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(54) RUBBER COMPONENT, AND COMB AND METHOD FOR MANUFACTURING SAME

(57) The invention belongs to the technical field of daily necessities, and in particular relates to a rubber assembly useful for a comb, a comb comprising the rubber assembly, and a method for manufacturing a comb. In the invention, raised columns are arranged at a back side of a rubber, and the bottom of comb teeth is bent and then fitted into the raised columns by clamping pieces to achieve the fixing of the comb teeth, which can meet the requirements of no easy tangling and firmly fixed comb teeth; and with the structure of a comb handle, a combing surface which is flat and easy to clean can be achieved.

FIG. 7

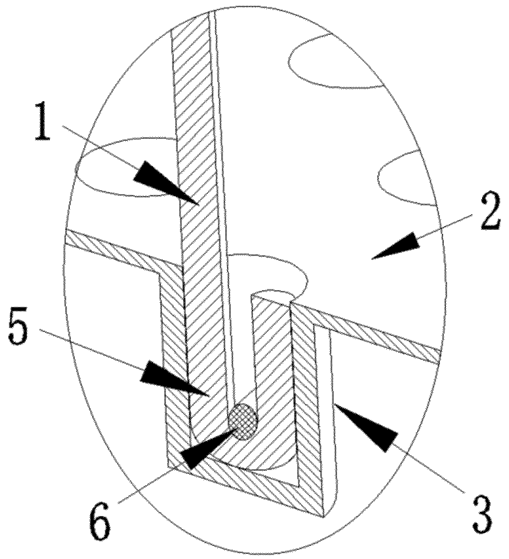

FIG. 8

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Description

FIELD OF THE INVENTION

[0001] The invention belongs to the technical field of daily necessities, and in particular relates to a rubber assembly useful for a comb, a comb comprising the rubber assembly, and a method for manufacturing a comb.

BACKGROUND OF THE INVENTION

[0002] A comb is a tool for combing hair, and its types and materials are various. A comb is a common item in people's daily life, which is a very necessary and practical tool for hair care, especially for long hair. Based on traditional combs, combs with many sub-functions and application scenarios have been further developed, one of which includes air-cushion combs. For an air-cushion comb (also referred to as an airbag comb), comb teeth of the comb are placed on a rubber or other similar flexible materials, a cavity is also formed between the rubber and a comb body, the comb teeth exert a force on the cavity when acting on hair or scalp during use, and since the rubber is soft, air in the cavity is discharged from a special air hole. Accordingly, the comb can better fit the shape of the scalp, and the flexible contact effect can also achieve the massage for the scalp.

[0003] KR101317714B1 discloses a comb provided with detachable comb teeth to reduce manufacturing cost and accommodation space. The comb comprises a body portion 110 formed with a handle 111 and having a body 112 into which a comb tooth body is inserted, wherein the comb tooth body is detachably assembled together with the body to form comb teeth thereon as well as an opening and closing portion 130 on an end portion of the body. Guide grooves 113 formed on both ends of the body are connected to guide protrusions 122 formed on both ends of the comb tooth body. For the comb, a hairstyle generated by a comb body can be selected according to a user's hair condition, hair amount and hair length, and a comb tooth body suitable for the hairstyle is selected. It is economical to reduce the purchase cost and the storage space is reduced by detachably using the comb tooth body; and when foreign matter is contaminated by a comb-shaped body formed by the comb after use for a long time, the foreign matter is easily separated and cleaned to provide a good hygienic effect by attaching/detaching the comb.

[0004] KR20160080197A discloses comb teeth for a hair brush, which include: a scalp scratch preventing member formed at the top of an upright comb tooth stand; an upper bracket and a lower bracket formed at the bottom of the upright comb tooth stand; and a plurality of rings formed on a middle part of the upright comb tooth stand. An upper locking claw 130, a lower locking claw 140 and a locking lever 150 located therebetween are arranged at the bottom of the comb teeth; a rubber plate 200 is provided with comb tooth holes 210 so that their lower ends can be fixed and combined with the rubber plate 200 to form the lower locking claw 140; and the upper locking claw 130 is formed in a conical shape so that the comb teeth are fixed on the rubber plate 200. The comb teeth not only can maintain wavy hair by forming a plurality of rings on a middle part of the upright comb tooth stand to make the wavy hair easier to comb, but also enable hair to be combed, thereby fundamentally preventing the hair from being tangled or twisted in the hair combing process to maintain a neater state. KR20110085799A also discloses a comb, and provides a comb capable of preventing dust from being adsorbed on a comb plate and comb teeth and easily removing tangled hair. The comb comprises: a body 1; a first comb plate 11 adhered to the body; a second comb plate 12 adhered to the first comb plate; a bottom plate 3 adhered to the first and second comb plates; and comb teeth 6 which are inserted to move up and down between the first comb plate and the second comb plate. The first comb plate comprises a top plane and a side plane surrounding the top plane, a plurality of holes are formed in the top plane, and the side plane is formed in a zigzag. The bottom of the comb teeth 6 is also fitted into holes 2 through recesses 5c so that the comb teeth 6 are fixed on the second comb plate 12, which is similar to KR20160080197A.

[0005] KR20160047289A discloses a hair brush with triple comb teeth, which is capable of, when tangled hair is combed, preventing the hair from being pulled or cut, by forming the comb teeth to have three lengths; and capable of, when hair is combed, preventing the hair from being cut due to the insertion of the hair between the comb teeth and a comb tooth pad. The hair brush 10 is formed by ,coupling a comb tooth pad 40 into which a plurality of comb teeth 30 are inserted and fixed in a predetermined arrangement, with one surface of a body portion 20, and coupling a handle 50 with the other part of the body portion 20, wherein the comb teeth 30 have a triple structure including long comb teeth 31, middle comb teeth 32 and short comb teeth 33 which have different lengths, and wherein protrusions 41 for preventing the insertion of hair protrude among the comb teeth 30 on an upper surface of the comb tooth pad 40. The comb tooth pad 40 can be formed from a rubber of an air-cushion comb, two convex rings 30a and 30b are arranged at the bottom of the comb teeth 30, and the comb teeth 30 are engaged into comb tooth holes of the comb tooth pad 40 via the two convex rings 30a, 30b to achieve the fixing of the comb teeth.

[0006] CN2347471Y discloses a combined comb comprising a head and a handle, wherein the head has a tail handle, the handle is hollow, and the two parts are mutually inserted and fixed and then connected as a whole. Although it is mainly disclosed that combs of different types or production series can be assembled by different combinations, it can be seen from FIG. 1 that comb teeth are fixed on a rubber in a manner that the outer diameter of the bottom of the comb teeth is greater than the inner

diameter of comb tooth holes.

[0007] It follows that it is one of the necessary structures of an air-cushion comb to use a soft rubber as a mounting carrier of comb teeth (also known as comb dents), but comb teeth are mostly formed by injection molding of materials such as plastic, and upper and lower locking claws capable of being engaged on comb tooth holes of a rubber are arranged at the bottom of the comb teeth, which are also common fixing structures for the comb teeth. Although such structure can achieve a massage effect on scalp, and KR20160080197A also discloses comb teeth provided with several rings 160 adapted for combing wavy hair, the structure does not fundamentally solve the problem of hair tangling caused by plastic comb teeth used in the type of the comb 2. Fundamentally, the root cause of this problem is that the material of comb teeth is relatively hard, and when curled hair is tangled, the tangled part will be pushed to move downward, and eventually the comb teeth will be firmly stuck by the tangled hair, which will affect the implementation of combing.

[0008] To solve this problem, it is necessary to cope with the root cause of harder comb teeth; and in the prior art, this problem is alleviated in most cases by adding an additional structure as described in KR20160080197A; but the root cause of this problem and how to solve this problem are not known. To solve this problem, we tried to use softer comb teeth instead, but this will bring another new problem - how the comb teeth are firmly fixed to a rubber. Apparently, due to a harder material and a thicker diameter, traditional plastic comb teeth can be fixed into comb tooth holes of a rubber by the above upper and lower locking claws, and thus firmly fixed on the rubber; but if softer comb teeth are used instead and the same structure is used, the fixing strength is obviously insufficient. On the one hand, such material and specifications are not suitable for injection molding, on the other hand, even if the comb teeth are manufactured, the comb teeth will be disengaged from the rubber due to weak fixing of the bottom of the comb teeth to the rubber in case of hair tangling. This is also the biggest problem we have encountered when the comb of the invention is developed

[0009] Traditionally, gluing may be selected, i.e. the comb teeth are applied with glue at the bottom and then placed in comb tooth holes. In order to ensure a sufficient adhesive effect, a sufficient contact area is needed, so the thickness of the rubber is increased to provide a sufficient contact area therebetween to facilitate fit and fixing. However, the increase in the thickness of the rubber will obviously weaken the overall use effect of an air-cushion comb, and an external force required for the deformation of its rubber is increased, which will greatly affect the massage effect and the user's satisfaction with the air-cushion comb.

