

[54] **DRY SHAVER WITH HAIR GUIDING AND SKIN STRETCHING MEANS**

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[56] **References Cited**

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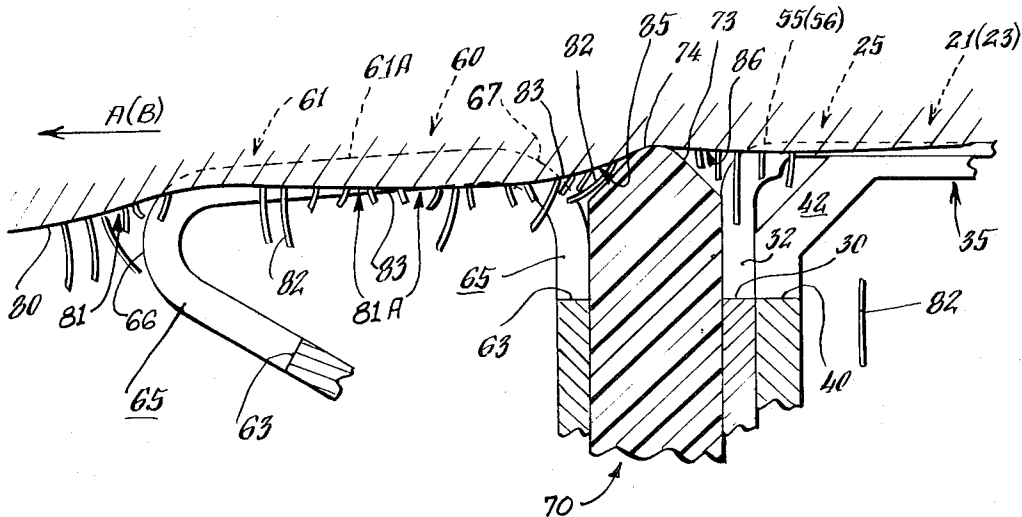
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[57] **ABSTRACT**

An improvement in hair guiding and skin stretching means mounted on a shaver having a cutter which contacts the user's skin as the shaver is moved in a hair shearing path across the user's skin. The improvement includes a first member, for combing hair and stretching skin, in combination with a second member, for lifting hair and stretching skin. The first and second members are connected alongside of the cutter to contact the skin ahead of the cutter as the shaver is advanced in the hair shearing path of movement across the user's skin, the first member stretching the skin and combing the long hair in advance of the second member, and the second member further stretching the skin and lifting the short hairs from the surface of the skin in advance of the cutter.

2 Claims, 6 Drawing Figures



DRY SHAVER WITH HAIR GUIDING AND SKIN STRETCHING MEANS

BACKGROUND OF THE INVENTION

This invention is concerned with a shaver including a cutter head having cutter teeth, which is provided with means for guiding the hairs toward the cutter teeth, while preventing attendant irritation to the user's skin. More particularly, the invention is concerned with an improvement for combing and lifting hairs into the hair shearing path of the cutter teeth, and stretching the user's skin to prevent entry thereof into the hair shearing path.

A cutter head of the type here being considered includes one or more elongated outer cutters and a corresponding number of elongated inner cutters mounted for reciprocation within the outer cutters. The outer cutters each have an inverted U-shaped cross-section, and have a plurality of parallel transverse slots formed in the upwardly disposed mid-portion thereof, to define a plurality of parallel cutter teeth in the mid-portion. The inner cutters have a hollow rectangularly-shaped cross-section and have a plurality of parallel cutter teeth in the upper side. The inner cutters are each mounted within one of the outer cutters, with their respective cutter teeth upwardly oriented and slidably engaged in hair shearing relationship with one another, and provision is made for the inner cutters to be reciprocated by the motor of the shaver.

In a cutter head including plural inner and outer cutters, the mid-portions of the outer cutters and thus the outer surfaces of the outer cutter teeth, normally contact the user's skin as the shaver is moved in a hair shearing path across the user's skin. Most users tend to press the outer cutters against their skin with considerable force, in an effort to cause the hair bristles protruding from the skin to enter into the slots between the outer cutter teeth for shearing by the inner cutter teeth. In doing so, the user's skin may be caused to bulge inwardly of the slots of the outer cutters and come into contact with the inner cutters, thus causing the skin to be irritated by the inner cutters. The bulging takes place to a greater or lesser extent depending on the width of the slots and the force with which the user presses the outer cutters against his skin.

