direction by the at least one channel, the dirt particles and deposits picked up by the oral hygiene device can be distributed not only along but also transversely to the cleaning bars.

[0015] This is advantageous particularly during application of the oral hygiene device when the deposits and dirt particles which are to be removed accumulate inhomogeneously and differently in different surface sections of the base area, for example, due to the complex condition of the surface of the tongue. For example, during use some spaces between cleaning elements situated in a particular surface section of the oral hygiene device may already be completely clogged with deposits or dirt particles, which degrades their cleaning performance. By contrast, the deposits on cleaning elements situated in a different surface section may be less pronounced.

[0016] Considering in particular that oral hygiene devices having cleaning elements arranged on the rear side of a toothbrush head are moved by the user preferably along a single direction of motion over the surface of the tongue, the dirt particles picked up by the tongue cleaner, for example, are preferably deposited in a surface section of the head portion which directly adjoins the handle portion.

[0017] By contrast, the channel of some embodiments of the invention which extends at an inclination to the oblong cleaning bars facilitates a uniform distribution of dirt particles over the entire cleaning surface of the oral hygiene device, in addition to facilitating rinsing and cleaning of the oral hygiene device after use. In this manner, a more uniform possible degree of deposits can be achieved over the entire base area, as a result of which the functionality of individual cleaning elements is less impaired.

[0018] According to a first preferred embodiment, at least cleaning bars of oblong construction and cleaning studs of knob-type construction are provided as cleaning elements with different basic geometries. While the cleaning bars extend in a substantially straight longitudinal orientation along the base area, the cleaning studs by comparison have a less extensive lateral spread in the plane of the base area. This lateral spread of the studs in the plane of the base area typically corresponds substantially to the width of the cleaning bars.

[0019] Depending on their geometry, the cleaning bars and the cleaning studs perform different functions during the cleaning of the tongue surface. For example, particularly the cleaning studs may tend to dislodge deposits and dirt particles adhering to the tongue, such as bacteria, food residue or the like.

[0020] By contrast, the cleaning bars may tend to move and shift along a cleaning direction the dirt particles and deposits dislodged by the cleaning studs. They are therefore likely to carry away dislodged dirt particles and deposits from the oral cavity.

[0021] According to a further embodiment, the at least one channel is configured to extend in a direction substantially perpendicular to the longitudinal direction of those cleaning bars that are adjacent to the channel. Such an arrangement is advantageous in particular if the cleaning bars are arranged so that their longitudinal direction is perpendicular to the direction of movement of the oral hygiene device, so that the deposits and dirt particles transported by the cleaning bars can be distributed via the at least one channel over the base area. In this way the complete clogging with dirt particles of the elevations formed by the cleaning bars is effectively counteracted.

[0022] Furthermore, at least two channels are provided which extend in spaces between directly adjacent cleaning elements and run obliquely to each other at least in part. The provision of a plurality of channels which run obliquely to each other in part is advantageous in particular for a homogeneous distribution of dirt particles over the entire base area. In the same way, this facilitates the cleaning of contamination from the base area following the intended usage.

[0023] Furthermore, in some embodiments, the at least one channel is configured to extend along a substantially straight line. It is also advantageous if the at least one channel has a diverging profile, i.e., a widening or a narrowing profile. Due to the varying channel width along the course of the channel, it is possible to enhance the transport mechanism in a multitude of ways. As such, a varying channel width is achieved by means of a continuously varying distance between immediately adjacent cleaning elements which form the channel.

[0024] Still further, the at least one channel is configured to extend in a curved fashion. In particular a run in the shape of a circular arc or a spiral run can be contemplated. In this way, the transportation of deposits along the base area can also be

performed at an inclination to the brushing or cleaning direction of the oral hygiene device.

[0025] The course and the configuration of the channel formed by spaces between individual cleaning elements depend in some embodiments on the basic geometry of the cleaning elements arranged on the base area. The factors which are significant for the material transport include the distance and the surface density of the cleaning elements as well as the preferred direction of movement of the oral hygiene device during the cleaning operation and the concrete physical form of the surface which is to be cleaned, such as the tongue surface.

[0026] According to a further embodiment, at least two cleaning bars are configured to lie with their longitudinal end section on opposing sides of the channel. In this way the channel can be formed predominantly, if not completely, by such spaces which lie in the longitudinal direction between cleaning bars.

[0027] Accordingly, at least some of the cleaning bars arranged on the base area are arranged and aligned to each other in such a way that the channel provided to carry deposits away is formed substantially perpendicularly to the bars' longitudinal extension. The cleaning bars, which with their longitudinal end section directly adjoin the channel on opposing sides, are aligned preferably parallel to each other.

[0028] Alternatively or in addition, the cleaning bars arranged to the side of the channel can also be aligned and arranged in relation to each other largely in mirror symmetry to the run of the channel.

[0029] According to a further embodiment, the longitudinal dimension of the cleaning bars increases along the course of the channel. As a result, a material transport in angular relation to the longitudinal direction of the cleaning bars can be improved and optimized in an advantageous manner. The arrangement and configuration of the individual cleaning elements, in particular the cleaning bars, can be adapted to a distribution and adhesion of deposits and dirt particles which is inherently inhomogeneous over the base area of the oral hygiene device. In this way, particularly in the regions of the base area in which the deposits dislodged by the cleaning studs tend to accumulate, the cleaning bars can be configured to have greater length and the channel to have increasing width.

[0030] Depending on the physical form of the tissue surface to be cleaned in the oral cavity, alternative and reversed configurations and arrangements of individual cleaning elements may be advantageous.

[0031] According to a further advantageous embodiment, the curvature radius of a curved channel decreases along the course of the channel, which results in particular in a channel having a spiral-type course.

[0032] According to a further preferred embodiment of the invention, at least one cleaning stud is arranged in the extension of the longitudinal dimension of cleaning bars.

[0033] According to a further aspect in particular, cleaning studs are arranged in particular in an outer edge region and cleaning bars are arranged in a central region of the base area. Such an arrangement is particularly advantageous for the cleaning of the differently formed papillae which are distributed inhomogeneously over the tongue. Furthermore, such an arrangement may make it more likely that the dirt particles and deposits dislodged by the cleaning studs preferably accumulate on the centrally situated cleaning bars during the

cleaning operation. In addition, using an angled scraping motion solely along the studs, it is possible to boost the effect of the latter.

**[0034]** By virtue of this arrangement, it is possible to assist or define a transport direction for the dirt particles and deposits towards the center of the base area. This is advantageous in particular for the cleaning of tongue edge regions, because the outward-lying regions of the base area of the oral hygiene device may primarily dislodge contamination and deposits, rather than carry them away. As a result, it is possible to effectively prevent the particles dislodged in an edge region of the tongue from being pushed down sideways from the surface which is to be cleaned. The central arrangement of the cleaning bars thus contributes to an improved pick-up of dislodged dirt particles and deposits.

