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(54) **ROTARY TOOTHBRUSH**

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(57) **ABSTRACT**

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The present invention relates to a rotary toothbrush as an improvement for the conventional toothbrush. The rotary toothbrush includes a toothbrush bar having a grip part (1), a neck part (2) and a head part (3). At least of rotary toothbrush plates (4, 5) can be installed on head part (3) of the toothbrush bar to rotate around the center shaft thereof. A plurality of toothbrush furs (8a, 8b, 8c, 8d, 8e) which are arranged in regular group shapes are installed at several places on rotary toothbrush plates (4, 5). By varying plant-installation density, plant-installation height, or materials or strength of toothbrush firs (8), toothbrush furs (8) on rotary toothbrush plates (4, 5) generate a biased resistance between teeth upon brushing of teeth, and thus rotary toothbrush plates (4, 5) can be automatically rotated by generation of the biased resistance.

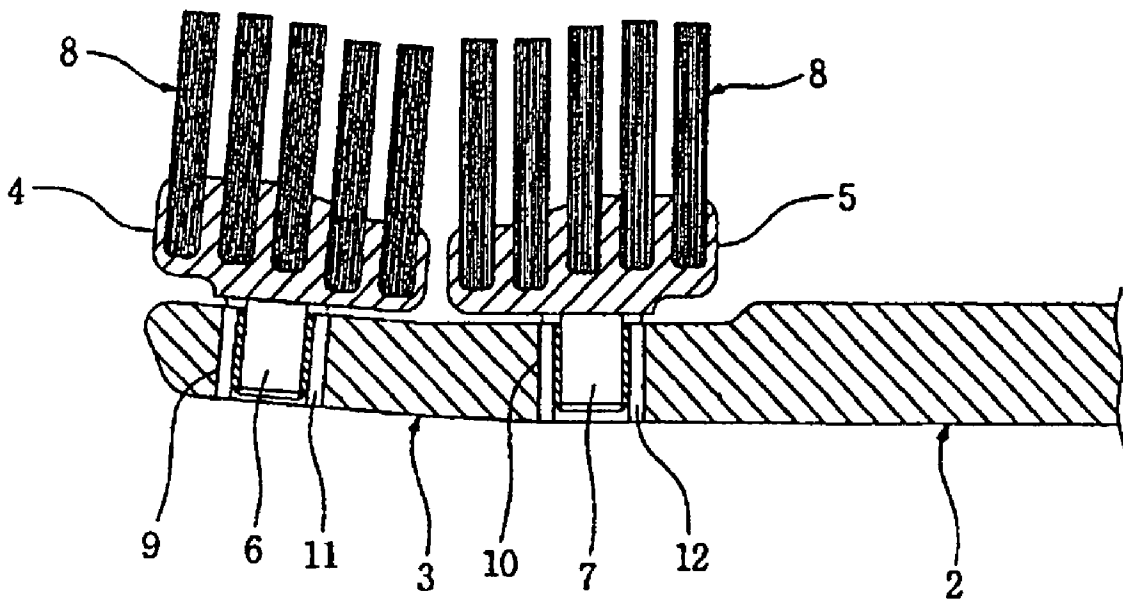


FIG. 1a

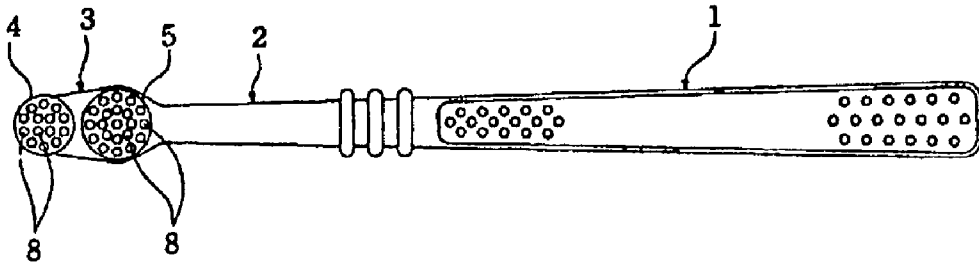


FIG. 1b

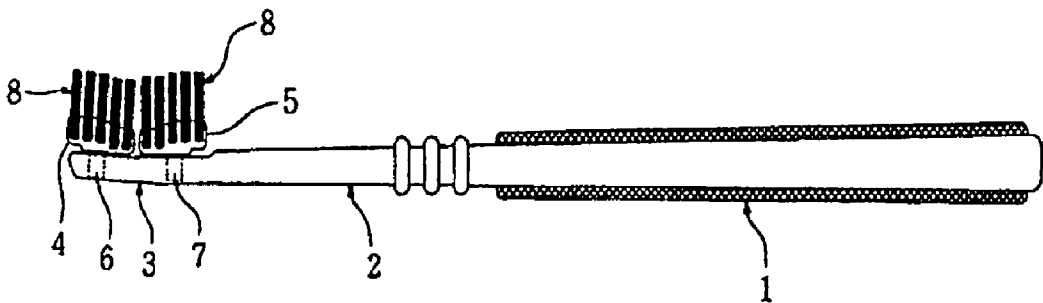


FIG. 1c

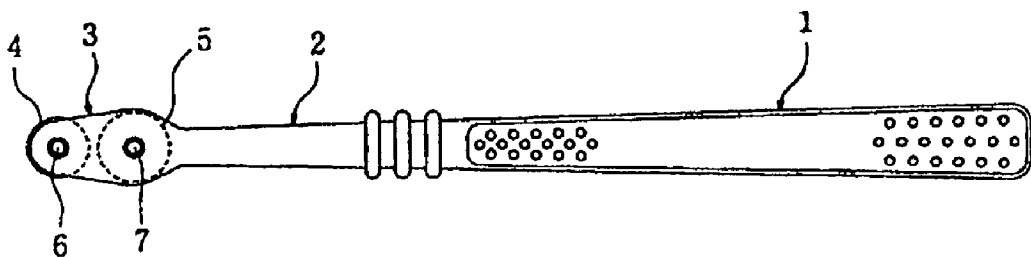


FIG. 2

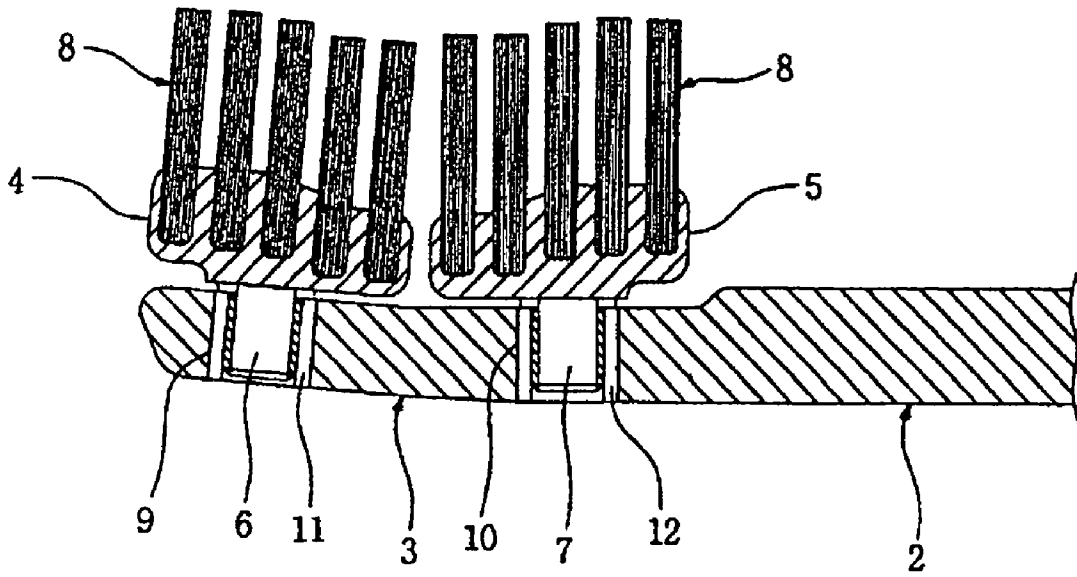
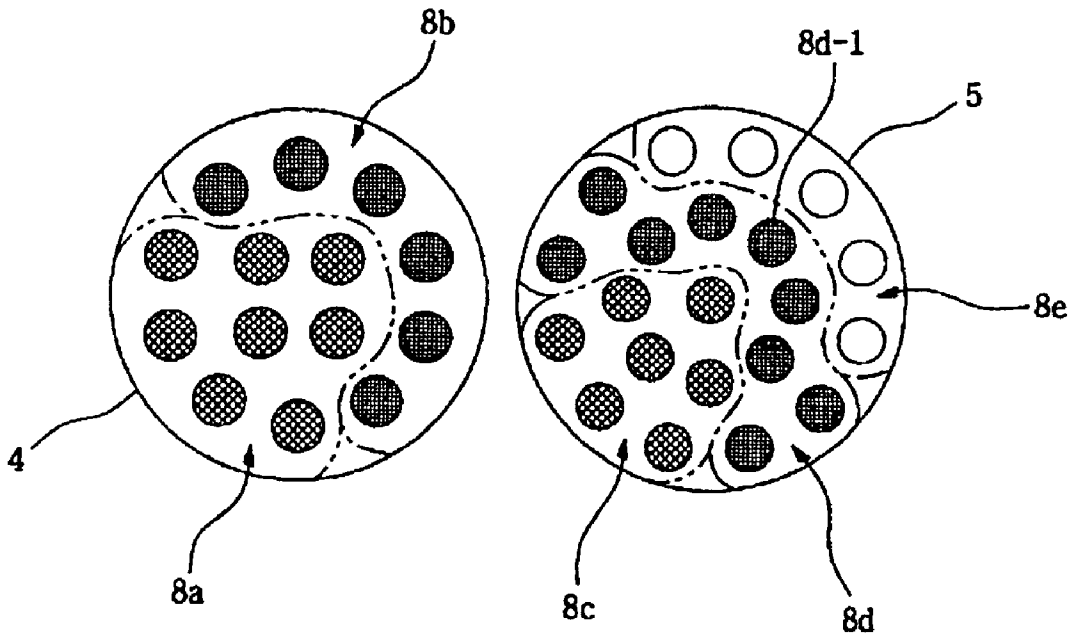