SUMMARY OF THE INVENTION

[0010] An object of the invention is to solve the above problems and to provide a new fixing structure for comb teeth of an air-cushion comb, thereby differently solving the problem of tangling in an existing air-cushion comb while ensuring the firm combination of comb teeth and a rubber.

[0011] As a first aspect of the invention, a rubber assembly is provided, which comprises comb teeth and a rubber, wherein several raised columns are arranged at a back side of the rubber, and the bottom of the comb teeth is bent and then fitted into the raised columns by clamping pieces so that the fixing effect of the raised columns with the rubber meets the requirements, and the thickness of the body of the rubber is also not increased so that the overall use effect of the air-cushion comb is not affected; and the raised columns enable relevant fixing structures (i.e. bending of the comb teeth and the clamping pieces) of the comb teeth and the rubber to have sufficient arrangement space, i.e. the combination of the raised columns with the fixing manners of bending and the clamping pieces can also ensure that the fixing strength meets the requirements without affecting the thickness of the rubber.

[0012] As a second aspect of the invention, a comb comprising the rubber assembly is provided, and it is mainly intended to use the rubber assembly on the comb to achieve a non-tangling comb. Moreover, the rubber assembly and a comb handle are connected by an engaging structure and therefore detachable, which is very beneficial in the maintenance of the comb. When curled hair is wound at the root of the comb teeth of the rubber, the hair can only be cleaned manually for a traditional comb, which is very inconvenient, or an additional cleaning assembly is used as described in KR20110085799A, which significantly increases its structural complexity. However, in the comb, the rubber assembly is detachable and hence can be disassembled to form a smooth component, and then the rubber assembly is placed in water with the comb teeth downward, and can be lifted and lowered to allow curled hair to automatically fall off, thus it can be very convenient to clean most of the hair.

[0013] As a third aspect of the invention, a method for manufacturing a comb is provided, wherein the comb manufactured by the method has an ingenious structure and low overall manufacturing cost, can well solve the problem of hair tangling and is also easy to clean; and meanwhile, the comb also completely retains all the functions of a traditional air-cushion comb without any reduction, and with a special comb handle structure, the comb provides a smooth combing surface which has a greater contact area with hair or scalp when hair is combed, which is not available for a traditional air-cushion comb. In addition, the comb also solves the problems with the fixing strength and the safety caused by fixing with glue in a traditional non-tangling comb, and problems such as a weakened massage effect caused by the increase in

the thickness of the rubber.

[0014] In the invention, softer comb teeth are selected to solve the problem of hair tangling in a traditional air-cushion comb; and meanwhile, the fixing structure of the comb teeth is redesigned, so that the thickness of the rubber is not increased which would otherwise adversely affect the overall massage effect of the air-cushion comb, and it is also possible to ensure that the comb teeth are firmly and effectively fixed to the rubber, thereby avoiding the problems in use caused by insufficient fixing strength of the comb teeth. Meanwhile, after the rubber assembly is fitted to the comb handle, the rubber assembly is detachable and easy to clean on the one hand, and on the other hand, the body of the combing surface is straight due to the design of the comb handle structure, so that the combing surface has a greater contact area with a user's hair or head.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a schematic perspective structural view of a back side of a rubber of an embodiment of the invention;

FIG. 2 is a plan view of the rubber of the embodiment of FIG. 1;

FIG. 3 is a cross-sectional view (with comb teeth) along A-A in FIG. 2;

FIG. 4 is a cross-sectional view (without comb teeth) along C-C in FIG. 2;

FIG. 5 is an enlarged view of C in FIG. 3;

FIG. 6 is a cross-sectional view along D-D in FIG. 3;

FIG. 7 is a partially enlarged schematic view of another section of the rubber of the embodiment of FIG. 1 to show the positional relationship between raised columns and the rubber;

FIG. 8 is a cross-sectional view of the rubber of the embodiment of FIG. 1 that cooperates with comb teeth to show one of the feasible schemes for the comb teeth to be fitted to the rubber by the raised columns and clamping pieces;

FIG. 9 is a cross-sectional view showing the connection between a rubber assembly and a comb handle of the invention;

FIG. 10 is a schematic perspective structural view of a comb of an embodiment of the invention;

FIG. 11 is a schematic perspective structural view of a comb handle of the embodiment of FIG. 10;

FIG. 12 is a cross-sectional view of the comb handle of the embodiment of FIG. 10;

FIG. 13 is a schematic view (without comb teeth) showing the cooperation between the comb handle of the embodiment of FIG. 10 and a rubber;

FIG. 14 is a cross-sectional view showing the connection between a rubber assembly and a comb handle of the prior art;

FIG. 15 is a schematic perspective structural view of a traditional air-cushion comb having plastic comb teeth fitted into comb tooth holes of a rubber in an engaging manner, which is the current mainstream air-cushion comb structure; and

FIG. 16 is a schematic perspective structural view of an improved air-cushion comb, wherein softer comb teeth are used, but the thickness of a rubber is increased and gluing is performed to ensure the fixing effect of the comb teeth, thus the rubber has a poor massage effect and the fixing strength of the comb teeth is also not high.

[0016] In the Figures: 1: comb tooth; 2: rubber; 3: raised column; 4: tooth hole; 5: hook; 6: clamping piece; 7: comb handle; 8: placement groove; 9: engaging slot; 10: engaging block; 11: first inclined surface; 12: second inclined surface; 13: notch; 31: cavity; 81: flat end of placement groove; 82: low point of placement groove.

DETAILED DESCRIPTION OF THE INVENTION

[0017] In order that those skilled in the art better understand the invention to clearly define the claimed scope of the invention, the invention will be described below in detail with reference to some particular embodiments of the invention.

[0018] As shown in FIGS. 1 to 8, a rubber assembly comprises comb teeth 1 and a rubber 2, and the comb teeth 1 are directly or indirectly fitted on the rubber 2 to form the rubber assembly. A plurality of raised columns 3 are also arranged at a back side of the rubber 2, and the raised columns 3 are arranged independently of each other and spacedly. As shown in FIGS. 1 and 2, the raised columns 3 have a certain interstitial space among each other so that the overall thickness of the rubber assembly in use is not increased due to the arrangement of the raised columns 3. In fact, excessively dense raised columns 3 cause such problem to some extent, thus the thickness of the rubber 2 and the parameters and distribution density of the raised columns 3 can be set correspondingly according to actual conditions. The raised columns 3 are internally provided with tooth holes 4 in which the comb teeth 1 are arranged and cavities 31 for accommodating the comb teeth 1, the tooth holes 4 extend through a front side of the rubber 2, and the cavities 31 are sealed except for the tooth holes 4; that is, a cavity having an opening (i.e. the tooth hole 4) at one end is formed in the raised column 3. Accordingly, the comb teeth 1 are passed through the tooth holes 4 from the front side of the rubber 2 and into the cavities 31, so that the comb teeth 1 are fixed on the rubber 2.

[0019] The comb teeth 1 is made of a soft material, a hook 5 is arranged at one end of the comb tooth 1, and the tooth holes 4 are internally provided with clamping pieces 6 which can be fitted into the cavities 31 and fixed; for example, the length of the cavities 31 is greater than the diameter of the tooth holes 4, so that the hooks 5 are tightly fitted into the cavities 31 and hook the clamping

pieces 6; and of course, the clamping pieces 6 are not limited in a cylindrical shape, a cubic shape or other shapes, and all relevant shapes that can be independently fitted into the cavities 31 are optional. The diameter of the tooth holes 4 is equal to or smaller than the inner diameter of the cavities 31. Since the rubber 2 is made of a flexible material and has a certain elasticity, the diameter of the tooth holes 4 of the above two specifications can allow the arrangement of the clamping pieces 6 in the cavities 31. Most preferably, the inner diameter of the cavities 31 matches the outer diameter of the comb teeth 1, so that inner walls of the cavities 31 can exert a force on the comb teeth 1 after the comb teeth 1 are bent and fitted into the cavities 31, thus imparting the comb teeth with a good fixing effect. Theoretically, a smaller inner diameter of the cavities 31 enables the comb teeth 1 to have a better fixing effect, but increases the difficulty of fitting the hooks 5 of the comb teeth 1 into the cavities 31, while larger cavities 31 can reduce the difficulty of fitting the hooks 5 of the comb teeth 1 into the cavities 31, but weaken the fixing effect of the comb teeth 1 in the cavities 31, so their relative specifications need to be moderately set. In addition, the hooks 5 can hook the clamping pieces 6 followed by being together inserted into the cavities 31, and the manner in which the comb teeth 1 and the rubber 2 are assembled is very easy to achieve.