**[0035]** According to a further embodiment, cleaning bars are configured to be aligned in the style of a herringbone pattern in an alternating layout at preferably approximately equal angles but in reverse directions in relation to the transverse direction of the head portion. Alternatively, the angles included between the legs may vary. Furthermore, in this embodiment, cleaning bars which lie adjacent to one another in the longitudinal direction are spaced from each other along the longitudinal axis of the head portion and are arranged in a partly overlapping relationship in the transverse direction of the head portion.

**[0036]** The inclined and different arrangement of individual cleaning bars in relation to the longitudinal axis of the head portion is advantageous for a multi-directional cleaning effect using the oral hygiene device in a uni-directional direction of motion. By virtue of the partially overlapping arrangement of the cleaning bars in the transverse direction of the head portion, in some embodiments, deposits can be guided in particular towards the center of the base area.

**[0037]** According to a further embodiment, the cleaning bars are aligned from the edge of the head portion towards the center and towards the free end of the head portion, with the free end of the head portion being understood to mean the end situated on the side opposite the handle portion or remote from the handle portion. In view of a uni-directional direction of motion of the oral hygiene device during tongue cleaning, during which the oral hygiene device is preferably moved starting from a posterior part of the tongue deep in the oral cavity towards an anterior part of the tongue, a transport of material takes place in the direction towards the free end of the head portion of the oral hygiene device.

**[0038]** According to a further advantageous embodiment of the invention, the cleaning elements are radiused at their free end section remote from the base area and are configured to be flattened substantially parallel to the base area. The flattened end of the cleaning elements may serve as a contact surface which, during the cleaning process, makes substantially full engagement with the surface of the tongue which is to be cleaned.

**[0039]** Furthermore, in some embodiments, the radiused free end is formed in the shape of a circular arc between a lateral cheek surface and a frontally flattened contact surface. These radiused edges of the cleaning bars and cleaning studs facilitate a smooth sliding motion of the oral hygiene device across the surface to be cleaned, as a result of which abrupt and jerky movements caused by tissue in the inner mouth being scraped by sharp corners on the cleaning device can be avoided. Consequently, in some of these embodiments, the oral hygiene device displays no aggressive scraping behavior,

instead enabling a gentle and at the same time highly efficient cleaning of the tongue surface by virtue of the functionally appropriate configuration of the different cleaning elements, cleaning bars and cleaning studs.

**[0040]** For the radiused free end of cleaning elements, in particular a circular arc covering an angular range of between 60° and 120° is provided in certain implementations.

**[0041]** Furthermore, in some embodiments, the radius of the circular arc amounts to between 10% and 50%, in particular between 25% and 40%, of the diameter or the width of the respective cleaning element.

**[0042]** Furthermore, in some embodiments, the height of the radiused end region of cleaning elements accounts for between 15% and 40% of the overall height of the respective cleaning element. The radius of the circular arc of the radiused region is between 0.2 mm and 0.5 mm. Such radiused and flattened configurations of the cleaning elements are particularly designed to provide a smooth and gentle sliding motion of the oral hygiene device across the surface to be cleaned.

**[0043]** According to a further aspect of the invention, at least some of the cleaning studs have a circular or elliptical area of cross-section in the plane parallel to the base area. The diameter of cylindrically formed cleaning studs or the ellipticity of the area of cross-section of the cleaning studs may be matched to the orientation and size of the papillae to be cleaned.

**[0044]** Furthermore, in some embodiments, at least some of the cleaning elements have a quadrangular area of cross-section in the plane perpendicular to the base area. For example, a square-shaped base area is provided for the cleaning studs and a rectangular cross-sectional area is provided for the cleaning bars.

**[0045]** According to a further embodiment, cleaning studs have a diamond-type area of cross-section in the plane parallel to the base area, with the aspect ratio of the diagonals of the diamond being between 0.2 and 5, in particular between 1 and 3.5.

**[0046]** Furthermore, in some embodiments, at least one of the lateral surfaces or cheek surfaces of cleaning studs and/or cleaning bars can be configured to be arched in a convex and/or concave shape.

**[0047]** Furthermore, lateral boundaries or side edges of the cleaning elements can be configured to be radiused over almost the entire height of the cleaning elements. This is advantageous particularly for rectangular or triangular basic geometries of cleaning elements, because in this case not only the free end of the cleaning elements, but also all the edges and corners of the cleaning elements which extend substantially parallel to the normal to the surface of the base area, are radiused.

**[0048]** According to a further embodiment, at least some of the cleaning elements have lateral surfaces which are arranged at different inclinations to the normal to the surface of the base area. For this purpose, cleaning elements are configured to be in particular of the type having a substantially triangular cross-sectional profile in the plane perpendicular to the base area. In this arrangement, an end region of the cleaning element on the side remote from the base area and tapering into a point is preferably also radiused.

**[0049]** Furthermore, in some implementations, at least some of the cleaning elements, in particular cleaning studs, are configured to be in the form of a truncated cone. In a particularly advantageous manner, the cleaning studs which

have the form of a truncated cone are formed as a truncated cone which is cut along its longitudinal direction and lies along this cut surface on the base area. This results in a cleaning element having a semi-circular lateral surface and a semi-conical surface which tapers into a point. The area of transition between the semi-conical envelope surface and the semi-circular lateral surface may also be radiused.

**[0050]** Furthermore, in some embodiments, cleaning studs are configured to have a basic geometry of the spherical or hemispherical type with a concavely arched lateral surface which extends substantially at an inclination to the base area and adjoins the base area directly. Again, the area of transition between the concavely arched lateral surface and the surface of the sphere may be radiused. In this configuration, the concave arch can be variously formed, including, for example, as an arch having the normal to the surface of the base area as its center point, or also being perpendicular thereto, for example.

**[0051]** According to another preferred embodiment of the invention, the width or the diameter of the cleaning elements is less than or equal to their height. A height-to-width ratio greater than 1 is believed to facilitate the use of a relatively soft plastic material for the cleaning elements, which is beneficial for gentle and relatively unstressful cleaning of the tongue surface.

**[0052]** In this embodiment in particular, the width of the cleaning elements may amount to at least 0.5 mm, preferably at least 0.6 mm.

**[0053]** According to a further embodiment, the height of the cleaning elements amounts to at least 0.6 mm, preferably at least 0.7 mm.

**[0054]** According to a further advantageous aspect of the invention, in some embodiments, the base area of the cleaning studs amounts to at least  $0.2 \text{ mm}^2$ , preferably however not less than  $0.25 \text{ mm}^2$ . The base area of the cleaning studs describes the area of cross-section of the cleaning studs which lies on the base area of the head portion.

**[0055]** Furthermore, in some embodiments, the maximum area of cross-section of the cleaning studs of circular cross-section is  $0.8 \text{ mm}^2$ . All the other cleaning elements/studs may have a maximum area of cross-section of  $4 \text{ mm}^2$ , in particular  $3 \text{ mm}^2$ .