FIG. 3



ROTARY TOOTHBRUSH

TECHNICAL FIELD

[0001] The present invention relates, in general, to toothbrushes and, more particularly, to an improvement in the structure of such a toothbrush to allow the bristles of the toothbrush to move on the teeth while generating different resistance forces against the teeth in accordance with positions of the bristles on the teeth, thus forcing a rotary bristle bed to be automatically rotated on the head of the toothbrush in either direction around its rotating shaft due to the different resistance forces, the rotary toothbrush thereby effectively and uniformly brushing the teeth even when a user horizontally brushes his teeth along the sets of teeth without brushing the teeth vertically.

BACKGROUND ART

[0002] The teeth of the human body are arranged along two sets of teeth, or the upper and lower sets of teeth, which engage with each other. Since each of the upper and lower sets of teeth comprises a plurality of teeth regularly arranged along a horizontal arrangement, it is easy for people to horizontally brush the teeth along the sets of teeth in opposite directions. That is, such a horizontal tooth brushing action agrees with the natural posture of an arm holding the toothbrush while brushing the teeth, and allows people to brush their teeth without difficulty, and so the people unconsciously prefer the horizontal tooth brushing action of all other directional brushing actions.

[0003] However, since a vertical slit is left between two teeth of each set of teeth, in addition to a plurality of microgrooves formed along the vertical grains of the enamel of each tooth, dental plaque is inevitably deposited in the vertical slits between the teeth and in the microgrooves of the enamels. It is almost impossible to effectively remove such dental plaque, deposited in the vertical slits between the teeth and in the microgrooves of the enamels, by the horizontal tooth brushing action. Therefore, most dentists advise users of typical toothbrushes to vertically, repeatedly and sequentially brush their teeth along the vertical slits between the teeth and the vertical microgrooves of the enamels to remove the dental plaque from the slits and microgrooves. However, such a vertical tooth brushing action is not natural for the human body, and so people are not likely to easily get the action into a habit. People, wanting to do such a vertical tooth brushing action, are forced to consciously perform the action each time they brush the teeth. Another problem, experienced in the vertical tooth brushing action, resides in that the action forces people to consume excessive time with difficulty to effectively or desirably brush the teeth.