[0020] For the material of the comb teeth 1, the comb teeth of the prior art are mainly manufactured by injection molding of plastic, and therefore are relatively hard and prone to hair tangling; and in some patented technologies, the comb teeth are provided with spherical or spheroidal structures to alleviate this problem, which has not been fundamentally solved. Therefore, a softer material (compared with a traditional plastic material) is used to make the comb teeth, which can fundamentally solve this problem. The actual material of the comb teeth can have many options after meeting the above requirement on flexibility. Preferably, the comb teeth 1 are made of nylon, more specifically, nylon yarn. The comb tooth 1 made of nylon yarn has one end bent to form the hook 5 and the other end formed as a comb tooth head. Compared with the comb teeth formed by injection molding and then engaged on a rubber in a traditional connection method, the nylon comb teeth are softer, which can fundamentally overcome the problem of hair tangling easily caused by the traditional plastic injection comb teeth during use.

[0021] However, for the technical problem of how the nylon comb teeth are relatively firmly and safely fixed on the rubber, there is no effective solution in the prior art, and a possible general solution is to fix with glue. In this way, the fixing strength is not high on the one hand, the volatilization of glue brings safety problems on the other hand, and the fixing performance is obviously weakened with the passage of service time. In addition, in order to ensure a sufficient adhesive contact area, the thickness of a rubber also tends to be correspondingly increased, which greatly affects the massage effect of an air-cushion comb and therefore is not preferable. Therefore, the invention adopts a separate design scheme in which the rubber 2 with an integrally supporting function is first designed, the raised columns 3 for fixing the comb teeth 1 are then arranged at the back side of the rubber 2, and the comb teeth 1 are securely fixed in the raised columns 3 by the clamping pieces 6; hence, the fixing strength of the comb teeth is also enhanced without the use of glue, and meanwhile the thickness of the rubber 2 also does not need to be additionally increased, i.e. the above problem is solved by the raised columns 3 and the thin rubber 2 instead of a thick rubber.

[0022] Preferably, the thickness of a body portion of the rubber 2 in a cross-sectional direction gradually increases from the middle to the edge, i.e. the thickness of an intermediate portion of the rubber 2 is smaller than that of an outer edge portion thereof, which not only enables the intermediate portion that is first contacted and deformed to be the softest part so as to enhance user experience, but also can facilitate the restoration of the deformed rubber 2 by gradually increasing the elastic force. Practice shows that a rubber with a uniform thickness has a small probability of being unable to automatically restore in use, but the above design of gradual thickening from the middle to the edge can completely avoid this problem. In general, the thickness H1 of the center of the body portion of the rubber 2 (i.e. except for the outer edge for rubber fixing) is 1-3 mm, the thickness H2 of the outer edge is 2-5 mm, and the thickness is gradually increased from the center to the outer edge, but uniform thickening from the center to the edge is also not required; and of course, theoretically, stepwise thickening is also a feasible scheme (for example, the entire rubber is divided into three parts of 1.5 mm, 2 mm and 3 mm from the inside to the outside). In one embodiment, the thickness H2 of the outer edge of the rubber 2 is 3 mm, the thickness H1 of the thinnest portion of the center is 1.5 mm (although the variation in thickness is not apparently shown in related drawings, the thickness of the rubber 2 of the invention in a cross-sectional direction shown in FIGS. 3 to 9 gradually changes from the center to the edge).

[0023] Preferably, the raised columns 3 and the rubber 2 are integrally formed by injection molding. Specifically, the manufacturing process of the invention is also different from a conventional rubber manufacturing process, wherein the conventional rubber manufacturing process comprises forming comb teeth by die stamping on a rubber plate and then gluing the comb teeth to a rubber, while the invention is configured as follows: the rubber 2 is subjected to injection molding by an injection mold and then the comb teeth are embedded into the comb tooth holes by a machine, and the length of the clamping pieces 6 is greater than the diameter of the tooth holes so that the clamping pieces 6 are closely connected, thus ensuring the connection strength between the comb teeth 1 and the tooth holes 4. The tensile force of the connection strength is 1.2-1.5 kg, but the tensile force of the

traditional glued comb teeth is 1.0-1.2 kg, so the connection strength of the invention is greater, and no glue is needed. Therefore, the invention is very environmentally friendly and can also ensure that the thickness of the rubber 2 is not increased which would otherwise affect the overall massage effect.

[0024] As shown in FIGS. 9 to 13, a comb comprises a comb handle 7 and a comb portion fitted thereon, wherein the comb portion is the above rubber assembly.

[0025] Preferably, the comb handle 7 comprises a placement groove 8 for placing the rubber 2, a transverse engaging slot 9 is arranged at an edge of the placement groove 8, an engaging block 10 is arranged at an outer edge of the rubber 2, the rubber 2 is mounted in the placement groove 8, and the engaging block 10 is in snap fit with the engaging slot 9 so that the center of the rubber is raised toward the front side. The thickness of the engaging block 10 is greater than that of an intermediate portion of the rubber 2.

[0026] Preferably, the engaging slot 9 and the engaging block 10 are tooth-shaped or triangular. More preferably, a surface of the engaging slot toward a back side of the comb handle is provided with a second inclined surface 12 which is toward the front side and inclined toward the center of the rubber 2, and the engaging block 10 contacts the second inclined surface 12; and a back side of the engaging block 10 is provided with a first inclined surface 11 which is outward and inclined toward the front side of the rubber 2, and the first inclined surface 11 contacts the second inclined surface 12. The engaging block 10 comprises an annular notch 13 and the step slot is cooperatively engaged with the comb handle 7.

[0027] For a traditional air-cushion comb, an air cushion or airbag structure is formed due to the expansion of a rubber, which causes the rubber to bulge in the middle relative to the edge, forming a shape similar to an ellipsoidal rubber and an ellipsoidal comb tooth surface (i.e. a curved surface on which the top of comb teeth is located).

[0028] For this reason, the placement groove 8 of the comb handle 7 of the comb of the invention is bent toward the back side of the rubber 2, and after the rubber assembly is fitted to the comb handle 7, the rubber 2 is straight in the AA direction; hence, the comb teeth 1 are also straight in this direction (as shown in FIGS. 10 and 13), so that the contact area between a comb tooth surface and hair or scalp can be increased. Meanwhile, as shown in FIGS. 10 to 13, the edges at both sides of the placement groove 8 are relatively recessed downward to form low points 82 at both sides, and its both ends in the straight direction are respectively formed as flat ends 81. In other words, a placement groove 8 of a traditional comb substantially takes the shape of an ellipse on the same plane, while for the placement groove 8 of the comb handle 7 of the invention, the above placement groove is unchanged in its major axis direction, but bent downward in its minor axis direction to form the placement groove 8 shown in FIGS. 10 to 13. The placement groove 8 enables the rubber to achieve the effect of no sagging in a smooth state by downwardly rolling the edges of the rubber 2 in the minor axis direction, and the rubber can also provide a good restoring force when pressed downward. Of course, the above scheme in which the major axis is unchanged and the minor axis is rolled downward is also not fixed, and direction exchange or appropriate rotation may also be an alternative embodiment.

