HAIR-CUTTING SYSTEM INCLUDING A HAIR-CUTTING APPARATUS AND A COMB DEVICE

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Appl. No.: 09/747,415
Filed: Dec. 21, 2000

Foreign Application Priority Data
Dec. 22, 1999 (EP) ........................................ 99204477.6

Publication Classification

A hair-cutting system (1) comprising a hair-cutting apparatus (2) for cutting hairs, having a cutting device (3), and a comb device (4) which at least during operation is mounted on the hair-cutting apparatus (2) in the area of its cutting device (3) and which has juxtaposed comb elements (5), in which system (1) at least some of the comb elements (5) can be applied to a skin area of a person during operation, each of said comb elements (5) having a proximal end (6) and a distal end (7) and a contact zone (8) extending between the two ends (6, 7). At least one of said comb elements (5) comprises a rigid part (13) and flexible connection means (10) attached to each other, by means of which the comb element (5) adapts itself to the contour of the skin region it is applied to during operation. This improves the raising of hairs on curved regions of the skin area by the comb element (5), so that the hairs can be cut properly, and it improves the handling of the apparatus (2). Next to that, the contact of the comb elements (5) with the skin is experienced as more comfortable by the user.
FIG. 3a
HAIR-CUTTING SYSTEM INCLUDING A HAIR-CUTTING APPARATUS AND A COMB DEVICE

The invention relates to a hair-cutting system comprising a hair-cutting apparatus for cutting hairs, having a cutting device and a comb device which at least during operation is mounted on the hair-cutting apparatus in the area of its cutting device and which has juxtaposed comb elements, in which system at least some of the comb elements can be applied to a skin area of a person and can be moved over this skin area during operation, each of said comb elements having a proximal end and a distal end and a contact zone extending between the two ends, while each comb element is attached to the comb device at an attachment area.

The invention further relates to a comb device suitable for use in a hair-cutting system according to the invention.

A hair-cutting system of the type defined in the opening paragraph is known from WO 98/25734.

This known hair-cutting system comprises a hair-cutting apparatus for cutting hairs, which apparatus is held in a hand during operation. It further comprises a comb device comprising a first comb section which is stationarily mounted, and a second comb section which is adjustable relative to the first comb section. The second comb section comprises juxtaposed comb elements which each have a proximal end, being the tip, and a distal end, being the back. Each comb element has a contact zone extending between the proximal end and the distal end. The comb elements can be applied to a skin area of a person, especially a person's face, by means of these contact zones for raising hairs to be cut from that skin area by the cutting device. For raising the hairs properly, the hair-cutting apparatus with the comb device should always be held in such a relative position with respect to the skin area that an optimal contact with the skin area is achieved in the contact zone. For users who lack experience or dexterity, this could lead to handling problems and possibly to unsatisfactory cutting results in curved regions of the face, such as the chin.

It is an object of the invention to reduce the afore-mentioned problems and to provide an improved hair-cutting system.

To achieve this object, a hair-cutting system according to the invention is characterized in that at least one of said comb elements comprises a rigid part and flexible connection means attached to each other. It is achieved in this way that the comb element is partly flexibly movable with respect to the region of the face it is applied to. The comb element thus adapts itself to the contour of the face region during operation. Hairs on curved regions of the face are better raised by the comb element thanks to this close following of the contour, so that they can be cut properly, while a user can handle the apparatus more easily. This benefits the overall performance of the hair-cutting system. Next to that, the user experiences the contact of the comb element with his skin as more comfortable.

In a hair-cutting system according to the invention, it has proved to be advantageous if the flexible connection means are chosen from a group comprising mechanical hinges, springs, film joints, and elastic hinges. This creates the freedom to adapt the structure of the comb elements to the type of hair and skin of different user groups.

A special embodiment of a hair-cutting system in accordance with the invention is characterized in that the flexible connection means are provided at least in the contact zone.

In this way the shape of the contact zone of the comb element adapts itself to the curvature of a facial region by flexibly bending along the flexible connection means while being moved by a user of the comb element along this region.

