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Natman et al.

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[54] **NON-SNAGGING HAIRBRUSH**

[75] Inventors: **Solomon Natman**, Brooklyn; **Robert A. Cohen**, Kew Gardens, both of N.Y.

[73] Assignee: **Stance Industries, Inc.**, Brooklyn, N.Y.

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[52] **U.S. Cl.** **15/187**, 15/201

[51] **Int. Cl.** **A46b 3/22**, A46b 5/00

[58] **Field of Search** ..... 15/110, 114, 159 R, 15/172, 180, 186–188, 201, 202, 396–400, 402; 128/62 R, 65–67; 401/289, 291; 132/85

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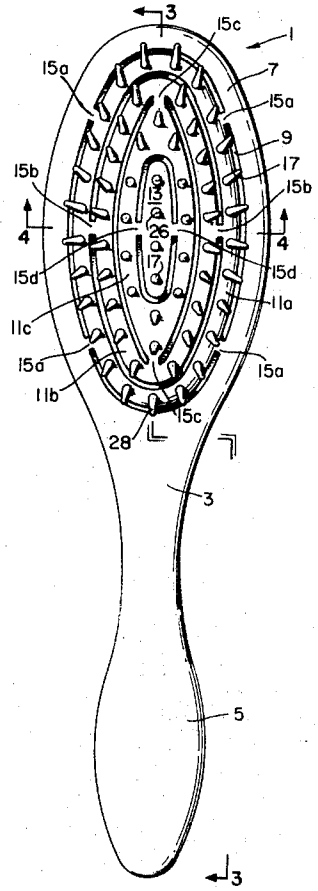
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Primary Examiner—Daniel Blum
Attorney—Yuter & Fields

[57] **ABSTRACT**

A hairbrush includes a plurality of concentric rings forming carrier plates for the bristles. The concentric rings are flexibly connected by hinges to allow the rings to move with respect to each other. The bristles carried by the concentric rings are stiff, allowing deep penetration of the hair. The flexibly mounted concentric rings allow the bristles to easily slip past any snags or knots encountered in the hair.

23 Claims, 5 Drawing Figures



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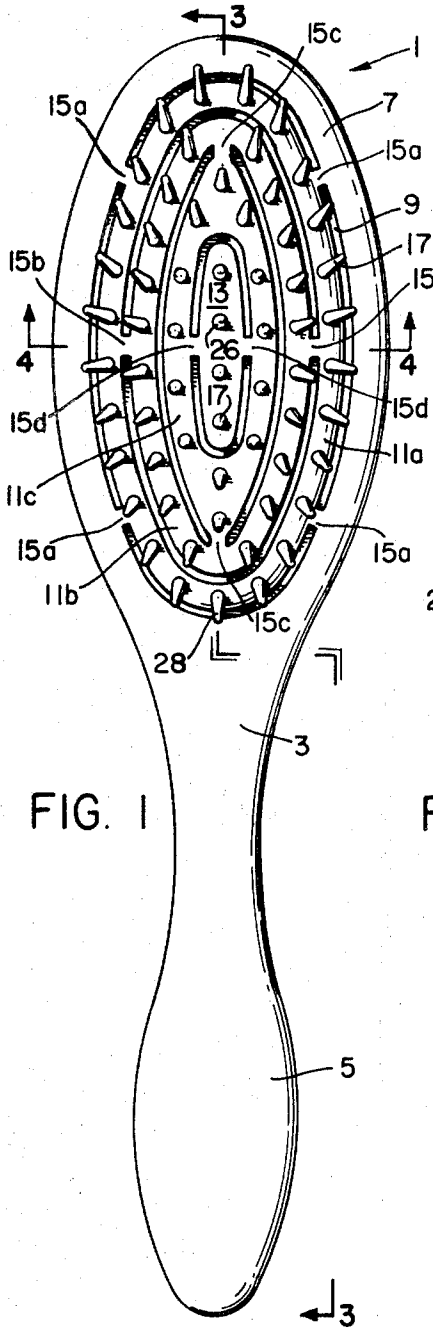


