

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
26 February 2009 (26.02.2009)

PCT

(10) International Publication Number  
WO 2009/024900 A1

- (51) International Patent Classification:  
B26B 19/20 (2006.01) B26B 19/38 (2006.01)
- (21) International Application Number:  
PCT/IB2008/053242
- (22) International Filing Date: 13 August 2008 (13.08.2008)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
07114520.5 17 August 2007 (17.08.2007) EP
- (71) Applicant (for all designated States except US): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

- (72) Inventor; and
- (75) Inventor/Applicant (for US only): FLOESSHOLZER, Hannes, U. [AT/AT]; c/o High Tech Campus Building 44, NL-5656 AE Eindhoven (NL).
- (74) Agents: UITTENBOGAARD, Frank et al.; c/o High Tech Campus Building 44, NL-5656 AE Eindhoven (NL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

**Declaration under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

**Published:**

— with international search report  
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(54) Title: HAIR TRIMMING DEVICE

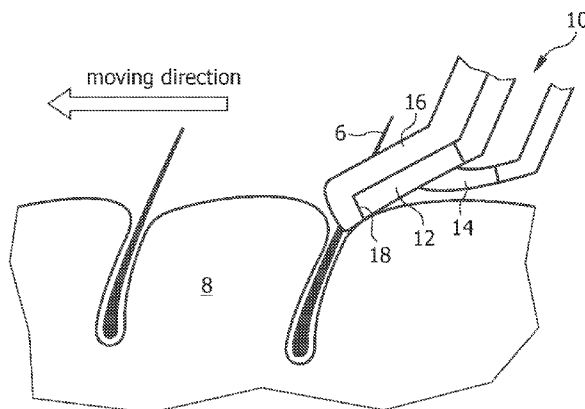


FIG. 2

(57) Abstract: The invention relates to a hair trimming device (10) comprising stationary cutter teeth (12), movable cutter teeth (14), and protective teeth (16), wherein the stationary cutter teeth (12), the movable cutter teeth (14) and the protective teeth (16) are arranged essentially in parallel. According to the invention, the protective teeth (16) are arranged such that at least some of the stationary cutter teeth (12) or some of the movable cutter teeth (14) can contact the skin 8 during operation of the hair trimming device (10). Advantageously, the hair trimming device (10) comprises a body piece (24) and a safety comb (30), the body piece (24) including the stationary cutter teeth (12) and the movable cutter teeth (14), and the safety comb (30) including the protective teeth (16), wherein the safety comb (30) is movable relative to the body piece (24) such that it can be reversibly moved from a protective position, in which each protective tooth (16) has a portion situated in front of at least one stationary cutter tooth (12), to a non-protective position, in which the safety comb (30) does not constrain contact between the skin (8) and the stationary cutter teeth (12) or between the skin (8) and the movable cutter teeth (14).



WO 2009/024900 A1

## Hair trimming device

## FIELD OF THE INVENTION

The present invention relates to a hair trimming device comprising stationary cutter teeth, movable cutter teeth, and protective teeth, wherein the stationary cutter teeth, the movable cutter teeth and the protective teeth are arranged essentially in parallel. More particularly, it relates to a safety attachment of a hair trimming device, designed to prevent skin injuries when shaving in sensitive areas of the body.

## BACKGROUND OF THE INVENTION

Electric shaving devices, commonly known as shavers, razors or body groomers, are used for shaving the human skin. Such devices typically comprise a shaving foil for cutting hair very short, usually to invisible lengths and even to a level below that of the skin, and a pre-trimmer for trimming hair in a preparative step prior to shaving, especially when the hair to be cut is somewhat longer. However, the pre-trimmer can generally be used also to cut hair very short, and some users prefer to use the pre-trimmer instead of the shaving foil.

The pre-trimmer section of the hair trimming device typically includes a row of stationary cutter teeth adjacent and parallel to a similar row of movable cutter teeth (see, e.g., patent document US 4,724,614). During the shaving operation, the row of movable cutter teeth performs a bidirectional movement with respect to the stationary cutter teeth, such that respectively one movable cutter tooth and one stationary cutter tooth act together in a manner similar to a pair of scissors. The stationary cutter teeth usually protrude with respect to the movable cutter teeth in order to reduce friction between the skin and the movable cutter teeth. During the pre-trimming step, one of the protruding stationary cutter teeth engages a hair which is subsequently cut off due to interaction with one of the movable cutter teeth.

Here and throughout the remainder of the application, the term "hair trimming device" is to be understood in a broad sense. It includes fully operational battery or AC powered electric shavers and hair trimmers as well as portions thereof having stationary cutter teeth and movable cutter teeth.

Although existing hair trimming devices perform well for most applications, for example, beard trimming and leg shaving, they may cause skin injuries when shaving in

sensitive areas of the body, such as armpits or the pubic area. These injuries arise when one or several of the protruding stationary cutter teeth penetrate the skin, for example at a skin pore. Such skin injuries can be painful and cause infections. It is important to note that these injuries generally stem from the tips of the stationary teeth, rather than from the teeth's surfaces facing the skin. The tips of the teeth may penetrate the skin because the teeth point in the direction of motion of the device with respect to the skin during a standard shaving operation. In contrast, the sharp cutting edges of both the stationary and the moving cutter teeth are oriented away from the skin and therefore present little risk. For the sake of brevity, the direction of motion of the device with respect to the skin during a standard shaving operation is herein referred to as the direction of movement.