To aid in preventing the skin from being bulged into contact with the inner cutters, the widths of the outer cutter slots are normally reduced as much as technology will allow without also preventing hairs from entering the slots. In some instances, skin stretching members having hair lifting characteristics have been mounted alongside and parallel to the leading edges of the outer cutters. Such members are designed to enable the user to force the skin taut in advance of contacting the outer cutters. Thus stretching the skin renders the skin less able to be forced into contact with the inner cutters, and lifting the hairs promotes entry thereof into the shearing path of the inner cutters. See, for example, U.S. Pat. No. 2,735,625, issued to Muntz, Dec. 6, 1955.

The aforesaid type of skin stretching member is normally provided with either a sharply angled leading edge or a roughened upper surface, or both, for elevating the free ends of the hairs from the surface of the skin as the member is moved thereacross. In practice it has been found that although the typical member is

useful for guiding short hairs into the slots of the outer cutter, the member's leading edge or outer surface may be pressed against the skin with sufficient force to scrape the surface of the skin.

Another type of aid for preventing the skin from being bulged into contact with the inner cutters is disclosed in U.S. Pat. No. 3,290,775 issued to Tolmie, Dec. 13, 1966. This patent shows a skin stretching member having hair combing characteristics. The member, which is provided with a plurality of transversely oriented slots aligned with the slots of the outer cutter, is mounted alongside and parallel to the leading edge of the outer cutter. In practice it has been found that although these members adequately guide the longer hair into slots of the outer cutter, users tend to press the member against the skin with sufficient force to "comb" the stretched skin as well as the hairs into the slots of the outer cutter, with consequent irritation to the skin. In addition, the shorter hairs are substantially unaffected by such members.

Accordingly, an object of this invention is to provide a shaver for shearing hairs without attendant irritation to the skin.

Another object is to provide a shaver including improved means for stretching the skin and guiding the hair.

Another object is to provide an improved shaver including means for first stretching the skin and combing hair and then stretching the skin and lifting hair.

A further object is to provide means for successively stretching the skin in the path of movement of the outer cutter of a shaver and combing and lifting hairs protruding from the stretched skin for entry into the hair reception slots between the teeth of the outer cutter, whereat the hairs are disposed in the hair shearing path of the inner cutter.

And, a still further object is to provide a shaver including means for stretching the skin and combing long hairs and thereafter stretching the skin and lifting short hairs from the surface thereof, the hair thus being guided toward the hair shearing path of the cutter teeth of the shaver.

SUMMARY OF THE INVENTION

The present invention provides an improved shaver including means for preventing the skin from contacting the inner cutters and guiding hairs into the slots between the teeth of the outer cutter for shearing by the inner cutter. The improved shaver has first and second elongated skin stretching members, the first of which includes means for combing long hair into the hair reception slots of the outer cutter and the second of which includes means for lifting short hairs from the surface of the skin for entry into the aforesaid hair reception slots. Preferably, the first and second members are mounted alongside and parallel to one another and to the leading edge of the outer cutter, such that the first member is the first to contact a given area of skin in the hair shearing path of movement of the shaver, followed by the second member and then the outer cutter. The first member stretches the skin and combs the longer hair protruding from the skin area, and the second member thereafter further stretches the skin area and lifts the shorter hairs from the surface thereof, for entry into the hair reception slots of the outer cutter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the upper end portion of an electric dry shaver including the present invention;

FIG. 2 is an enlarged section of FIG. 1 taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is an exploded perspective view of parts of the hair guiding and skin stretching means according to the invention;

FIG. 4 is an enlarged fragmentary top plan view, partially in section, of the electric dry shaver of FIG. 1;

FIG. 5 is a schematic view of a portion of a shaver according to the prior art; and,

FIG. 6 is a schematic view of a portion of the shaver according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings, wherein like reference numerals designate like or corresponding parts throughout the several views, an upper end portion of an electric dry shaver 10 generally includes an upper portion of a casing 12.

