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

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

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

(54) **A MANUAL TOOTHBRUSH**

(57) This invention provides a manual toothbrush, comprising: a toothbrush main body, the casing of the top portion of the toothbrush main body is configured with one or more first connecting holes; one or more bristle tuft assemblies, every bristle tuft assembly comprises a bristle tuft and a base, bristle tufts of one or more bristle tuft assemblies go through one or more first connecting holes respectively; a spring assembly, the spring assembly comprises one or more springs, every spring comprises a coil and a coil fastening plate connecting with the coil, coils of one or more springs contact with bases of one or more bristle tuft assemblies respectively; the

spring assembly also comprises an assembly base plate and an assembly surface plate, the coil fastening plate of every spring is clamped and fixed between the assembly base plate and the assembly surface plate. This manual toothbrush skillfully is configured with springs, based upon the contact between the spring and the bristle tuft assembly, to realize the flexible movement and spring 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 and durable usage.

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Description

TECHNICAL FIELD

[0001] The present application relates to the technical field of toothbrush products, and particularly relates to a manual toothbrush in which every bristle tuft can independently move upward and downward.

BACKGROUND OF THE INVENTION

[0002] The bristle tufts in a conventional manual toothbrush in the marketplace are implanted into implantation device to be fixed, and hence the bristle tufts cannot move flexibly, which has become a big disadvantage of manual toothbrush, 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 manual 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 manual toothbrush 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 present application provides a manual toothbrush, wherein, comprising:

a toothbrush main body, the casing of the top portion of said toothbrush main body is configured with one or more first connecting holes ;
one or more bristle tuft assemblies, every said bristle tuft assembly comprises a bristle tuft and a base, bristle tufts of one or more said bristle tuft assemblies go through one or more said first connecting holes respectively;
a spring assembly, said spring assembly comprises one or more springs , every said spring comprises a coil and a coil fastening plate connecting with said coil, coils of one or more said springs contact with bases of one or more said bristle tuft assemblies respectively;

said spring assembly also comprises an assembly base plate and an assembly surface plate, the coil fastening plate of every said spring is clamped and fixed between said assembly base plate and said assembly surface plate .

[0005] Advantageously, the manual toothbrush further comprises toothbrush back cover , the inner side wall of said toothbrush back cover is configured with fitting protrusions, the size of which matches with the size of said spring assembly, said spring assembly is fixed within said toothbrush back cover through fitting into said fitting protrusions.

[0006] Advantageously, one or more first rivet connection holes and one or more second rivet connection holes are configured on said assembly base plate and said assembly surface plate respectively, one or more connecting rivets go through one or more first rivet connection holes and one or more second rivet connection holes respectively for riveting, connecting said assembly base plate and said assembly surface plate.

[0007] Advantageously, said assembly surface plate is configured with one or more surface plate through holes, the size of which match with the size of coils of one or more said springs, coils of one or more said springs go through one or more said surface plate through holes respectively;

[0008] said assembly base plate is configured with one or more enclosed protrusions, the size of which match with the size of central holes of coil fastening plates of one or more said springs, making coil fastening plates of one or more said springs being fixed by one or more enclosed protrusions respectively.

[0009] Advantageously, the area of coil fastening plates of one or more said springs are larger than one or more said surface plate through holes, one or more said enclosed protrusions go through one or more said surface plate through holes, compressing and fixing the coil fastening plates of one or more said springs between said assembly base plate and said assembly surface plate;

[0010] after going through one or more said surface plate through holes respectively, the coils of one or more said springs contact with the bases of one or more said bristle tuft assemblies respectively.

[0011] Advantageously, every said bristle tuft assembly comprises a base, a compression plate, a bristle tuft and a base support plate.

[0012] Advantageously, the base of every said bristle tuft assembly is configured with an accommodation chamber, a top opening, and a spring-holding base cavity, said base support plate is placed horizontally and fit in the bottom of said accommodation chamber, said compression plate is placed vertically and fit in said accommodation chamber; the middle part of said bristle tuft is compressed and fixed between said vertically placed compression plate and said horizontally placed base support plate, and both ends of said bristle tuft go through

the space in said accommodation chamber and are set up and exposed outside said base.

[0013] Advantageously, said top opening is configured with a splayed shape that is wide at the bottom and narrow at the top in order to compress said compression plate inside said accommodation chamber, said spring-holding base cavity accommodates the top portion of the coil of the spring, realizing that said bristle tuft press said spring downward when exerted by external force, and said bristle tuft is moved upward driven by said spring when the external force is removed.

[0014] Advantageously, for every said first connecting hole, the upper part is narrow and the lower part is wide, said base is accommodated inside the lower part, and said bristle tuft goes through the upper part and is exposed outside said toothbrush main body for cleansing teeth.

[0015] Advantageously, the bottom of every said base is configured with a fixing flange (224), the size of said fixing flange is larger than the opening size of said spring-holding base cavity.

THE BENEFICIAL EFFECT OF THE INVENTION

Beneficial Effect

[0016] The beneficial effects of the present application are that springs are skillfully configured within the manual toothbrush, and the flexible configuration and spring loaded driving force for the bristle tuft assembly are realized by letting the spring 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

[0017] In order to more clearly illustrate the embodiments of the present application or the technical solutions in the prior art, the following drawings, which are intended to be used in the description of the embodiments or the prior art, will be briefly described. It will be apparent that the drawings in the following description is an embodiment of the present invention, it will be apparent to those skilled in the art that other drawings may be obtained in accordance with the provided drawings without paying creative work.

Figure 1 provides an exploded structure diagram of a manual toothbrush, according to an embodiment of the present application.

Figure 2 provides an exploded structure diagram of a bristle tuft assembly of the manual toothbrush, ac-

cording to an embodiment of the present application. Figure 3 provides an exploded structure diagram of a bristle tuft assembly contacting with a spring-holding base cavity, according to an embodiment of the present application.

Figure 4a provides an overall structure diagram from an angle of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application.

Figure 4b provides an overall structure diagram from another angle of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application.

Figure 5a provides a structure diagram of a spring assembly fastening the coil fastening plate of a spring, according to an embodiment of the present application.

Figure 5b provides an enlarged partial structure diagram of a spring assembly fastening the coil fastening plate of a spring, according to an embodiment of the present application.

Figure 6a provides a structure diagram of the bristle tuft assembly free of external force and the spring in a free condition, according to an embodiment of the present application.

Figure 6b provides a structure diagram of the bristle tuft assembly under external force and the spring in a stressed condition, according to an embodiment of the present application.

Figure 7 provides a structure diagram of the bristle tuft assemblies corresponding to the first connecting holes, according to an embodiment of the present application.

Figure 8a provides a structure diagram of the bristle tuft assemblies configured within the first connecting holes, according to an embodiment of the present application.

Figure 8b provides an enlarged partial structure diagram of the spring contacting with the bottom of bristle tuft assembly, according to an embodiment of the present application.

Figure 9a provides a structure diagram of before using a connecting rivet to complete rivet connection between an assembly base plate and an assembly surface plate, according to an embodiment of the present application.

Figure 9b provides a structure diagram of after using a connecting rivet to complete rivet connection between an assembly base plate and an assembly surface plate, according to an embodiment of the present application.

Figure 10 provides an exploded structure diagram of the coil of the spring fitting into and contacting with the spring-holding base cavities, according to an embodiment of the present application.

Figure 11a provides an overall structure diagram of a bristle tuft assembly, according to an embodiment of the present application.

Figure 11b provides an exploded structure diagram of a bristle tuft assembly, according to an embodiment of the present application.

Figure 12 provides a cross-sectional structure diagram of a bristle tuft assembly, according to an embodiment of the present application.