[0029] That is to say, due to the structure of the placement groove 8 and the rubber 2, the surface of the traditional rubber 2 is substantially spherical or ellipsoidal, while the edges at both sides of the placement groove 8 of the invention are relatively recessed downward, so that the rubber 2 is arranged in the shape of a curved surface similar to the shape of a curved TV after being fitted therein, i.e. the rubber is formed as follows: the rubber is divided into left and right parts by a connecting line (referred to as a straight line) between the two flat ends 81, and the left and right parts are respectively rolled downward; and more specifically, the curved surface is a trajectory formed by the continuous movement of a straight line as a generatrix in a parabolic direction in space. FIGS. 9 and 10 show a preferred embodiment. It can also be seen from the Figures that the rubber 2 of the comb is in a straight line in the direction of the generatrix on the curved surface, which is quite different from that of the traditional spherical or ellipsoidal comb; such structure can increase the contact area between the comb and scalp or hair, which also provides better overall conformability when hair is combed; and meanwhile, the combination of the curved structure with the design of a thin middle part and a thick periphery for the rubber 2 also improves the restoration effect, and since the rubber is straight in the centerline direction, the rubber 2 is stretched in the centerline direction after its intermediate portion is deformed, so that a restoring force in another direction can be provided. That is to say, the rubber of the invention has not only the restoring force generated by the compression of downwardly rolled portions at its both sides, but also the restoring force generated by the stretching of the straight central portion. In addition, although the above description and FIGS. 9 and 10 mainly describe the downward rolling in a certain direction (or the arrangement along a certain curved surface), it is very apparent that the curling direction of the rubber 2 is not limited to this direction, and any similar curling scheme (excluding traditional spherical curling) is feasible in principle.

[0030] As shown in FIGS. 9 and 14, for the comb of the prior art, the rubber is deformed and bulging after being mounted to the comb handle 7, and a transverse pressure F is generated when hair is combed, so that the contact area between the edge of the rubber and the engaging slot 9 is very small, and the rubber is not mounted firmly and is easy to fall off. In order to solve this problem, as shown in FIG. 9, a surface of the engaging slot toward a back side of the comb handle is provided with a second inclined surface 12 which is toward the front

side and inclined toward the center of the rubber 2, the engaging block 10 contacts the second inclined surface 12, and the use of the inclination angle of the second inclined surface 12 can block the transverse pressure F generated by hair combing as much as possible, thereby increasing the connection strength between the engaging block and the engaging block, so that the rubber is not easy to fall off. A back side of the engaging block 10 is provided with a first inclined surface 11 which is outward and inclined toward the front side of the rubber 2, and the first inclined surface 11 contacts the second inclined surface 12. After the rubber 2 is integrally deformed, the angle of the first inclined surface 11 changes to approximate the inclination angle of the second inclined surface 12, thereby increasing the contact area between the first inclined surface 11 and the second inclined surface 12, and further improving the connection strength between the engaging block and the engaging block. The engaging block 10 comprises an annular notch 13 and the step slot is cooperatively engaged with the comb handle 7 to provide a more smooth appearance.

[0031] A method for manufacturing a comb comprises the following steps:

a comb is configured to comprise a comb handle and a rubber assembly which are detachably fitted; wherein the rubber assembly further comprises comb teeth 1 and a rubber 2; and the comb teeth 1 are directly or indirectly fitted on the rubber 2 to form the rubber assembly;

a plurality of raised columns 3 are arranged at a back side of the rubber 2, the raised columns 3 are internally provided with tooth holes 4 in which the comb teeth 1 are arranged and cavities 31 for accommodating the comb teeth 1, the tooth holes 4 extend through a front side of the rubber 2, and the cavities 31 are sealed except for the tooth holes 4; hence, the comb teeth 1 are passed through the tooth holes 4 from the front side of the rubber 2 and into the cavities 31, so that the comb teeth 1 are fixed on the rubber 2; and

a hook 5 is arranged at one end of the comb tooth 1, and the tooth holes 4 are internally provided with clamping pieces 6 which can be fitted into the cavities 31 and fixed, for example, the length of the cavities 31 is greater than the diameter of the tooth holes 4, so that the hooks 5 are tightly fitted into the cavities 31 and hook the clamping pieces 6. The diameter of the tooth holes 4 is equal to or smaller than the inner diameter of the cavities 31. Since the rubber 2 is made of a flexible material and has a certain elasticity, the diameter of the tooth holes 4 of the above two specifications can allow the arrangement of the clamping pieces 6 in the cavities 31. Most preferably, the inner diameter of the cavities 31 matches the outer diameter of the comb teeth 1, so that inner walls of the cavities 31 can exert a force on the comb teeth 1 after the comb teeth 1 are bent and fitted into the cavities 31, thus imparting the comb teeth with a good fixing effect. Theoretically, a smaller inner diameter of the cavities 31 enables the comb teeth 1 to have a better fixing effect, but increases the difficulty of fitting the hooks 5 of the comb teeth 1 into the cavities 31, while larger cavities 31 can reduce the difficulty of fitting the hooks 5 of the comb teeth 1 into the cavities 31, but weaken the fixing effect of the comb teeth 1 in the cavities 31, so their relative specifications need to be moderately set. In addition, the hooks 5 can hook the clamping pieces 6 followed by being together inserted into the cavities 31, and the manner in which the comb teeth 1 and the rubber 2 are assembled is very easy to achieve.

[0032] The comb teeth 1 are softer than traditional plastic comb teeth to overcome the problem of hair tangling, and therefore can be made of nylon yarn or other similar flexible materials instead, e.g. nylon yarn with a diameter of 0.7-0.8 mm; the comb tooth (1) has one end bent to form the hook 5 and the other end formed as a spherical or similarly shaped comb tooth head; and the comb tooth head may be formed by hot working of nylon yarn, or by adhesion of other substances on the other end of nylon yarn. Compared with the comb teeth formed by injection molding and then engaged on a rubber in a traditional connection method, the nylon comb teeth are softer, which can overcome the problem of hair tangling easily caused by the traditional plastic injection comb teeth during use; and meanwhile, the invention also solves the resulting problem of fixing the comb teeth 1.

[0033] Preferably, the thickness of the rubber 2 in a cross-sectional direction gradually increases from the middle to the edge, i.e. the thickness of an intermediate portion of the rubber 2 is smaller than that of an outer edge portion thereof, which not only enables the intermediate portion that is first contacted and deformed to be the softest part so as to enhance user experience, but also can facilitate the restoration of the deformed rubber 2 by gradually increasing the elastic force. Practice shows that a rubber with a uniform thickness has a small probability of being unable to automatically restore in use, but the above design of gradual thickening from the middle to the edge can completely avoid this problem. Most preferably, the raised columns 3 and the rubber 2 are integrally formed by injection molding. In general, the thickness H1 of the center of the body portion of the rubber 2 (i.e. except for the outer edge for rubber fixing) is 1-3 mm, the thickness H2 of the outer edge is 2-5 mm, and the thickness is gradually increased from the center to the outer edge, but uniform thickening from the center to the edge is also not required; and of course, theoretically, stepwise thickening is also a feasible scheme (for example, the entire rubber is divided into three parts of 1.5 mm, 2 mm and 3 mm from the inside to the outside). In principle, the thickness of the rubber 2 can be specifically selected according to product parameters, materials and the like, but the overall requirement of relative

thickness difference must be considered.

[0034] Preferably, the comb handle 7 comprises a placement groove 8 for placing the rubber 2, a transverse engaging slot 9 is arranged at an edge of the placement groove 8, an engaging block 10 is arranged at an outer edge of the rubber 2, the rubber 2 is mounted in the placement groove 8, and the engaging block 10 is in snap fit with the engaging slot 9 so that the center of the rubber is raised toward the front side.

[0035] Preferably, the placement groove 8 of the comb handle 7 of the comb of the invention is bent toward the back side of the rubber 2, so that the placement groove 8 is arranged along a curved surface.

[0036] The comb manufactured by the method has an ingenious structure and low overall manufacturing cost, can well solve the problem of hair tangling and is also easy to clean; and meanwhile, the comb also completely retains all the functions of a traditional air-cushion comb without any reduction, and with a special comb handle structure, the comb provides a smooth combing surface which has a greater contact area with hair or scalp when hair is combed, which is not available for a traditional air-cushion comb.

[0037] It should be noted that the above description only refers to some particular embodiments within the inventive concept, which are only part of the embodiments of the invention, wherein the detailed direct description of the related structures is only for the convenience of understanding the invention, and various specific features do not certainly and directly define the implementation range of the invention. Conventional selection, substitution or permutation and combination made by those skilled in the art under the guidance of the inventive concept shall be considered to be within the claimed scope of the invention.

Claims

1. A rubber assembly, comprising comb teeth (1) and a rubber (2), the comb teeth (1) being fitted on the rubber (2) to form the rubber assembly; and a plurality of raised columns (3) being also arranged at a back side of the rubber (2), the raised columns (3) comprising tooth holes (4) in which the comb teeth (1) are arranged and cavities (31) for accommodating the comb teeth (1), and the tooth holes (4) extending through a front side of the rubber; and a hook (5) being arranged at one end of the comb tooth (1), the tooth holes (4) being internally provided with clamping pieces (6) which can be fitted into the cavities (31) and fixed, and the hooks (5) being tightly fitted into the cavities (31) and hooking the clamping pieces (6).