**[0056]** According to a further embodiment, in the surface segment of the base area in which the cleaning studs are arranged, the sum total of the base areas (bounded by the outermost lying cleaning studs) of all the cleaning studs is up to 75%, in particular 10-50%, of the area of this surface segment. As a result, the individual cleaning studs are arranged relatively densely and at a correspondingly short distance of, for example, 0.2 mm to 0.3 mm from each other.

**[0057]** This provides a cleaning effect irrespectively of the cleaning direction.

**[0058]** According to a further embodiment, at least some of the cleaning elements are aligned and/or arranged in mirror symmetry to the longitudinal axis of the handle portion.

**[0059]** Furthermore, the cleaning elements, including in particular the cleaning bars and/or the cleaning studs, can be configured to be arranged in point symmetry to the center point of the base area or to the center point of the surface area of the head portion. The mirror-symmetric and/or point-symmetric arrangement of cleaning elements not only relates to their position, but also in particular to the orientation of the cleaning elements in relation to the longitudinal axis of the handle or head portion.

**[0060]** According to a further embodiment, at least in some regions the cleaning bars have a cheek surface or lateral surface which is inclined in an angular range from  $-30^\circ$ , in particular  $10^\circ$  to  $+60^\circ$  (undercut), in particular  $45^\circ$ , to the normal to the surface of the base area. As a result, the cleaning bars can be configured not only as rectangular and right parallelepipedal rods, but also as structures having a cross-sectional profile of the parallelogram or trapezoidal type.

**[0061]** In this arrangement, the lateral surfaces can be configured to narrow or, alternatively, to widen toward the free end of the bars. Given the latter configuration, the cheek surfaces or lateral surfaces of the cleaning bars form at least an undercut which can be beneficial for accommodating deposits and dirt particles from the tongue surface. A widening is the preferred option. An undercut may be desirable in conjunction with a soft plastic material.

**[0062]** According to a further aspect of the invention, in the surface segment of the base area in which the cleaning bars are arranged, the sum total of the areas of cross-section of all the cleaning bars measured parallel to the base area is between 5 percent and 50 percent of the area of this surface segment. In comparison to the arrangement of the cleaning studs, the cleaning bars are preferably arranged at a greater distance to each other on the base area of the oral hygiene device. On the one hand, this increases the spaces which are provided between the cleaning bars to accommodate contaminated particles. On the other hand, this facilitates a better distribution and a better transportation of dirt particles over the base area. In the same way, this also improves and facilitates the cleaning of the base area following completion of the cleaning operation in the oral cavity.

**[0063]** According to a further embodiment, the minimum width of the at least one channel is configured to be 0.5 mm, in particular 0.8 mm, and the maximum mean width of the at least one channel 2 mm, in particular 1.5 mm.

**[0064]** Furthermore, in some embodiments, the longitudinal dimension of the at least one channel is configured to be at least 5 mm. In this way a transport of material by means of the at least one channel can take place substantially perpendicularly to the longitudinal extension of the cleaning bars over a length of at least 5 mm.

**[0065]** According to a further aspect of the invention, in the section of the base area remote from the handle portion, at least one bent cleaning bar is arranged, forming two legs which are aligned in a substantially perpendicular relationship to each other. Each of the legs is configured in the type of a straight cleaning bar having a substantially rectangular basic geometry. The two legs arranged at right angles to each other are preferably connected to each other on the longitudinal axis of the head portion in one integral piece. As such, each of the two legs extends obliquely outwardly and in the direction towards the handle portion from the longitudinal axis which runs centrally along the head portion.

**[0066]** According to another advantageous aspect of the invention, cleaning arches extending in a curved configuration in the plane parallel to the base area are provided as cleaning elements. Such cleaning arches, which preferably are equally radiused at their free end section, have the function of tongue scraper elements situated in particular in the region of the free end of the head portion. These cleaning arches, which in some cases have a wall-like form, extend with their lateral surfaces or cheek surfaces predominantly at an inclination to the normal to the surface of the base area.

[0067] In this arrangement in particular, the cheek surface of cleaning arches on the side close to the handle portion may extend at an angle of 85° to 100° to the base area, so that the cleaning arch forms an undercut, if appropriate, in which deposits and dirt particles can be accumulated during the cleaning operation.

[0068] Furthermore, at least two cleaning arches spaced from each other along the longitudinal axis of the handle portion and/or at least two bent cleaning bars are arranged on the base area of the oral hygiene device.

[0069] In this arrangement in some implementations, the height of the arch-type or bent cleaning elements varies and increases in particular towards the center of the head portion. Such cleaning elements, which are formed at varying heights and perform a scraping function, take into account that the tongue surface which is to be cleaned is formed as a surface which is curved in some areas and not a straight surface. Due to the different heights of the cleaning elements, it is further possible to achieve cleaning which is matched to the tongue structure and is particularly gentle.

[0070] According to a further aspect of the invention, all the cleaning elements are made of a thermoplastic elastomer which has a Shore hardness of between 30 and 70 A, for example, between 40 and 60 A. Such a flexible plastic material enables comfortable cleaning of the tongue or gum in a manner which is agreeable for the user. With regard to the elastic plastic material, reference is made at this point to the geometric dimensions and the dimensioning of the individual cleaning elements. The combination of a height-to-width ratio greater than 1 with dimensions in the sub-millimeter range and a Shore hardness of 40 to 60 A is more gentle and, particularly by virtue of the implementation of cleaning elements having varying geometries and sizes, provides at the same time an effective cleaning effect for soft body tissue in the oral cavity.

[0071] According to another advantageous embodiment of the invention, the cleaning elements which are made from a thermoplastic elastomer are connected to the base area provided on the head portion in one integral piece. Another advantage in this connection is that the base area formed from a thermoplastic elastomer merges seamlessly and in one integral piece with at least the rear side of the handle portion.

[0072] According to another advantageous aspect, the head portion includes at least two different plastic materials of preferably different elasticity. In addition to the base area formed preferably from a thermoplastic elastomer, the core of the head portion may be made preferably of a harder plastic material, such as polypropylene. The core element made of polypropylene of the oral hygiene device therefore provides, on account of its relatively inflexible and stiff condition, immediate and direct control of the oral hygiene device during the cleaning operation. In this way, pressure exerted by the user is substantially transferred directly and in an unadulterated manner to the surface in the oral cavity which is to be cleaned.

[0073] According to a further embodiment, the plastic material which forms the base area nearly completely embraces the head portion on its undersurface and on the lateral surfaces. Considering that the undersurface of the head portion of the oral hygiene device is preferably intended for cleaning of the tongue, a substantially closed surface which is furnished with cleaning elements comes into contact with the surface of the tongue.

[0074] This embodiment is advantageous because the rear side and the lateral surfaces of the toothbrush head can be moved in the oral cavity with enhanced handling comfort.