As shown in FIGS. 1 and 2, the casing 12 includes spaced front and rear walls, respectively numbered 14 and 15, and spaced side walls 16. The front and rear walls 14 and 15, of the casing 12, respectively include structural member portions 14A and 15A and decorative panel portions 14B and 15B respectively connected by means well known in the art to the structural member portions 14A and 15A. The walls 14, 15 and 16 define a rectangularly-shaped receptacle 18 within which a cutter head 20 is located. The cutter head 20 includes a plurality of spaced cutter head units 21, 22 and 23.

Each of the cutter head units 21, 22 and 23, includes an elongated outer cutter 25 of inverted U-shaped cross-section, having an upwardly oriented mid-portion 26 and spaced, depending, skirt portions 27. Each of the outer cutters also includes an elongated base spacer 28 of U-shaped cross-section, located between the lower ends of the skirt portions 27 and fixedly connected thereto. The outer cutters 25 each have a plurality of parallel, transversely extending, slots 30 (FIG. 4) in the mid-portion 26 thereof, forming a plurality of parallel, transversely oriented, cutter teeth 32 in the respective mid-portions 26. In addition, each of the cutter head units 21, 22 and 23, includes an elongated inner cutter 35 of hollow, rectangularly-shaped, cross-section, having spaced upper and lower sides, respectively numbered 36 and 38 and spaced side walls 39. And, as shown in FIG. 4, each of the inner cutters 35 has a plurality of parallel, transversely extending slots 40 in the upper side 36 thereof, forming a plurality of parallel, transversely oriented, cutter teeth 42 in the respective upper sides 36. Each of the inner cutters 35 is movably mounted within one of the outer cutters 25, with the inner and outer cutter teeth, 32 and 42, upwardly oriented (FIG. 2).

The cutter head units 21, 22 and 23 are mounted alongside and parallel to one another on a cutter head frame 24. The frame 24 includes a base plate 45 having a top portion 46, on which the base spacers 28 of the outer cutters 25 are mounted, and depending side walls 47. The base spacers 28 are fixedly connected by known means to the top portion 46 of the base plate 45,

and the base plate 45 removably mounted within the casing 12 in a known manner. For example, the depending side walls 47 of the base plate 45 may be removably connected to a motor housing 48 by means of resilient clips 49, extending laterally from the motor housing 48. The upper sides 36 of the inner cutters 35 are urged upwardly into sliding engagement with the undersides of the mid-portions 26 of the associated outer cutters 25, in a known manner, for example, by means of leaf springs 50. The respective inner cutter teeth 42 are thus resiliently urged into cutting engagement with the outer cutter teeth 32 with which they are adjacently associated.

Each of the leaf springs 50 is connected to the lower side 38, of an inner cutter 35, and seated on a drive arm 52. For this purpose, appropriately sized and aligned openings 43, are formed in the base spacers 28 and base plate 45, to allow the upper ends of each of the drive arms 52, and portions 53 of the leaf springs 50, to extend therethrough.

The drive arms 52 are adapted to be driven by a motor (not shown), which is housed in a suitable manner within the motor housing 48, the latter being supported in place within the shaver casing 12 by means well known in the art. Upon operation of the motor, the drive arms 52 reciprocate the springs 50, and thus the inner cutters 35 relative to the outer cutters 25, thereby slidably moving the inner cutter teeth 42 in cutting cooperation with the adjacently associated outer cutter teeth 32.

When the shaver 10 is in use, the uppermost surfaces of the cutter head 20, and thus the outer surfaces of the mid-portions 26 of the respective outer cutters 25, are pressed against and moved across the user's skin, in the direction of orientation of the outer cutter slots 30.

For the purpose of this description, forward movement of the shaver 10 should be taken to mean movement of the shaver in the direction designated by the arrow "A" (FIG. 2), and rearward movement by the arrow "B." Accordingly, when the shaver 10, and thus the cutter head 20, is moved forwardly across the user's skin, the cutter head units, 21, 22 and 23, are consecutively moved across a given portion of the user's skin in the order: 21, 22, 23. On the other hand, when the cutter head 10 is moved rearwardly across the aforesaid given portion of the user's skin, the cutter head units are consecutively moved thereacross in the order: 23, 22, 21.

During forward movement of the cutter head 20, outer cutter edge 55 of cutter head unit 21 is the leading edge of the cutter head, and outer cutter edge 56 of cutter head unit 23 is the trailing edge of the cutter head, whereas, during rearward movement of the cutter head the leading and trailing roles of outer cutter edges 55 and 56 are reversed.

