(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 501 332 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.06.2019 Bulletin 2019/26

(21) Application number: **17209802.2**

(22) Date of filing: **21.12.2017**

(51) Int Cl.:
A46B 3/16 *(2006.01)* ***A46B 7/04*** *(2006.01)*
A46B 7/06 *(2006.01)* ***A46B 9/04*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD TN

(71) Applicant: **Innotech Appliance Limited**
Hong Kong (HK)

(72) Inventor: **WANG, Hai**
Kowloon (HK)

(74) Representative: **Walker, Ross Thomson**
Forresters IP LLP
Skygarden
Erika-Mann-Strasse 11
80636 München (DE)

(54) **A TOOTHBRUSH**

(57) This invention provides a toothbrush closely fitted to the teeth, comprising: a toothbrush main body, a bristle tuft hole is provided on a head of the toothbrush main body; a bristle tuft assembly, movably arranged in the bristle tuft hole; a spring assembly, the bristle tuft assembly is connected with the toothbrush main body through the spring assembly. This toothbrush skillfully is configured with spring assemblies, based upon the contact between the elastic body and the bristle tuft assembly, to realize the flexible movement and elastic body force driving of the bristle tuft, making every bristle tuft independently move upward and downward according to the surface and structure of teeth, achieving the benefit of effective cleaning, durable usage, simple structure and low manufacturing costs.

EP 3 501 332 A1

Description

THCHNICAL FIELD

[0001] The present application relates to the field of daily necessities, and more particularly, relates to a toothbrush; each bristle tuft of which can be independently moved up and down and closely fitted to the teeth.

BACKGROUND OF THE INVENTION

[0002] The bristle tufts in the conventional toothbrushes that can be closely fitted to the teeth are implanted in the hair-setting sheet to be fixed, and hence the bristle tufts cannot move flexibly, which has become a big disadvantage of toothbrushes that can be closely fitted to the teeth, fixed bristle tufts make the toothbrush unable to clean effectively in accordance with the complex inner and outer shape and surface of teeth, giving rise to the bad result of teeth cleaning, and such method of fixing bristle tufts makes bristle tufts not durable for use and easy to fall off, thus the life span of toothbrush is short, and the toothbrush often needs to be replaced, significantly affecting user experience.

TECHNICAL PROBLEM

[0003] The present application aims to solve the technical problem that the bristle tufts in the conventional toothbrush are fixed and cannot move freely, which makes it unable to clean effectively in accordance with the complex inner and outer surface and structure of teeth, giving rise to bad cleaning effect, and provide a toothbrush closely fitted to the teeth in which every bristle tuft is able to move independently in different directions in accordance with the specific shape and structure of teeth surface, ensuring effective cleaning result and long use life.

SOLUTION TO THE PROBLEM

Technical solution

[0004] The technical solution adopted by the application for solving the technical problem is as follows: providing a toothbrush closely fitted to the teeth, comprising:

a toothbrush main body, a bristle tuft hole is provided on a head of the toothbrush main body;
a bristle tuft assembly , movably arranged in the bristle tuft hole ;
a spring assembly , the bristle tuft assembly is connected with the toothbrush main body through the spring assembly.

[0005] In the toothbrush closely fitted to the teeth according to the present application, the toothbrush main body comprises a first main body and a toothbrush back cover connected with the first main body; the bristle tuft hole is a through hole arranged on the first main body; a bottom of the bristle tuft assembly is connected with the toothbrush back cover through the spring assembly.

[0006] In the toothbrush closely fitted to the teeth according to the present application, the number of the bristle tuft hole is more than one; the spring assembly comprises a plurality of elastic bodies connected with each other, an arrangement of the elastic bodies corresponds to arrangement of the bristle tuft holes on the toothbrush main body.

[0007] In the toothbrush closely fitted to the teeth according to the present application, the bristle tuft assembly comprises a bristle tuft base with a fixing hole, a compression plate and a bristle tuft base support plate fixed in the fixing hole, and a bristle tuft that is compressed on the bristle tuft base support plate by the compression plate.

[0008] In the toothbrush closely fitted to the teeth according to the present application, the fixing hole is a tapered hole whose diameter decreases from the top to the bottom, and the compression plate and the bristle tuft base support plate are fixed in the fixing hole by interference fit.

[0009] In the toothbrush closely fitted to the teeth according to the present application, an opening top of the fixing hole is inwardly closed to form a certain taper.

[0010] In the toothbrush closely fitted to the teeth according to the present application, the elastic body is a hollow frustoconical rubber elastic body.

[0011] In the toothbrush closely fitted to the teeth according to the present application, the spring assembly comprises one or more of a spring, a rubber, a silicone rubber, an EVA elastic body and a sponge.

[0012] In the toothbrush closely fitted to the teeth according to the present application, a diameter of the bristle tuft base is small than a diameter of the bristle tuft hole , and an opening top of the bristle tuft hole is provided with an inwardly convex flange , an opening diameter of the convex flange is small than a diameter of the bristle tuft base.

[0013] In the toothbrush closely fitted to the teeth according to the present application, edges of the first main body and the toothbrush back cover are configured with fixing groove and protrusion that match with other each in size, and the first main body and the toothbrush back cover are fixedly connected as a uniform body through the fixing groove and protrusion fitting into each other, the spring assembly is fixed within a chamber formed between the first main body and the toothbrush back cover.

THE BENEFICIAL EFFECT OF THE INVENTION

Beneficial Effect

[0014] The beneficial effects of the present application are that a spring assembly is skillfully configured within

the toothbrush closely fitted to the teeth, and the flexible configuration and spring loaded driving force for the bristle tuft assembly are realized by letting the elastic body and bristle tuft assembly contact each other, so that every bristle tuft is able to independently move upward and downward in accordance with the shape and structure of teeth surface, which gives rise to good cleaning result and is durable for use, and moreover, the structure is simply and the manufacturing cost is low.

BRIEF DESCRIPTION OF THE DRAWINGS

Description of drawings

[0015] The present application will be further described with reference to the accompanying drawings and embodiments, in the accompanying drawings:

Figure 1 provides an exploded structure diagram, according to an embodiment of the present application;
Figure 2 provides an overall structure diagram, according to an embodiment of the present application;
Figure 3 provides an exploded structure diagram of a bristle tuft assembly, according to an embodiment of the present application;
Figure 4 provides a cross-sectional structure diagram of a bristle tuft assembly, according to an embodiment of the present application;
Figure 5 provides a schematic diagram of the B-B cross-sectional structure of the bristle tuft assembly of Figure. 2 free of external force;
Figure 6 provides a schematic diagram of the B-B cross-sectional structure of the bristle tuft assembly of Figure 2 under external force;
Figure 7 provides a cross-sectional structure diagram of Figure 2;
Figure 8 provides a structure diagram of the part A of Figure 7;
Figure 9 provides a schematic diagram of an assembly process according to an embodiment of the present application.