Figure 13a provides a section structure diagram of a bristle tuft assembly, according to an embodiment of the present application.

Figure 13b provides an enlarged partial structure diagram of part A of a bristle tuft assembly, according to an embodiment of the present application.

Figure 13c provides an enlarged partial structure diagram of part B of a bristle tuft assembly, according to an embodiment of the present application.

EMBODIMENT OF THE INVENTION

[0018] In order to solve the above technical problems, the overall idea of the embodiment of the present application is as follows:

[0019] Figure 1 provides an exploded structure diagram of a manual toothbrush, according to an embodiment of the present application, and figure 2 provides an exploded structure diagram of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application. The manual toothbrush of this invention comprises a toothbrush main body 1, one or more bristle tuft assemblies 2, and a spring assembly 3. The casing of the top portion of the toothbrush main body 1 is configured with one or more first connecting holes 11. Combined with figure 11, it can be drawn that every bristle tuft assembly 2 comprises a bristle tuft 21 and a base 22, bristle tufts 21 of one or more bristle tuft assemblies 2 go through one or more first connecting holes 11 respectively.

[0020] The spring assembly 3 comprises one or more springs 31, every spring 31 comprises a coil 312 and a coil fastening plate 311 connecting with the coil 312. Combined with figures 2 and 3, it can be drawn that the spring assembly 3 comprises one or more springs 31, top portions of one or more springs 31 contact with spring-holding base cavity 223 of one or more bristle tuft assembly bases 22 respectively.

[0021] The spring assembly 3 also comprises an assembly base plate 32 and an assembly surface plate 33, the coil fastening plate 311 of every spring 31 is clamped and fixed between the assembly base plate 32 and the assembly surface plate 33. Every spring 31 comprises the coil 312 and the coil fastening plate 311 connecting with the coil 312, the coil fastening plate 311 is clamped and fixed between the assembly base plate 32 and the assembly surface plate 33.

[0022] As shown in figure 10, the edges of the toothbrush 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 toothbrush main body 1 and toothbrush back cover 4 are fixedly connected as a

uniform body through the fixing groove and protrusion fitting into each other, one or more bristle tuft assemblies 2 and spring assembly 3 are configured and fixed within the chamber formed between the toothbrush main body 1 and toothbrush back cover 4.

[0023] The manual toothbrush also comprises a toothbrush back cover 4, the inner side wall of the toothbrush back cover 4 is configured with fitting protrusions 41, the size of which matches with the size of the spring assembly 3, and the spring assembly 3 is fixed within the toothbrush back cover 4 through fitting into the fitting protrusions 41, and the whole spring assembly 3 is fixedly connected with the toothbrush back cover 4 through ultrasonic welding.

[0024] Figure 2 provides an exploded structure diagram of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application. One or more first rivet connection holes 321 and one or more second rivet connection holes 331 are configured on the assembly base plate 32 and the assembly surface plate 33 respectively, one or more connecting rivets 5 go through one or more first rivet connection holes 321 and one or more second rivet connection holes 331 respectively for riveting, connecting the assembly base plate 32 and the assembly surface plate 33. In the preferred embodiment in figure 2, there are four first rivet connection holes 321 and four second rivet connection holes 331 configured on the assembly base plate 32 and the assembly surface plate 33 respectively, and correspondingly four connecting rivets are used to connect the assembly base plate 32 and the assembly surface plate 33.

[0025] The assembly surface plate 33 is configured with one or more surface plate through holes 332, the size of which match with the size of coils 312 of one or more springs 31, coils 312 of one or more springs 31 go through one or more surface plate through holes 332 respectively. However, the sizes of the coil fastening plates 311 of one or more springs 31 is larger than the corresponding one or more surface plate through holes 332 respectively, so that only the coil 312 of every spring 31 is able to go through the corresponding surface plate through hole 332, while the coil fastening plate 311 cannot.

[0026] The assembly base plate 32 is configured with one or more enclosed protrusions 322, the size of which match with the size of central holes of coil fastening plates 311 of one or more springs 31, making coil fastening plates 311 of one or more springs 31 being fixed by one or more enclosed protrusions 322 respectively, and hence the coil fastening plate 311 is clamped and fixed between the assembly base plate 32 and the assembly surface plate 33. Advantageously, the size, shape and material of every spring 31 in one or more springs 31 are the same.

[0027] Figure 3 provides an exploded structure diagram of a bristle tuft assembly contacting with a spring-holding base cavity, according to an embodiment of the present application. After going through one or more sur-

face plate through holes 332 respectively, the coils 312 of one or more springs 31 contact with the spring-holding base cavities 223 of the bases 22 of one or more bristle tuft assemblies 2 respectively.

[0028] Figure 4a provides an overall structure diagram from an angle of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application, and figure 4b provides an overall structure diagram from another angle of a bristle tuft assembly of the manual toothbrush, according to an embodiment of the present application. It can be drawn from figures 4a and 4b that besides applying connecting rivet 5 to realize rivet connection between the assembly base plate 32 and the assembly surface plate 33, multiple concave connecting points of the assembly base plate 32 and the assembly surface plate 33 are applied with laser riveting, further fastening the assembly base plate 32 and the assembly surface plate 33 as a uniform body, along with the formation of connecting concave 39. For the preferred embodiments in the figures, six concave connecting points are applied with laser riveting, after which six connecting concave 39 are formed. In addition, the six connecting concave 39 are fit into and fixed with six corresponding connecting convex 41 respectively, the sizes and positions of which match with those of the six connecting concave 39, in order to realize that the spring assembly 3 is fixed within the toothbrush back cover 4 through fitting into the connecting convex 41.

[0029] Figure 5a provides a structure diagram of a spring assembly fastening the coil fastening plate of a spring, according to an embodiment of the present application, and figure 5b provides an enlarged partial structure diagram of a spring assembly fastening the coil fastening plate of a spring, according to an embodiment of the present application. The area of coil fastening plates 311 of one or more springs 31 are larger than one or more surface plate through holes 332, one or more enclosed protrusions 322 go through one or more surface plate through holes 332, compressing and fixing the coil fastening plates 311 of one or more springs 31 between the assembly base plate 32 and the assembly surface plate 33. In addition, the outer diameter of every enclosed protrusion 322 is smaller than the corresponding inner diameter of the coil 312. In such way, under the condition that the coil fastening plate 311 is clamped, coil 312 extends outward based upon the assembly base plate 32 and the assembly surface plate 33.

[0030] Figure 6a provides a structure diagram of the bristle tuft assembly free of external force and the spring in a free condition, according to an embodiment of the present application, and figure 6b provides a structure diagram of the bristle tuft assembly under external force and the spring in a stressed condition, according to an embodiment of the present application. Springs 31 contact with the spring-holding base cavity (not shown) configured in the bottom of the base 22 of the bristle tuft assembly 2. Every first connecting hole 11 the upper part is narrow and the lower part is wide, the base 22 is con-

figured within the lower part of the first connecting hole 11, and the diameter size of the upper part of the first connecting hole 11 is smaller than the size of the base 22, and hence base 22 cannot go through but is only able to move upward and downward in the room of the lower part of the first connecting hole 11. The bristle tuft 21 goes through the upper part of the first connecting hole 11 and is exposed outside the toothbrush main body 1 for cleansing teeth. When bristle tufts 21 that are exposed outside the toothbrush main body 1 contact with the tooth surface, the bristle tufts 21 are exerted by external force, which presses the spring 31 that contacts with the bottom of the bristle tuft 2. The degree of the external force exerted upon the bristle tuft 21 by tooth surface and the degree of compression of the spring 31 depend upon the irregular shape of the tooth surface and the force by user's hand.