[0075] Furthermore, in some embodiments, the relatively hard plastic material in the region of the head portion includes at least one projection which is embedded in the base area formed from the relatively soft plastic material so as to be flush with the surface. The projection may extend substantially perpendicularly to the base area and projects into it.

[0076] Furthermore, the projection which extends into the base area may have a lighter coloration and/or a lower degree of optical absorption than the base area itself. In this way, the degree of contamination of the base area of the head portion can be visually observed and noticed without greater difficulty directly by the user even during the cleaning operation.

[0077] According to a further advantageous aspect of the invention, at least one surface section is provided in the center of the base area which is configured to accommodate a cleaning medium. The surface section provided for the cleaning medium may be substantially planar and formed without having any protruding cleaning elements.

[0078] In addition, the surface section provided to accommodate the cleaning medium can be configured to include a depression for the cleaning medium, or to be wholly formed as a depressed section in relation to the base area. The arrangement of a surface section in the center of the base area for accommodating a cleaning medium is particularly well suited to a uniform distribution of the cleaning medium on the surface of the tongue to be cleaned.

[0079] According to a further aspect, the present invention relates to an oral hygiene device in which the front side of the head portion, which is opposite the base area, is configured as a toothbrush head which is set with toothbrush bristles. In this respect, the oral hygiene device of the invention which is designed particularly for cleaning of the tongue can be combined with a toothbrush or be formed as an integral part of a toothbrush.

[0080] Certain aspects of the invention provide an oral hygiene device designed particularly for tongue cleaning, which is improved both in terms of a gentle and effective pick-up of dirt particles on the one hand and a simple and fast cleaning of removed dirt particles and deposits on the other hand.

[0081] Some aspects provide a tongue cleaner which can be cleaned more easily itself from picked up dirt particles, bacteria, germs and the like after use.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0082] Further objects, features and advantageous application possibilities of the present invention will become apparent from the subsequent description of embodiments with reference to the accompanying drawings. It will be appreciated that any feature described and/or represented by illustration, when used singularly or in any meaningful combination, forms the subject matter of the present invention, also independently of the claims or their back-reference.

[0083] In the drawings,

[0084] FIG. 1 is a schematic top plan view of an embodiment of an oral hygiene device;

[0085] FIG. 2 is a perspective view of the oral hygiene device of FIG. 1;

[0086] FIG. 3 is another perspective view of the oral hygiene device of FIG. 1;

[0087] FIG. 4 is a perspective view of a cleaning bar according to the embodiment of FIGS. 1 to 3;

[0088] FIG. 5 is a cross-sectional view of the cleaning bar of FIG. 4;

[0089] FIG. 6 is another perspective view of the cleaning bar of FIG. 4;

[0090] FIG. 7 is a longitudinal sectional view of the cleaning bar of FIG. 4;

[0091] FIG. 8 is a perspective view of a cleaning stud according to the embodiment of FIG. 1;

[0092] FIG. 9 is a side view of the cleaning stud of FIG. 8;

[0093] FIG. 10 is a cross-sectional view of the cleaning stud of FIG. 8;

[0094] FIG. 11 is a perspective view of another embodiment including cleaning elements of a trapezoidal configuration;

[0095] FIG. 12 is an enlarged perspective view of the cleaning element of FIG. 11;

[0096] FIG. 13 is a perspective view of a cleaning stud shaped in the manner of a halved cone;

[0097] FIG. 14 is a perspective view of a cleaning stud shaped in the manner of a hemisphere;

[0098] FIG. 15 is a side view of the hemispherical cleaning stud of FIG. 14;

[0099] FIG. 16 is a perspective view of a cleaning stud of heart-shaped cross-section;

[0100] FIG. 17 is another perspective view of the cleaning stud of FIG. 16 as seen looking obliquely from above;

[0101] FIG. 18 is a perspective view of an elliptically shaped cleaning element;

[0102] FIG. 19 is another perspective view of the cleaning element of FIG. 18 with an elliptical area of cross-section;

[0103] FIG. 20 is a perspective view of a diamond-shaped cleaning element;

[0104] FIG. 21 is another perspective view of the cleaning element of FIG. 20;

[0105] FIG. 22 is a perspective view of a cleaning element of square cross-section with radiused edges;

[0106] FIG. 23 is a view of another embodiment of a tongue cleaner including a total of three differently configured cleaning elements;

[0107] FIG. 24 is a perspective view of the cleaning element of FIG. 23 as seen looking obliquely from above;

[0108] FIG. 25 is another perspective view of the tongue cleaner of FIG. 23 as seen looking obliquely from the side;

[0109] FIG. 26 is a schematic and perspective view of three bent and angularly extending cleaning bars;

[0110] FIG. 27 is a view of another embodiment of a tongue cleaner including tongue scraper elements;

[0111] FIG. 28 is a perspective view of the embodiment of FIG. 27;

[0112] FIG. 29 is another perspective view of the embodiment of FIG. 27 as seen looking obliquely from the side;

[0113] FIG. 30 is a view of another embodiment of a tongue-cleaning structure;

[0114] FIG. 31 is a perspective view of the tongue cleaner of FIG. 30;

[0115] FIG. 32 is a top plan view of another configuration of cleaning bars and cleaning studs on a base area;

[0116] FIG. 33 is a perspective view of the structure of FIG. 32;

[0117] FIG. 34 is another perspective view of the structure of FIG. 32 as seen looking obliquely from the side;

[0118] FIG. 35 is a top plan view of another cleaning structure in spiral-type arrangement including cleaning bars and cleaning studs;

[0119] FIG. 36 is a view of a tongue cleaner configuration including cleaning bars arranged in the manner of a herringbone pattern;

[0120] FIG. 37 is a perspective view of the tongue cleaner of FIG. 36;

[0121] FIG. 38 is another perspective view of the tongue cleaner of FIG. 36 as seen looking obliquely from the side;

[0122] FIG. 39 is a top plan view of another cleaning bar configuration; and

[0123] FIG. 40 is a view of the configuration of FIG. 39 as seen looking obliquely from above.

#### DETAILED DESCRIPTION

[0124] FIGS. 1 to 3 show, as a first embodiment, an oral hygiene device 10 in the form of a tongue cleaner having a head portion 12 and a handle portion 14 adjoining the head portion. The head portion 12 includes a substantially planar base area 18 on which at least two different types or kinds of projecting cleaning elements 20, 22, 24, 25, 26, 28 are arranged.

[0125] In this embodiment, cylindrically formed cleaning studs 20 on the one hand and oblong and straight cleaning bars 22, 24, 25, 26, 28 of varying lengths on the other hand can be considered to act as cleaning elements.

