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### Specification

This invention relates to a long-hair trimming device for dry shaving apparatus, with a shearing comb fixedly secured to a shearing head frame and with a shearing blade assembly which is reciprocable longitudinally of said comb in a straight line and is urged thereagainst by means of pressure springs, said shearing blade assembly being comprised of a blade and a flexurally rigid carrier body.

It is a general problem in long-hair shearing components to provide blades manufactured by electroplating or etching techniques. Blades which are manufactured according to this method have a plurality of advantages residing in particular in the improved cutting performance which is attributable to the optimum configuration of the cutting edges and the maintenance of the cutting angles, and in reduced manufacturing cost resulting from the elimination of production processes otherwise necessary for blades manufactured by pressworking. As is known, pressed blades have to be subsequently stamped, hardened and ground. Apart from the required use of machine tools and tools which are subject to wear and necessitate continuous maintenance, blades with perfect cutting edges and cutting angles cannot be manufactured with this method.

A further advantage of blades manufactured by electrodepositing or etching resides in the thickness of the blade material which is substantially less than in pressed blades. The thin material supports the threading process of the hair into the cutting area and results in a closer cut lying nearer to the skin area. So far, however, the reduced thickness of the blade material has prevented these blades from being used in long-hair trimming devices because of the lack of stiffness or flexural rigidity over the entire width of the blade manufactured according to the methods identified above, this applying in particular to blades manufactured by electrodepositing.

From CH-PS 480,922 a pivotally carried long-hair trimmer is known having a fixed cutting comb and an oscillating, thin, angled and resilient cutting blade which is embedded in a carrier body. Resilient cutting blades of such shape can be manufactured neither by electrodepositing nor by etching methods, consequently they do not have the optimum cutting edges and cutting angles of the blades manufactured by such methods.

US-PS 3,909,938 discloses a pivotally carried long-hair trimmer with a cutting blade which is embedded in or riveted to a carrier body. The carrier body is movably carried on a fixedly mounted bearing rod. The cutting blade which protrudes from the carrier body by a relatively large amount extends into a resilient cutting comb of U-shaped configuration. While torsions of the cutting blade protruding from the carrier body are absorbed by the U-shaped cutting comb surrounding the cutting blade, this prevents on the other hand some sections of the cutting blade from being in abutting engagement with the active cutting edge, whereby in this area hair threaded in is not cut off but at best pulled or nipped off.

DE-PS 2,019,978 discloses a long-hair trimming device comprising a pressed cutting comb and a pressed cutting blade, with the fixed cutting comb being secured to a carrier body while the oscillating, flexurally rigid blade is urged against the cutting comb by means of pressure springs provided between the carrier body and the cutting blade.

From DE-OS 2,836,959 A1 it is known to provide a double-armed lever between the flexurally rigid cutting blade abutting a fixed cutting comb and the shearing head frame to distribute the forces exerted by the pressure springs, with the lever bearing with one end against the shearing head frame and with its other end against the cutting blade.

In the long-hair trimming device of the type referred to as disclosed in DE-OS 3,031,918 A1, the flexurally rigid cutting blade which has an angular profile is mounted on a reciprocable carrier body, with the fastening being provided by means of the bolts shown such that the pressure springs bearing directly against the cutting blade are in a position to move the blade perpendicularly into abutting engagement with the fixed cutting comb. The bolts shown merely prevent a lateral movement of the cutting blade on the carrier body.

None of the known long-hair trimming devices referred to in the foregoing provides a special construction with respect to particularly the shaping or the required elastic properties of the cutting blade or the manner in which the pressure springs bear against the blade, which would make it suitable for the direct use of a cutting blade manufactured by electrodepositing or etching methods.

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It is an object of the present invention to provide a long-hair trimming device of the type referred to in the foregoing which permits the use of cutting blades manufactured by electrodepositing or etching methods, in order to utilize the above-mentioned advantages afforded by such blades.

According to the invention, this requirement is satisfied in that the blade is of plane configuration and fixedly secured to the carrier body, with at least the teeth having their entire cutting area projecting beyond the carrier body, that the blade and the carrier body form a flexurally rigid constructional unit, and that the pressure springs bear with their one ends against a support strip provided on the shearing head frame while their other ends rest against the carrier body. By fastening the blade to the carrier body which is preferably an injection-molded plastic part with knobs formed thereon which engage into corresponding recesses in the blade, the rigidity of the carrier body is transmitted to the thin blade, such that the blade and the carrier body form a flexurally rigid unit. This flexurally rigid unit provided by the invention permits the use of blades manufactured by electrodepositing or etching methods and the utilization of the advantages afforded by such blades.