Patent document US 4,724,614 presents an attachment for electric beard trimmers, which spaces the teeth on the blades of the trimmer a desired distance from the skin to produce stubble having the appearance of uniform growth. Although not designed specifically for the purpose of preventing skin injuries of the type described above, said beard-trimmer attachment, or adaptations thereof, is likely to prevent such skin injury if it were used for shaving in sensitive areas. However, it will not be suited for trimming hair to very short or invisible lengths, since the attachment substantially surrounds the trimmer and thereby prevents the cutter teeth from contacting the skin.

In the present application, the term "protective tooth" shall designate any tooth-like or spike-like mechanical feature designed to inhibit, at least partially, direct contact between the skin and at least one of the cutter teeth of the hair trimming device during a normal pre-trimming or shaving operation. For example, portions near the apex of the attachment described in US 4,724,614 are protective teeth in the present nomenclature.

No device has been designed to prevent skin injuries while shaving in sensitive areas of the body using a conventional pre-trimmer having stationary cutter teeth and movable cutter teeth. At the same time, shaving in armpits and pubic areas is becoming increasingly popular amongst women, and there is a considerable commercial interest in such devices.

It is therefore an object of the present invention to provide a hair trimming device comprising stationary cutter teeth, movable cutter teeth, and protective teeth, wherein the stationary cutter teeth, the movable cutter teeth and the protective teeth are arranged essentially in parallel, and which avoids skin injuries when shaving in sensitive areas of the body, while still allowing to trim hair to the usual, extremely short lengths as with a conventional hair trimming device.

This object is achieved by the features of the independent claim. Further specifications and preferred embodiments of the invention are outlined in the dependent claims.

## 5 SUMMARY OF THE INVENTION

The invention provides a hair trimming device comprising stationary cutter teeth, movable cutter teeth, and protective teeth, wherein the stationary cutter teeth, the movable cutter teeth and the protective teeth are arranged essentially in parallel, and wherein the protective teeth are arranged such that at least some of the stationary cutter teeth or some  
10 of the movable cutter teeth can contact the skin during operation of the hair trimming device. This characteristic allows pre-trimming of hair to very short lengths, and it sets the invention apart from the prior art. It is based on the insight that it is not the sharp cutting edges but the tips of the cutter teeth which can injure the skin when shaving in sensitive areas. Hence, the protective teeth can be designed to provide a barrier between the skin and the tips of the  
15 cutter teeth while still allowing the skin to touch all or a sufficient number of cutter teeth, so that the hair can be trimmed to very short lengths. The degree of protection offered by the protective teeth will generally depend on the particular geometry of both the cutter teeth and the protective teeth, and on their mutual positions. Examples of such designs will be outlined below and in the dependent claims. It should be mentioned that a possible alternative to  
20 providing protective teeth would be to adapt the size and/or shape of at least some of the cutter teeth, for example, by enlarging the tips and/or by making them more rounded. However, such a solution would permanently reduce the catch area surrounding the cutter tooth where the hair is caught before it is cut, and hence reduce the cutting rate, even when the hair trimming device is to be applied to less sensitive areas of the skin where there is little  
25 risk of injury. In contrast, the protective teeth according to the invention can be designed to form part of a detachable safety comb which may be detached from the main or body part of the hair trimming device when the protection offered by the protective teeth is not needed, typically when shaving in non-sensitive parts of the skin. This is an important aspect of the invention, which will be further discussed below. In a typical embodiment of the invention,  
30 the hair trimming device further includes a shaving foil, wherein the protective teeth do not interact with the shaving foil, the protective teeth being designed to interact only with the pre-trimmer. In one embodiment, the stationary cutter teeth are arranged such that they do not contact the skin. Thereby the protection offered by the protective teeth is combined with a characteristic of many conventional hair trimmers, many of which are designed such that

only the movable cutter teeth can contact the skin. In a different embodiment, the movable cutter teeth are arranged such that they do not contact the skin. That embodiment combines the protection offered by the protective teeth with the type of conventional hair trimmers in which only the stationary cutter teeth contact the skin.

5           According to the invention, it is preferred that the stationary cutter teeth extend further in a direction of movement of the hair trimming device than the movable cutter teeth. This enables the stationary cutter teeth to collect hair over an area on the skin located in front of the movable cutter such that the hairs bend and are more efficiently cut on the sharp cutting edges of both the stationary and the movable cutter teeth. It also virtually  
10 eliminates the risk of injury by the tips of the movable cutter teeth, so that a protection from only the tips of the stationary cutter teeth is sufficient.

          In this context, it is advantageous that each protective tooth has a portion situated in front of at least one stationary cutter tooth, with respect to a direction of movement of the hair trimming device. In fact, by creating a barrier between the protective  
15 tooth and at least one stationary cutter tooth, the risk of injury by the stationary tooth/teeth situated behind that protective tooth is substantially reduced.

          It is further advantageous that in front of only every second or third stationary cutter tooth there is situated a portion of one of the protective teeth. Placing a protective tooth in front of only every second or third stationary cutter has indeed proven to be a good  
20 compromise between providing maximum protection against skin injury, on the one hand, and not unnecessarily obstructing the area in front of the cutter teeth, on the other hand, in order to ensure that hair is still efficiently caught by the stationary cutter teeth.

          In a preferred embodiment, each protective tooth masks the tip of at least one of the stationary cutter teeth situated behind it, in the sense that the protective tooth and the  
25 tip of that stationary cutter tooth both have projections on a plane perpendicular to a direction of movement of the hair trimming device, such that the projection of the tip of the protective tooth completely overlaps the projection of the tip of the stationary cutter tooth. For this purpose, the protective tooth's tip must have a larger cross section than the stationary cutter tooth's tip and be situated in front of the stationary cutter tooth. Ideally, the cross-section is  
30 chosen sufficiently large as to render penetration of the skin by the protective tooth impossible.