[0004] In an effort to overcome such problems experienced in the tooth brushing action using typical toothbrushes, a variety of electric toothbrushes have been proposed and used. The conventional electric toothbrushes are designed to automatically rotate the bristles of a toothbrush using electric power, thus allowing users to more easily brush their teeth. However, such electric toothbrushes are problematic in that they have excessive volume and excessive weight since they must be provided with means for electrically operating the bristles. In addition, the electric toothbrushes inevitably have a complex construction, and so

they are likely to be easily and repeatedly broken, thus being required to be repeatedly repaired or forcing the users to purchase new toothbrushes. The conventional electric toothbrushes are operated by electric power of batteries, and so it is necessary to repeatedly change the batteries with new ones. Another problem experienced in the conventional electric toothbrushes resides in that they are expensive, thus forcing users to pay excessive money for the electric toothbrushes. Therefore, people do not generally use such electric toothbrushes.

[0005] In addition, a toothbrush, having a rotatable disc-shaped bristle bed, has been proposed and used. In this toothbrush, a disc-shaped bristle bed is set in the head of the toothbrush such that the bristle bed is eccentrically rotatable relative to the head during a tooth brushing process. However, this toothbrush has a structural limit in that the disc-shaped bristle bed of the head is not allowed to smoothly perform its desired rotation relative to the head when a user horizontally brushes his teeth along the sets of teeth. In addition, the bristle bed is eccentrically rotated at a position excessively away from the central axis of the head of the toothbrush during tooth brushing process, and so the bristles and the bristle bed may come into undesired contact with other parts of the mouth to impact or injure the parts. It is also very difficult for the toothbrush to effectively brush desired parts of teeth.

DISCLOSURE OF THE INVENTION

[0006] Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a rotary toothbrush, which allows its bristles to move on teeth while generating different resistance forces against the teeth in accordance with positions of the bristles on the teeth, thus forcing its rotary bristle bed to be automatically rotated on the head of the toothbrush due to the different resistance force, and thereby effectively and uniformly brushing the teeth even when a user horizontally brushes his teeth along the sets of teeth.

[0007] In order to accomplish the above object, the present invention provides a rotary toothbrush, comprising a longitudinal body including a head, at least one rotary bristle bed set on the head of the body through a shaft such that the bristle bed is rotatable relative to the head around the shaft, and a plurality of bristles implanted in the bristle bed such that the bristles generate different resistance forces against teeth in accordance with positions of the bristles on the teeth during a tooth brushing process. Due to the different resistance forces, the rotary bristle bed is rotatable in either direction around its shaft on the head of the body.

[0008] When brushing teeth using the toothbrush of this invention, a user horizontally and repeatedly brushes his teeth along the sets of teeth, with the bristles of the rotary bristle bed brought into contact with the outer surfaces of the teeth. In such a case, the bristles form desired different resistance forces against the teeth, and actively and smoothly rotate the bristle bed in either direction due to the different resistance forces. The bristles are thus rotated in the same direction as that of the bristle bed, and so it is possible to effectively brush the teeth. In addition, this rotary toothbrush accomplishes its desired operational effect by the movement of the bristles relative to the teeth, and so it does

not require any electric drive means or another complex structure, and has a simple construction capable of reducing the production cost of the toothbrushes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0010] FIG. 1a is a plan view of a rotary toothbrush in accordance with the preferred embodiment of the present invention, FIG. 1b is a front view of the rotary toothbrush of this invention, and FIG. 1c is a bottom view of the rotary toothbrush of this invention;

[0011] FIG. 2 is a sectional view of the toothbrush's head having two rotary bristle beds in accordance with the present invention; and

[0012] FIG. 3 is a plan view of the two rotary bristle beds of this invention, each having different groups of bristles.

BEST MODE FOR CARRYING OUT THE INVENTION

[0013] Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components.

[0014] FIGS. 1a to 1c are views, showing the appearance of a rotary toothbrush in accordance with the preferred embodiment of the present invention, in which FIG. 1a is a plan view of the toothbrush, FIG. 1b is a front view of the toothbrush, and FIG. 1c is a bottom view of the toothbrush.