2. The rubber assembly according to claim 1, wherein the comb tooth (1) is made of nylon yarn, and has one end bent to form the hook (5) and the other end formed as a comb tooth head.

3. The rubber assembly according to claim 1, wherein the raised columns (3) are arranged independently of each other and spacedly at the back side of the rubber (2).

4. The rubber assembly according to claim 1, wherein the thickness of the rubber (2) in a cross-sectional direction gradually increases from the middle to the edge.

5. The rubber assembly according to claim 1, wherein the raised columns (3) and the rubber (2) are integrally formed by injection molding.

6. A comb, comprising the rubber assembly according to any one of claims 1 to 5.

7. The comb according to claim 6, further comprising a comb handle (7), the comb handle (7) comprising a placement groove (8) for placing the rubber (2), a transverse engaging slot (9) being arranged at an edge of the placement groove (8), an engaging block (10) being arranged at an outer edge of the rubber (1), the rubber (1) being mounted in the placement groove (8), and the engaging block (10) being in snap fit with the engaging slot (9) so that the center of the rubber is raised toward the front side.

8. The comb according to claim 6, wherein the engaging slot (9) and the engaging block (10) are tooth-shaped or triangular.

9. The comb according to claim 7, wherein a surface of the engaging slot toward a back side of the comb handle is provided with a second inclined surface (12) which is toward the front side and inclined toward the center of the rubber (2), and the engaging block (10) contacts the second inclined surface (12).

10. The comb according to claim 8, wherein a back side of the engaging block (10) is provided with a first inclined surface (11) which is outward and inclined toward the front side of the rubber (2), and the first inclined surface (11) contacts the second inclined surface (12).

11. The comb according to claim 7, wherein the engaging block (10) comprises an annular notch (13) and the step slot is cooperatively engaged with the comb handle (7).

12. The comb according to claim 7, wherein the thickness of the engaging block (10) is greater than that of an intermediate portion of the rubber (2).

13. The comb according to claim 6, wherein the place-

ment groove (8) is arranged along a curved surface.

14. The comb according to claim 13, wherein the placement groove (8) is arranged in a bending manner toward the back side of the rubber (2), and after the rubber assembly is fitted to the comb handle (7), the rubber (2) is straight in the direction of its centerline.

15. A method for manufacturing a comb, comprising the following steps:

a comb is configured to comprise a comb handle (7) and a rubber assembly which are detachably fitted; wherein the rubber assembly comprises comb teeth (1) and a rubber (2), and
the comb teeth (1) are directly or indirectly fitted on the rubber (2) to form the rubber assembly;
a plurality of raised columns (3) are arranged at a back side of the rubber (2), the raised columns (3) are internally provided with tooth holes (4) in which the comb teeth (1) are arranged and cavities (31) for accommodating the comb teeth (1), the tooth holes (4) extend through a front side of the rubber (2), and the cavities (31) are sealed except for the tooth holes (4); and the comb teeth (1) are passed through the tooth holes (4) from the front side of the rubber (2) and into the cavities (31), so that the comb teeth (1) are fixed on the rubber (2); and
a hook (5) is arranged at one end of the comb tooth (1), and the tooth holes (4) are internally provided with clamping pieces (6) which can be fitted into the cavities (31) and fixed; and the hooks (5) and the clamping pieces (6) together are disposed in the cavities (31) after being fitted so as to fix the comb teeth (1) on the rubber (2).

16. The method according to claim 15, wherein the comb tooth (1) is made of nylon yarn or other similar materials which are softer than plastic comb teeth; and the comb tooth (1) has one end bent to form the hook 5 and the other end formed as a comb tooth head.

17. The method according to claim 16, wherein the raised columns (3) are arranged independently of each other and spacedly at the back side of the rubber (2).

18. The method according to claim 15, wherein the thickness of the rubber (2) in a cross-sectional direction gradually increases from the middle to the edge.

19. The method according to claim 15, wherein the comb handle (7) comprises a placement groove (8) for placing the rubber (2), a transverse engaging slot (9) is arranged at an edge of the placement groove (8), an engaging block (10) is arranged at an outer edge of the rubber (1), and the rubber (1) is mounted in the placement groove (8); and the placement groove (8) is arranged along a curved surface.

20. The method according to claim 19, wherein the placement groove (8) is bent toward the back side of the rubber (2), and after the rubber assembly is fitted to the comb handle (7), the rubber (2) is straight in the direction of its centerline.