[0031] 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. Compared with the conventional toothbrush that the bristle tufts are fixed, 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. 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 spring 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 manual toothbrush which cannot undertake effective cleaning in accordance with the irregular shape of teeth.

[0032] Figure 7 provides a structure diagram of the bristle tuft assemblies corresponding to the first connecting holes, according to an embodiment of the present application. Figure 8a provides a structure diagram of the bristle tuft assemblies configured within the first connecting holes, according to an embodiment of the present application, and figure 8b provides an enlarged partial structure diagram of the spring contacting with the bottom of bristle tuft assembly, according to an embodiment of the present application.

[0033] Figure 9a provides a structure diagram of before using a connecting rivet to complete rivet connection between an assembly base plate and an assembly surface plate, according to an embodiment of the present application, and figure 9b provides a structure diagram of after

using a connecting rivet to complete rivet connection between an assembly base plate and an assembly surface plate, according to an embodiment of the present application. One end of the connecting rivet 5 goes through the second rivet connection hole 331 of the assembly surface plate 33 and the first rivet connection hole 321 of the assembly base plate 32, and rivet machining and processing is applied upon such end to form flanging, so that the assembly base plate 32 and the assembly surface plate 33 are fixed together as a uniform body.

[0034] Figure 10 provides an exploded structure diagram of the coil of the spring fitting into and contacting with the spring-holding base cavities, according to an embodiment of the present application.

[0035] Figure 11a provides an overall structure diagram of a bristle tuft assembly, according to an embodiment of the present application, and figure 11b provides an exploded structure diagram of a bristle tuft assembly, according to an embodiment of the present application. Every bristle tuft assembly 2 comprises a base 22, a compression plate 23, and a bristle tuft 21 and a base support plate 24.

[0036] Figure 12 provides a cross-sectional structure diagram of a bristle tuft assembly, according to an embodiment of the present application. Figure 13a provides a section structure diagram of a bristle tuft assembly, according to an embodiment of the present application; figure 13b provides an enlarged partial structure diagram of part A of a bristle tuft assembly, according to an embodiment of the present application; figure 13c provides an enlarged partial structure diagram of part B of a bristle tuft assembly, according to an embodiment of the present application. The base 22 of every bristle tuft assembly 2 is configured with an accommodation chamber 221, a top opening 222, and a spring-holding base cavity 223, and the base support plate 24 is placed horizontally and fit in the bottom of the accommodation chamber 221, and the compression plate 23 is placed vertically and fit in the accommodation chamber 221; the middle part of the bristle tuft 21 is compressed and fixed between the vertically placed compression plate 23 and the horizontally placed base support plate 24, and both ends of the bristle tuft 21 go through the space in the accommodation chamber 221 and are set up and exposed outside the base 22.

[0037] the top opening 222 is configured with a splayed shape that is wide at the bottom and narrow at the top in order to compress the compression plate 23 inside the accommodation chamber 221, and the top opening 222 is made of materials that are easy to deform. The spring-holding base cavity 223 accommodates the top portion of the coil 312 of the spring 31, realizing that the bristle tuft 2 press the spring 31 downward when exerted by external force, and the bristle tuft 2 is moved upwards driven by the spring 31 when the external force is removed.

[0038] For every first connecting hole 11, the upper part is narrow and the lower part is wide, the main body 226 of the base 22 is accommodated within the lower

part of the first connecting hole 11, the bristle tuft 21 goes through the upper part and is exposed outside the tooth-brush main body 1 for cleaning purpose.

[0039] The bottom of every base 22 is configured with a fixing flange 224, and the size of the fixing flange 224 is larger than the opening size of the spring-holding base cavity 223. As shown in figure 11, the fixing flange 224 can be round enclosure. the size of the fixing flange 224 is larger than the opening size of the spring-holding base cavity 223. Together with figure 8, it can be drawn that the main body 226 of the base 22 above the fixing flange 224 can be accommodated within the lower part of the first connecting hole 11, and the size of the fixing flange 224 is larger than the size of the cross section of the first connecting hole 11, and thus the base 22 can be prevented to be completely accommodated within or got stuck in the first connecting hole 11, which makes it unable to freely move upwards and downwards.

[0040] In the assembling process of the bristle tuft assembly 2, before the compression plate 23 is placed into the accommodation chamber 221 of the base 22, the top opening 222 is configured with a splayed shape that is wide at the bottom and narrow at the top in order to make it convenient for placing the compression plate 23 and the base support plate 24, and then the base support plate 24 is placed into and fixed in the accommodation chamber 221 of the base 22. In assembling, the bristle tuft 21 initially is in a condition that the two ends are in a straight line, and the compression plate 23, under the external force by a mechanical fixture, is moved to the middle part of the bristle tuft 21 and is positioned vertical to the extension direction of the bristle tuft 21, and then the compression plate 23 is moved in the direction that is vertical to the extension direction of the bristle tuft under the mechanical fixture, so that the bristle tuft 21 is bent and folded, and finally the middle part of the folded bristle tuft 21 drives the bristle tuft 21, together with the compression plate 23, to be placed into the accommodation chamber 221. Moreover, the middle part of the bristle tuft 21 is compressed between the compression plate 23 and the base support plate 24. The top opening 222, under manual or mechanical external force, is deformed from the inverted splayed shape that is narrow at the bottom and wide at the top to the splayed shape that is narrow at the top and wide at the bottom, in such way the compression plate 23 is fixed within the accommodation chamber 221, and is not easy to loosen or fall off. The spring-holding base cavity 223 accommodates the top portion of the spring, realizing that the spring is compressed when the bristle tuft assembly 2 is exerted external force, and the bristle tuft assembly 2 is moved by the spring to the initial position when the external force is removed.

[0041] In addition, from the two enlarged diagrams of figures 13b and 13c, it can be drawn that the compression plate 23 and the inner side wall (namely the wall of the accommodation chamber 221) of the main body 226 are fixed through interference fit, and the base support plate

24 and the inner side wall (namely the wall of the accommodation chamber 221) of the main body 226 are also fixed through interference fit.

[0042] 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.

[0043] 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.

Claims

1. A manual toothbrush, wherein, comprising:

a toothbrush main body (1), the casing of the top portion of said toothbrush main body (1) is configured with one or more first connecting holes (11);

one or more bristle tuft assemblies (2), every said bristle tuft assembly (2) comprises a bristle tuft (21) and a base (22), bristle tufts (21) of one or more said bristle tuft assemblies (2) go through one or more said first connecting holes (11) respectively;

a spring assembly (3), said spring assembly (3) comprises one or more springs (31), every said spring (31) comprises a coil (312) and a coil fastening plate (311) connecting with said coil (312), coils (312) of one or more said springs (31) contact with bases (22) of one or more said bristle tuft assemblies (2) respectively;

said spring assembly (3) also comprises an assembly base plate (32) and an assembly surface plate (33), the coil fastening plate (311) of every said spring (31) is clamped and fixed between said assembly base plate (32) and said assembly surface plate (33).

2. The manual toothbrush according to claim 1, wherein, further comprising toothbrush back cover (4), the inner side wall of said toothbrush back cover (4) is configured with fitting protrusions (41), the size of which matches with the size of said spring assembly (3), said spring assembly (3) is fixed within said toothbrush back cover (4) through fitting into said fitting protrusions (41).

3. The manual toothbrush according to claim 2, where-

in, one or more first rivet connection holes (321) and one or more second rivet connection holes (331) are configured on said assembly base plate (32) and said assembly surface plate (33) respectively, one or more connecting rivets (5) go through one or more first rivet connection holes (321) and one or more second rivet connection holes (331) respectively for riveting, connecting said assembly base plate (32) and said assembly surface plate (33).