This invention is directed to providing apparatus for preventing the user's skin from entering into the hair reception slots 30 of the outer cutters 25 and being irritated by the cutter teeth 42 of the inner cutter 35, including means for guiding the hairs into the hair reception slots 30 for shearing by the inner cutter 35. The apparatus includes first and second hair guiding and skin stretching means, including a first skin stretching and hair combing member 60 (FIG. 3), and a second skin stretching and hair lifting member 70.

As shown in FIGS. 2 and 3, the first skin stretching and hair guiding member 60 is an elongated member

made of, for example, sheet metal. The member includes a curved body portion 61 (FIG. 3) having an upper surface 61A, and spaced, depending leg portions 62; the latter extending downwardly from one side of the body portion 61. The body portion 61 is provided with a plurality of parallel, transversely extending, slots 63, which are formed therein to define a plurality of parallel, transversely oriented, hair combing teeth 65. The body portion 61 has curved leading and trailing edges respectively designated 66 and 67. The leg portions 62 are each provided with an opening 68 therein, to receive a fastener, such as the rivet 59, for connecting the first member 60 to the upper end of the front wall 14, and, in particular, to the structural portion 14A thereof.

As shown in FIGS. 2 and 3, the second skin stretching and hair guiding member 70 is an elongated member made of, for example, a plastic material, and has an upper body portion 71 and spaced, depending leg portions 72. The leg portions 72 extend downwardly from the body portion 71. The body portion 71 has an inverted V-shaped, upper end surface 73, defining a smooth, slightly curved, marginal edge 74 in the body portion 71. The leg portions 72 are each provided with an opening 76 therein, to receive the fastener 59, by means of which the second member 70 is connected to the first member 60 and also to the upper end of the front wall 14, and, in particular, to the structural portion 14A thereof. Of course, members 60 and 70 may also be mounted in a like manner adjacent cutter head unit 23, on wall 15, without departing from the spirit and scope of the invention.

In FIGS. 5 the first skin stretching and hair combing member 60 is diagrammatically shown mounted next adjacent to one of the outer cutters 25 in accordance with the prior art as shown in U.S. Pat. No. 3,290,775, issued to Tolmie, Dec. 13, 1972.

In FIG. 5, the cutter head unit 21 and outer cutter leading edge 55 are respectively designated 21 (23) and 55 (56), since a choice of designation occurs depending on the direction of movement, A (B), of the shaver 10. The cutter head unit 21 (23) is held in contact against the user's skin and moved in the direction of movement designated A (B) to shear the hairs protruding from the skin in the path of movement of the cutters. The surface of a user's skin 80 is diagrammatically shown in FIG. 5. The skin surface 80 in the hair cutting path is initially caused to bulge, for example at 81, in advance of the leading edge 66 of the first member 60. The bulging occurs to a great or lesser extent in response to the pressure with which the first member 60, and in particular the leading edge 66 thereof, is forced against the user's skin as cutter head is moved across the user's skin. Skin bulging 81 in advance of the leading edge 66 is accompanied by skin stretching across the upper surface 61A and trailing edge 67 of the first member 60. As the skin is so stretched, the longer hairs 82 tend to protrude from the skin and are combed into alignment with the slots 63 of the first member 60, by the combing teeth 65. Although the shorter hairs 83, also tend to protrude from the skin as it is stretched, they are relatively unaffected by the combing teeth 65.

Assuming sufficient force is applied to do so, the skin as well as the hair may be combed into the slots 63 between the hair combing teeth 65. For example, the skin may be bulged between the teeth 65 as shown in an ex-

aggerated manner at 81A in FIG. 5. As a result of which, the skin may have elongated ridges formed therein which thereafter come into contact with the inner cutter teeth 42, as the cutter head is advanced across the user's skin. For example, as shown in an exaggerated manner at 84 in FIG. 5, the previously ridged skin bulges inwardly of the outer cutter slots 30 to a sufficient depth to become irritated by the inner cutter teeth 42 as the inner cutter 35 is slidably moved within the outer cutter 25.