EMBODIMENT OF THE INVENTION

[0016] In order to solve the above technical problems, the overall idea of the embodiment of the present application is as follows:

As shown in Figure 1 and 2, the toothbrush provided by the embodiment of the present application comprises a toothbrush main body, a bristle tuft assembly 2 and a spring assembly 3. A bristle tuft hole 11 is provided on a head of the toothbrush main body; the bristle tuft assembly 2 is arranged in the bristle tuft hole 11 and the bottom is connected with the spring assembly 3 to make bristle tuft assembly 2 float up and down under the action of external force. Specifically, the toothbrush main body comprises a first main body 1 and a toothbrush back cover 4 connected with the first main body 1; first main body 1 comprises a handhold for user grasping and a brushing part for brushing teeth; the upper surface of the handhold is provided with a non-slippery pattern 12; the toothbrush back cover 4 is mainly connected with the lower part of the brushing part. The specific connection between the first main body 1 and the toothbrush back cover 4 is: the brushing part of the first main body 1 and the edge of the toothbrush back cover 4 are configured with fixing groove and protrusion that match with other each in size, and the toothbrush main body and the toothbrush back cover 4 are fixedly connected as a uniform body through the fixing groove and protrusion fitting into each other. In this embodiment, the first main body 1 and the toothbrush back cover 4 are made of plastic material and have certain deformation elastic properties so that they are detachably connected with each other; when they need to be disassembled, only the external force needs to be used to pry the groove out of the protrusion, so that the aged or deformed bristle tuft assembly 2 and spring assembly 3 of the toothbrush can be replaced. The bristle tuft hole 11 is arranged on the head of the first main body 1 and the number of the bristle tuft hole 11 is more than one; the bristle tuft hole 11 is a through hole that is communicated with the upper and lower sides; correspondingly, a plurality of the bristle tuft assemblies 2 are also provided, the number of the plurality of bristle tuft assemblies 2 is the same as the number of the bristle tuft holes 11; the plurality of the bristle tuft assemblies 2 are independent from each other, and each of the bristle tuft assemblies 2 is mounted in the bristle tuft hole 11. The first main body 1 and the toothbrush back cover 4 are connected to each other to form a cavity therebetween. The spring assembly 3 is disposed in the cavity, so that the spring assembly 3 can achieve elastic compression and resetting movements in the cavity. The inner surface of the toothbrush back cover 4 after tooth brushing is easy to store moisture to breed bacteria, in order to ensure that the toothbrush back cover 4 can be kept clean, in this embodiment, a plurality of ventilating holes 41 are further provided on the toothbrush back cover 4, so that to make the moisture flow out through the ventilating holes 41 and enhance the air circulation in the cavity to keep the bristle tuft assembly 2 and the spring assembly 3 in the cavity dry. The spring assembly 3 comprises a plurality of elastic bodies 31, the number of the elastic bodies 31 is the same as the number of the bristle tuft holes 11, an arrangement of the elastic bodies 31 corresponds to arrangement of the bristle tuft hole 11 on the first main body 1; one end of the elastic body 31 is fixed on the toothbrush back cover 4, and the other end corresponds to the bristle tuft assembly 2 arranged

in the bristle tuft hole 11 中, so that the bottom of each bristle tuft assembly 2 is connected with the toothbrush back cover 4 through the elastic body 31; when the bristle tuft assembly 2 presses the elastic body 31 downwardly, the elastic body 31 is deformed to make the bristle tuft assembly 2 move downwardly; when the pressure disappears, under the elastic force of the elastic body 31, the bristle tuft assembly 2 can move up to the initial position. In order to facilitate the replacement of the spring assembly 3, in this embodiment, the bottom of each elastic body 31 in the spring assembly 3 is connected with each other into an integrated structure. When the spring assembly 3 is needed to be replaced, the user only needs to take out and replace the whole spring assembly 3. In other embodiments, the toothbrush body may be an integrated structure. The bristle tuft hole 11 may also be a groove provided on the toothbrush main body. The elastic body 31 may be an elastic sheet mounted and fixed in the groove, and the bristle tuft assembly 2 can be directly fixedly mounted on the elastic sheet, this embodiment can also realize the application, but does not have the function of replaceable disassembly.

[0017] Further, as shown in Figure 3 and 4, the bristle tuft assembly 2 comprises a bristle tuft 21, a bristle tuft base 22, a compression plate 23 and a bristle tuft base support plate 24. A fixing hole 221 for fixing the bristle tuft 21 is arranged on one end of the bristle tuft base 22; the shape and size of the compression plate 23 and the bristle tuft base support plate 24 are the same as those of the fixing hole 221, so that the compression plate 23 and the bristle tuft base support plate 24 can be placed in the fixing hole 221. At the time of manufacture, first, the bristle tuft base support plate 24 is fixed at the bottom of the fixing hole 221, and then the middle of the bristle tuft 21 is placed at the opening of the fixing hole 221 to fix the compression plate 23 from the middle of the bristle tuft 21. The fixing hole 221 is pressed in until the middle portion of the bristle tuft 21 is pressed against the base support plate 24, and the compression plate 23 is also fixed in the fixing hole 221. For the convenience of making and making the whole of the bristle tuft assembly 2 more stable, the fixing hole 221 as a whole adopts a taper design whose diameter gradually decreases from top to bottom, so that the bristle tuft base support plate 24 in the present embodiment can be more easily squeezed into the hole from the slightly larger opening of the fixing hole 221 and the deeper the pressure is, the harder it is for the base support plate 24 to fall out, playing a good role in the fixing; in the same way, the compression plate 23 can be pressed more easily during manufacture. Meanwhile, the diameters of the bristle tuft base support plate 24 and the compression plate 23 and the diameter of the fixing hole 221 on the bristle tuft base 22 are designed in an interference manner, that is the diameters of the bristle tuft base support plate 24 and the compression plate 23 are smaller than the diameter of the opening of the fixing hole 221 but a litter bigger than the diameter of the bottom of the fixing hole 221; when the bristle tuft base support plate 24 and the compression plate 23 are pressed from the upper end of the fixing hole 221 to the bottom, the bristle tuft base support plate 24 and the compression plate 23 are both snapped and fixed in the fixing hole 221 under the action of the interference fit with the inner wall of the fixing hole 221, so that the bristle tuft base support plate 24, the bristle tuft 21 and the compression plate 23 are fixed and the compression plate 23 will not be bounced by the elasticity of the bristle tuft 21 itself after the bristle tuft 21 is pressed into the fixing hole 221. Since the bristle tufts 21 are longer, the two ends of the bristle tufts 21 can still protrude from the openings of the fixing holes 221, and the bristle tufts 21 protruding therefrom are bristle tufts for users to brush their teeth. In the present embodiment, the fixing hole 221 is also inwardly closed to form a certain taper at the opening. The taper is determined by taking the top of the compression plate 23 as the reference, that is, the diameter of the fixing hole 221 above the top of the compression plate 23 is smaller than the diameter of the compression plate 23, Thereby further pressing the compression plate 23 so that it is impossible to be removed from the fixing holes 221. At the same time, the taper can also play the role of combing the bristle tuft 21, so that the bristle tuft 21 can be folded together without spreading out to the two sides so that the tufts 2 are more aesthetically pleasing. The making process of taper is as follows: after the assembling of the bristle tuft base support plate 24, the bristle tuft 21 and the compression plate 23 are completed, the bristle tuft base 22 is further processed, the bristle tuft 21 is concentrically wrapped around the opening of the fixing hole 221, forming an undercut and the compression plate 23 is pressed. In this embodiment 的 elastic body In this embodiment, the elastic body 31 is a hollow frustoconical natural rubber elastic body. The natural rubber is safe, non-toxic and elastic. The hollow frustoconical shape has certain supporting force and can sag under pressure. The elastic body 31 is connected with the bristle tuft base support plate 24, when the bristle tuft 21 is subjected to the external force of the tooth, the bristle tuft 21 will move the bristle tuft base 22 to compress the elastic body through the bristle tuft base support plate 24 for downward movement; when the external force is withdrawn, the bristle tuft assembly 2 will move upward (reset) under the force of the rubber elastic body.