[0126] Depending on their respective geometric configurations, the individual cleaning elements 22, 24, 25, 26 may be arranged on the base area 18 in such a way that at least one channel is formed which extends in a direction transverse to the longitudinal direction of cleaning bars 22, 24, 25, 26 and is formed from spaces between directly adjacent cleaning elements 22, 24, 25, 26. The channel is provided in particular for a homogeneous distribution and for the transportation of cleaners and dirt particles, which are picked up by the tongue cleaner 10 during the cleaning operation.

[0127] The embodiment of FIGS. 1 and 3 includes a plurality of channels which extend transversely to the longitudinal direction of cleaning bars 22, 24, 25, 26. For example, a first channel, which follows a curved path down to the right in FIG. 1, starts at the height of the cleaning bar 26. The channel then continues between the cleaning bars 24 and 25, finally ending at the height of the cleaning bar 22 arranged close to the handle.

[0128] A further cleaning channel runs in similar fashion on the right above the centrally arranged projection 30, equally at the height of the bar 26, and continues, under widening of its channel width, along a curved path toward the top left.

[0129] The individual cleaning bars adjoining the channel sides have an increasing longitudinal dimension with increasing progress along the channel. In addition, the orientation of adjacent cleaning bars 22, 24, 26, 28 which adjoin the channel successively changes by a predetermined variable angle, so that ultimately the first cleaning bar 26 and the last cleaning bar 22 of the cleaning channel are turned 30° to 80° from each other. Larger angular ranges, about greater than 90° or even 180°, are readily conceivable.

[0130] Due to the different orientation of the individual cleaning bars 22, 24, 25, 26, 28, it is possible to also achieve a cleaning effect in a direction transverse to the direction of

motion of the oral hygiene device **10** using even a uni-directional cleaning movement, such as a straight forward-and-backward movement.

[0131] The arrangement of cleaning elements **20**, **22**, **24**, **25**, **26**, **28** shown in FIGS. **1** to **3** is further substantially in point symmetry to the center point of the centrally arranged projection **30**. The projection **30**, which is embedded in the base area **18**, is connected to the core material **13** of the head portion **12** in one integral piece. By contrast, the entire rear side of the head portion **12** shown in FIGS. **1** to **3** may be coated with a layer of a soft plastic material, such as a thermoplastic elastomer, which encloses in particular also the lateral edge **15** of the head portion **12**.

[0132] In the illustrated embodiment, the elastomer layer which forms the base area **18** also merges seamlessly with the rear side of the handle portion **14**. In the region of the neck portion **13** the elastomer layer **18** which encloses the head portion **12** exposes the relatively hard core area of the head portion and the handle portion **14**, which is manufactured from a hard plastic material such as polypropylene. The projection **30** which is connected with the core material **13** in one integral piece penetrates through the base area **18** and terminates flush with its surface. The projection **30** is, so-to-speak, embedded in the base area **18** and is laterally surrounded by individual cleaning elements **28**.

[0133] The lateral overlap of the head portion **12** with the elastomer layer and the embedding of the projection **30** which may be configured to project from the core material for penetration into the base area **18** are advantageous for the joining and holding together of the different plastic materials, in particular with regard to the formation of a positive engagement between the base area **18** and the projection.

[0134] The front side of the head portion **12**, which front side is not shown explicitly in FIGS. **1** to **3**, can be configured in particular to attach a multiplicity of toothbrush bristles **16**, so that the oral hygiene device can fulfill a dual role as toothbrush and tongue cleaner.

[0135] FIGS. **4** to **6** show various views of a cleaning bar **25** by way of example. The cleaning bar **25** has, at its free end section remote from the base area **18**, a flattened contact surface **36** which extends substantially parallel to the base area, and radiused edge areas. Furthermore, the ratio of height **31** to width **32** of all the cleaning bars **22**, **24**, **25**, **26**, **28** may be greater than or equal to 1.

[0136] In some embodiments, the height of the cleaning bars is configured to amount to at least 0.6 mm, preferably however at least 0.7 mm, while the width of the cleaning bars **22**, **24**, **25**, **26**, **28** is at least 0.5 mm, preferably at least 0.6 mm. The radiused area which forms a transition between the lateral surface and the frontal contact surface **36** serves for easy and smooth gliding of the oral hygiene device along the surface to be cleaned.

[0137] The cleaning bars, which may be radiused in virtually every direction, serve primarily to transport deposits and dirt particles which have already been dislodged from the surface of the tongue. In this way it is possible to facilitate the transport of deposits away from the oral cavity.

[0138] FIGS. **8** to **10** illustrate, by way of example, a cylindrically formed cleaning stud. The cleaning studs are also radiused in their end section remote from the base area **18** and have a flattened contact surface **38** which adjoins the radius.

[0139] In the illustrated embodiment, the curvature radius **40** of the cleaning studs **20** and the curvature radius **33** of the cleaning bars **22**, **24**, **25**, **26**, **28** are in a range from 10% to

50%, in particular from 25% to 40%, of the width **32** of a cleaning bar **22**, **24**, **25**, **26**, **28** and, respectively, from 10% to 50%, in particular from 25% to 40%, of the diameter **41** of a cylindrically formed cleaning stud **20**.

[0140] The ratio of the height **39** to the diameter **41** of the cleaning studs **20** may correspond substantially to the height-to-width ratio of the cleaning bars **22**, **24**, **25**, **26**, **28**.

[0141] In contrast to the function of the cleaning bars **22**, **24**, **25**, **26**, **28**, the cleaning studs **20** are designed to dip into surface depressions or spaces in the tongue, in order to dislodge dirt particles or other deposits there. The differently formed cleaning elements, i.e., cleaning studs **20** and cleaning bars **22**, **24**, **25**, **26**, **28**, are thus designed for different functions and display correspondingly different geometries.

[0142] In this embodiment, the height of cleaning bars **22**, **24**, **25**, **26**, **28** and cleaning studs **20** is approximately the same, and the other features are different. In other embodiments, at least the studs **20** do not project beyond the cleaning bars **22**, **24**, **25**, **26**, **28**.

[0143] FIG. **11** shows a further embodiment having a fan-shaped arrangement of cleaning elements **42**, which have an approximately triangular area of cross-section parallel to the base area **18**. The cleaning elements **42**, which substantially taper to a point and are radiused at their free ends and are shown in a detailed perspective view in FIG. **12**, have in particular differently inclined cheek surfaces or lateral surfaces **50**, **48**.

[0144] The illustrated lateral surfaces or cheek surfaces **50**, **48** which taper towards each other in particular at an acute angle, are connected to each other via radiuses **51**, **52**.

[0145] In the embodiment of FIG. **11**, the longitudinal dimension of the individual cleaning elements **42** increases with increasing distance from the handle portion **14**. In addition, three cleaning bars **44**, **45**, **46** which extend in a bent and angled fashion are arranged in the area of the free end section of the head portion **12**, at the end remote from the handle portion **14**. The bars are further furnished with two legs which are aligned substantially perpendicular to each other. The bent cleaning bars serve for the collection of residue, deposits and dirt particles which have previously been dislodged by the individual cleaning elements **42** from the surface of the tongue during the cleaning operation.