As shown in FIG. 6, in accordance with the invention, the first skin stretching and hair combing member 60 is spaced from the outer cutter 25 by means of the second skin stretching and hair lifting member 70, and the second member 70 is mounted next adjacent to the leading edge 55 (56) of the outer cutter head 21 (23). Again, the leading edge 66 of the first member 60 causes the skin to be bulged at 81 in advance of the first member 60, and the skin is stretched across the upper surface 61A and over the trailing edge 67 of the first member 60. Thereafter, depending on the force applied by the user, the skin may be caused to bulge at 81A into the slots 63 between the combing teeth 65, so as to form ridges in the skin. But in this arrangement the second skin stretching member 70 forms an additional bulge in the user's skin in advance of the marginal edge 74 of the second member 70, for example, as shown at 85 in FIG. 6. The additional bulging is accompanied by additional skin stretching at the marginal edge 74, of the second member 70, whereby the skin area located immediately in advance of the leading edge 55 (56) of the outer cutter 21 (23), for example at 86 in FIG. 6, is additionally stretched and smoothed to remove and/or reduce the aforesaid skin ridges formed by the hair combing teeth 65 of the first member 60. As a consequence, the depth of entry of the skin into the outer cutter slots 30 is sufficiently reduced to prevent the skin from contacting the inner cutter teeth 42. As the second skin stretching member 70 is advanced across the user's face, the hair which was combed by the first member 60 passes over the marginal edges 74 of element 70. Although these hairs may be bent toward the skin by marginal edge 74, they remain combed in the direction of orientation of the slots of the outer cutter for entry thereinto, and are caused to further protrude from the skin due to the skin being stretched by the second member 70. At the same time, the shorter hairs are caused to protrude from the skin due to the stretching action of the second member 70, and tend to be lifted from the surface of the skin and normal thereto due to the marginal edge 74 gently rubbing the surface of the skin and elevating the ends of shorter hairs or bristles. Accordingly, the second member 70 lifts the shorter hairs from the surface of the skin for entry into the outer cutter slots 30 for cutting by the inner cutter teeth 42.

In accordance with the objects of the invention there has been described a dry shaver including improved means for guiding hair bristles toward the cutter teeth of the shaver and preventing irritation to the user's skin. Preferably, the shaver improvement means includes a first skin stretching and hair combing member in combination with a second skin stretching and hair lifting member, the combination being connected to the shaver alongside the leading edge of the outer cutter.

Inasmuch as certain changes may be made in the above described invention without departing from the spirit and scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted in an illustrative rather than limiting sense. And, it is intended that the following claims be interpreted to cover all the generic and specific features of the invention herein described.

I claim:

- 1. A shaver for shearing hair protruding from a user's skin as the shaver is moved in a hair shearing path thereacross, the shaver comprising:
 - a. a casing;
 - b. an outer cutter mounted within the casing and having hair reception slots, the outer cutter contacting the user's skin as the shaver is moved in the hair shearing path, the outer cutter having a leading edge extending transversely of the path of movement of the shaver, and a movable inner cutter cooperatively associated with the outer cutter and movable relative thereto for shearing hairs which enter into the hair reception slots of the outer cutter as the shaver is moved in the shearing path;
 - c. means mounted within the casing for moving the inner cutter relative to the outer cutter;
 - d. first means for stretching the skin in an area thereof in advance of the leading edge of the outer cutter and guiding long hairs into the hair reception slots of the outer cutter as the shaver is moved in said path, the first means including a first member connected to the casing and having an upper end,

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the upper end having a leading edge and a trailing edge oriented parallel to the leading edge of the outer cutter, the upper end of the first member located in the area in advance of the leading edge of the outer cutter and initially stretching the skin thereat as the shaver is moved thereacross, and the upper end having a plurality of hair reception slots formed therein to define a plurality of spaced hair combing teeth which form elongated ridges in the user's skin; and,

- e. second means for further stretching the skin in said area in advance of the leading edge of the outer cutter and guiding short hair into the hair reception slots of the outer cutter as the shaver is moved in said path, the second means including a second member connected to the casing and having an upper end, and the upper end of the second member having a marginal edge oriented parallel to the leading edge of the outer cutter and located between the leading edge thereof and the trailing edge of the first member and at an elevation above the bottom of the hair reception slots in the first stretching means, the marginal edge smoothing out the elongated ridges and further stretching the skin and lifting short hairs from the skin for entry thereof into the hair reception slots of the outer cutter.

- 2. The shaver according to claim 1, and the upper end of the second member including an inverted V-shaped upper end surface having a curved apex, the apex forming the marginal edge of the second member.

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