[0018] As shown in Figure 5 and 6, in this embodiment the fixing hole 221 on the bristle tuft base 22 is a through hole which penetrates the upper and lower ends of the bristle tuft base 22; the bristle tuft base support plate 24 is fixed at the lower two-thirds of the fixing hole 221, so that the bristle tuft base support plate 24 is separated from the lowermost end of the fixing hole 221 by a distance and space; when the bristle tuft assembly 2 and

the spring assembly 3 are installed, the top of the elastic body 31 on the spring assembly 3 just falls into the space, and the top of the elastic body 31 abuts against the bottom of the bristle tuft base support plate 24 under the elastic force, so that the elastic body 31 is connected with the bottom of each bristle tuft assembly 2 in a one-to-one correspondence. The force of the bristle tuft 21 can directly act on the elastic body 31 through the bristle tuft base support plate 24. The upper end of the elastic body 31 is located at the bottom of the bristle tuft assembly in the fixing hole 221. In order to make the bristle tuft assembly 2 easier to install and disassemble in this embodiment, the elastic body 31 and the bristle tuft base support plate 24 are not connected in a fixed manner. When the elastic body 31 elastically deforms, the lower end space of the fixing hole 221 can accommodate the elastic deformation portion of the elastic body 31, so as to prevent the elastic body 31 from deviating to the two sides of the bristle tuft assembly 2 when being elastically deformed. Similarly, during the restoration of the elastic body 31, the top end of the elastic body 31 always abuts on the bristle tuft base support plate 24 to have a tendency to deviate to both sides. The top end of the elastic body 31 is always confined in the fixing hole 221 through the lower space of the fixing hole 221 to prevent the elastic body 31 from being detached from the bristle tuft assembly 2 during the elastic deformation of the elastic body 31, further ensuring that each of the elastic bodies 31 and the bristle tuft assembly 2 still have better connection accuracy and stability effectiveness under multiple interactions. In other embodiments, the elastic body 31 can also be replaced by other soft and resilient materials, such as one or more of springs, rubber, silicone, EVA elastomer and sponge.

[0019] Since the bristle tuft assembly 2 and the spring assembly 3 in this embodiment are not connected in a fixed manner, on the one hand, it is necessary for the bristle tuft assembly 2 to move freely up and down in the bristle tuft hole 11, and on the other hand, it is necessary to restrict the movement of the bristle tuft assembly 2 to prevent it from coming out of the bristle tuft hole 11. Therefore, as shown in Figure 7 and 8, the diameter of the bristle tuft base 22 in the present embodiment is slightly smaller than the diameter of the bristle tuft hole 11, so that the entire bristle tuft assembly 2 can move up and down within the bristle tuft hole 11. In addition, the top opening of the bristle tuft hole 11 is provided with an inwardly convex flange 111 with a diameter smaller than the diameter of the bristle tuft base 22 so that the bristle tuft assembly 2 can not be removed from the bristle tuft hole 11. In order to make the whole bristle tuft assembly 2 more stable, preferably, the bristle tuft assembly 2 in the initial state is pressed against the lower end surface of the convex flange 111 under the action of the bottom spring assembly 3, thus avoiding the condition that the bristle tuft assembly 2 is not strong enough and swayed left and right. Meanwhile, the diameter of the opening of the convex flange 111 is set so that the portion of the bristle tuft 21 protruding from the fixing hole 221 can be tightly bundled into a bundle, making the bristle tuft 21 bundled together can avoid bearing when brushing, avoiding the uneven bearing of the dispersed bristle tuft causing that the spring assembly 3 can not be pressed without enough pressure.

[0020] In order to facilitate the installation, there is a cavity on the toothbrush back cover 4 which is matched with the shape and size of the part where the bristle tuft holes 11 are arranged on the first body 1. The overall shape of the spring assembly 3 also coincides with the cavity, and the elastic body 31 thereon corresponds in position to the bristle tuft hole 11. As shown in FIG. 9, at the time of installation, the prepared bristle tuft assemblies 2 are installed in the bristle tuft holes 11 one by one, the upper ends of the bristle tufts 21 are exposed outside the toothbrush body through the bristle tuft holes 11 for cleaning the teeth; then the entire spring assembly 3 is fixedly mounted in the cavity on the toothbrush back cover 4 of the toothbrush and then the toothbrush back cover 4 of the toothbrush and the first main body 1 are fastened with each other. When the bristle tufts 21 exposed on the outside of the toothbrush body act on the tooth surface, the bristle tufts 21 will be subjected to external forces to compress the spring assembly 3 abutting against the bottom of the bristle tuft assembly 2. The extent to which the bristle tufts 21 are exposed to the force of the surface of the teeth and the degree to which the spring assembly 3 are compressed depend on the irregular shape of the surface of the teeth and the force of the user's hand.

[0021] With regard to tooth cleaning by a toothbrush, the most effective part for cleaning tooth is the top portion of the bristle tuft. When the bristle tufts of a conventional toothbrush contact with the tooth surface and are applied force by tooth surface, the bristle tufts would bend, making the top portion of the bristle tufts unable to effectively contact with the teeth surface to clean the teeth, which results to bad cleaning effect; and long term bending has serious damage to the properties of the bristle tufts 21, which causes the brush to wear easily and the use life is not long. Compared with the conventional toothbrush that the bristle tufts are fixed and closely fitted with the teeth, when the bristle tufts 21 in this invention are applied by external force from teeth surface, the bristle tufts 21 would compress spring 31 and move downward, so that they are not easy to bend, which makes the top portion of the bristle tufts always able to directly contact with the teeth surface, and this significantly improves the cleaning effect; at the same time, it also reduces the wear of the bristle tufts and improves the service life of the bristles. Usually, the sides of teeth and the gaps between teeth have more room and sunken space compared with the teeth surface, and when the top portion of a bristle tuft moves from tooth surface towards tooth side or the gap between teeth, the compressed elastic body 31 would quickly and responsively moves the top portion of the bristle tuft so that it would contact with the tooth side or the gap between teeth for cleaning purpose, and would

not work like conventional toothbrush closely fitted with the teeth which cannot undertake effective cleaning in accordance with the irregular shape of teeth.