FIG. 1

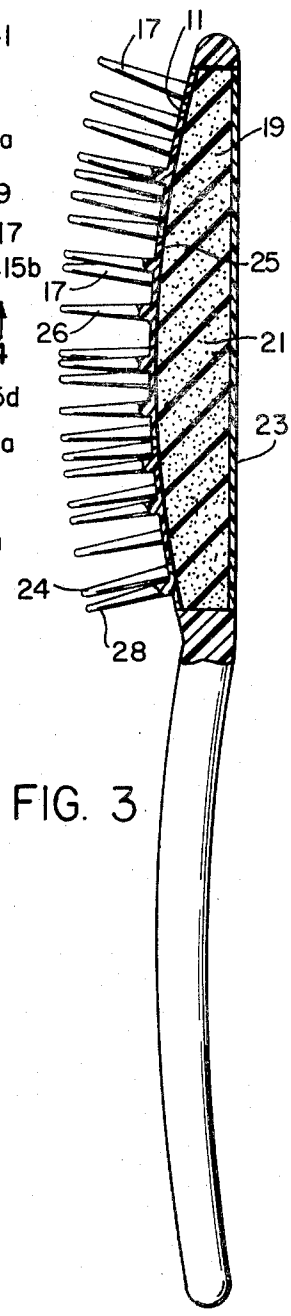


FIG. 3

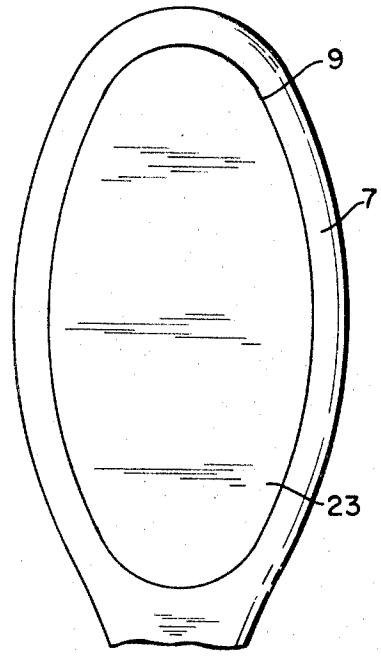


FIG. 2

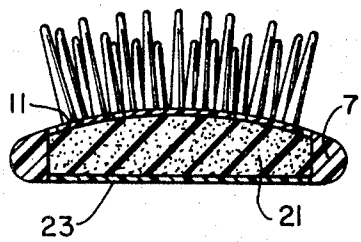


FIG. 4

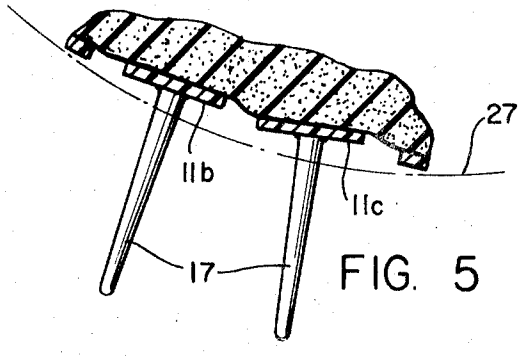


FIG. 5

INVENTORS:
SOLOMON NATMAN
ROBERT A. COHEN
BY Yuter + Fields
Attorneys

NON-SNAGGING HAIRBRUSH

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a new and useful improvement in brushes, and more particularly to hairbrushes having stiff bristles for deep hair penetration.

2. Prior Art

The basic criteria of good hairbrush design has been known for a substantial period. One goal is to manufacture a brush which deeply penetrates the hair. This facilitates the brushing of all the hair, both the hair that is located near the surface and that which is located near the scalp and in the interior. Further, since more hair is brushed with each stroke, deep penetration results in less time being required to brush the hair.

Another goal of good hairbrush design is a brush having bristles which easily slip past knots and snags in the hair. Fulfillment of this goal is especially true of brushes designed for wigs and other artificial hair. If a bristle does not slip by a snag or knot, in the case of a wig, there is a strong possibility that the hair will be pulled from the base in which it is mounted. In the case of natural hair, a bristle catching a snag or knot will undoubtedly cause pain to the individual whose hair is being brushed.

The prior art has met these goals with various techniques. Brushes with stiff bristles were constructed. These brushes easily and deeply penetrated the hair. However, when they encountered a snag or knot, they engaged the snag or knot and pulled on the hair.