[0015] As shown in the drawings, the toothbrush according to the preferred embodiment of this invention comprises a longitudinal body, and two rotary bristle beds 4 and 5. The body of the toothbrush consists of three parts: a handle 1, a neck 2 and a head 3, while the two rotary bristle beds 4 and 5 are set on the head 3 of the body such that the beds 4 and 5 are freely, independently rotatable around their rotating axes relative to the head 3. A plurality of bristles 8 are densely implanted on each of the beds 4 and 5 as will be described in detail later herein. In the preferred embodiment of this invention, the number of the rotary bristle beds is two. However, it should be understood that the number of the bristle beds is not limited to two, but may be freely changed as desired. That is, at least one rotary bristle bed may be set on the head 3 to perform its desired operational effect without affecting the functioning of this invention.

[0016] In the preferred embodiment of this invention, the two rotary bristle beds 4 and 5, each having a disc shape, are arranged along the longitudinal axis of the head 3 so as to be spaced apart from each other while forming a predetermined gap between them. Each of the two bristle beds 4 and 5 has a rotating shaft 6 or 7 at the center of its lower surface opposite to its bristle holding surface. In order to set the two bristle beds 4 and 5 on the head 3, two shaft holes 9 and 10 are formed on the head 3 at desired positions. The two bristle beds 4 and 5 are set on the head 3 by removably and rotatably fitting the shafts 6 and 7 into the shaft holes 9 and 10 of the head 10 and holding the shafts 6 and 7 to the head

3 using washers 11 and 12 such that the beds 4 and 5 are detachable and rotatable relative to the head 3.

[0017] In such a case, the two rotary bristle beds 4 and 5 are arranged on the head 3 of the toothbrush such that the bristles 8 of the two bristle beds 4 and 5 move on the teeth while generating different resistance forces against the teeth in accordance with positions of the bristles 8 on the teeth when a user horizontally brushes his teeth along the sets of teeth. The rotary bristle beds 4 and 5 are thus automatically rotated around their rotating shafts 6 and 7 on the head 3 in either direction due to the different resistance forces.

[0018] FIG. 2 is a sectional view of the head 3 having the two rotary bristle beds 4 and 5 according to the present invention. FIG. 3 is a plan view of the two bristle beds 4 and 5, each having different groups of bristles 8. As shown in the drawings, the two bristle beds 4 and 5 may have the same size or different sizes. In the present invention, it is preferred to set the size of the rear bed 5, positioned at the rear end of the head 3, to be larger in its diameter by about 1.10~1.15 times than that of the front bed 4 positioned at the front end of the head 3. In addition, it is preferred to design the top surface of each of the two beds 4 and 5 to vary in its height when seeing the beds 4 and 5 from a side as shown in FIG. 2. In the present invention, the two bristle beds 4 and 5 may be set on the head 3 such that their rotating shafts 6 and 7 are in parallel to each other. However, it is more preferred to set the two bristle beds 4 and 5 on the head 3 such that the rotating shafts 6 and 7 of the two beds 4 and 5 are inclined relative to each other at an inclination angle of 5°. In the preferred embodiment of this invention, such an inclined arrangement of the two bristle beds 4 and 5 is accomplished by bending the head 3 such that the front portion of the head 3 for holding the front bed 4 is inclined relative to the rear portion holding the rear bed 5 at an inclination angle of 5°. In such a case, it is necessary to space the two beds 4 and 5 from each other by a gap of about 1 mm so as to prevent any interference between them during a rotating action of them.

[0019] In the present invention, the bristles 8, implanted on each of the two beds 4 and 5, are preferably divided into two or more bristle groups. In the preferred embodiment, the front bed 4 has two different groups of bristles 8a and 8b, while the rear bed 5 has three different groups of bristles 8c, 8d and 8e as shown in FIG. 3.

[0020] In a detailed description, the bristles included in the first bristle group 8c of the rear bed 5 are the same in their thickness, strength and length as those of the bristles included in the second bristle group 8d, but are different in their implanting density from that of the bristles of the second bristle group 8d. Therefore, the resistance forces formed between the bristles of the first bristle group 8c and the teeth are different from those of the bristles of the second bristle group 8d during a tooth brushing process, and so it is possible to rotate the rear bristle bed 5 on the head 3 due to a difference in the resistance force between the two bristle groups 8c and 8d.