[0146] FIG. **13** shows a further embodiment of a cleaning stud **54** which is formed in the manner of a halved truncated cone. A semi-circular cheek or end surface **60** is arranged substantially perpendicular to the base area **18**, while a conical envelope surface **56** adjoining a radius **58** merges with the base area **18** with decreasing height. This cleaning stud **54** which is formed in the manner of a halved, truncated cone lying on its side proves to be advantageous if a cleaning effect is to be exercised on the tongue using only one direction of motion of the oral hygiene device **10**.

[0147] If, for example, the cheek or end surface **60** leads the envelope surface **56** during a cleaning movement, dislodged material is at least pushed further along or dislodged by the end surface **60**. However, in the case of a reverse direction of motion of the cleaning stud **54**, barely any cleaning effect can be expected on account of the continuous rise of the cleaning stud up to the radius **58**. An arrangement of the cleaning elements at varying angles relative to the longitudinal axis permits a number of different effective cleaning surfaces particularly when the element is shaped in the manner of a halved truncated cone or truncated pyramid lying on its side.



[0148] A further embodiment of a spherical cleaning stud 64 is shown in FIGS. 14 and 15. The cleaning stud 64 formed in the shape of a hemisphere lies on the base area 18 close to its maximum cross-section, as a result of which, in this embodiment, only the hemisphere extending upward with a decreasing cross-section projects from the base area 18.

[0149] Furthermore, the illustrated hemispherical cleaning stud 64 is provided with an inwardly arched cheek surface 68 which extends from the base of the cleaning stud 64 to almost its highest elevation above the base area 18. In this respect, the spherical cleaning stud 64 can also be described approximately as a quarter-sphere, the plane side of which, i.e., the non-spherical side, has a concavely arched portion. The area of transition between the concavely arched portion 68 and the convex surface of the sphere is again formed as a radius 66.

[0150] Similarly to the embodiment shown in FIG. 13, the hemispherically formed cleaning stud also provides a substantially uni-directional cleaning effect.

[0151] A further embodiment of a cleaning stud 70 is shown in FIGS. 16 and 17 in different perspective views. The base area of the cleaning stud 70 resembles a heart form, which can be described in a first approximation as a triangle with radiused corners, two outwardly arched sidewalls, and one inwardly arched sidewall.

[0152] The concave, inwardly arched cheek surface or lateral surface 72 and the two convex, outwardly arched cheek surfaces or lateral surfaces 76 of the cleaning stud 70 extend substantially perpendicularly to the plane of the base area 18. The area of transition between the lateral surfaces 72, 76 and the contact surface 75 which extends substantially parallel to the base area 18 is again implemented in the form of a radius 74 and not, in this embodiment, as an edge.

[0153] FIGS. 18 and 19 show a further cleaning element 78 which can be described both as an elliptical cleaning stud and as a cleaning bar which is symmetrically domed along the longitudinal axis in the sense of this invention. Here again, the lateral surfaces extend similarly to the triangular form of FIGS. 16 and 17 substantially perpendicularly to the base area 18. The upper region which extends up to the contact surface 80 is once again formed as a radius between the contact surface and the lateral surfaces, extending circumferentially around the upper edge region.

[0154] FIGS. 20 and 21 further show a cleaning stud 84 in different perspective views, said cleaning stud having a base area of a generally diamond-shaped configuration. Such cleaning studs 84 can be implemented in a variety of embodiments and geometries. The aspect ratio of the two diagonals 90, 92 can be between 0.2 and 5, in this embodiment.

[0155] FIG. 22 shows further a perspective view of a cuboid cleaning stud 94 having a flattened contact surface 96 at its free end remote from the base area 18. In addition, all corners and adjoining sides may be formed as radiuses 98, 99.

[0156] FIGS. 23 to 25 show a further embodiment of the oral hygiene device in which three different types of cleaning elements, namely cleaning studs 20, cleaning bars 24, 26 and three bent cleaning bars 100, 102, 104, of varying heights are arranged. The overall arrangement of the cleaning elements 20, 24, 26, 100, 102, 104 is configured to be in mirror symmetry to the longitudinal axis 105 of the handle portion or the head portion.

[0157] The cleaning studs 20 are arranged along the longitudinal sides in two rows in an offset relation to each other, while the cleaning bars 24, 26 which extend obliquely to the transverse axis of the head portion are arranged in pairs at the

same height and extend inwardly and towards the free end of the head. The longitudinal dimension of the individual cleaning bars 26, 24 increases toward the free end of the head portion 12.

[0158] In the upper end section of the head portion 12 the three bent cleaning bars 100, 102, 104 are arranged in an offset relation to each other along the longitudinal axis 105 of the head portion 12. Each of the bent cleaning bars 100, 102, 104 includes two side legs which are formed in a rod-like shape, are turned by around 90° from each other and are connected to each other at the height of the longitudinal axis 105 of the head portion 12 in a one-piece construction. Each of the individual bent cleaning bars 100, 102, 104 has an approximately constant height profile.

[0159] The three bent cleaning bars 100, 102, 104 are of different heights. The cleaning bar 100 has a lower height than the directly adjacent cleaning bar 102, which in turn has a lower height than the innermost lying bent cleaning bar 104. Between the legs of the bent cleaning bar 104 and the straight cleaning bars 24, 26 the projection 106 which is connected to the core material 108 of the head portion in one integral piece terminates flush with the surface of the base area 18.

[0160] Apart from the advantageous fastening options for the different plastic materials of the head portion, the projection 106 embedded in the base area 18 provides the opportunity in conjunction with the use of, for example, a white or yellow plastic material, to visually monitor in a simple and reliable fashion the degree of soiling of the tongue cleaner during application of the cleaner.

[0161] In addition, the section in which the projection 106 is disposed forms a central region within the base area 18 which may be devoid of cleaning elements, being instead surrounded by such. For this reason, the surface section arranged around the projection is suitable for accommodating a cleaning medium.

[0162] FIG. 26 shows again in an enlarged representation and in a perspective view from the side the different heights of the bent or angled cleaning bars 100, 102, 104 according to the embodiment of FIGS. 23 to 25.

[0163] FIGS. 27 and 28 show a top plan view and a perspective view of a further embodiment of the tongue cleaner. Here again, a total of three differently structured cleaning elements 20, 22, 26, 110, 112, 114 are used. Each cleaning bar 22, 26 is paired with two cleaning studs 20, with each one cleaning stud 20 being arranged at a distance from its associated cleaning bar 22, 26 in the longitudinal extension thereof.