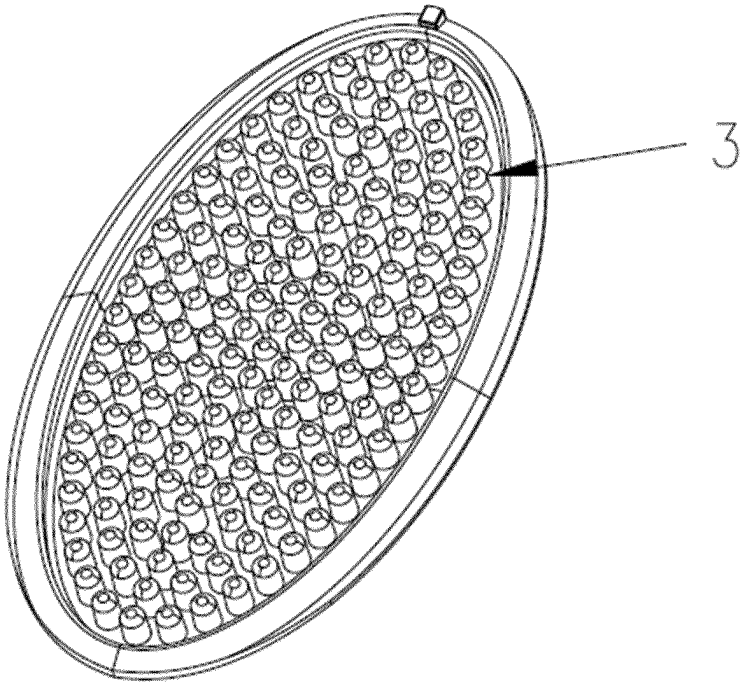

FIG. 1

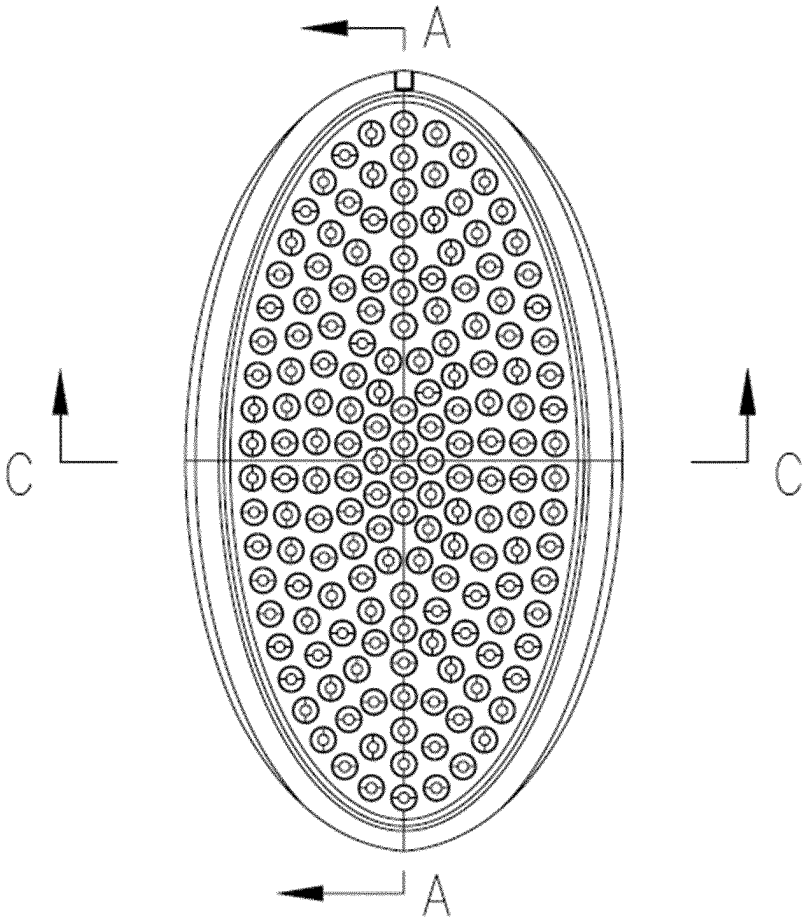

FIG. 2

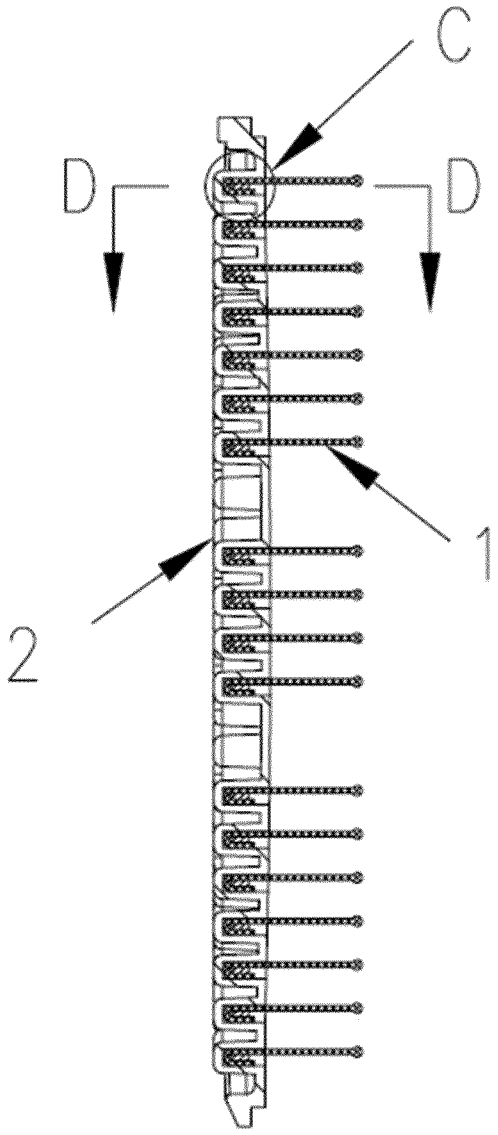

FIG. 3

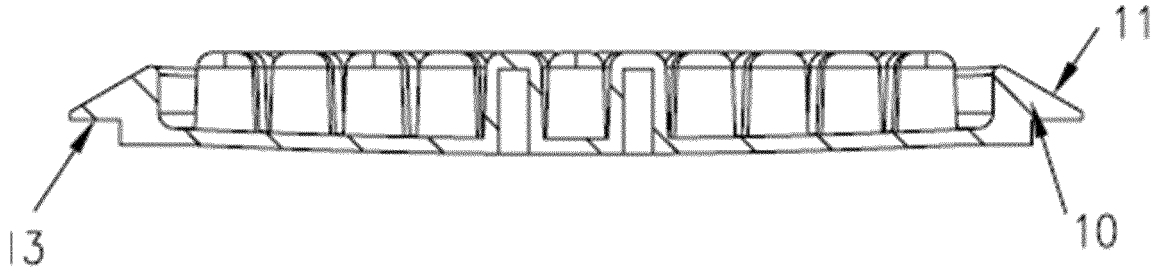

FIG. 4

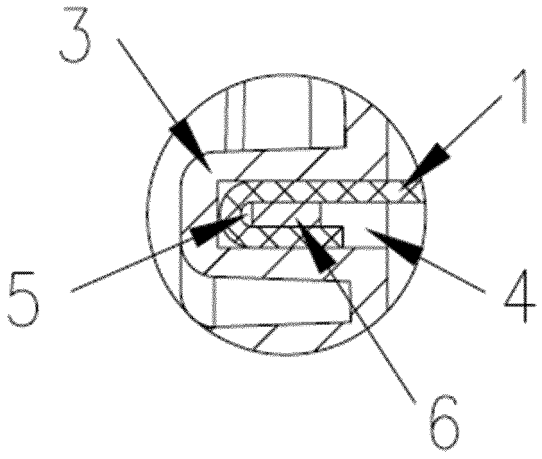

FIG. 5

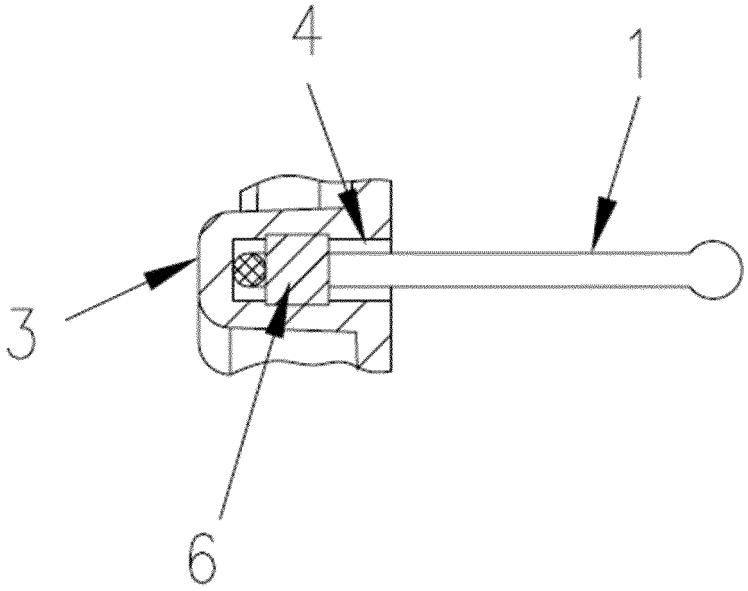

FIG. 6

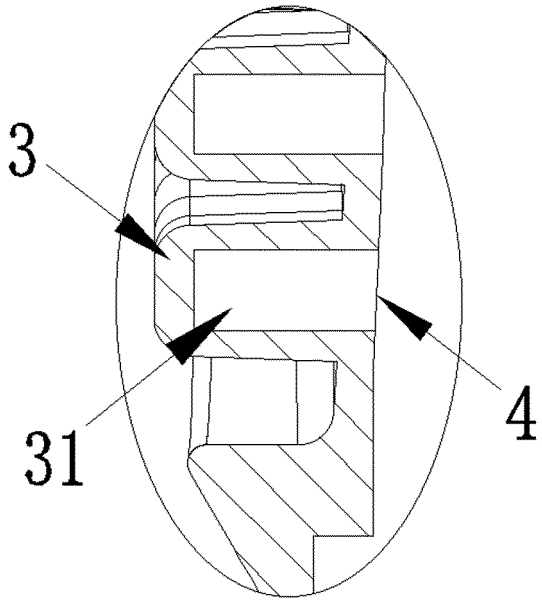

FIG. 7

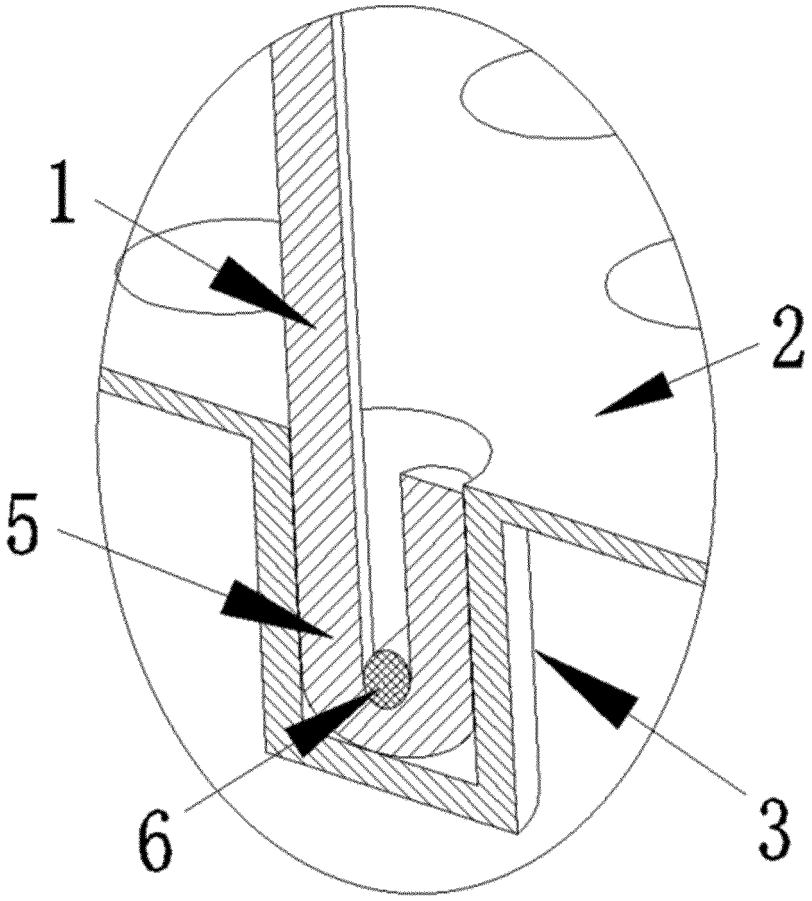

FIG. 8

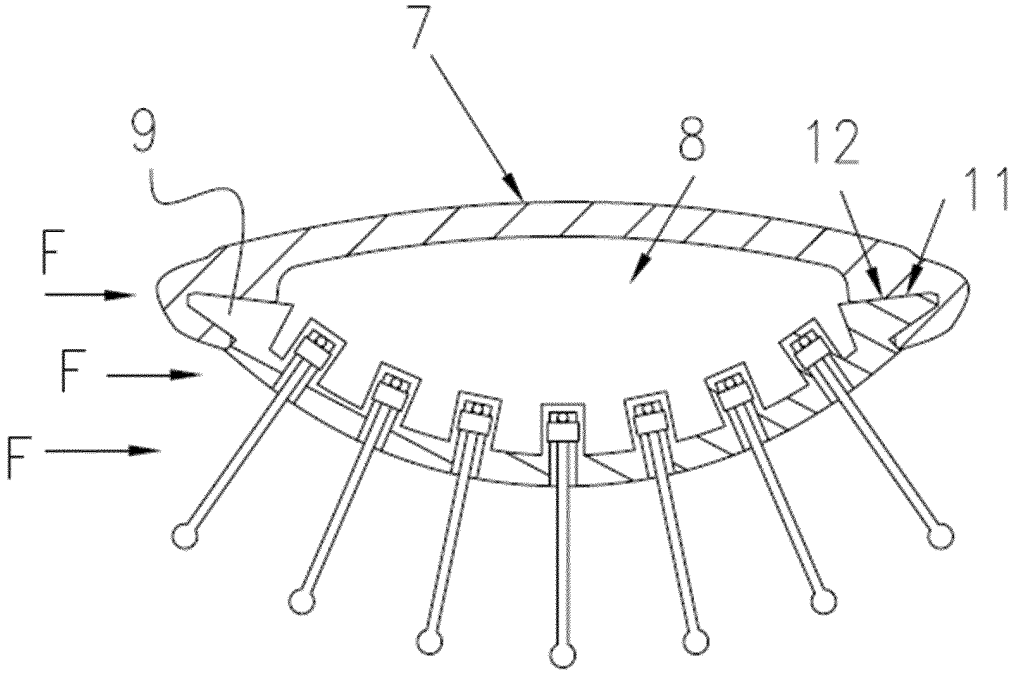

FIG. 9

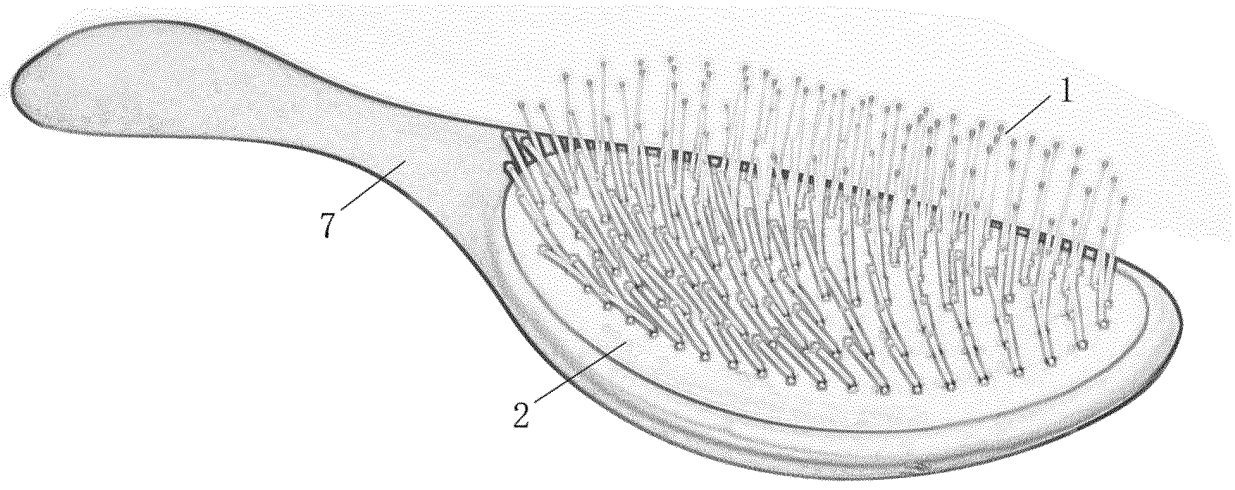

FIG. 10

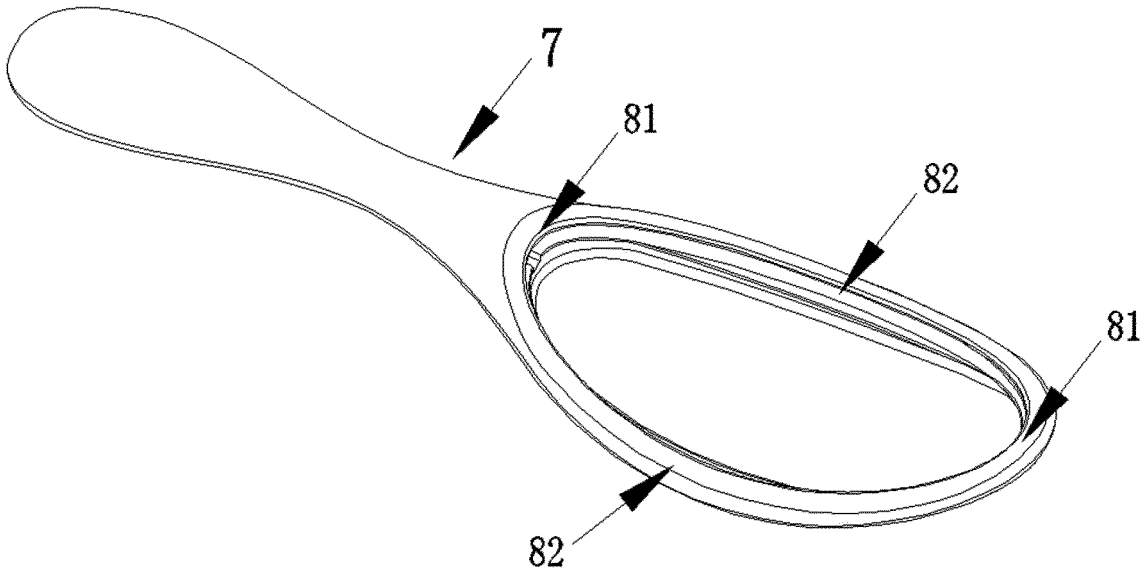

FIG. 11

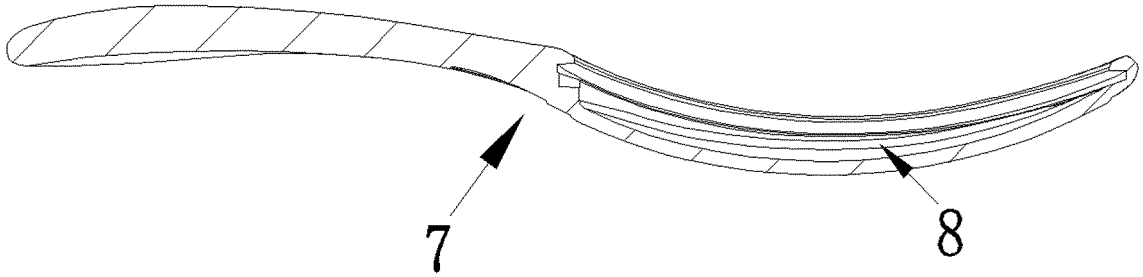

FIG. 12

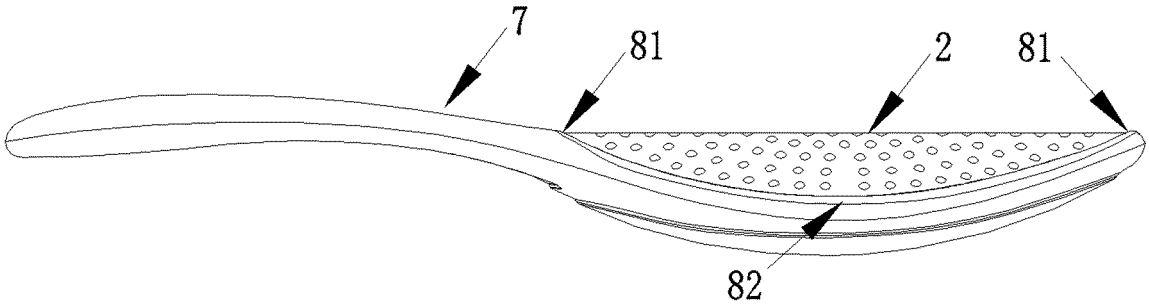

FIG. 13

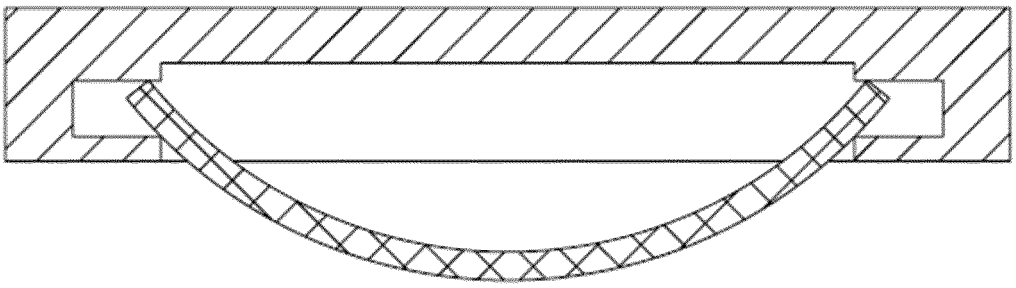

FIG. 14

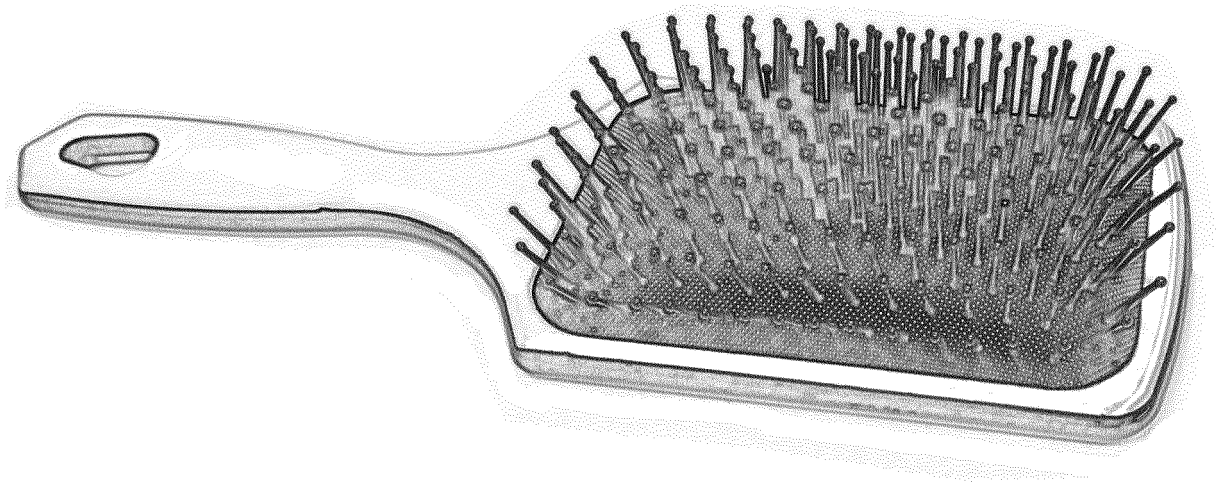

FIG. 15

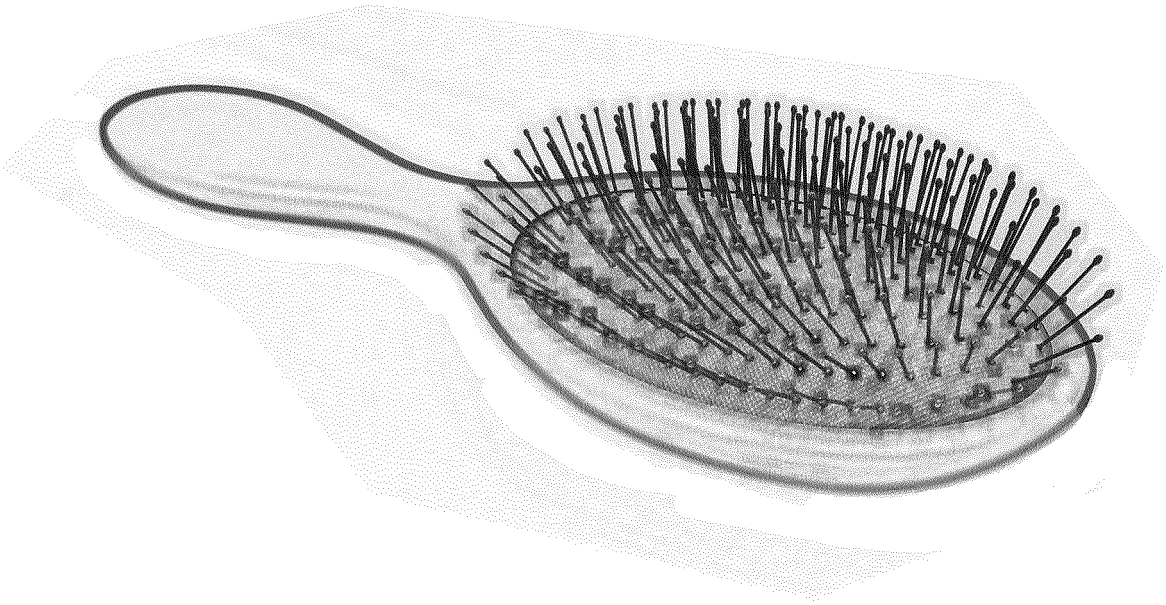

FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/100625

A. CLASSIFICATION OF SUBJECT MATTER