          In this context, it can be advantageous that each protective tooth masks exactly one stationary cutter tooth, as this minimizes the area in front of the stationary cutter teeth that is effectively blocked by the protective teeth. It is then desirable that each protective

tooth is formed to fit the stationary cutter tooth which it masks, such that essentially no gap is present between the protective tooth and the stationary cutter tooth. Close mechanical contact between each protective tooth and the cutter tooth that is masked by the protective tooth helps to maintain the protective teeth in place. It also prevents dirt from accumulating  
5 between the protective teeth and the stationary cutter teeth and thereby helps to keep the hair trimming device clean.

In a preferred embodiment of the invention, the protective teeth are identical and/or evenly spaced. As is well known, the cutter teeth of conventional hair trimmers are generally identical and/or evenly spaced. A similar design for the protective teeth then allows  
10 the protective teeth to be matched geometrically to the cutter teeth of such a conventional hair trimmer. The simplicity of such a design also helps to keep production costs low.

In a privileged embodiment of the invention, some or all of the protective teeth are formed of a compliant and/or water-resistant material. Compared to a hard material, e.g. a metallic one, a compliant material interacts more gently with the skin and is less likely to  
15 penetrate it. The material should also be water-resistant so that it can be rinsed or otherwise cleaned with water.

In a specific embodiment, some or all of the protective teeth are formed of plastic, moulded plastic, horn, rubber-based material, metal, or ceramic. These are standard industrial materials, which can be produced and tailored using standard techniques and which  
20 can be sufficiently compliant and sufficiently water-resistant.

According to the invention, the stationary cutter teeth and/or the movable cutter teeth are formed of metal, steel, stainless steel, or ceramic. These materials are generally hard, resistant, robust, and capable of having sharp cutting edges. They can also be produced and processed using standard metal treatment techniques.

25 According to the invention, it is advantageous that the tips of the protective teeth are rounded, disk-shaped or ball-shaped, or a combination thereof. A gentle, round shape clearly helps to minimize the risk of skin penetration by the tip.

A key aspect of the invention is that the hair trimming device comprises a body piece and a safety comb, the body piece including the stationary cutter teeth and the  
30 movable cutter teeth, and the safety comb including the protective teeth, wherein the safety comb is movable relative to the body piece such that it can be reversibly moved from a protective position, in which each protective tooth has a portion situated in front of at least one stationary cutter tooth, to a non-protective position, in which the safety comb does not constrain contact between the skin and the stationary cutter teeth or between the skin and the

movable cutter teeth. The body piece typically includes further features, such as a body of the hair trimming device, a hand grip, an electric motor, etc. As mentioned above, the protective teeth tend to reduce the pre-trimming efficiency and may therefore be superfluous and, worse, inconvenient for shaving/pre-trimming in non-sensitive areas of the body, e.g. legs. In contrast, incorporating the protective teeth in a movable safety comb enables the user to put the protective teeth in the protective position when they are needed, and to put them in the non-protective position when they are not needed so that they will then not affect the shaving/pre-trimming procedure. A movable safety comb also facilitates cleaning of both the protective teeth and the cutter teeth. Also, when a component of the hair trimming device such as the cutter teeth or a shaving foil needs to be replaced, it can be convenient to put the safety comb in the non-protective position, depending on the details of the hair trimming device. In the protective position, the safety comb is firmly attached to the body piece so that its protective teeth remain in place with respect to the stationary cutter teeth during the shaving/pre-trimming procedure. In contrast, the non-protective position can be one in which the safety comb remains attached to a portion of the body piece while not obstructing contact between the skin and the cutter teeth, or, alternatively, any position in which the safety comb is sufficiently far away from the body piece and in which there is no mechanical contact between the safety comb and the body piece. If, in its non-protective position, the safety comb remains attached to the body piece, it is convenient that it remains attached also in its intermediate positions, which it assumes when it is moved from the protective position to the non-protective position or back. For example, the safety comb can be moved from the protective position to the non-protective position and back in a well-defined manner with the interaction of guide rails, arms, levers, pivots, and the like, or a combination thereof. Alternatively, the hair trimming device can be designed such that in order to move the safety comb from its protective (non-protective) position to its non-protective (protective) position, the user first removes the safety comb from the body piece and then re-attaches it in its non-protective (protective) position. In this context it is preferred that the body piece is operational both when the safety comb is in the non-protective position and when it is in the protective position. It can be advantageous that the protective teeth are formed in a single piece with the safety comb. For example, the entire safety comb can be a single piece of moulded plastic, which helps to keep production costs low. Advantageously, the body piece is provided with means for holding the safety comb. The means for holding the safety comb may take the form of recesses, slots, or clamps designed to engage the safety comb, or any other suitable form. The safety comb can be formed so as to be at least partly elastic, so that

it can be removably clamped to the body piece, which provides a particularly convenient way of attaching the safety comb to and removing it from the body piece.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

5

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partial sectional view of a conventional hair trimming device having no protective teeth.

10 Figure 2 shows the hair trimming device of Figure 1 after the device has been provided with protective teeth according to the invention.

Figure 3 is a bottom view of a hair trimming device shown in Figure 2, where the hair trimming device comprises a shaving foil and two pre-trimmers located on opposite sides of the shaving foil, and wherein each pre-trimmer is provided with protective teeth.

15 Figure 4 is a sectional view of a second preferred embodiment of the invention, in which only the protective teeth and the stationary cutter teeth, but not the movable cutter teeth, contact the skin.

Figure 5 is a schematic front view of the embodiment shown in Figure 4.

## DESCRIPTION OF PREFERRED EMBODIMENTS

20 In the drawings, similar or analogous features appearing in different Figures are designated using the same reference numerals and are not necessarily described more than once.