[0164] The individual cleaning bars 22, 26 are arranged in the manner of a spiral, in which the distance between adjacent bars 22, 26 and their orientation successively grows as the spiral progresses. In similar fashion, the space between the cleaning bars 26, 22 and the cleaning studs 20 associated with them in longitudinal direction increases nearly throughout. The channel provided in order to transport away dirt particles accumulating at the cleaning bars 22, 26 extends between the longitudinal ends of the cleaning bars 22, 26 and the cleaning studs 20 arranged in spaced relation to them in longitudinal direction.

[0165] The overall arrangement of cleaning studs 20 and cleaning bars 22, 26 is substantially in point symmetry to the center point of the projection 30 embedded in the base area 18. While the spiral starting at the left above the projection 30 curves from the top left to the bottom right, the other spiral-shaped arrangement formed from cleaning bars 22, 26 and

cleaning studs **20** curves from the bottom right to the top left around the projection **30**, which is elliptically formed in the plane.

[0166] At the free end of the head portion **12**, three further cleaning bars **110**, **112**, **114** are arranged which extend in a bent configuration as scrapers or collecting elements. They have an asymmetrical cross-sectional profile with sidewalls of varying steepness. The side of the cleaning bars **114**, **112**, **110** close to the cleaning studs **20** and close to the straight cleaning bars **22**, **26** extends nearly perpendicularly to the base area **18**, while the lateral surface or cheek surface close to the free end of the head portion **12** ends on the base area **18** at a relatively flat angle.

[0167] These cleaning elements **110**, **112**, **114**, which extend substantially transversely across the entire head portion **12**, are designed in particular for scraping and collecting dislodged particles.

[0168] FIGS. **30** and **31** show a further embodiment which, in comparison to the embodiment of FIGS. **27** to **29**, is configured without the cleaning bars **110**, **112**, **114** at the free end of the head portion **12**. Instead, the spiral-shaped arrangement of pairs of cleaning bars **24**, **22** and cleaning studs **20** is longitudinally stretched in the longitudinal direction of the head portion **12**.

[0169] FIGS. **32** to **34** show a further point-symmetrical arrangement of cleaning bars **24**, **26** and cleaning studs **20** in a variety of perspective views. In this arrangement, almost every cleaning bar **24**, **26** is associated with one outward lying cleaning stud **20**. Here again, the cleaning bars are arranged along a spiral, with channels being provided either between cleaning studs **20** and cleaning bars **24**, **26** or purely between cleaning bars **24**, **26** set apart at a distance in longitudinal direction.

[0170] A further example of point-symmetrically and spirally arranged cleaning bars **26**, **22** and cleaning studs **20** is shown in a top plan view in FIG. **35**.

[0171] FIGS. **36** to **38** show another embodiment of the head portion **12** including three differently formed cleaning elements **20**, **116**, **118** and **124**, **126**, **128**. The cleaning studs **20** are arranged at the edge and with an offset to each other in the lower region close to the handle portion **14**.

[0172] Lying in between, a total of six cleaning bars **116**, **118** is provided, which are arranged in a herringbone-style pattern, starting from the lower head portion on alternating sides, extending from the outside inward and towards the free end of the head portion.

[0173] In this arrangement, the cleaning bars **118**, **116**, which in terms of their orientation extend in mirror symmetry to one another, do not converge at the same height on the head portion **12**, but are in an offset position to each other in the longitudinal direction. The cleaning bars **116**, which slope inwardly and upwardly on the right-hand side of the head portion **12**, have their inward-lying ends in partial overlap in longitudinal direction with the cleaning bars **118**, the latter being arranged mirror-symmetrically and at an offset on the left-hand side of the head portion.

[0174] In the region of the free end of the head portion, three lamella or wall-type, slightly curved or ogival cleaning bars **128**, **126**, **124** are provided. They are inclined toward the middle of the head portion, so that the respective cheek or lateral surfaces facing toward the center of the head portion **12** can be advantageous for the accumulation of deposits and dirt particles.

[0175] Furthermore, as becomes apparent particularly from the perspective view of FIG. **37**, the cleaning elements **20**, **116**, **118** and also the lamella-shaped cleaning elements **124**, **126**, **128** have a greater height in the middle of the head portion **12** than on the edges at the left and right-hand sides. Such an arrangement takes into account that the base area **18** which lies underneath is not exactly planar, but that it extends under a slight downward inclination towards the lateral edges of the head portion **12**.

[0176] FIGS. **39** and **40** show a further arrangement of cleaning elements **20**, **116**, **118** on the basis of the embodiment of FIGS. **36** to **38**. In this arrangement, the cleaning studs form an edge extending circumferentially around the entire base area, whereas the cleaning bars **116**, **118** arranged in a herringbone pattern lie within this edge formed by the cleaning studs **20**.

[0177] In the embodiments of FIGS. **36** to **40**, the channel adjoining the cleaning bars **116**, **118** winds in an S or serpentine shape between the inward-lying end sections of the individual cleaning bars **118**, **116**.

[0178] Preferably, the embodiments include cleaning elements whose lateral surface areas, which are approximately at right angles to the base area, add up over all elements to between 50 mm<sup>2</sup> and 200 mm<sup>2</sup>, in particular between 60 mm<sup>2</sup> and 180 mm<sup>2</sup> and above all between 60 mm<sup>2</sup> and 120 mm<sup>2</sup>, wherein the lower and upper limits can also be swapped. It has been shown that if the sum total of all vertical (active) cleaning surfaces is in this range, optimum cleaning results are accomplishable in comparison to what otherwise might only amount to a massaging effect or a relatively poor cleaning performance.

[0179] In a further embodiment of an oral hygiene device in the form of a toothbrush (not shown), a tongue cleaner is provided in the manner shown in FIG. **1** on the rear side **201** of the toothbrush head. Alternatively, the toothbrush can be equipped with one of the other previously described tongue cleaners or elements thereof. The front side of the toothbrush head has a bristle zone including a plurality of filament tufts and, in particular, gum massaging bars on each side of the bristle zone. The gum massaging bars or massaging extensions are preferably formed from a TPE (thermoplastic elastomer) plastic material and are thus injection-molded, preferably from the same material as the tongue cleaner, onto the PP (polypropylene) basic body of the toothbrush. The toothbrush head is therefore manufactured in a 2-component injection molding process, wherein a TPE soft component in the handle region may be introduced as a third component or the same soft component as for the head. Advantageously, the tongue cleaner **10** and the gum massaging bars can thus be manufactured in a single injection-molding step. In this embodiment, a plurality of recesses is optionally provided on the side cheeks of the brush head and/or on the rear side of the brush head. The recesses are arranged underneath or adjacent to the oblong gum massaging bars. Consequently, the TPE plastic shrinkage during cool down after injection molding is reduced in the region of the recess by virtue of the lower TPE material thickness, so that the massaging extensions remain better in the intended (upright) position after injection molding than would be the case without the recesses. This design with recesses adjacent to the massaging extensions can also be provided independently of a tongue cleaner, i.e., without the latter and on all types of toothbrush.