4. The manual toothbrush according to claim 3, wherein, said assembly surface plate (33) is configured with one or more surface plate through holes (332), the size of which match with the size of coils (312) of one or more said springs (31), coils (312) of one or more said springs (31) go through one or more said surface plate through holes (332) respectively; said assembly base plate (32) is configured with one or more enclosed protrusions (322), the size of which match with the size of central holes of coil fastening plates (311) of one or more said springs (31), making coil fastening plates (311) of one or more said springs (31) being fixed by one or more enclosed protrusions (322) respectively.

5. The manual toothbrush according to claim 4, wherein, the area of coil fastening plates (311) of one or more said springs (31) are larger than one or more said surface plate through holes (332), one or more said enclosed protrusions (322) go through one or more said surface plate through holes (332), compressing and fixing the coil fastening plates (311) of one or more said springs (31) between said assembly base plate (32) and said assembly surface plate (33); after going through one or more said surface plate through holes (332) respectively, the coils (312) of one or more said springs (31) contact with the bases (22) of one or more said bristle tuft assemblies (2) respectively.

6. The manual toothbrush according to claim 1, wherein, every said bristle tuft assembly (2) comprises a base (22), a compression plate (23), a bristle tuft (21) and a base support plate (24).

7. The manual toothbrush according to claim 6, wherein, the base (22) of every said bristle tuft assembly (2) is configured with an accommodation chamber (221), a top opening (222), and a spring-holding base cavity (223), said base support plate (24) is placed horizontally and fit in the bottom of said accommodation chamber (221), said compression plate (23) is placed vertically and fit in said accommodation chamber (221); the middle part of said bristle tuft (21) is compressed and fixed between said vertically placed compression plate (23) and said horizontally placed base support plate (24), and both ends of

said bristle tuft (21) go through the space in said accommodation chamber (221) and are set up and exposed outside said base (22).

8. The manual toothbrush according to claim 7, wherein, said top opening (222) is configured with a splayed shape that is wide at the bottom and narrow at the top in order to compress said compression plate (23) inside said accommodation chamber (221), said spring-holding base cavity (223) accommodates the top portion of the coil (312) of the spring (31), realizing that said bristle tuft (2) press said spring (31) downward when exerted by external force, and said bristle tuft (2) is moved upward driven by said spring (31) when the external force is removed. 5 10 15
9. The manual toothbrush according to claim 8, wherein, for every said first connecting hole (11), the upper part is narrow and the lower part is wide, said base (22) is accommodated inside the lower part, and said bristle tuft (21) goes through the upper part and is exposed outside said toothbrush main body (1) for cleansing teeth. 20 25
10. The manual toothbrush according to claim 9, wherein, the bottom of every said base (22) is configured with a fixing flange (224), the size of said fixing flange (224) is larger than the opening size of said spring-holding base cavity (223). 30

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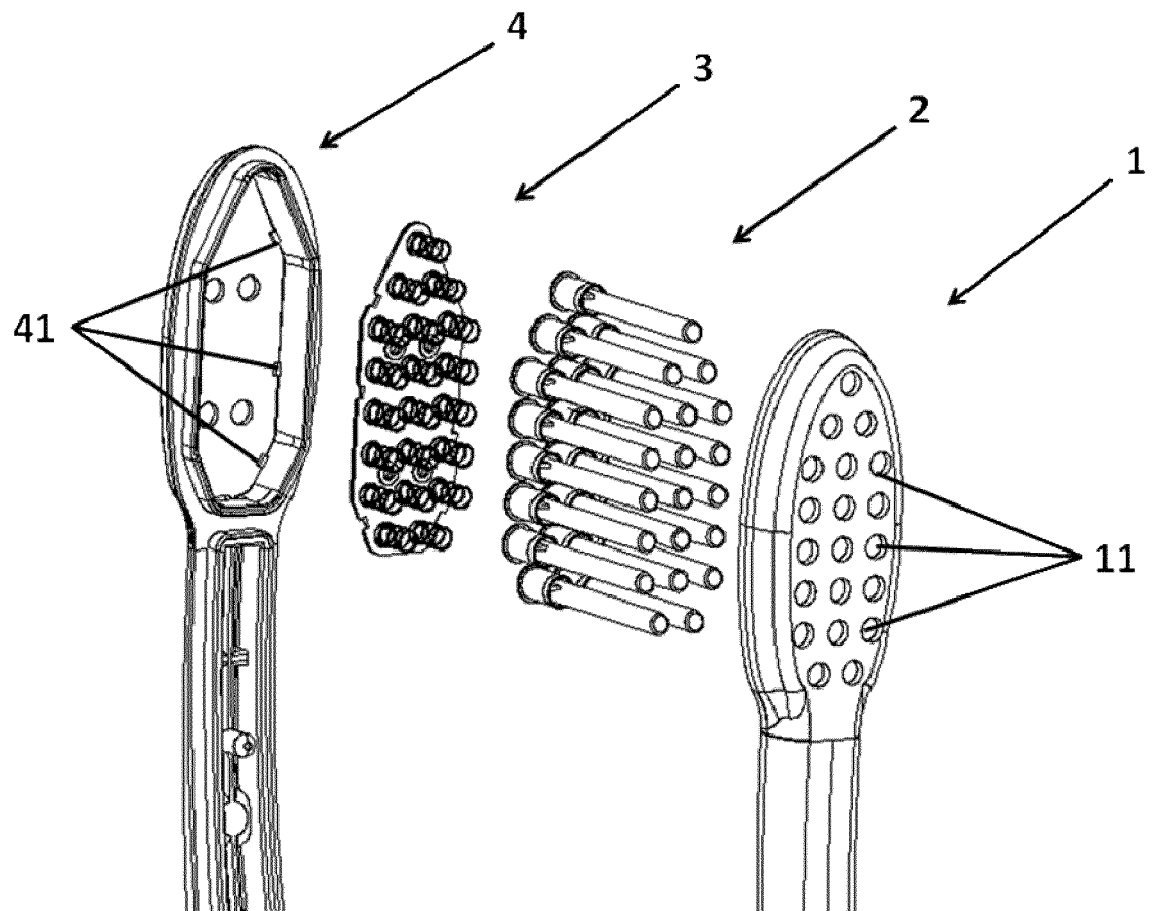