For the purpose of reducing friction between the relatively sliding surfaces, the flexurally rigid unit allows the provision of sliding surfaces on the side of the blade abutting the fixed shearing comb.

The oscillating motion of the driving lever is transmitted through a driving pin to a fork configured as a coupling element which may be formed on the carrier body or on the blade and causes the unit to oscillate when in operating condition.

The carrier body includes on the side remote from the blade recesses for receiving pressure springs. On the one hand, these recesses facilitate the mounting of the carrier body with the pressure springs in the shearing head frame, on the other hand, they define the position and the center of pressure of the pressure springs for the purpose of ensuring that the shearing blade assembly is urged against the shearing comb at a pressure which is evenly distributed over the entire width of the unit.

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The position of the shearing blade assembly and thus of the carrier body is determined by three sides and ensured by the pressure springs bearing against the support strip on the housing wall of the shearing head frame, by the abutment on the housing wall of the shearing head frame, as well as by the abutment of the blade fixed to the carrier body on the shearing comb. To prevent an excursion to the fourth open side, the shearing blade assembly or the carrier body are slidably held in the provided position by means of one or several guide strips. These guide strips are preferably part of the shearing head frame or are secured to the inside wall of said frame.

Further features, advantages and details of the invention will become apparent from the subsequent description and the accompanying drawings showing a preferred embodiment of a long-hair trimming device. In the drawings,

FIG. 1 is a side view of a shearing head frame showing a portion broken away in the area of the long-hair trimming device;

FIG. 2 is a front view of a shearing head frame, as seen from the direction of arrow A in FIG. 1, including a shearing foil and a long-hair trimming device, showing a portion broken away in the front wall of the housing;

FIG. 3 is top plan view of the shearing blade assembly, as seen from the direction of arrow B in FIG. 1; and

FIG. 4 is a section through the shearing blade assembly, taken along the line C-C of FIG. 3.

Referring now to FIG. 1, reference numeral 1 identifies a shearing head frame of a dry shaving apparatus, reference numeral 2 a housing wall illustrated in section, and reference numeral 3 denotes an end wall. Formed on the inside of the housing wall 2 is a support strip 4 extending in longitudinal direction.

The long-hair trimming device includes a fixed shearing comb 5, a movable shearing blade assembly comprised of a blade 6 and a carrier body 7, as well as pressure springs 8 bearing against the support strip 4, and a fork 9 formed on the carrier body 7.

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The long-hair trimming device is shown in its operating condition. The slidable driving lever 10 with the driving pin 11 formed thereon is in the U-shaped opening of the fork 9, transmitting in this manner the oscillating motion of the driving lever 10 which is in the ON condition to the movable shearing blade assembly. When the driving lever 10 is displaced in the direction of arrow B, the driving pin 11 moves out of the fork 9, causing the long-hair trimmer to stop.

The shearing foil 12 is held in the shearing head frame 1 in the known manner, while the fixed shearing comb 5 is fastened to a molding 14 provided on the shearing head frame 1 by means of two screws or rivets 13. The housing wall 2 of the shearing head frame ends a short distance below the movable blade 6, thereby producing a narrow slit 27 through which the blade 6 and part of the carrier body 7 are visible over their entire length. The broken away portion in the housing wall 2 makes it possible to recognize the driving lever 10 with the driving pin 11, the fork 9, the carrier body 7, two pressure springs 8 and one guide strip 15, to the extent that these parts are exposed by the broken away portion.

The pressure springs 8 bear against the support strip 4 shown in FIG. 2 in broken lines which is provided on the inside of the housing wall 2 of the shearing head frame, the springs extending with their opposite ends into recesses 16 provided on the carrier body 7. These recesses 16 define the position and the center of pressure of the pressure springs 8 in the carrier body 7, in addition to serving a guiding function and facilitating the mounting of these interengaging components. Preferably, the long-hair trimming device shown provides four recesses 16 in the carrier body 7 and four pressure springs 8.

The broken away portion clears the view on a guide strip 15 which serves the function of maintaining the carrier body 7 in its sliding position, that is, of preventing a movement or excursion of the carrier body 7 in the direction of the arrow A in FIG. 1.

Starting at the center line, the broken away portion shows only the right-hand side of the carrier body 7 with the guide strip 15 and two pressure springs 8. It will be understood that the left-hand side is a mirror image thereof.

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Above the fork 9, the carrier body 7 provides a groove 17 in which a knob 18 for securing the blade 6 is engaged.