[0022] While the preferred embodiments of the present application have been described, it will be apparent to those skilled in the art that other changes and modifications may be made to these embodiments once the basic inventive concepts are known. Accordingly, the appended claims are intended to be construed as including preferred embodiments and all changes and modifications that fall within the scope of the invention. It will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope of the application so that if such modifications and variations of the invention are within the scope of the appended claims and the equivalents thereof. The present application is also intended to embrace such variations.

[0023] Preferred features of the present invention are set forth in the clauses below:

1. A toothbrush closely fitted to the teeth, wherein, comprising:

a toothbrush main body, a bristle tuft hole (11) is provided on a head of the toothbrush main body;
a bristle tuft assembly (2), movably arranged in the bristle tuft hole (11);
a spring assembly (3), the bristle tuft assembly (2) is connected with the toothbrush main body through the spring assembly (3).

2. The toothbrush closely fitted to the teeth according to clause 1, wherein, the toothbrush main body comprises a first main body (1) and a toothbrush back cover (4) connected with the first main body (1); the bristle tuft hole (11) is a through hole arranged on the first main body (1); a bottom of the bristle tuft assembly (2) is connected with the toothbrush back cover (4) through the spring assembly (3).

3. The toothbrush closely fitted to the teeth according to clause 1 or 2, wherein, the number of the bristle tuft hole (11) is more than one; the spring assembly comprises a plurality of elastic bodies (31) connected with each other, an arrangement of the elastic bodies (31) corresponds to arrangement of the bristle tuft holes (11) on the toothbrush main body.

4. The toothbrush closely fitted to the teeth according to clause 1 or 2, wherein, the bristle tuft assembly (2) comprises a bristle tuft base (22) with a fixing hole (221), a compression plate (23) and a bristle tuft base support plate (24) fixed in the fixing hole (221), and a bristle tuft (21) that is compressed on the bristle tuft base support plate (24) by the compression plate (23).

5. The toothbrush closely fitted to the teeth according to clause 4, wherein, the fixing hole (221) is a tapered hole whose diameter decreases from the top to the bottom, and the compression plate (23) and the bristle tuft base support plate (24) are fixed in the fixing hole (221) by interference fit.

6. The toothbrush closely fitted to the teeth according to clause 4, wherein, an opening top of the fixing hole (221) is inwardly closed to form a certain taper.

7. The toothbrush closely fitted to the teeth according to clause 3, wherein, the elastic body (31) is a hollow frustoconical rubber elastic body.

8. The toothbrush closely fitted to the teeth according to clause 1, wherein, the spring assembly (3) comprises one or more of a spring, a rubber, a silicone rubber, an EVA elastic body and a sponge.

9. The toothbrush closely fitted to the teeth according to clause 4, wherein, a diameter of the bristle tuft base (22) is small than a diameter of the bristle tuft hole (11), and an opening top of the bristle tuft hole (11) is provided with an inwardly convex flange (111), an opening diameter of the convex flange (111) is small than a diameter of the bristle tuft base (22).

10. The toothbrush closely fitted to the teeth according to clause 2, wherein, edges of the first main body (1) and the toothbrush back cover (4) are configured with fixing groove and protrusion that match with other each in size, and the first main body (1) and the toothbrush back cover (4) are fixedly connected as a uniform body through the fixing groove and protrusion fitting into each other, the spring assembly (3) is fixed within a chamber formed between the first main body (1) and the toothbrush back cover (4).

Claims

1. A toothbrush comprising:

a toothbrush main body,
a bristle tuft hole (11) provided on a head of the toothbrush main body;
a bristle tuft assembly (2) movably arranged in the bristle tuft hole (11);
a spring assembly (3),
wherein the bristle tuft assembly (2) is connected with the toothbrush main body through the spring assembly (3).

2. The toothbrush according to claim 1, wherein the toothbrush main body comprises a first main body (1) and a toothbrush back cover (4) connected to/with the first main body (1);

wherein the bristle tuft hole (11) is a through hole arranged on the first main body (1);
and wherein a bottom of the bristle tuft assembly (2) is connected to/with the toothbrush back cover (4) through the spring assembly (3).

3. The toothbrush according to claim 1 or 2, wherein the number of the bristle tuft holes (11) is more than one; and wherein the spring assembly comprises a plurality of elastic bodies (31) connected with each other,
wherein an arrangement of the elastic bodies (31) corresponds to the arrangement of the bristle tuft holes (11) on the toothbrush main body.

4. The toothbrush according to claim 1 or 2, wherein the bristle tuft assembly (2) comprises a bristle tuft base (22) with a fixing hole (221),
and wherein a compression plate (23) and a bristle tuft base support plate (24) is fixed in the fixing hole (221), and wherein a bristle tuft (21) is compressed on the bristle tuft base support plate (24) by the compression plate (23).

5. The toothbrush according to claim 4, wherein the fixing hole (221) is a tapered hole whose diameter decreases from the top to the bottom, and wherein the compression plate (23) and the bristle tuft base support plate (24) are fixed in the fixing hole (221) by interference fit.

6. The toothbrush according to claim 4, wherein an opening top of the fixing hole (221) is inwardly closed to form a certain taper.

7. The toothbrush according to claim 3, wherein the elastic body (31) is a hollow frustoconical rubber elastic body.

8. The toothbrush according to claim 1, wherein the spring assembly (3) comprises one or more of a spring, a rubber, a silicone rubber, an EVA elastic body and a sponge.

9. The toothbrush according to claim 4, wherein a diameter of the bristle tuft base (22) is smaller than a diameter of the bristle tuft hole (11), and an opening top of the bristle tuft hole (11) is provided with an inwardly convex flange (111), and wherein an opening diameter of the convex flange (111) is smaller than a diameter of the bristle tuft base (22).

10. The toothbrush according to claim 2, wherein edges of the first main body (1) and the toothbrush back cover (4) are configured with a fixing groove and protrusion that match with other each in size, and wherein the first main body (1) and the toothbrush back cover (4) are fixedly connected as a uniform body through the fixing groove and protrusion fitting into each other, and wherein the spring assembly (3) is fixed within a chamber formed between the first main body (1) and the toothbrush back cover (4).