Figure 1

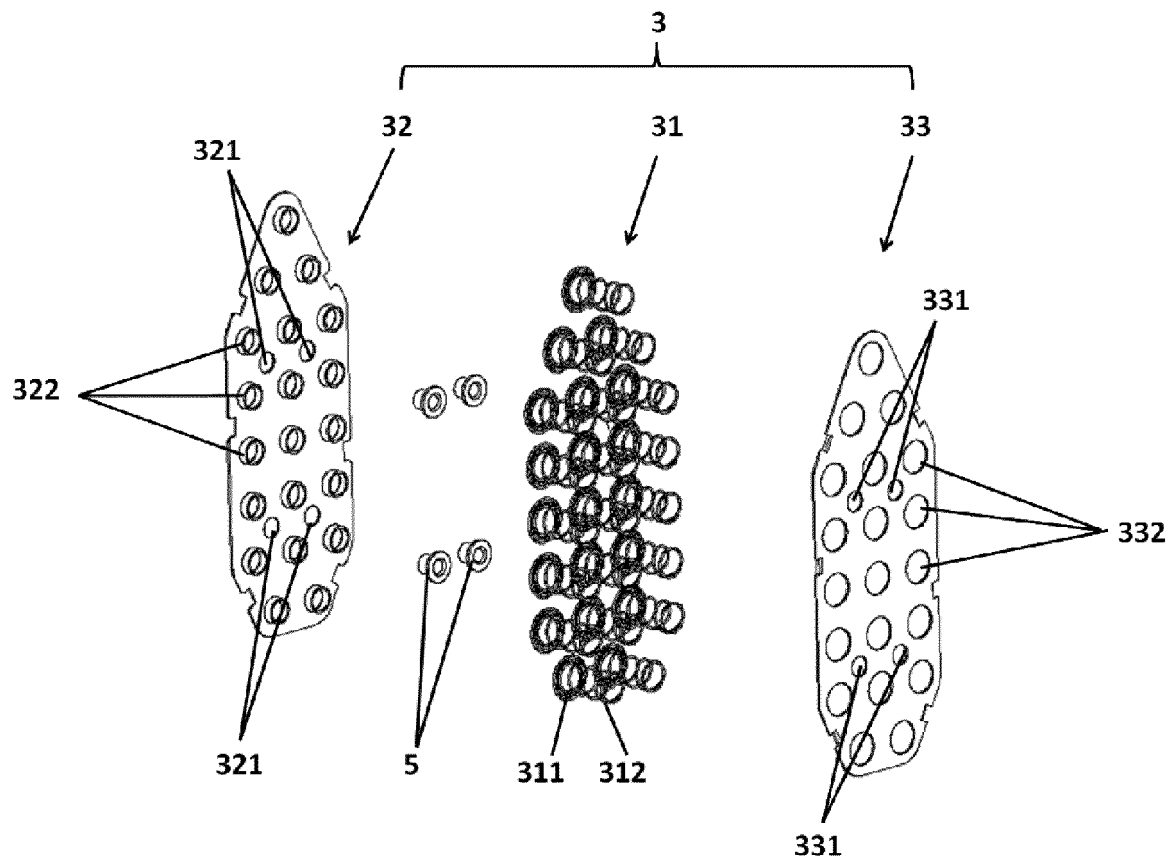


Figure 2

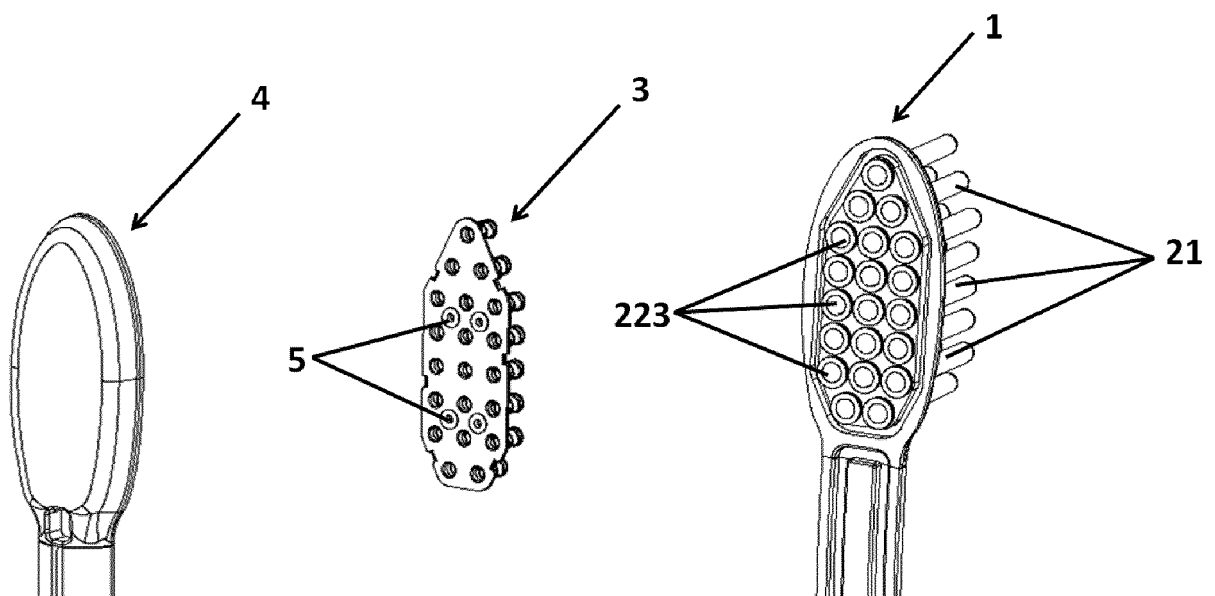


Figure 3

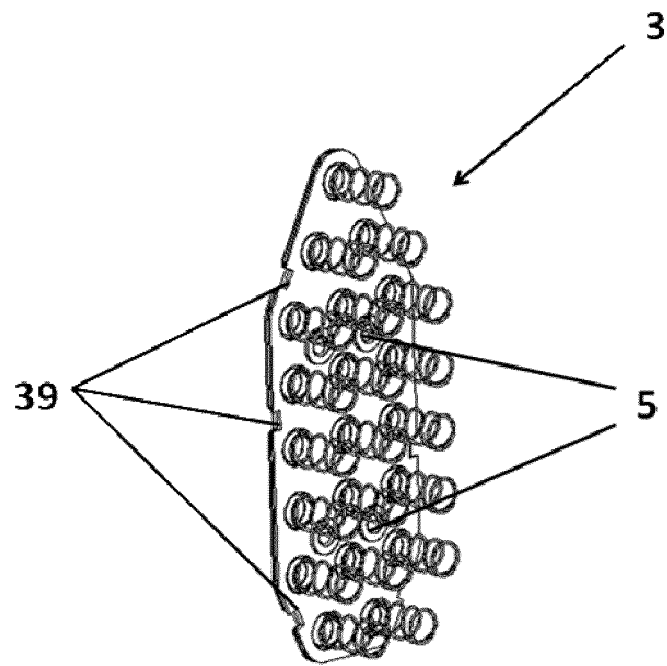


Figure 4a

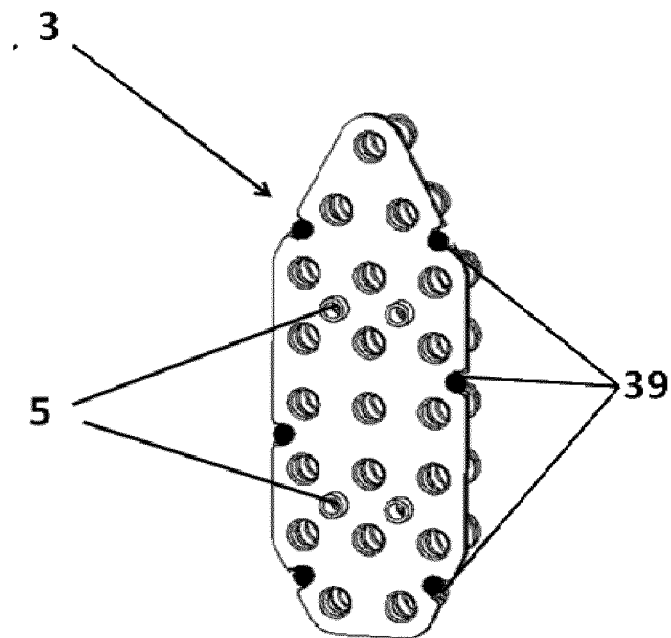


Figure 4b

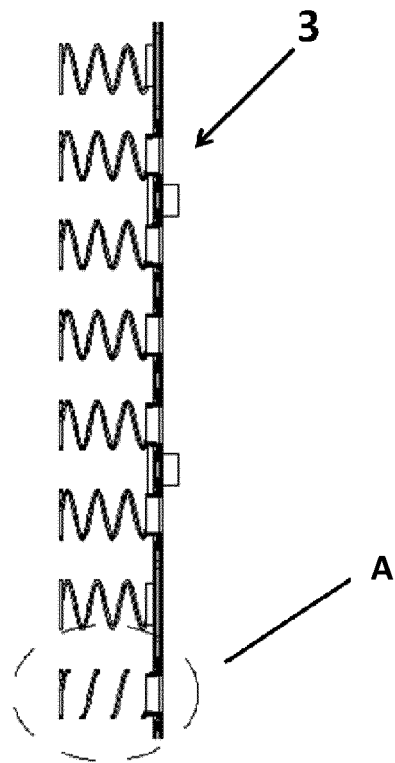


Figure 5a

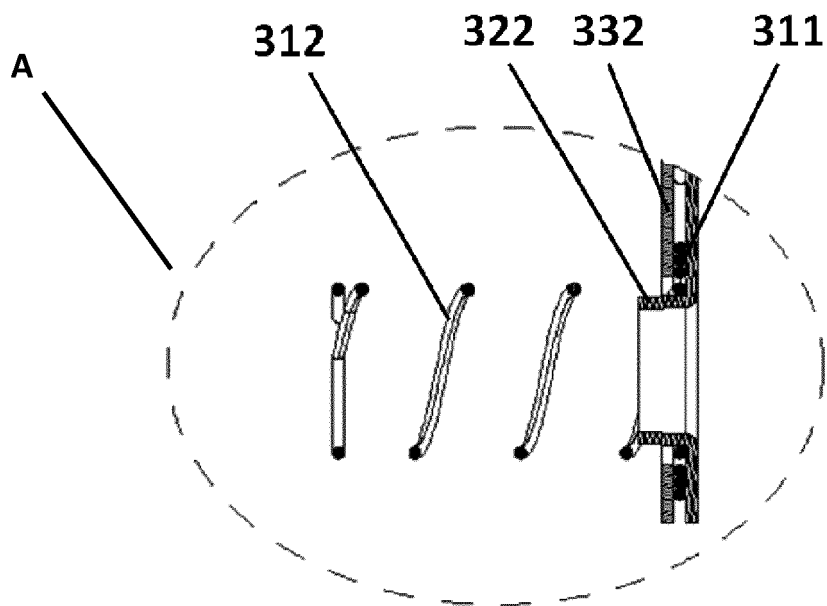


Figure 5b

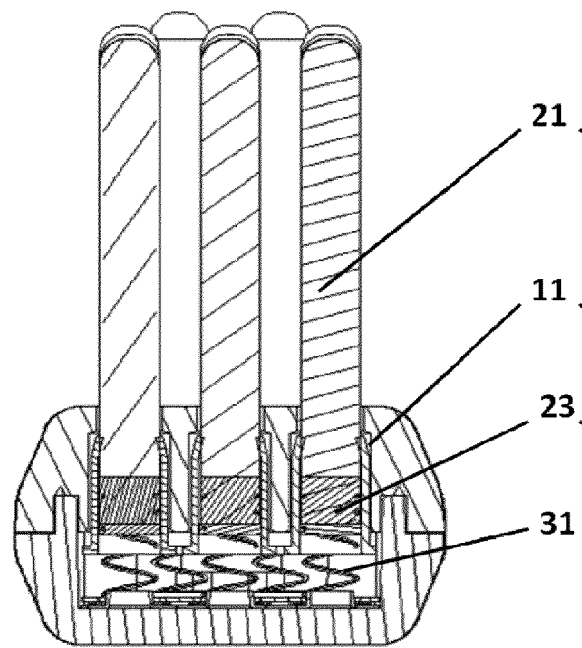


Figure 6a