Another solution was constructing brushes with flexible bristles. Although these brushes slipped easily past snags and knots, their brushing action was inadequate. They did not penetrate the hair. Further, during normal brushing encounters with tangled hair, rather than brushing out the entanglement, they slipped by. Thus, many brush strokes of the hair were necessary before the hair was adequately brushed.

Still another brush in the prior art combined stiff bristles with a flexible carrier plate. These bristles were made of a stiff metal such as spring steel and were mounted in a flexible rubber carrier plate. The stiff metal bristles allowed deep penetration of the hair, while the flexible rubber carrier plate allowed the stiff bristles to bend at their base. This latter action allowed the stiff bristles to slip by snags and knots in the hair. Although this brush met the basic goals of hairbrush design, it had many practical shortcomings. Manufacture of metal bristles mounted in a flexible rubber carrier plate is expensive and not easily automated. Therefore, the cost of this brush has kept it out of the reach of the greater portion of the population. Further, the mounting of the metal bristle in the flexible rubber carrier plate has given rise to many problems. First, the stiff metal has caused the bond between the metal and the rubber to wear, allowing the metal bristles to be pulled out of the rubber carrier plate in due course. Second, the metal has been subject to corrosion as well as to fatigue resulting in the metal elements rupturing in normal use.

Another brush in the prior art has attempted to improve upon the shortcomings of the brush described immediately above. This brush has replaced the metal bristles with nylon bristles. Although this obviates the corrosion problems, the problem of bonding the bristles to the rubber and the fatigue problem of the nylon still exists. Although this brush is slightly less expensive because of the nylon bristles, its normal life expectancy is shorter. Nylon can fatigue more quickly and bonding the nylon bristles to the rubber carrier plate is more difficult.

It is therefore an object of this invention to provide an improved hairbrush with deep penetration and the ability to slip past snags and knots in the hair.

It is another object of this invention to provide an improved hairbrush that has stiff bristles and a flexible carrier plate.

It is a further object of this invention to provide a hairbrush which fulfills the above two objects and is inexpensive to manufacture and has a long life expectancy.

SUMMARY OF THE INVENTION

The above objects are met by the present invention. The hairbrush of the present invention has a plurality of concentric rings forming carrier plates. Hinges flexibly connect adjacent concentric rings. Stiff bristles are mounted on the concentric rings. The stiff bristles can deeply penetrate the hair but easily slip past snags and knots in the hair which they encounter by rotation of the concentric rings about their hinges.

The preferred embodiment of the present invention has additional features. Both the bristles and the concentric rings upon which the bristles are mounted are molded from the same material. This molding can be performed in one step. This manufacturing process greatly reduces the cost of the brush.

Further, the hairbrush of the preferred embodiment is preferably molded from polypropylene containing about ten percent oleic acid by weight. This composition produces a smooth "lubricated" surface which facilitates the bristles slipping past snags and knots.

In the preferred embodiment, the hinges which connect the concentric rings take on a particular geometry. The hinges contrapositionally mounted which connect a first pair of concentric rings are displaced substantially 90° from the hinges connecting a third concentric ring to an adjacent one of said first pair of concentric rings. This gives the concentric rings the greatest degree of freedom. Other than the two outermost concentric rings, each of the inner rings has 3° of freedom.

In addition to the above features, the preferred embodiment has a flexible backing material beneath the concentric rings. This backing material limits the movement of the concentric rings. In addition, the backing material supports each next, inner concentric ring at a higher altitude. This gives the bristles a "domed" effect. Thus, the center bristles more deeply penetrate the hair. Since these bristles have the greatest degrees of freedom, they more easily slip past snags and knots than the outer bristles. However, because of the domed effect, the outer bristles do not engage as much hair and thus do not need as much freedom of movement.

Other objects, features, and advantages of the various aspects of the invention will be apparent from the following detailed description when read with the accompanying drawings. These drawings show, by way of example and not limitation, structure for practicing the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plane view of the hairbrush viewed

when the hairbrush of the present invention is lying on its back.

FIG. 2 is a rear plane view of the hairbrush of the present invention.

FIG. 3 is a side sectional view taken along line 3—3 in FIG. 1, of the hairbrush of the present invention.