Figure 1 is a partial sectional view of a conventional hair trimming device 10 having no protective teeth. The conventional hair trimming device 10 comprises stationary cutter teeth 12 and movable cutter teeth 14. Both the stationary cutter teeth 12 and the 25 movable cutter teeth 14 are formed of stainless steel. The stationary cutter teeth 12 and the movable cutter teeth 14 are arranged in two straight parallel rows extending perpendicularly to the drawing plane. Only one stationary cutter tooth 12 and only one movable cutter tooth 14 are seen in the Figure, the other teeth being hidden behind the ones shown. The movable 30 cutter teeth 14 are coupled to an electric motor (not shown). During operation, the electric motor drives the row of movable cutter teeth 14 to move back and forth parallel to the row of stationary cutter teeth 12, i.e. perpendicular to the drawing plane. At the same time, the user of the device may guide the device over the skin in a direction of movement that is generally parallel to the skin 8 in order to shave different parts of the skin. When a hair 6 is caught



between the row of stationary cutter teeth 12 and the row of movable cutter teeth 14, the hair 6 will be cut when one of the movable cutter teeth 14 meets one of the stationary cutter teeth 12. The stationary cutter teeth 12 protrude with respect to the movable cutter tooth, seen in the direction of movement. The tips 18 of the stationary cutter teeth 12 are comparable in size to typical features on the surface of the skin, such as skin pores, and they may penetrate the skin roughly in the direction of movement.

Figure 2 shows a portion of the hair trimming device 10 of Figure 1, after it has been provided with protective teeth 16 according to the invention. The protruding, stationary cutter tooth 12 visible in the Figure is clad on its upper surface, i.e. on its surface facing away from the skin 8, and on its tip 18 by one of the protective teeth 16 such that essentially no gap is present between the stationary cutter tooth 12 and the protective tooth 16. Seen against the direction of movement, the tip of the protective tooth 16 has a somewhat larger cross-sectional area than the tip 18 of the movable cutter tooth 12, which makes penetration of the skin 8 less likely. While the cutter teeth 12, 14 are of stainless steel, the protective teeth 16 are formed of a compliant water-resistant plastic material, which further reduces the risk of injury when one of the protective teeth 16 hits the skin 8. Since the protective teeth 16 protrude with respect to the stationary cutter teeth 12 in the direction of movement, the protective tooth 16 also ensures that a gap is maintained between the skin 8 and the stationary cutter tooth's 12 nearest neighbors in the row of stationary cutter teeth, i.e. those stationary cutter teeth 12 located outside the drawing plane and next to the stationary cutter tooth 12 shown in the Figure. Thus, in order to prevent skin injuries inflicted by the tips 18 of the stationary cutter teeth 12, it is not necessary for all stationary cutter teeth 16 to be clad with a compliant material. In fact, it is found preferable to clad only every second or third tooth in the row of stationary cutter teeth 12, as shown in Figure 3.

Figure 3 is a bottom view of the hair trimming device 10 shown in Figure 2. The surface seen in the Figure is the one facing the skin during shaving. The hair trimming device 10 includes a body piece 24 having a shaving foil 20 and two identical pre-trimmer assemblies 22, 22' located on opposite sides of the shaving foil 20. The two pre-trimmer assemblies 22, 22' respectively define two directions of movement M, M' in which the hair trimming device 10 is to be moved over the skin for pre-trimming and/or shaving. The pre-trimmer assembly 22 comprises a row of stationary cutter teeth 12, a parallel row of movable cutter teeth 14, and a parallel row of protective teeth 16. For the purpose of clarity, the row of stationary cutter teeth 12 and the row of movable cutter teeth 14 are depicted as comprising only a small number of teeth (seven stationary cutter teeth and six movable cutter teeth);

however, this is only intended as illustrative and not as typical or useful. In realistic embodiments, each row of cutter teeth comprises many more teeth, typically around 30 to 60 teeth. The stationary cutter teeth 12 are identical and evenly spaced. Similarly, the movable cutter teeth 14 are identical and evenly spaced. Accordingly, the protective teeth 16 are also identical and evenly spaced. The stationary cutter teeth 12 protrude with respect to the movable cutter teeth 14. The stationary cutter teeth 12 are formed as an integral part of a single stationary cutter piece 26 of stainless steel having a comb-like appearance. The movable cutter teeth 14 are similarly formed as an integral part of a single comb-like movable cutter piece 28 of stainless steel. In front of only every second stationary cutter tooth 12 there is a portion of a protective tooth 16 as described in relation to Figure 2. The row of protective teeth 16 is formed as a single piece of moulded plastic constituting a safety comb 30 that can be attached to and detached from the body 24. The comb-like pieces 26, 28, 30 are also seen in Figure 5, in a somewhat different second embodiment, from a different perspective.

In both Figure 2 and Figure 3 it is seen that each protective tooth 16 accurately fits a corresponding stationary cutter tooth 12, with essentially no gap remaining between the protective tooth 16 and the corresponding stationary cutter tooth 12. This further helps to maintain the protective teeth 16 in place, although the safety comb 30 which comprises the protective teeth 16 is held in place chiefly by the body 24.