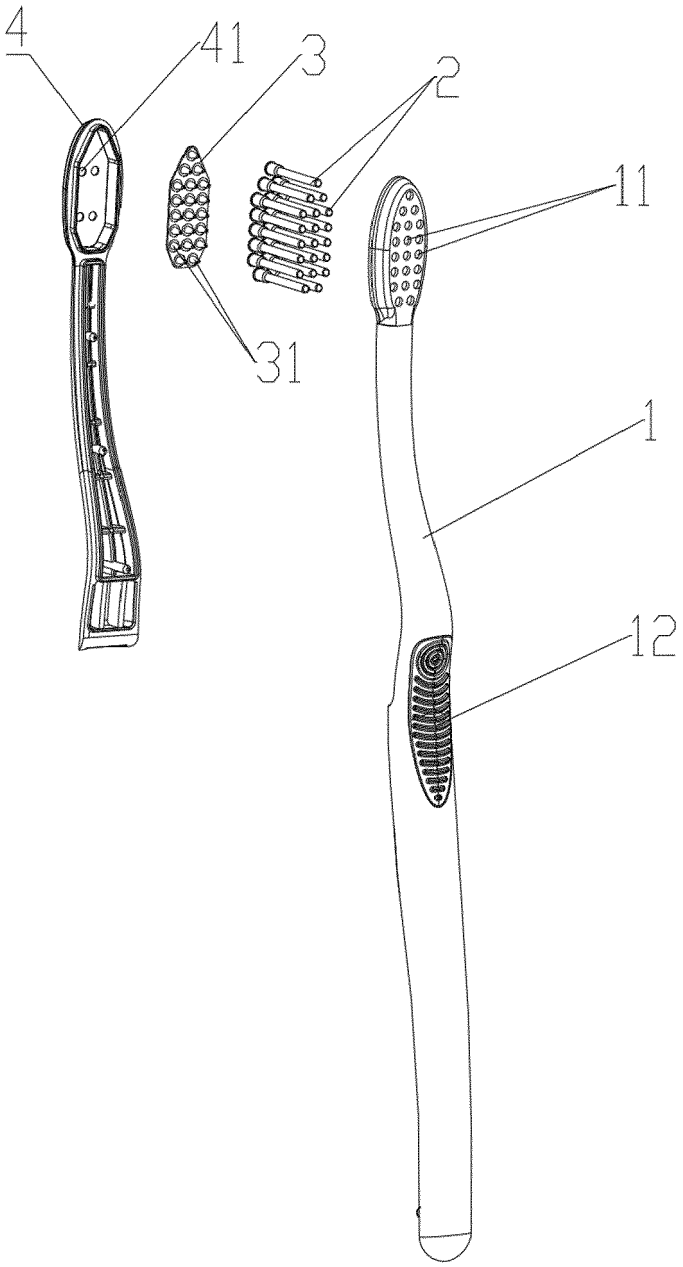

Figure 1

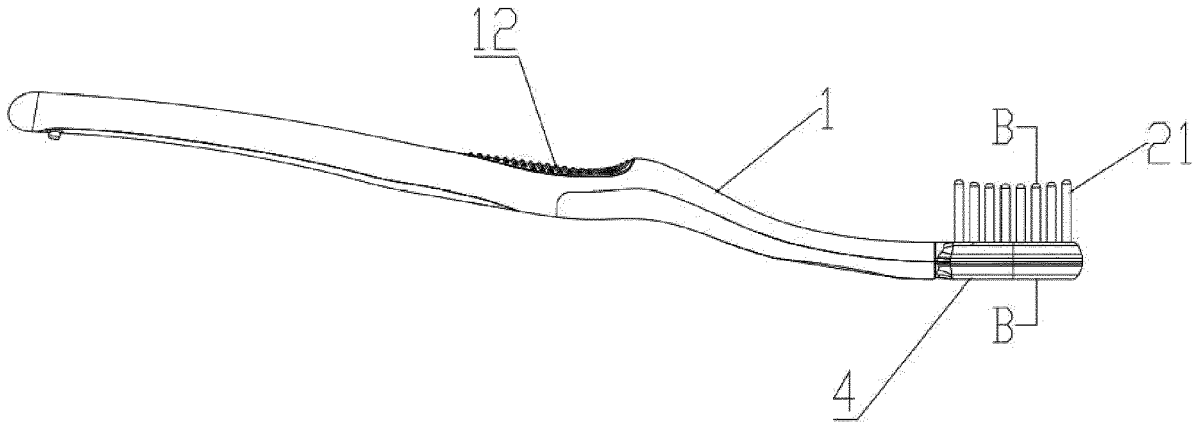

Figure 2

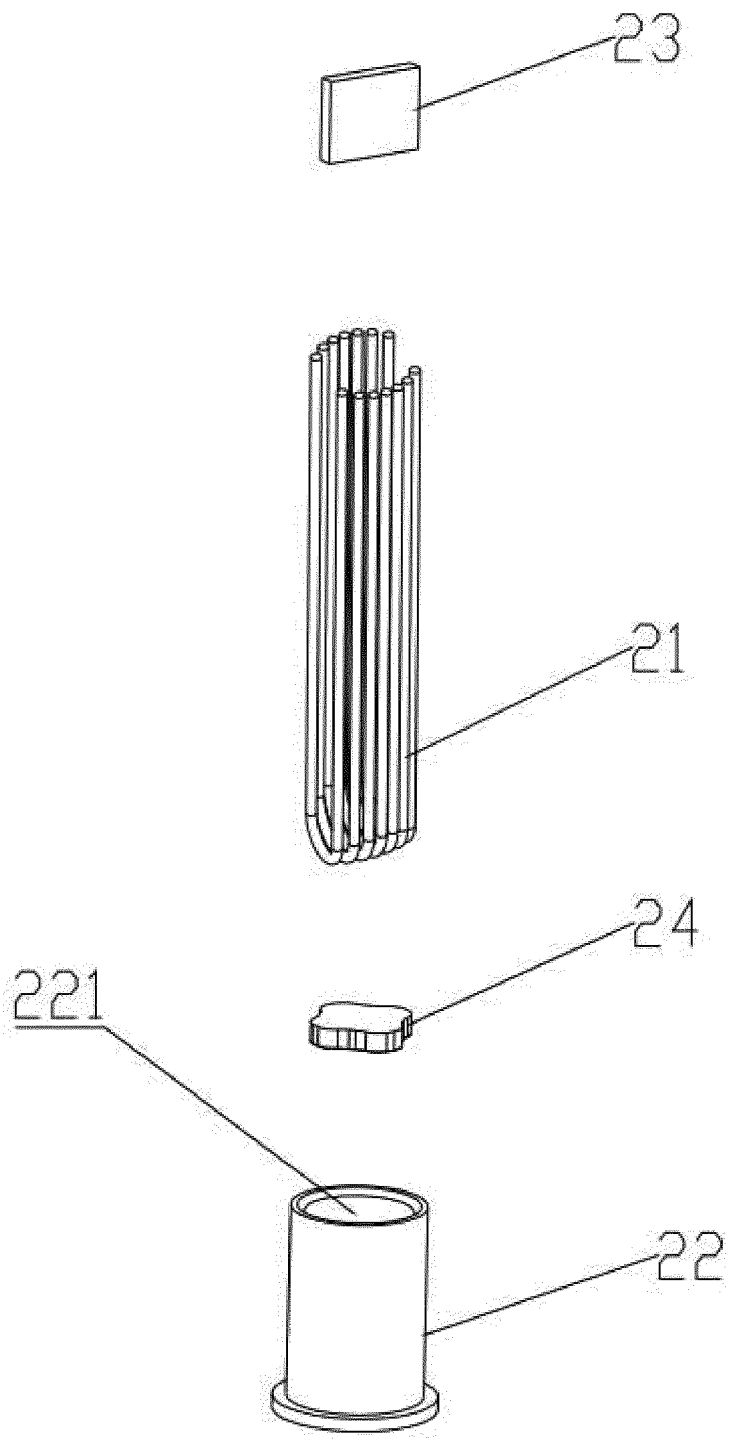

Figure 3

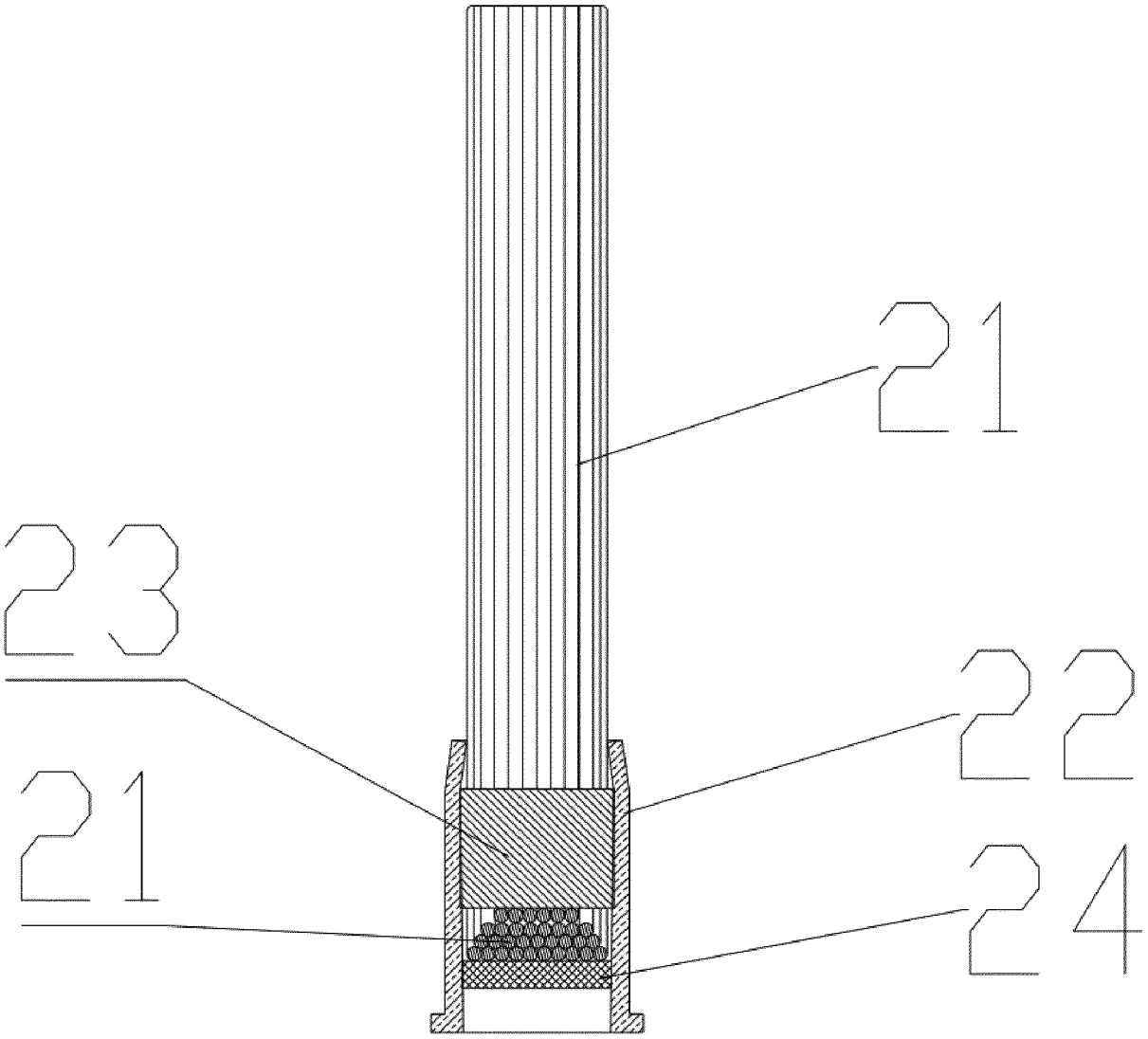

Figure 4

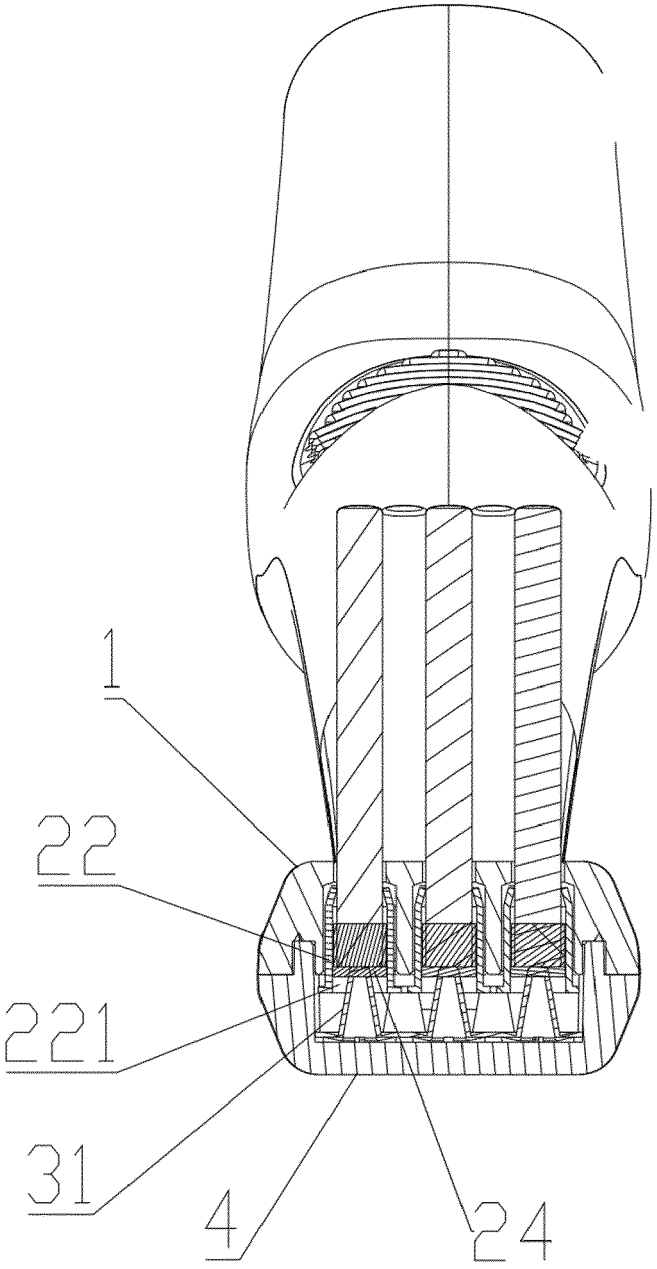

Figure 5

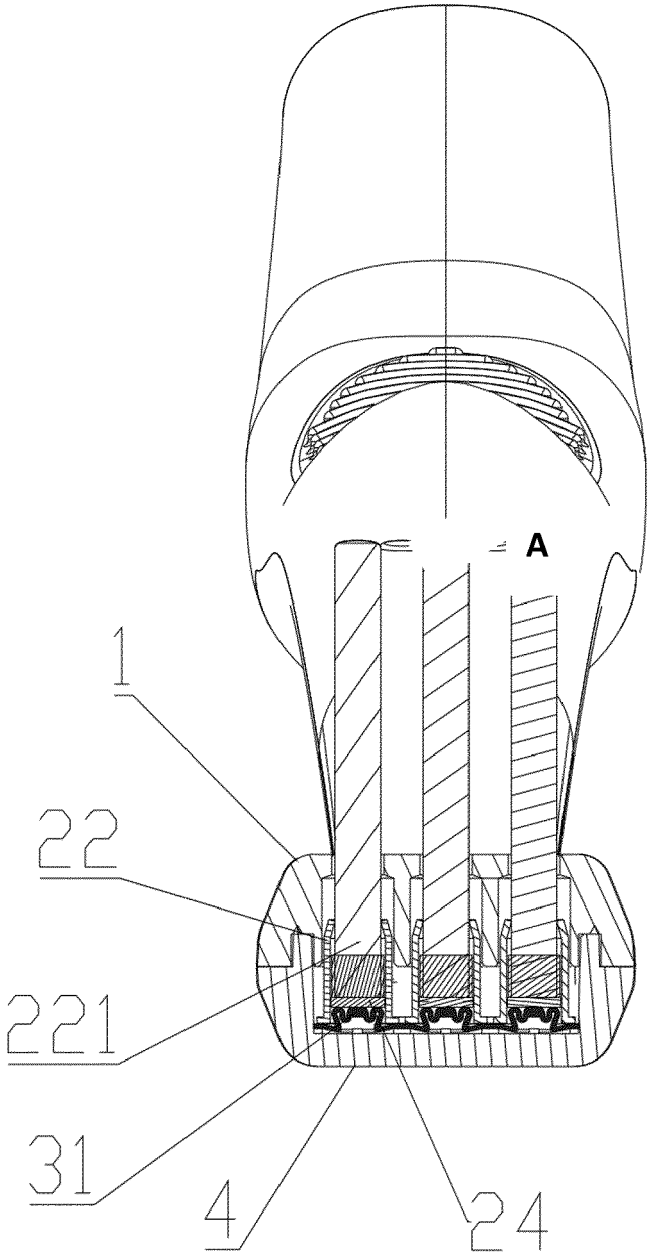

Figure 6

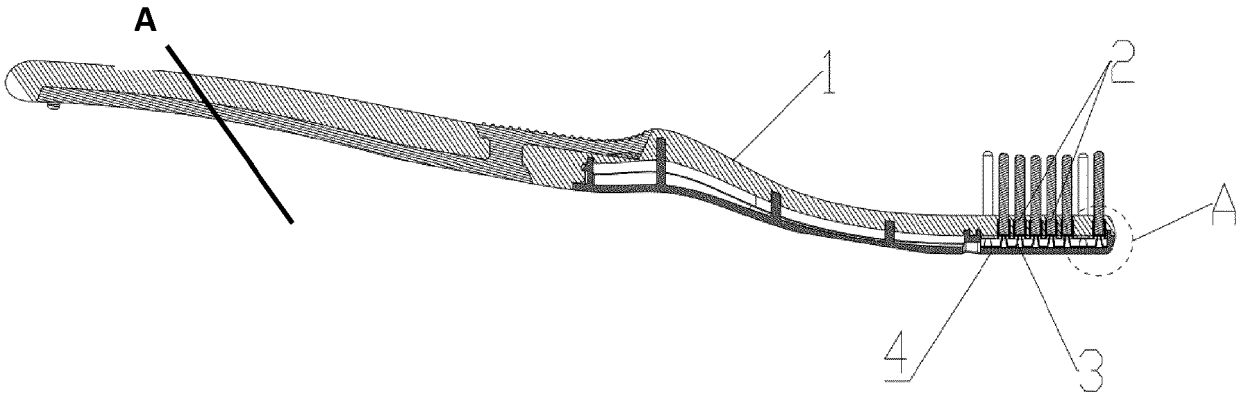

Figure 7

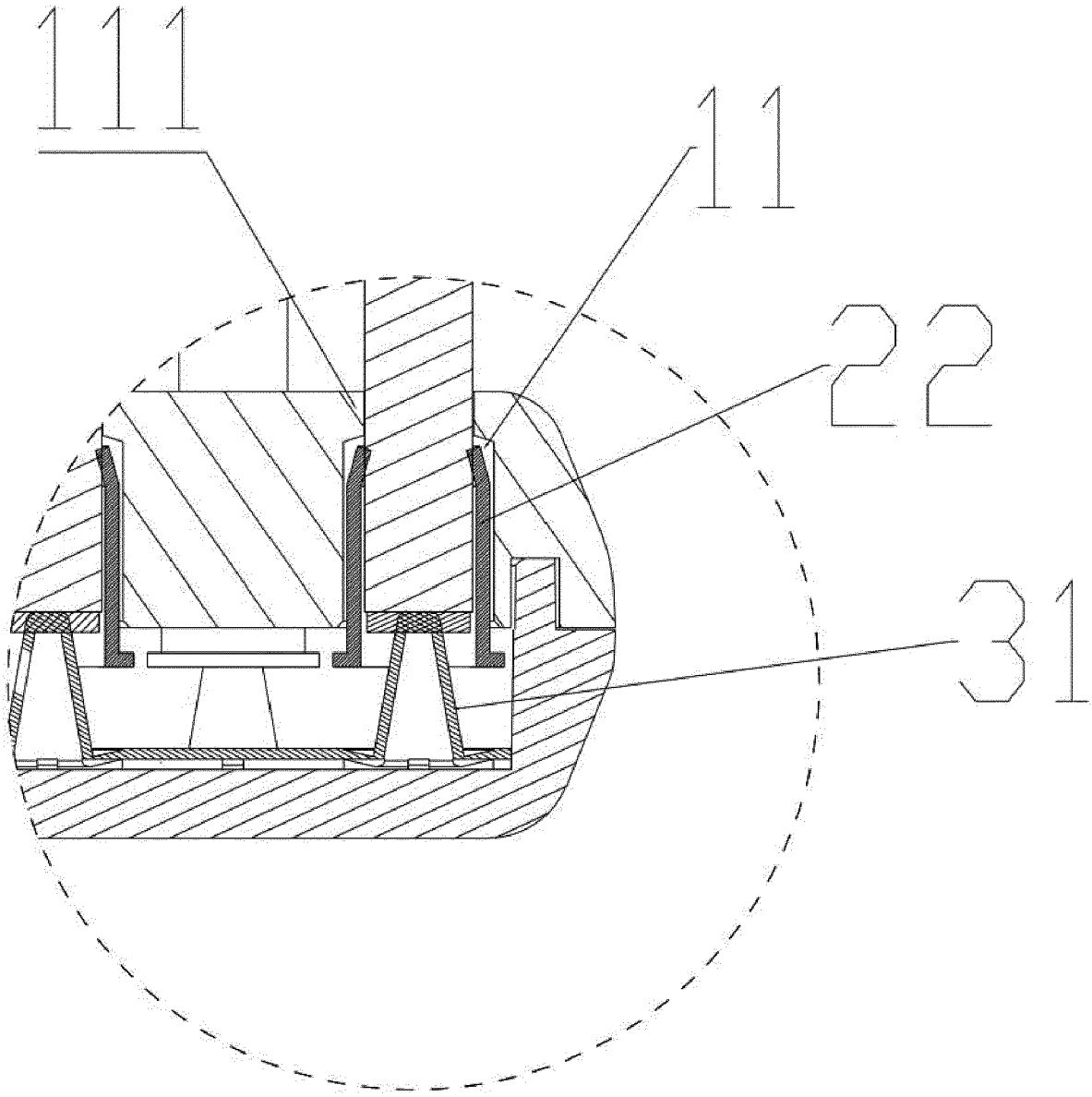

Figure 8

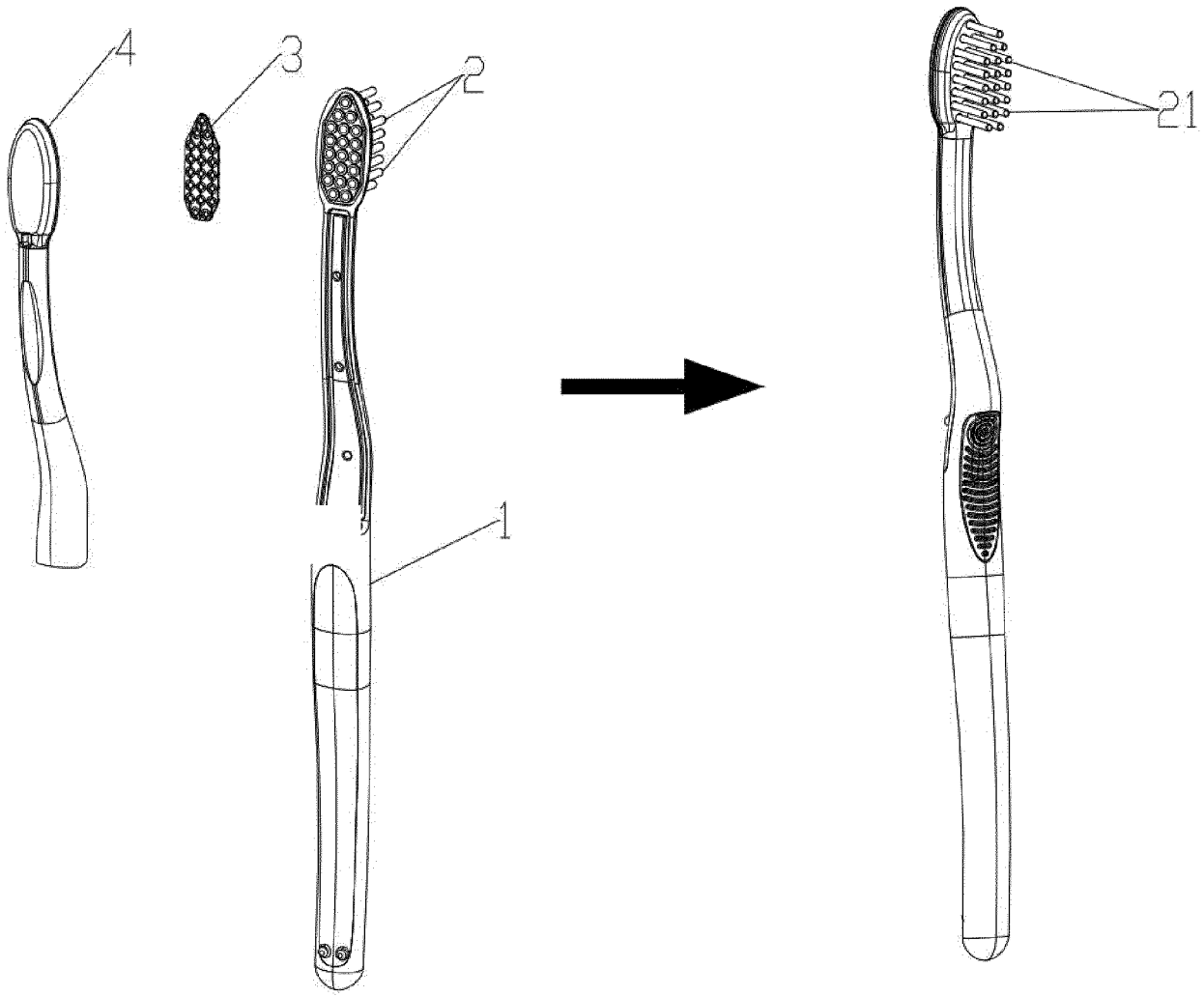

Figure 9

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 20 9802