FIG. 4 is a sectional view taken along line 4—4 in FIG. 1 in the hairbrush of the present invention.

FIG. 5 is a partial sectional view through the bristle portion of the hairbrush of the present invention illustrating the flexible nature and rotational freedom of the concentric rings.

DESCRIPTION OF THE INVENTION

Referring to FIG. 1, a hairbrush 1 of the present invention can be seen. The hairbrush includes a base 3. Base 3 comprises a handle portion 5 and a carrier plate support 7. In the preferred embodiment the base 3 is composed of polypropylene with 10 percent oleic acid by weight.

The carrier plate support 7 has an elliptical opening 9. Included within the elliptical opening 9 is a plurality of concentric rings 11. Within the central elliptical ring 11*c*, there is a solid ellipse 13. Although the concentric rings are elliptical in the preferred embodiment, the invention is not so limited.

In the preferred embodiment as shown in FIG. 1, hinges 15*a* connect the outer concentric ring 11*a* with the carrier plate support 7. As shown in FIG. 1, there are four hinges 15*a* each located approximately 45° from the major and minor axis of elliptical opening 9. Hinges 15*a* allow outer concentric rings 11*a* only 1° of freedom of motion. That is, outer concentric ring 11*a* has freedom of motion only in the direction perpendicular to the plane of FIG. 1, in and out of the plane of the paper.

With respect to the other concentric rings, two hinges are contrapositionally mounted flexibly connecting two adjacent concentric rings. These hinges connecting a first pair of concentric rings are displaced substantially 90° from the hinges connecting a third concentric ring to an adjacent one of said first pair of concentric rings. That is, hinges 15*b* are contrapositionally arranged to each other along the minor axis of elliptical opening 9 and flexibly connect concentric rings 11*a* and 11*b*. Hinges 15*c* are contrapositionally mounted along the major axis of elliptical opening 9, flexibly connecting the two adjacent concentric rings 11*b* and 11*c*. Hinges 15*d* are contrapositionally mounted along the minor axis of elliptical opening 9, flexibly connecting the two adjacent concentric rings, concentric ring 11*c* and solid ellipse 13. Although the hairbrush 1 of FIG. 1 shows three concentric rings 11*a–c* and one solid ellipse 13, one skilled in the art realizes that solid ellipse 13 could also be a concentric ring, with or without concentric rings in its interior. Depending on context throughout this specification solid ellipse 13 will be referred to as a solid ellipse or as a concentric ring.

In addition, the two hinges comprising a set of hinges contrapositionally mounted flexibly connecting a first pair of concentric rings are displaced substantially 90° from the hinges connecting a third concentric ring to an adjacent one of said first pair of adjacent concentric rings. For example, hinges 15*c* are contrapositionally mounted flexibly connecting a first pair of adjacent concentric rings 11*b* and 11*c* and are displaced 90° from the hinges 15*b* connecting third concentric ring 11*a* to adjacent concentric ring 11*b* of said first pair of concentric rings 11*b* and 11*c*.

Stiff bristles 17 are mounted upon concentric rings 11 and solid ellipse 13. In the preferred embodiment, stiff bristles 17, hinges 15, solid ellipse 13, concentric rings 11, and base 3 including handle 5 and carrier plate support 7 are molded of the same material during the same step. That is, they all comprise polypropylene with about 10 percent of oleic acid by weight.

Referring to FIG. 3, another feature of the hairbrush according to the present invention can be seen. A backing 19 is placed behind concentric rings 11 which form a carrier plate for bristles 17. Backing 19 is formed from a sponge-like material 21 mounted over a non-flexible backing 23.

Stiff bristles 17, which are mounted on the more inner of concentric rings 11, have their extremities 24 (FIG. 3) at a higher altitude than stiff bristles 17 which are mounted on the more outer concentric rings 11. For example, stiff bristle 26 on solid ellipse 13 has its extremity 24 at a higher altitude than the extremity 24 of bristle 28 on concentric ring 11a.

As can be best seen from FIg. 4, the sponge-like material 21 is contoured to support each next concentric ring 11 at such a higher altitude to give the bristles a dome effect. Non-flexible backing 23 limits the movement of concentric ring 11 and solid ellipse 13 to prevent the stiff bristles 17 mounted upon a concentric ring 11 from snagging upon another concentric ring 11.