Figure 4 is a sectional view of a second preferred embodiment of the invention. It differs from the set-up of the embodiment of Figures 2 and 3 mainly in that only the protective teeth 16 and the stationary cutter teeth 12, but not the movable cutter teeth 14, can contact the skin 8, the movable teeth 16 being located above the stationary teeth 12. In comparison with the first preferred embodiment shown in Figures 2 and 3, the protective teeth 12 of the present embodiment are more exposed and specifically shaped such that they do not contact the movable cutter teeth 14, so as not to obstruct their movement. The stationary cutter teeth 12, the movable cutter teeth 14, and the protective teeth 16 have essentially hook-like profiles, with tips pointing in the direction of movement. The tip 34 of the protective tooth 16 is rounded so as to minimize the risk of skin injury. The stationary cutter teeth 12, the movable cutter teeth 14, and the protective teeth 16 respectively form part of single pieces 26, 28, 30, which are not shown in this Figure for the sake of clarity and which extend perpendicularly to the drawing plane, parallel to the respective rows of cutter teeth 12, 14 and protective teeth 16. Said pieces 26, 28, 30 are evident in Figure 5. Referring again to the present Figure 4, a shaving foil 20 of perforated metal sheet, rounded toward the

skin, is situated behind the cutter teeth 12, 14. Although the shaving foil 20 does not directly interact with the cutter teeth 12, 14, it is oriented such that pre-trimming, using the arrangement of cutter teeth 12, 14, and shaving, using the shaving foil 20, can be performed in a single act by moving the hair-cutting device over the skin 8, such that hair cut by the cutter teeth 12, 14 is subsequently cut very short by the shaving foil 20.

Figure 5 is a schematic front view of the embodiment shown in Figure 4, seen against the direction of movement. The skin 8 is essentially perpendicular to the drawing plain. The edge that is defined by the row of protective teeth 16 and is next to the skin 8 is level with the analogous edge that is defined by the row of stationary cutter teeth 12 and is next to the skin 8. The analogously defined edge of the row of movable cutter teeth 14 is offset with respect to the skin 8 by a distance equal to the thickness of the tips of the stationary cutter teeth 12, the thickness being measured perpendicularly to the skin 8. Each of the protective teeth 16, except the left-most protective tooth 16a and the right-most one 16b, masks exactly two stationary cutter teeth, while respectively two stationary cutter teeth 14 located between two neighboring protective teeth 16 are essentially not masked by any protective tooth. The protective teeth 16 also mask some of the movable cutter teeth 14, at least partially, although this is not necessary. The degree to which a particular movable cutter tooth 14 is masked by the protective teeth 16 is variable, since the position of the movable cutter tooth 14 with respect to the stationary cutter teeth 12 is time-dependent. The cross section of each protective tooth 16, seen against the direction of movement, has a rounded contour and is about four times as large as the cross section of one of the stationary cutter teeth 12. The protective teeth 16 form an integral part of the safety attachment 30, which extends essentially perpendicularly to the skin 8 and is clamped at its upper edge 36 to the body 24 of the hair trimming device 10. The column-like upper portions of the protective teeth 16 are shaped so as to yield an arcade-like structure of the safety attachment 30, where there is a rounded arc 32 between any two neighboring protective teeth 16. The arcade-like structure helps to render the safety attachment 30 stable against vibration and deformation. However, it is only an example of many possible designs that fall within the scope of the present invention. For example, the transition between two neighboring protective teeth 16 could be essentially rectangular or exhibit a more complex three-dimensional structure. It is important to note that the area between two neighboring protective teeth 16 that is not masked is reduced compared to a similar prior art hair cutting device having no protective teeth. However, the area that is not masked still remains important, so that hair can be caught by the stationary cutter teeth 16 and subsequently be cut. The trimming rate of the hair

trimming device 10 of the invention is somewhat reduced compared to the prior art, but the reduction remains acceptable and is largely outweighed by the safety advantage provided by the protective teeth 16, at least in the case of shaving in sensitive areas of the skin 8.

Equivalents, combinations, and modifications not described above may also be  
5 realized without departing from the scope of the invention.

## CLAIMS:

1. A hair trimming device (10) comprising
  - stationary cutter teeth (12),
  - movable cutter teeth (14), and
  - protective teeth (16),

5 wherein the stationary cutter teeth (12), the movable cutter teeth (14) and the protective teeth (16) are arranged essentially in parallel, characterized in that the protective teeth (16) are arranged such that at least some of the stationary cutter teeth (12) or some of the movable cutter teeth (14) can contact the skin (8) during operation of the hair trimming device (10).

10

2. The hair trimming device (10) as claimed in claim 1, wherein the stationary cutter teeth (12) extend further in a direction of movement of the hair trimming device (10) than the movable cutter teeth (14).

15 3. The hair trimming device (10) as claimed in claim 1, wherein each protective tooth (16) has a portion situated in front of at least one stationary cutter tooth (12), with respect to a direction of movement of the hair trimming device (10).

20 4. The hair trimming device (10) as claimed in claim 1, wherein in front of only every second or third of the stationary cutter teeth (12), there is situated a portion of one of the protective teeth (16), with respect to a direction of movement of the hair trimming device.

5. The hair trimming device (10) as claimed in claim 1, wherein the protective teeth (16) are identical and/or evenly spaced.

25

6. The hair trimming device (10) as claimed in claim 1, wherein some or all of the protective teeth (16) are formed of a compliant and/or water-resistant material.

7. The hair trimming device (10) as claimed in claim 1, wherein some or all of the protective teeth (16) are formed of plastic, moulded plastic, horn, rubber-based material, metal, or ceramic.

5 8. The hair trimming device (10) as claimed in claim 1, wherein the stationary cutter teeth (12) and/or the movable cutter teeth (14) are of metal, steel, stainless steel, or ceramic.

9. The hair trimming device (10) as claimed in claim 1, wherein the tips of the  
10 protective teeth (16) are rounded, disk-shaped or ball-shaped, or a combination thereof.