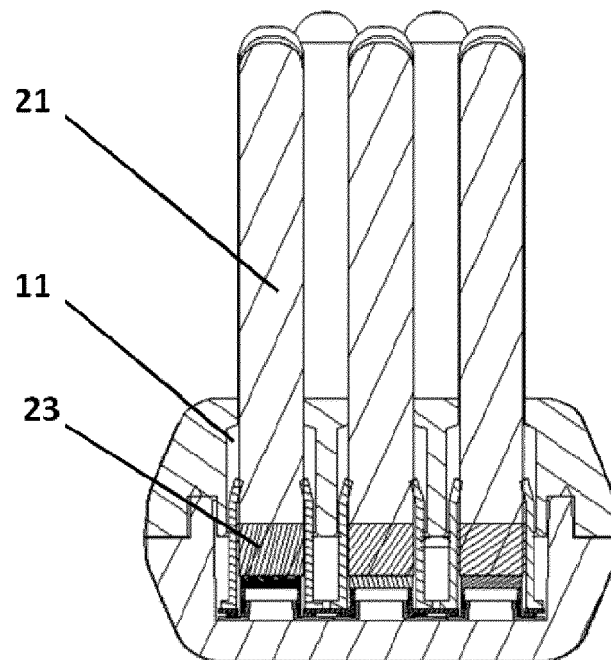


Figure 6b

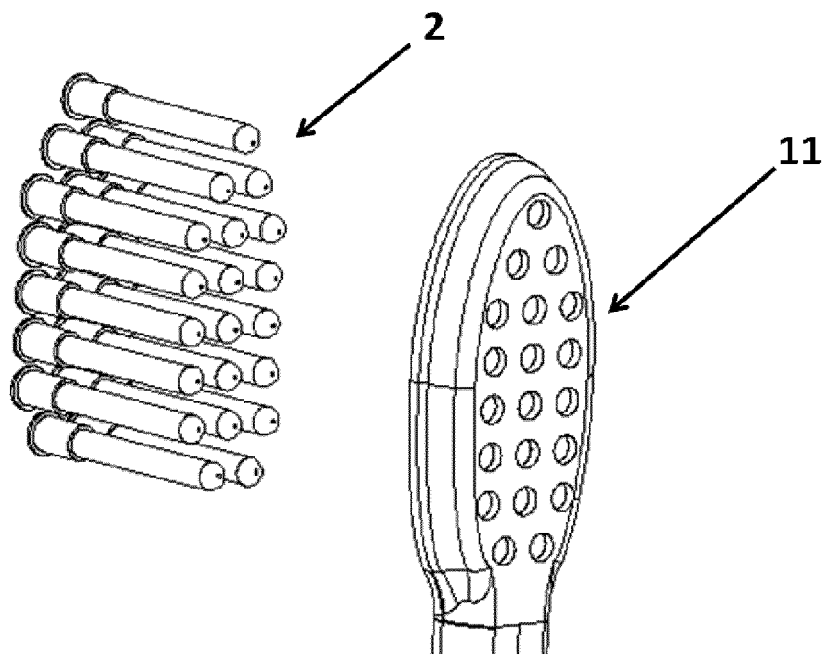


Figure 7

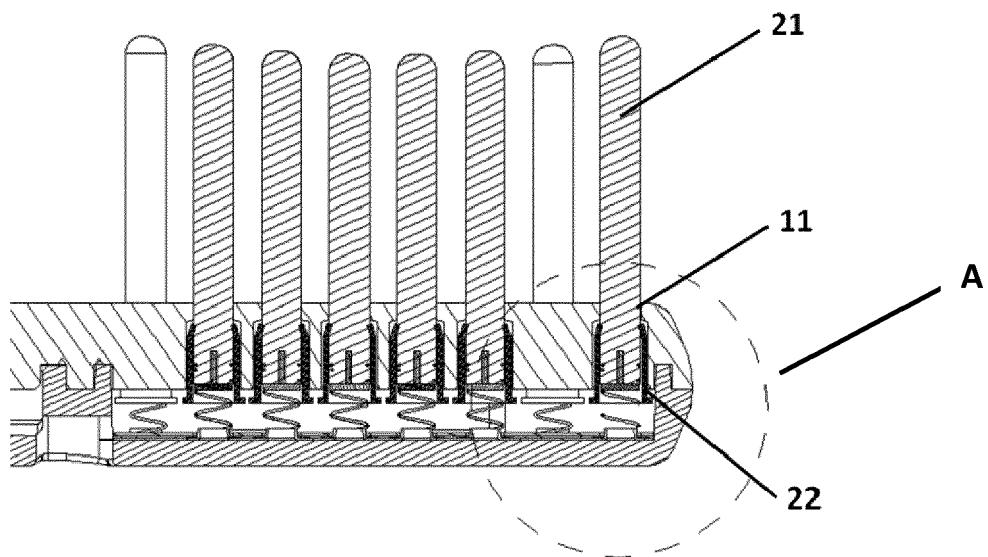


Figure 8a

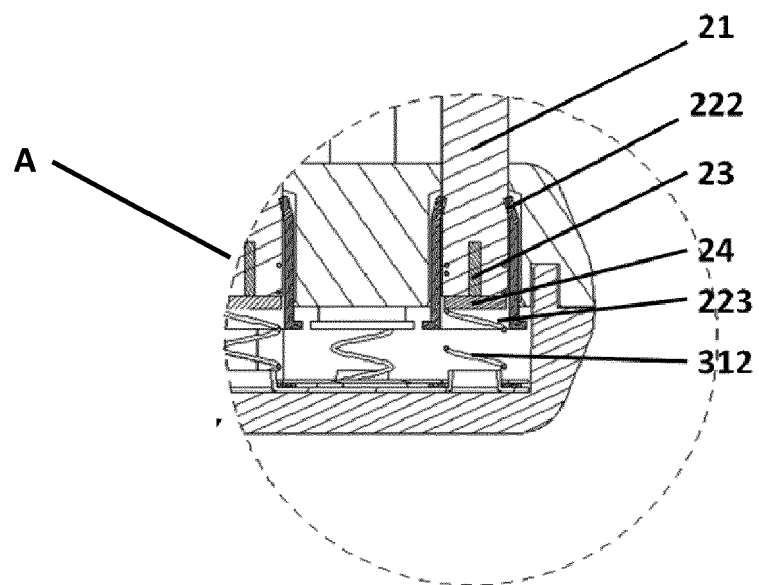


Figure 8b

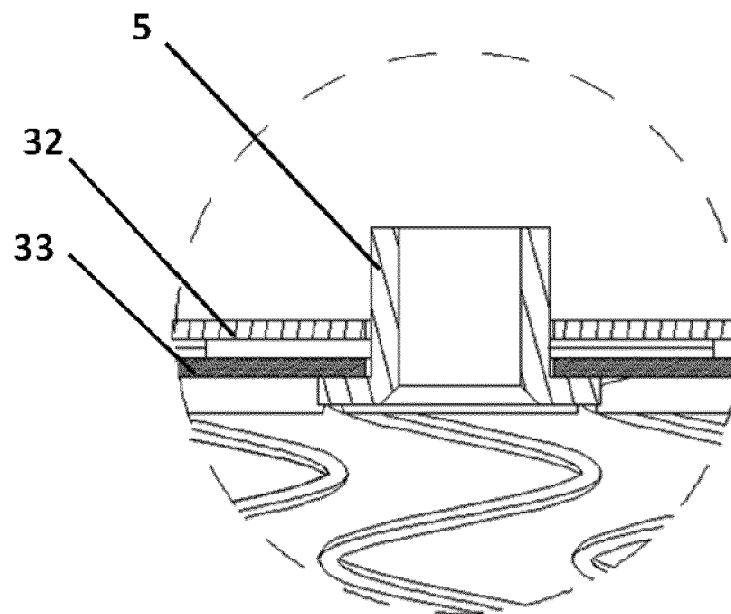


Figure 9a

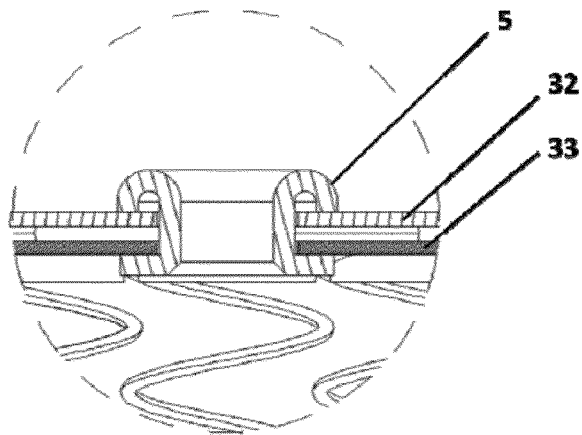


Figure 9b

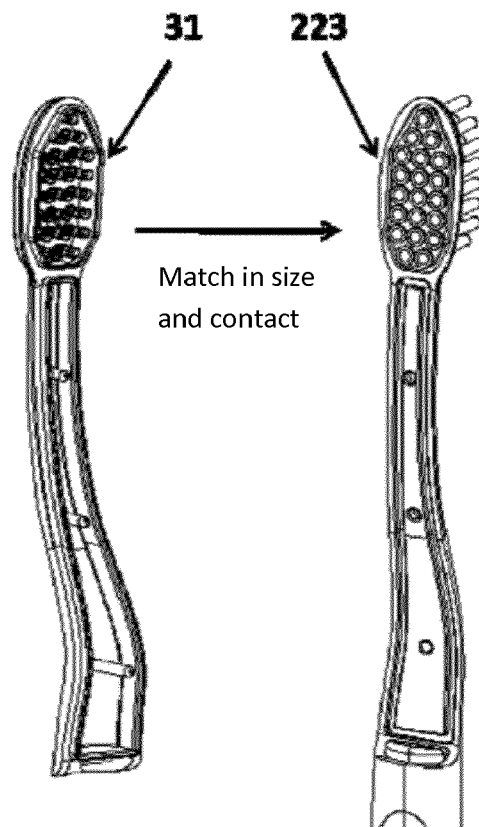


Figure 10

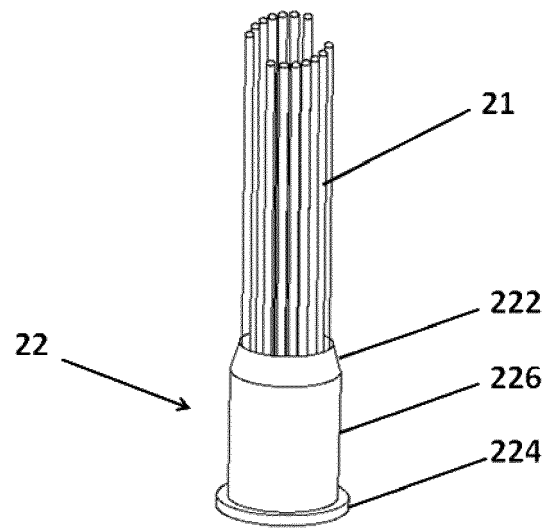