A45D 24/04(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A45D 24/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, WPI, EPODOC, CNKI: 孙一淳, 宁波瑾秀, 梳齿, 梳针, 弯折, 弯钩, 弯曲, 胶, 柔,软, 弹, 钩, 勾, 卡, 挤, 气垫, 气囊, 按摩, 梳, comb, teeth, tooth, bend+, clasp, catch, claw, hook, soft+, flexib+, elastic+, spring+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 109984449 A (NINGBO JINXIU PLASTIC INDUSTRY CO., LTD.) 09 July 2019 (2019-07-09) description, paragraphs [0034]-[0041], and figures 1-7	1-20
X	TW M419450 U1 (LONG, Xinjia) 01 January 2012 (2012-01-01) description, page 4, and figures 2-6	1-6, 8, 10, 13, 14
Y	TW M419450 U1 (LONG, Xinjia) 01 January 2012 (2012-01-01) description, page 4, and figures 2-6	7, 9, 11, 12, 15-20
Y	CN 205285430 U (NINGBO BIOFRIENDLY TRADING CO., LTD.) 08 June 2016 (2016-06-08) description, paragraphs [0015]-[0020], and figures 1-2	7, 9, 11, 12, 15-20
A	CN 2226403 Y (QIFA BRUSH-MAKING CO. LTD., NINGBO) 08 May 1996 (1996-05-08) entire document	1-20
A	CN 203723609 U (NINGBO CHUNGFAT BRUSHES CO., LTD.) 23 July 2014 (2014-07-23) entire document	1-20
A	WO 2016129764 A1 (ZUNA CORP.) 18 August 2016 (2016-08-18) entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 December 2019	**23 December 2019**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/100625

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 109984449 A	09 July 2019	None	
TW M419450 U1	01 January 2012	None	
CN 205285430 U	08 June 2016	None	
CN 2226403 Y	08 May 1996	None	
CN 203723609 U	23 July 2014	None	
WO 2016129764 A1	18 August 2016	US 2018360201 A1	20 December 2018
		KR 20160098811 A	19 August 2016
		KR 20160141698 A	09 December 2016

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 101317714 B1 **[0003]**
- KR 20160080197 A **[0004] [0007] [0008]**
- KR 20110085799 A **[0004] [0012]**
- KR 20160047289 A **[0005]**
- CN 2347471 Y **[0006]**