10. The hair trimming device (10) as claimed in claim 1, wherein the hair  
trimming device (10) comprises a body piece (24) and a safety comb (30), the body piece  
(24) including the stationary cutter teeth (12) and the movable cutter teeth (14), and the safety  
15 comb (30) including the protective teeth (16), wherein the safety comb (30) is movable  
relative to the body piece (24) such that it can be reversibly moved from a protective  
position, in which each protective tooth (16) has a portion situated in front of at least one  
stationary cutter tooth (12), to a non-protective position, in which the safety comb (30) does  
not constrain contact between the skin (8) and the stationary cutter teeth (12) or between the  
20 skin (8) and the movable cutter teeth (14).

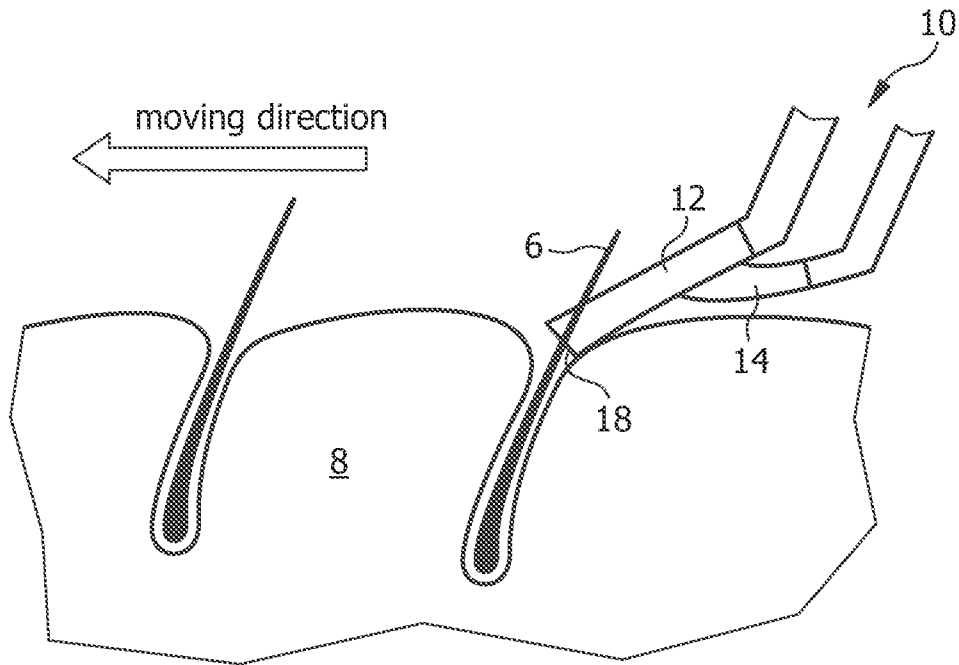


FIG. 1 Prior Art

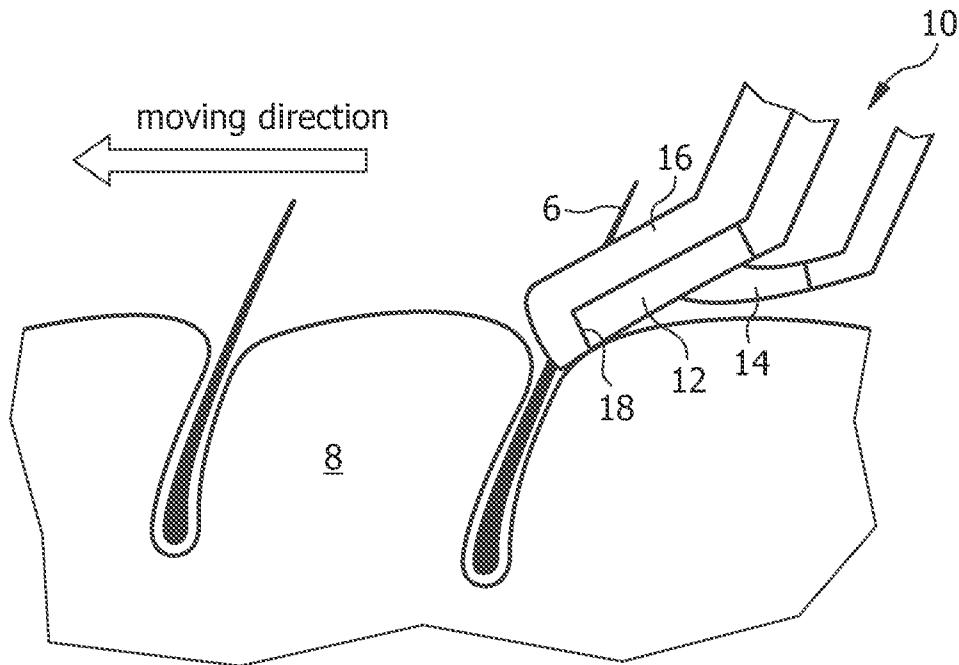


FIG. 2

2/3

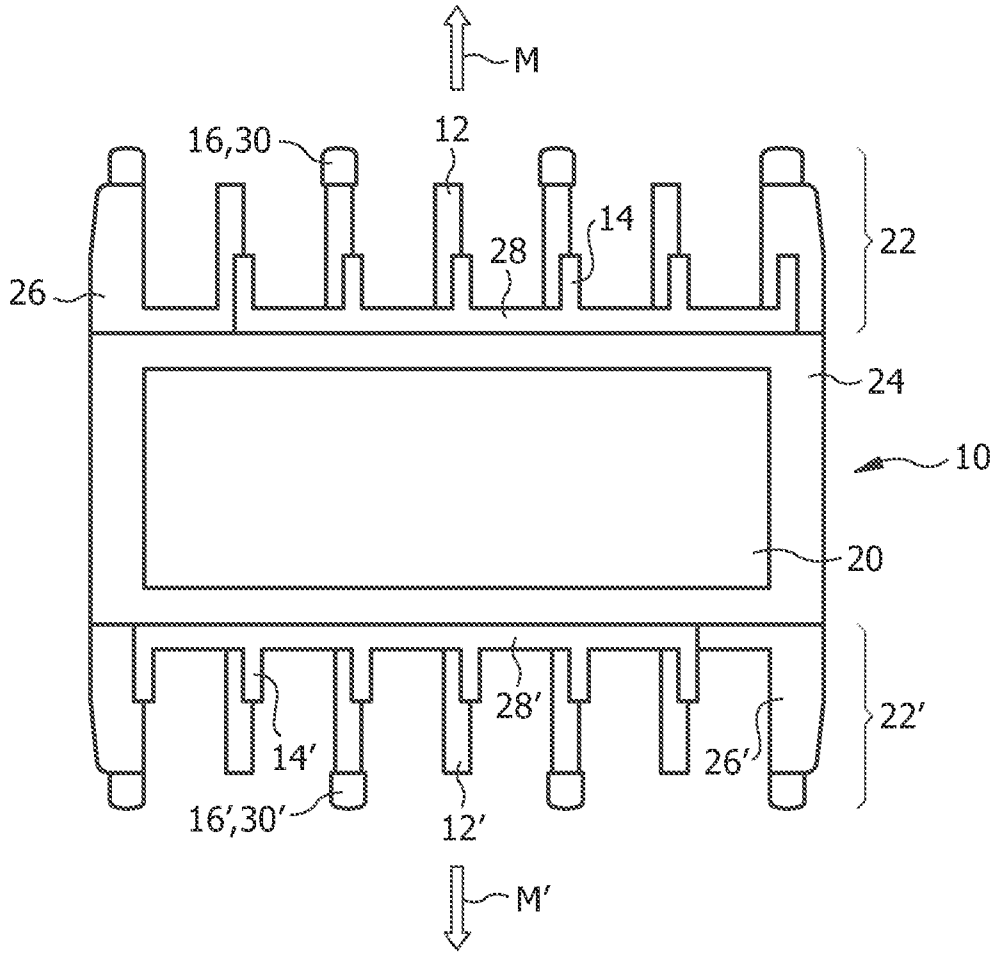


FIG. 3

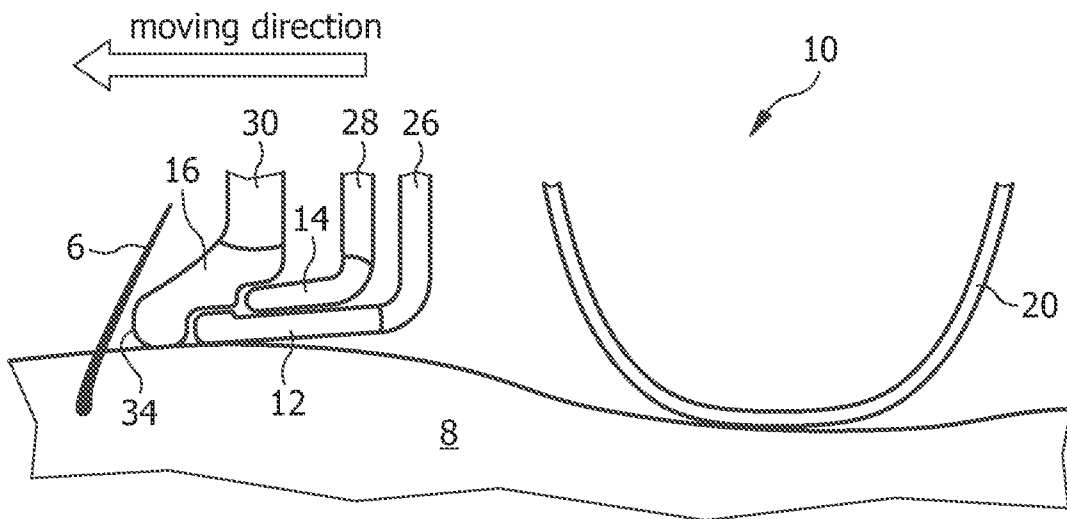


FIG. 4



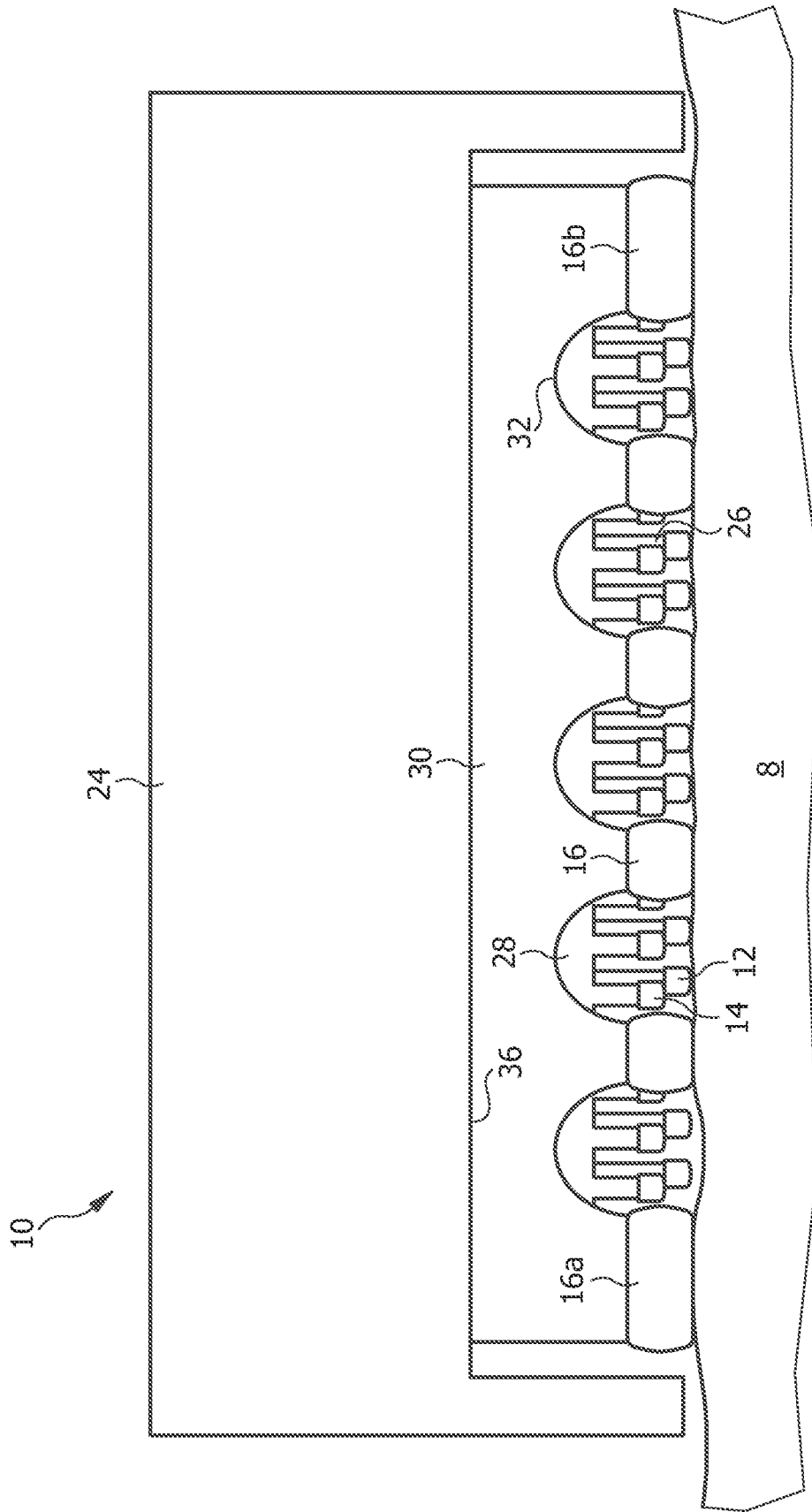


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IB2008/053242A. CLASSIFICATION OF SUBJECT MATTER  
INV. B26B19/20 B26B19/38

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)  
B26B