Two further knobs 19 and 20 serving to secure the blade 6 to the carrier body 7 become apparent from FIG. 3. The three-point fixing shown has proved to be sufficient and ideal for blades manufactured by electrodepositing or etching methods. However, fixing in two points or in more than three points is likewise possible. The knobs 18, 19, 20 may be of identical or different shape, for example, square and/or rectangular and/or round. The receiving openings 21, 22 and 23 in the blade 6 have to be conformed to the contours of the knobs 18, 19 and 20, with knobs and openings interengaging without any clearance. The blade 6 is urged against the carrier body 7 by means of the knobs and has its entire rear side in abutting engagement with the carrier body.

To reduce the friction between the blade 6 and the shearing comb 5, the blade 6 has on the side remote from the carrier body 7 sliding surfaces 24 and 25. Only these sliding surfaces 24 and 25 are in sliding engagement with the fixed shearing comb 5. The sliding surface 24 is a narrow strip, while the sliding surface 25 is wider, extending beyond the depth of the teeth 26 of the blade 6 around the receiving openings 21, 22 and 23. The material of the blade 6 is slightly thinner in the area between the sliding surfaces 24 and 25. With blades manufactured by electrodepositing or etching methods, this is achievable without additional expenditure being incurred by the process.

FIG. 4 shows the shearing blade assembly comprised of the carrier body 7 and the blade 6 in the section along the line C-C of FIG. 3. The blade 6, being slipped on and held by the knobs 18, lies flat against the carrier body 7. The blade 6 is thicker in the area of the sliding surfaces 24 and 25. The carrier body 7 is an injection-molded plastic part having integrally formed thereon the knob 18 shown, the other knobs 19 and 20 described, as well as the fork 9 which serves as a coupling member. The fork 9 may also be integrally formed on the blade 6. The blade 6 which is weaker in terms of stability combines with the stable carrier body 7 by its abutting engagement and fastening therewith to provide a flexurally rigid unit of uniform stability which is greater than that of the stable carrier body 7.

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The teeth 26 of the blade 6 extend with at least their entire cutting area beyond the outer contour of the carrier body 7. The end of the blade on the side remote from the teeth 26 may extend beyond the outer contour of the carrier body 7, because the blade 6 is more than sufficiently stable in this direction.

#### List of References

- 1 Shearing Head Frame
- 2 Housing Wall
- 3 End Wall
- 4 Support Strip
- 5 Shearing Comb
- 6 Blade Shearing Blade Assembly
- 7 Carrier Body
- 8 Pressure Springs (4)
- 9 Fork
- 10 Driving Lever
- 11 Driving Pin
- 12 Shearing Foil
- 13 Screws or Rivets (2)
- 14 Moldings (2)
- 15 Guide Strip
- 16 Recesses (4)
- 17 Groove
- 18 Knob
- 19 Knob
- 20 Knob
- 21 Receiving Opening
- 22 Receiving Opening
- 23 Receiving Opening
- 24 Sliding Surface
- 25 Sliding Surface
- 26 Teeth
- 27 Slit



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### Patent Claims

1. A long-hair trimming device for dry shaving apparatus, with a shearing comb (5) fixedly secured to a shearing head frame (1) and with a shearing blade assembly which is reciprocable longitudinally of said comb in a straight line and is urged thereagainst by means of pressure springs (8), said shearing blade assembly being comprised of a blade (6) and a flexurally rigid carrier body (7), characterized in that the blade (6) is of plane configuration and fixedly secured to the carrier body (7), with at least the teeth (26) having their entire cutting area projecting beyond the carrier body (7), that the blade (6) and the carrier body (7) form a flexurally rigid constructional unit, and that the pressure springs (8) bear with their one ends against a support strip (4) provided on the shearing head frame (1) while their other ends rest against the carrier body (7).

2. The long-hair trimming device as claimed in claim 1, characterized in that the blade (6) is thinner than the fixed shearing comb (5).

3. The long-hair trimming device as claimed in one or several of the preceding claims, characterized in that the blade (6) comprises sliding surfaces (24, 25).

4. The long-hair trimming device as claimed in one or several of the preceding claims, characterized in that the blade (6) comprises receiving openings (21, 22, 23).

5. The long-hair trimming device as claimed in claim 1, characterized in that knobs (18, 19, 20) are formed on the carrier body (7) for the purpose of holding the blade (6).

6. The long-hair trimming device as claimed in claim 1, characterized in that a fork (9) is formed on the carrier body (7) or on the blade (6) to provide a coupling element.

7. The long-hair trimming device as claimed in one or several of the preceding claims, characterized in that recesses (16) are provided in the carrier body (7) to receive the pressure springs (8).

8. The long-hair trimming device as claimed in one or several of the preceding claims, characterized in that the carrier body (7) is slidably held in its position by means of one or several guide strips (15).



9. The long-hair trimming device as claimed in claim 8, characterized in that the guide strips (15) are part of the shearing head frame (1) or are secured thereto.

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