In the preferred embodiment the sponge-like material 21 can be covered with an impervious layer 25 (FIG. 3). Impervious layer 25 prevents the sponge-like material 21 from absorbing water if the hairbrush were accidentally dropped into water. Also, by correctly proportioning the amount of sponge-like material 21 with relation to the overall weight of hairbrush 1, hairbrush 1 can be structured to float when dropped into water. Of course, this is aided if the handle portion 5 of hairbrush is hollow.

OPERATION

The combination of the stiff bristles and the relatively movable concentric rings allows the brush of the present invention to deeply and easily penetrate the hair while slipping past knots and snags. As can be seen from FIG. 1, the outermost concentric ring 11*a* has only 1° of freedom of motion. That is, its freedom of motion is perpendicular to the plane of the paper. The second outermost ring 11*b* has 2° of freedom of motion, i.e., perpendicular to the plane of the paper and rotational about the minor axis of elliptical opening 9. The third outermost ring 11*c* and all the more innermost rings and solid ellipse 13 have 3° of freedom of motion, i.e., perpendicular to the plane of the paper, rotational about minor axis of elliptical opening 9 and rotational about the major axis of elliptical opening 9.

Thus, if any of the stiff bristles 17 of the inner concentric rings 11 encounter a snag or knot in hair, the bristle 17 moves the concentric ring 11 around the hinges 15 upon which it is mounted in a one or more directions of its degrees of freedom. Since the outer concentric rings do not have as many degrees of freedom as the inner concentric rings, they do not as easily slip by snags or knots. Thus, these outer concentric rings can be used to brush out the more difficult entanglements of the hair.

Further, as is especially recognized from FIG. 4, the dome effect imparted to bristles 17 by the contoured shape of sponge-like material 21 insures that the stiff bristles 17 mounted on the inner concentric rings penetrate more deeply into the hair than the stiff bristles 17 mounted on the outer concentric rings 11. Since the more deeply penetrating stiff bristles 17 which have a great deal of freedom of motion are more likely to encounter unexpected snags or knots, they can easily slip by snags and knots. This contrasts to the stiff bristles 17 mounted on the outer concentric rings 11 which do not have as much freedom of motion. They will encounter snags and knots more easily seen and can be selectively utilized to remove those snags and knots.

The rotational action of hairbrush 1 of the present invention can be seen in FIG. 5. Line 27 is the contour upon which concentric rings 11*b* and 11*c* normally rest. Upon encountering a snag or knot in the hair, bristles 17 deform from the normal position of concentric rings 11b and 11c to that shown by way of example in FIG. 5. In this manner stiff bristles 17 "slip by" any snags and knots.

Some of the other features of the present invention can also easily be recognized from the above description. For example, since the entire structure including base 3, handle 5, carrier plate support 7, concentric rings 11, solid ellipse 13, hinges 15, and stiff bristles 17 are molded out of the same material, and at the same time, manufacturing costs are substantially reduced over other manufacturing techniques. Further, there is no problem mounting bristles 17 upon their carrier plates, concentric rings 11. There can be neither corrosion (stiff bristles 17 are made of plastic), fatigue (stiff bristles 17 are extremely stiff and have relatively little flex), nor wear at the junction between stiff bristles 17 and the concentric rings 11 (they are integrally molded). Yet, the desirable action of penetrating deeply and easily slipping past snags and knots is attained.

Those skilled in the art will easily see the variations upon the basic invention. For example, the material of propylene with ten percent by weight of oleic acid to provide a self-lubricating structure to facilitate the bristles slipping past knots and snags can be modified without changing the basic desirability of a self-lubricating surface. Further, although the inner hinges 15 are mounted 90° with respect to the hinged section joining adjacent concentric rings, this mounting difference can be varied in accordance with the amount and the degrees of freedom of motion that the carrier plates, concentric rings 11, are to have. Also, the degree of contour to sponge-like material 21 can be varied to different advantages or achieved by varying the length of stiff bristles 17.