Figure 11a

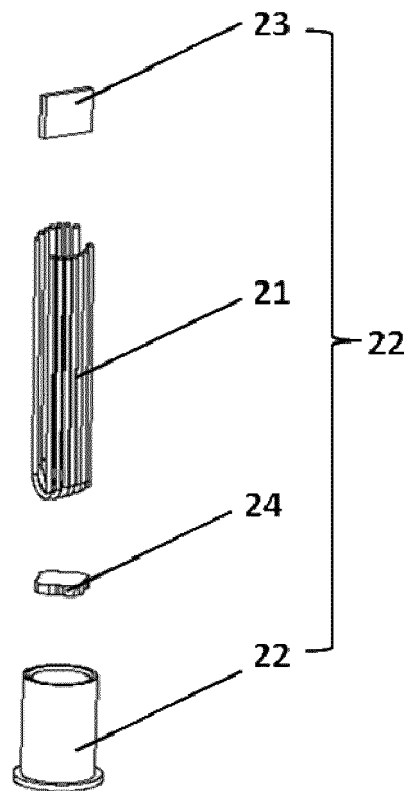


Figure 11b

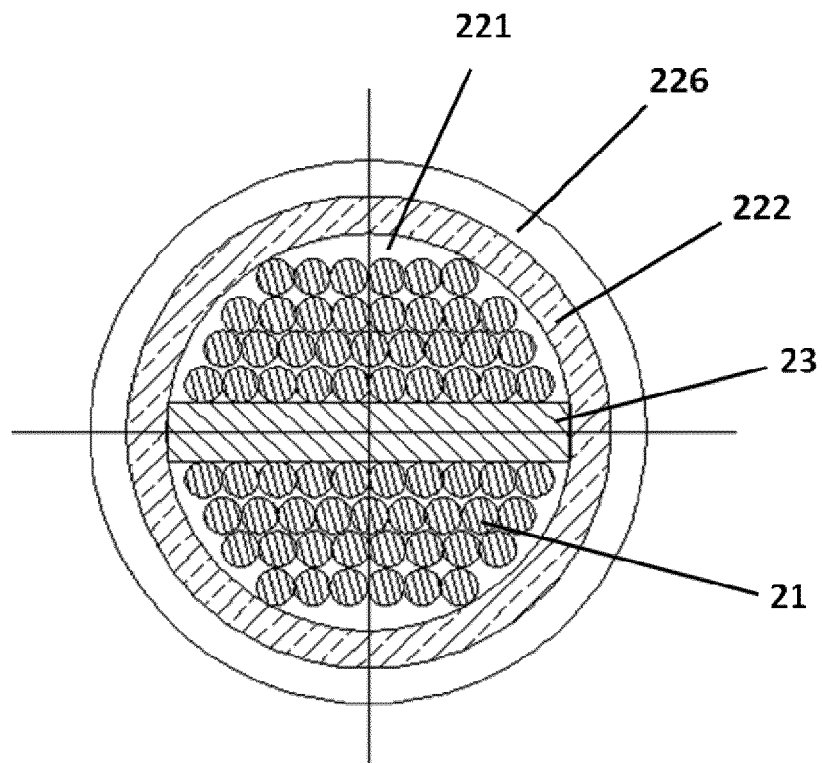


Figure 12

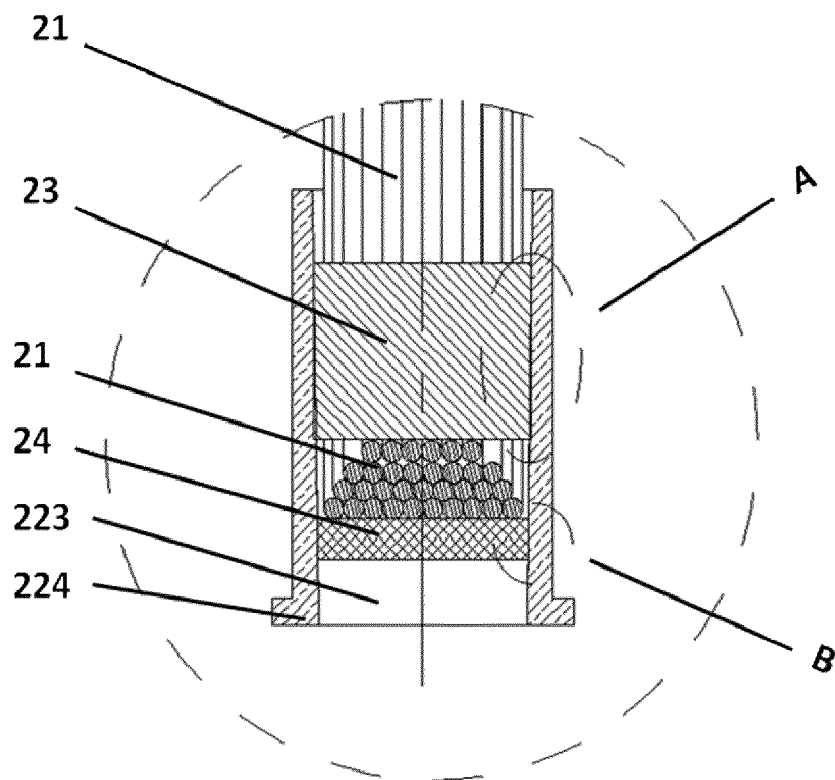


Figure 13a

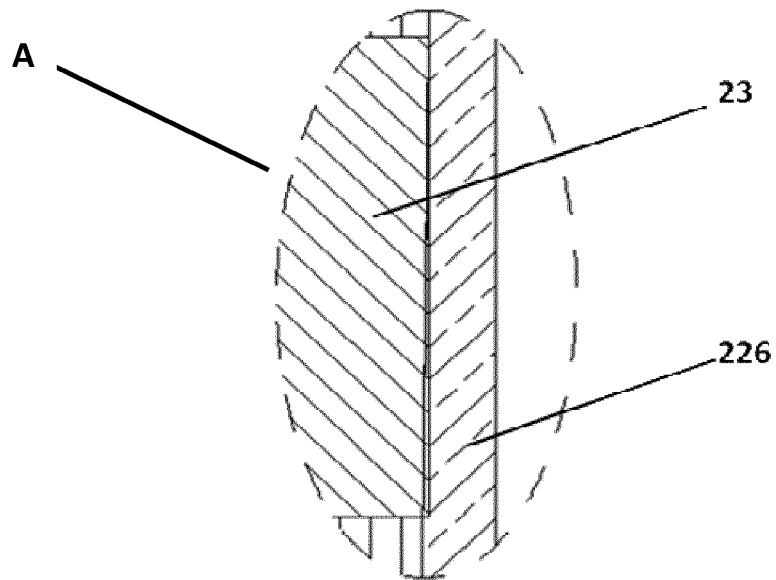


Figure 13b

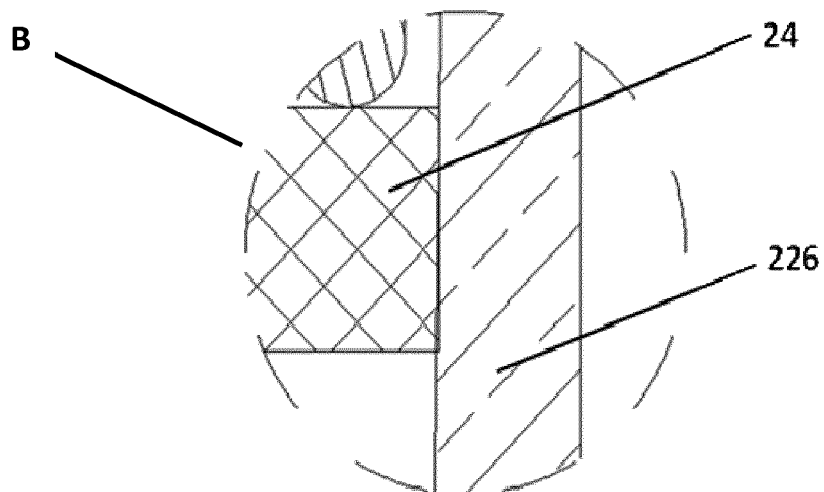


Figure 13c



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A	EP 0 159 940 A2 (VILLETTE H LAB SA [FR]) 30 October 1985 (1985-10-30) * abstract; figures 1-3 *	1-10	
A	US 3 082 457 A (LUCIBELLO FLORIO R ET AL) 26 March 1963 (1963-03-26) * abstract; claim 1; figures 1-6 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A46B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 February 2018	Examiner Dal Bó, Paolo
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			

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