It is advantageous if a plurality of flexible connection means are provided in the contact zone at substantially equal mutual distances. Thus the shape of the contact zone is adapted in a uniform manner to the curvature of the facial region it is applied to.

It is furthermore advantageous if the flexible connection means are provided at least between the attachment area and at least one of the ends. Thus the angle of the contact zone relative to a base part of the comb device is adjustable during operation in that the comb element is bent along the flexible connection means.

A further embodiment of a hair-cutting system in accordance with the invention is characterized in that a distal part of the comb element, which distal part extends from the distal end towards a base portion of the comb device, lies clear of the base portion of the comb device. In this way, the comb element has a distal part with an open end which is bendable along the flexible connection means which are provided in the contact zone or between the attachment area and the proximal end. This benefits the flexibility of the comb element, so that the contact zone of the comb element follows the curvature of this region relatively more easily when being moved by a user of the comb element along a curved face region.

In the aforementioned embodiment of a hair-cutting system in accordance with the invention comprising an element with a free distal part, it is advantageous if a plurality of distal parts of the comb elements are interconnected by means of connection pieces. In this way, the adaptation of the contact zone to the curvature of a face region is still acceptable while a stable construction of the comb elements is realised.

It is furthermore advantageous if the connection pieces comprise flexible elements. Thus the free distal parts are individually somewhat adaptable to the curvature of a face region, which benefits the following of the curvature of the face region by the contact zone.

The invention will be described in more detail below with reference to the drawings, in which

FIG. 1a is a perspective view of a first embodiment of a hair-cutting system according to the invention,

FIG. 1b is a diagrammatic view of a cross-section of a comb device of the hair-cutting system taken on the line 1b-1b in FIG. 1a,

FIG. 1c diagrammatically shows the bending of a comb element of the comb device of FIG. 1b relative to that comb device,
FIG. 2 shows the hair-cutting system of FIG. 1a while operated by a user,

FIG. 3a is a perspective view of a second embodiment of a hair-cutting system according to the invention,

FIG. 3b is a diagrammatic view of a cross-section of the comb device of the hair-cutting system taken on the line IIIb-IIIb in FIG. 3a,

FIG. 4 is a diagrammatic view of a cross-section of a comb device of a third embodiment of a hair-cutting system according to the invention,

FIG. 5a is a perspective view of a fourth embodiment of a hair-cutting system according to the invention,

FIG. 5b shows part of the comb device of FIG. 5a when applied to a curved skin area, viewed from direction F.

FIG. 1a shows a first embodiment of a hair-cutting system 1 according to the invention, comprising a hair-cutting apparatus 2 for cutting hairs with a main body 11, and a cutting device 3, and comprising a comb device 4 which at least during operation is mounted on the hair-cutting apparatus 2 in the area of its cutting device 3. The cutting device 3 comprises a stationary cutter and a movable cutter, which are known as such and therefore are not shown here in any detail. The comb device 4 is present around this cutting device 3, so as to provide a distance between the cutting device 3 and a skin area the hair-cutting system 1 is applied to. In this way, a more uniform hair-cutting length is realized. The comb device 4 in this embodiment is movable relative to the cutting device 3 in a direction A shown in FIG. 1a by means of an adjustment ring 14 for selecting different hair-cutting lengths, which principle is known from EP 325326 B 1. The varying adjustment positions of the cutting device 3 are rendered as dots C in FIG. 1b. Furthermore, the main body 11 of the hair-cutting apparatus 2 comprises actuating means connected to a drive motor for actuating the hair-cutting system 1, which are known as such and therefore are not shown here in any detail.