[0021] In addition, the bristles 8d-1 included in the second bristle group 8d of the rear bed 5 are the same in their thickness, strength and length as those of the third bristle group 8e, but are different in their heights above the top surface of the bed 5 from those of the bristles of the third bristle group 8e. In such a case, desired different resistance

forces are formed between the bristles **8** of the rear bed **S** and teeth during a tooth brushing process, and so the bed **S** is rotated on the head **3** in either direction due to the different resistance forces.

[0022] On the other hand, the bristles included in the bristle group **8a** of the front bed **4** have different in their strength from the bristles included in the other bristle group **8b**. Due to the difference in the strength between the bristles of the two groups **8a** and **8b**, the resistance force formed by the bristle group **8a** is different from that of the bristle group **8b**, and so the front bed **4** is rotated on the head **3** in either direction due to the difference in the resistance force between the two bristle groups **8a** and **8b**.

[0023] The arrangement of the bristle groups **8a**, **8b**, **8c**, **8d** and **8e** on the beds **4** and **5** may be somewhat freely changed from the embodiment of **FIG. 3** without affecting the functioning of the invention if the arrangement of the bristle groups forms desired different resistance forces against teeth.

[0024] When brushing teeth using the toothbrush of this invention, a user horizontally and repeatedly bushes his teeth along the sets of teeth, with the bristles **8** of the two rotary bristle beds **4** and **5** brought into contact with the outer surfaces of the teeth. In such a case, the bristle groups **8a**, **8b**, **8c**, **8d** and **8e** form desired different resistance forces against the teeth, and actively and **5** smoothly rotate the two bristle beds **4** and **5** around their shafts **6** and **7** in either direction due to the different resistance forces. Therefore, the bristles **8** of the two beds **4** and **5** are rotated around the shafts **6** and **7** in the same directions as those of the two beds **4** and **5**, and so it is possible to effectively and almost completely remove dental plaque from both the vertical slits between the teeth and the microgrooves of the enamels of the teeth by the horizontal tooth brushing action. The rotary toothbrush of this invention is thus very convenient to users while brushing teeth.

INDUSTRIAL APPLICABILITY

[0025] As described above, the present invention provides a rotary toothbrush. In the rotary toothbrush, the bristles move on teeth while generating different resistance forces against the teeth in accordance with positions of the bristles on the teeth, thus forcing the rotary bristle beds to be

automatically rotated on the head of the toothbrush due to the different resistance forces. Therefore, this toothbrush effectively, uniformly and quickly brushes the teeth without difficulty even when a user horizontally brushes his teeth along the sets of teeth. The rotary toothbrush of this invention accomplishes its desired operational effect without requiring any electric drive means or another complex structure, and so the toothbrush has a simple construction and is produced at a low production cost.

1. A rotary toothbrush, comprising:

a longitudinal body including a head;

at least one rotary bristle bed set on said head of the body through a shaft such that the bristle bed is rotatable relative to the head around the shaft; and

a plurality of bristles implanted in the bristle bed such that the bristles generate different resistance forces against teeth in accordance with positions of the bristles on the teeth during a tooth brushing process.

2. The rotary toothbrush according to claim 1, wherein two rotary bristle beds are set on said head of the body such that the two bristle beds are slightly spaced apart from each other and are independently rotatable relative to the head.

3. The rotary toothbrush according to claim 1 or 2, wherein said bristles are implanted on the bristle bed such that the bristles are divided into two or more groups of bristles arranged on the bed at different portions, with bristle implanting densities of said groups of bristles being different from each other.

4. The rotary toothbrush according to claim 1 or 2, wherein said bristles are implanted on the bristle bed such that the bristles are divided into two or more groups of bristles arranged on the bed at different portions, with bristle heights of said groups of bristles being different from each other.

5. The rotary toothbrush according to claim 1 or 2, wherein said bristles are implanted on the bristle bed such that the bristles are divided into two or more groups of bristles arranged on the bed at different portions, with bristle strengths of said groups of bristles being different from each other.

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