In addition to the suggestions immediately noted above, there will be obvious to those skilled in the art many other modifications and variations which set aside many or all of the objects of the invention and to which accrue many or all of its advantages. However, these modifications and variations will not depart from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A hairbrush comprising:
a plurality of concentric rings;
hinges mounted flexibly connecting said concentric rings;
stiff bristles mounted on said concentric rings; and
said stiff bristles which are mounted on the more inner of said concentric rings having their extremities at a higher altitude than the stiff bristles mounted on the more outer concentric rings.

2. A hairbrush as in claim 1 wherein said hinges connecting a first pair of concentric rings are displaced substantially 90° from the hinges connecting a third concentric ring to an adjacent concentric ring of said first pair of concentric rings.

3. A hairbrush as in claim 1 comprising a backing limiting the movement of said concentric rings.

4. A hairbrush comprising:
a plurality of concentric rings;
hinges contrapositionally mounted for flexibly connecting adjacent concentric rings;
stiff bristles mounted on said concentric rings; and
a backing supporting each inner concentric ring at a higher altitude.

5. A hairbrush comprising:
a plurality of concentric rings;
hinges contrapositionally mounted for flexibly connecting adjacent concentric rings;
stiff bristles mounted on said concentric rings; and
a backing limiting the movement of said concentric rings and supporting each next inner concentric ring at a higher altitude.

6. A hairbrush comprising:
a plurality of concentric rings surrounding a central member;
hinges contrapositionally mounted flexibly connecting adjacent concentric rings;
stiff bristles mounted on said concentric rings and said central member;
wherein the outer concentric rings have less degrees of freedom than the inner concentric ring and central member.

7. A hairbrush as in claim 6 and backing for supporting each next inner concentric ring at a higher altitude.

8. A hairbrush as in claim 7 wherein said hinges connecting a first pair of concentric rings are displaced substantially 90° from the hinges connecting a third concentric ring to an adjacent one of said first pair of concentric rings.

9. A hairbrush as in claim 6 substantially made from polypropylene.

10. A hairbrush as in claim 9 comprising about 10 percent oleic acid by weight.

11. A hairbrush as in claim 7 wherein said backing is a layer of sponge-like material over a non-flexible backing.

12. A hairbrush as in claim 11 wherein said layer of sponge-like material is covered with a water impervious layer.

13. A hairbrush comprising
a plurality of concentric rings surrounding a solid ellipse;
hinges mounted flexibly connecting said concentric rings and solid ellipse;
stiff bristles mounted on said concentric rings and solid ellipse;
wherein the outer concentric rings have less degrees of freedom than the inner concentric rings.

14. A hairbrush comprising
a plurality of concentric rings;
hinges contrapositionally mounted for flexibly connecting adjacent rings; and

stiff bristles mounted on said concentric rings;
wherein the outer concentric rings have less degrees of freedom than the inner concentric ring and solid ellipse.

15. A hairbrush as in claim **6** wherein the outermost concentric ring has 1° of freedom, the second outermost concentric ring has 2° of freedom, and all other concentric rings have three degrees of freedom.

16. A hairbrush as in claim **6** wherein said concentric rings, said hinges and said bristles are integral.

17. A hairbrush as in claim **1** wherein said concentric rings, said hinges and said bristles are integral.

18. A hairbrush as in claim **7** wherein said concentric rings, said hinges and said bristles are integral.

19. A hairbrush comprising:
a plurality of concentric rings;
hinges mounted flexibly connecting said concentric rings;
stiff bristles mounted on said concentric rings;
said concentric rings, said hinges and said bristles being integral; and
a carrier plate support and a handle portion integral with said integral concentric rings, said hinges and bristles.

20. A hairbrush as in claim **17** wherein said brush further comprises a carrier plate support and a handle portion, integral with said integral rings, hinges and bristles.

21. A hairbrush as in claim **18** wherein said brush further comprises a carrier plate support and a handle portion, integral with said integral rings, hinges and bristles.

22. A hairbrush as in claim **4** wherein said stiff bristles which are mounted on the more inner of said concentric rings have their extremities at a higher altitude than the stiff bristles mounted on the more outer concentric rings.

23. A hairbrush as in claim **6** wherein said stiff bristles which are mounted on the more inner of said concentric rings have their extremities at a higher altitude than the stiff bristles mounted on the more outer concentric rings.

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