1-55. (canceled)

56. An oral hygiene device, comprising:

a handle;

a head coupled to the handle;

a substantially planar base disposed on the head; and

a plurality of cleaning elements projecting from the base, the plurality of cleaning elements being characterized by at least two different geometries,

wherein at least some of the plurality of cleaning elements comprise generally oblong cleaning bars, and wherein adjacent cleaning elements define at least one channel that extends in a direction generally transverse to a longitudinal direction of at least some of the oblong cleaning bars.

57. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements are generally right circular cylindrical projections extending from the base.

58. The oral hygiene device of claim 56, wherein the channel is adjacent the oblong cleaning bars that the channel is generally transverse to.

59. The oral hygiene device of claim 56, wherein adjacent cleaning elements define at least two channels at least a portion of which are oblique to one another.

60. The oral hygiene device of claim 56, wherein the channel generally extends along a straight line.

61. The oral hygiene device of claim 56, wherein the channel has a width that increases along the channel.

62. The oral hygiene device of claim 61, wherein the channel curves.

63. The oral hygiene device of claim 62, wherein a radius of curvature of the channel decreases along the channel.

64. The oral hygiene device of claim 56, wherein at least two oblong cleaning bars are disposed on opposite sides of the channel and have a longitudinal direction that is generally transverse to the channel.

65. The oral hygiene device of claim 56, wherein a longitudinal dimension of the oblong cleaning bars increases along the channel.

66. The oral hygiene device of claim 56, wherein the plurality of cleaning elements comprise a cleaning stud, and wherein the cleaning stud is generally aligned with the longitudinal direction of one of the oblong cleaning bars.

67. The oral hygiene device of claim 56, wherein the plurality of cleaning elements comprises a plurality of cleaning studs.

68. The oral hygiene device of claim 67, wherein the plurality of cleaning studs are disposed in an outer region of the base and the plurality of oblong cleaning bars are disposed in an inner region of the base.

69. The oral hygiene device of claim 56, wherein the plurality of oblong cleaning bars are arranged in a herringbone pattern.

70. The oral hygiene device of claim 56, wherein the plurality of oblong cleaning bars extend from the edge of the head towards the center of the head and towards a distal end of the head.

71. The oral hygiene device in claim 56, wherein the plurality of cleaning elements are radiused at their distal end and have a distal surface that is substantially parallel to the base.

72. The oral hygiene device of claim 71, wherein the plurality of cleaning elements are radiused between an angle of 60 degrees and 120 degrees.

73. The oral hygiene device of claim 71, wherein the plurality of cleaning elements are radiused with a radius that is between 10% and 50% of the smaller of a diameter or a width of the cleaning elements.

74. The oral hygiene device of claim 71, wherein the plurality of cleaning elements are radiused with a radius that is between 15% and 40% of a height of the cleaning elements.

75. The oral hygiene device of claim 71, wherein the plurality of cleaning elements are radiused with a radius that is generally equal to the height of the cleaning elements.

76. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements have a generally circular or generally elliptical cross-section in a plane parallel to the base.

77. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements have a generally quadrangular cross-section in the plane parallel to the base.

78. The oral hygiene device of claim 77, wherein the generally quadrangular cross-section defines a diamond shape with diagonals having a ratio between 0.2 and 5.

79. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements comprise lateral surfaces that are at different angles to the normal of the base relative to one another.

80. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements are a truncated cone with a sidewall rising from the base.

81. The oral hygiene device in claim 56, wherein at least some of the plurality of cleaning elements are a segment of a spherical cap with a concave face.

82. The oral hygiene device of claim 56, wherein each of the plurality of cleaning elements has a width that is greater than or equal to 0.5 millimeters.

83. The oral hygiene device of claim 56, wherein each of the plurality of cleaning elements has a height that is greater than or equal to 0.6 millimeters.

84. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements have a base with a cross-sectional area that is greater than or equal to 0.2 square millimeters.

85. The oral hygiene device of claim 56, wherein the plurality of cleaning elements consume more than 75% of the area of the base.

86. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning bars are angled relative to a longitudinal axis of the handle.

87. The oral hygiene device of claim 56, wherein at least some of the plurality of cleaning elements are reflectively symmetric about the longitudinal axis of the handle.

88. The oral hygiene device of claim 56, wherein the plurality of cleaning elements are arranged in point symmetry.

89. The oral hygiene device claim 56, wherein at least some of the cleaning bars comprise cheek surfaces that are inclined at an angle between -30 degrees and +60 degrees to the normal vector of the base.

90. The oral hygiene device of claim 56, wherein the plurality of cleaning bars consume between 5% and 50% of the area of the base.

91. The oral hygiene device of claim 56, wherein the minimum width of the channel is 0.8 millimeters and the maximum width of the channel is 1.5 millimeters.

92. The oral hygiene device of claim 56, wherein the channel is longer than 5 millimeters.

**93.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements comprise a plurality of bent cleaning bars each defining two legs that are substantially perpendicular to one another.

**94.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements comprises a plurality of cleaning arches.

**95.** The oral hygiene device of claim **94**, wherein the plurality of cleaning arches decrease in height toward a center of the head.

**96.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements comprise a thermoplastic elastomer having a Shore hardness between 30 and 70 A.

**97.** The oral hygiene device of claim **94**, wherein the base is made of the thermoplastic elastomer, and wherein the base merges relatively seamlessly with at least a rear side of the head.

**98.** The oral hygiene device of claim **56**, wherein the head and the plurality of cleaning elements have a different hardness.

**99.** The oral hygiene device of claim **98**, wherein the head is formed from a harder material than the plurality of cleaning elements, and wherein the base is secured to the head by a projection of the head embedded in the base, the projection of the head being substantially flush with the surface of the base.

**100.** The oral hygiene device of claim **99**, wherein the projection has a lighter color than the base or is more transparent than the base.

**101.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements define an open area near the

center of the base configured to receive a cleaning medium, and wherein the open area is recessed within the base.

**102.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements extend from a back side of the head and toothbrush bristles extend from a first side of the head.

**103.** The oral hygiene device of claim **56**, wherein the plurality of cleaning elements consume between 50 and 200 square millimeters of an exposed area of the base.

**104.** A tongue-scraper toothbrush, comprising:

a toothbrush comprising bristles on a front side of the toothbrush; and

a plurality of cleaning elements disposed on a back side of the toothbrush, wherein the plurality of cleaning elements define one or more channels between the cleaning elements, and wherein at least some of the cleaning elements are cleaning bars that are angled relative to a longitudinal axis of the handle of the toothbrush.

**105.** An oral hygiene device, comprising:

a handle;

a head extending from the handle; and

a tongue scraper disposed on a side of the head, wherein the tongue scraper comprises a plurality of cleaning bars disposed on opposite sides of a channel defined by the plurality of cleaning bars, wherein each of the plurality of cleaning bars has a longitudinal axis that is generally perpendicular to the channel.

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