The comb device 4 has juxtaposed comb elements 5 which can be applied to a skin area of a person and can be moved over this skin area during operation. Each of said comb elements 5 has a proximal end 6 and a distal end 7 and a contact zone 8 extending between the two ends 6 and 7, as can also be seen in FIG. 1b. Furthermore, each comb element 5 is attached to the comb device 4 at an attachment area 9 which is part of a base portion 20 of the comb device 4. The comb elements 5 comprise a plurality of rigid parts 13 attached to flexible connection means 10. In this embodiment, a plurality of flexible connection means 10 are first of all provided in the contact zone 8. The flexible connection means 10 comprise elastic hinges R1-R3 made of, for example, an elastic material such as rubber. It is achieved in this manner that during operation the shape of the contact zone 8 is adapted to a curvature of a face region it is applied to. Thus, it is relatively easy for a user to hold the apparatus during operation in such a relative position with respect to the skin area that an optimal contact with the skin area is achieved for the contact zone. Because of this optimal contact, the hairs present on the curvature of a face region are raised properly to a relatively large extent, so that as many hairs as possible can be cut. The elastic hinges R1-R3 are provided in the contact zone 8 at substantially equal mutual distances. Thus the shape of the contact zone 8 is adapted in a uniform manner to the curvature of the face region it is applied to during operation. It is noted that the number of flexible connection means provided in the contact zone can be freely chosen as desired.

Furthermore, as can be seen in FIGS. 1a and 1b, further flexible connection means 10 are provided at least between the attachment area 9 and one of the ends 6 and 7. In this embodiment the flexible connection means 10 are provided between the attachment area 9 and both ends 6 and 7, and are present closely adjacent this attachment area 9. These flexible connection means 10 comprise elastic hinges R4 and R5 and are made of, for example, an elastic material such as rubber. In this way the angle of the contact zone 8 relative to the base portion 20 of the comb device 4 is also adjustable, to achieve a better adaptation to a curvature of a face region it is applied to, as is diagrammatically shown in FIG. 1c. The deformed shape of the comb element 5, as bent along the flexible connection means 10 and 10 in the contact zone 8 and between the attachment area 9 and both ends 6 and 7, respectively, is rendered as a dotted line B in FIG. 1b.

It is noted, that the flexible connection means are chosen from a group comprising mechanical hinges, springs, film joints, and elastic hinges, and can be applied both in the contact zone 8 and between the attachment area 9 and at least one of the ends 6 and 7. This renders it possible to realize varying structures of the comb element, and thus varying embodiments of the comb device including the comb elements, for use in the hair-cutting system according to the invention. The structure of the comb element can be varied in dependence on, for example, the types of hair and skin of different user groups.

FIG. 2 shows the hair-cutting system 1 of FIGS. 1a and 1b while being operated by a user. The hair-cutting apparatus 2 is held in a hand by the user and is moved by him over a curved face region, i.e. the chin in this case. As can be seen in FIG. 2, the shape of contact zone 8 adapts itself to the curvature of the chin, and thus the user can easily operate the hair-cutting apparatus 2 in such a relative position with respect to the chin that an optimal contact with the chin is achieved for the contact zone 8. It is prevented thereby that hairs present on the chin are not or not correctly contacted by the contact zone 8, and hence the hairs are raised properly by the comb element to be cut by the cutting device 3.

FIGS. 3a and 3b show a second embodiment of the hair-cutting system 1, in which the comb elements 5 are realized in a different manner. Parts of the second embodiment which correspond with parts of the first embodiment have been given corresponding reference numbers. In this embodiment, the comb elements 5' each have a distal part 15, which extends from the distal end 7 towards the base portion 20 of the comb device 4, and which lies clear of the base portion 20 of the comb device 4. In the contact zone 8, flexible connection means 10' are provided, which comprise a film joint R6, as can be seen in FIG. 3b. The free distal part 15 is thus bendable along the film joint R6, and the comb element 5' has a deformed state as rendered with a broken line D in FIG. 3b. In this way, the contact zone 8 of the comb element 5' is better able to follow the curvature of the face region it is applied to, which results in the hairs on this region being raised more properly.
FIG. 4 shows a comb device 4 of a third embodiment of the hair-cutting system according to the invention, which comb device 4 differs from the aforementioned embodiment in that flexible connection means 10 are provided in the comb elements 5 between the proximal end 6 and the attachment area 9. The flexible connection means 10 comprise an elastic hinge R7. The free distal part 15 is thus bendable along the elastic hinge R7, and the comb element 5 has a deformed state as rendered with a broken line E.