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 3 212964 U (WANG H [JP]) 12 October 2017 (2017-10-12)	1-6,8-10	INV. A46B3/16
A	* paragraphs [0004] - [0039] * * figures 1-13 *	7	A46B7/04 A46B7/06 A46B9/04

X	US 5 318 352 A (HOLLAND NETTA [IL]) 7 June 1994 (1994-06-07)	1-4,8,10	
A	* column 1, line 29 - column 2, line 2 * * column 2, line 42 - column 4, line 44 * * figures 1-7 *	5-7,9	

X	JP H05 93253 U (MOGAMI S [JP]) 21 December 1993 (1993-12-21)	1-3,7,8, 10	
A	* paragraphs [0004] - [0006] * * figures 1-4 *	4-6,9	

X	US 2 935 755 A (RAMON LEIRA ALBERTO ET AL) 10 May 1960 (1960-05-10)	1-3,8,10	
A	* column 2, line 5 - column 3, line 7 * * figures 1-8 *	4-7,9	
	-----		TECHNICAL FIELDS SEARCHED (IPC)
X	WO 92/08390 A2 (PAZ OHAD [IL]; NATHANSON DAN [US]) 29 May 1992 (1992-05-29)	1-3,8,10	A46B
A	* page 2, paragraph 1-2 * * page 3, paragraph 7 - page 6, paragraph 1 * * figures 1-3 *	4-7,9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 May 2018	Zupancic, Gregor

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 20 9802

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-05-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 3212964 U	12-10-2017	NONE	
US 5318352 A	07-06-1994	NONE	
JP H0593253 U	21-12-1993	JP H0593253 U	21-12-1993
		JP H0647298 Y2	07-12-1994
US 2935755 A	10-05-1960	NONE	
WO 9208390 A2	29-05-1992	AT 157227 T	15-09-1997
		AU 660955 B2	13-07-1995
		CA 2096234 A1	21-05-1992
		DE 69127475 D1	02-10-1997
		DE 69127475 T2	02-04-1998
		EP 0669813 A1	06-09-1995
		JP H06505889 A	07-07-1994
		WO 9208390 A2	29-05-1992

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82