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 practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 724 614 A (WAHL JOHN F [US] ET AL) 16 February 1988 (1988-02-16) cited in the application	1,3-9
Y	column 3, line 29 - column 4, line 16; figures 2-5	2
Y	----- US 4 614 036 A (HARAGUCHI HIDEAKI [JP]) 30 September 1986 (1986-09-30) column 2, lines 60-66 column 4, lines 25-59; figures 5,6	2
X	----- US 4 085 503 A (BECK WILLIAM P ET AL.) 25 April 1978 (1978-04-25) column 6, line 64 - column 7, line 8; figures 1,3,4,8	1,2
	----- -/--	

 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 document 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

13 January 2009

Date of mailing of the international search report

27/01/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Rattenberger, B

## INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2008/053242

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1 753 750 A (MCARDLE MICHAEL W ET AL) 8 April 1930 (1930-04-08) column 3, lines 4-20 column 4, lines 94-121; figures 1,7,8 -----	1,2,10
X	EP 0 176 372 A (WAHL CLIPPER CORP [US]) 2 April 1986 (1986-04-02) page 8, line 23 - page 10, line 21; figures 1,2,8 -----	1,3-9
X	DE 10 2004 021503 B3 (BRAUN GMBH [DE]) 9 February 2006 (2006-02-09) paragraphs [0022] - [0026]; figures 1,2 -----	1