FIG. 5a shows a fourth embodiment of a hair-cutting system according to the invention, which differs from the second embodiment as seen in FIGS. 3a and 3b in that connection pieces 16 are provided between the free distal parts 15 of the comb elements 5. By means of these connection pieces 16, the stability of the comb elements 5 as a whole is improved, which benefits the handling of the apparatus by the user. If the connection pieces 16 comprise flexible elements, such as, for example, rubber portions, the comb elements 5 are connected to each other to achieve stability, while each distal part 15 of a comb element 5 can move more or less individually with respect to a curved region of the face it is applied to, as can be seen in FIG. 5b. In this Figure, the distal parts 15 connected by flexible pieces 16 are seen from a direction F, while the contact zones 8 of the comb elements 5 are being applied to a curved skin area. The flexible connection pieces 16 that connect the free ends of the distal parts 15 to each other are bendable, in such a way that each comb element 5 is more or less individually adapted to contact the curved skin area.

It is noted that, with the hair-cutting systems 1 as described above, it is relatively easy for a user who lacks experience or dexterity to hold the hair-cutting apparatus 2 with the comb device 4 in such a relative position with respect to the skin area that an optimal contact with the skin area is achieved for the contact zone 8. Owing to the optimal contact, even hairs on curved parts of the face are raised properly by the comb elements 5, so that these hairs can be cut by the cutting device 3. Moreover, a more comfortable contact of the comb elements 5 with the skin area is achieved in this manner, which benefits the overall appreciation of the hair-cutting system 1 by the user. Furthermore, it is noted that the hair-cutting systems 1 as described above are not limited to systems for cutting facial hair, such as a beard trimmer, but also comprise systems for cutting hair on the scalp, such as a hair clipper.

The invention is further not limited to the embodiments as described above. For example, the flexible connection means which are provided in the contact zone of the comb element, formed by elastic hinges in the first embodiment, could also comprise any other type of flexible connection means chosen from a group comprising mechanical and elastic hinges, springs, and film joints. Next to that, other combinations of comb elements with rigid parts attached to flexible connection means according to the invention are within the bounds of possibility. Another possible embodiment could be, for example, a comb element with flexible connection means provided in the contact zone and between the attachment area 9 and only one of the ends 6 or 7.

1. A hair-cutting system (1) comprising a hair-cutting apparatus (2) for cutting hairs, having a cutting device (3), and a comb device (4) which at least during operation is mounted on the hair-cutting apparatus (2) in the area of its cutting device (3) and which has juxtaposed comb elements (5), in which system (1) at least some of the comb elements (5) can be applied to a skin area of a person and can be moved over this skin area during operation, each of said comb elements (5) having a proximal end (6) and a distal end (7) and a contact zone (8) extending between the two ends (6, 7), while each comb element (5) is attached to the comb device (4) at an attachment area (9), characterized in that at least one of said comb elements (5) comprises a rigid part (13) and flexible connection means (10) attached to each other.

2. A hair-cutting system as claimed in claim 1, characterized in that the flexible connection means (10) are chosen from a group comprising mechanical hinges, springs, film joints and elastic hinges.

3. A hair-cutting system as claimed in claim 1, characterized in that the flexible connection means (10) are provided in at least the contact zone (8).

4. A hair-cutting system as claimed in claim 3, characterized in that a plurality of flexible connection means (10) are provided in the contact zone (8) at substantially equal mutual distances.

5. A hair-cutting system as claimed in claim 1, characterized in that the flexible connection means (10) are provided at least between the attachment area (9) and at least one of the ends (6, 7).

6. A hair-cutting system as claimed in claim 1, characterized in that a distal part (15) of the comb element (5), which proximal part (15) extends between the proximal end 6 and a base portion (20) of the comb device (4) lies clear of the base portion (20) of the comb device (4).

7. A hair-cutting system as claimed in claim 6, characterized in that a plurality of distal parts (15) of the comb elements (5) are interconnected by means of connection pieces (16).

8. A hair-cutting system as claimed in claim 7, characterized in that the connection pieces (16) comprise flexible elements.

9. A comb device suitable for use in a hair-cutting system as claimed in any one or several of the preceding claims.