X	US 4 118 863 A (SANDY JULIUS W) 10 October 1978 (1978-10-10) column 4, lines 25-37; figures 1-3 -----	1
X	US 1 988 199 A (RALPH GRECO ET AL) 15 January 1935 (1935-01-15) column 2, lines 21-33; figures 1,2,4 -----	1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2008/053242

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
US 4724614	A	16-02-1988	NONE	
US 4614036	A	30-09-1986	DE 3441060 A1 JP 1448794 C JP 60108074 A JP 62058753 B	05-06-1985 11-07-1988 13-06-1985 08-12-1987
US 4085503	A	25-04-1978	AU 500200 B2 AU 8769175 A CA 1035935 A1 DE 2557368 A1 ES 443763 A1 FR 2295816 A1 GB 1499917 A IT 1052627 B	10-05-1979 23-06-1977 08-08-1978 24-06-1976 01-10-1977 23-07-1976 01-02-1978 20-07-1981
US 1753750	A	08-04-1930	NONE	
EP 0176372	A	02-04-1986	AU 569993 B2 AU 4788385 A CA 1243832 A1 DE 3569491 D1 JP 8015509 B JP 61087576 A US 4622745 A	25-02-1988 10-04-1986 01-11-1988 24-05-1989 21-02-1996 02-05-1986 18-11-1986
DE 102004021503	B3	09-02-2006	NONE	
US 4118863	A	10-10-1978	AT 385229 B AU 510511 B2 AU 3274978 A CA 1064243 A1 DE 2809345 A1 GB 1558741 A JP 54018357 A SU 814269 A3 ZA 7800707 A	10-03-1988 26-06-1980 02-08-1979 16-10-1979 25-01-1979 09-01-1980 10-02-1979 15-03-1981 31-01-1979
US 1988199	A	15-01-1935	NONE	