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CUTTER BLADE ASSEMBLY FOR A MOTOR DRIVEN DRY SHAVER

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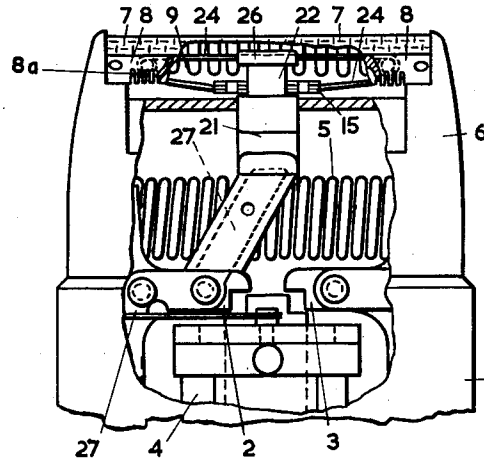


FIG. 1

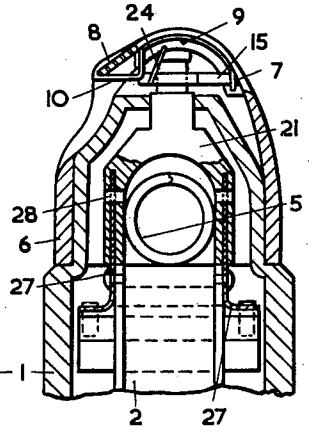


FIG. 2

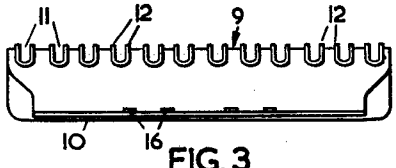


FIG. 3

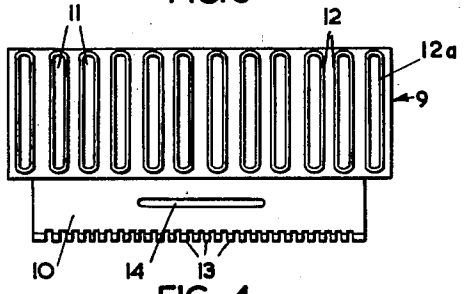


FIG. 4

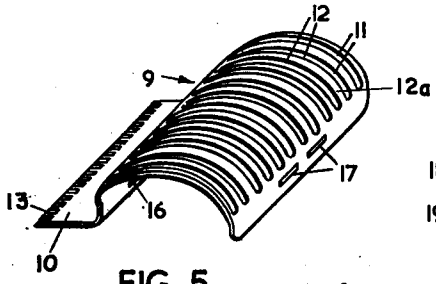


FIG. 5

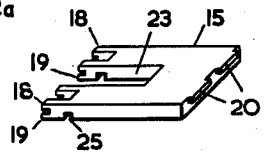


FIG. 6

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CUTTER BLADE ASSEMBLY FOR A MOTOR DRIVEN DRY SHAVER

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5 Claims. (Cl. 30—34)

This invention relates to hair and like clippers and more particularly to an improved form of movable cutter blade for a dry-shaver and to an improved means for attaching a movable cutter blade to the drive of a dry-shaver.

In dry-shavers it is known to form a stationary outer cutter, or shear plate, of a very thin, flexible perforated metal sheet or foil, which is held in arched condition by its attachment along two opposite edges to the casing of the dry-shaver. The present invention provides an improved movable cutter blade for use with outer cutters of this type and an improved means for attaching such a movable cutter blade to the drive of a dry-shaver.

One particular construction of hair or like clipper in accordance with the invention is shown by way of preferred example in the accompanying drawing, in which

FIGURE 1 is a front view of the upper part of the clipper with parts broken away;

FIGURE 2 is a transverse section through the upper part of the clipper;

FIGURES 3, 4 and 5 are a front elevation plan and perspective view respectively of a reciprocating inner cutter forming part of the clipper and

FIGURE 6 is a perspective view of another part of the clipper.

Referring to the drawing, a body casing 1 accommodates a vibratory electric motor of the construction forming the subject of copending application Serial No. 736,576 and fully described and illustrated in the complete specification of that application. For the purpose of the present application it is sufficient to note that it comprises a pair of armatures 2, 3 mounted for oscillation in the plane of FIGURE 1 and mechanically coupled together so that their movements are always equal and opposite. The armatures are caused to oscillate towards and away from one another by the magnetic force produced by the passage of alternating current through a coil 4 and the restoring force of a biasing spring 5.

Detachably mounted on the body casing 1 is a head frame 6 which supports a stationary outer cutter or shear plate 7 formed of very thin, flexible, perforated sheet metal or foil. This shear plate is held in arched condition by its attachment along one edge to the frame 6 and along the opposite edge to the underside of a comb 8, which is in turn secured at its ends to the frame 6. The comb 8 has its edge further from the shear plate notched to form teeth 8*a*, thus constituting a stationary trimmer comb.

A reciprocable cutter 9 (shown separately in FIGURES 3 to 5) cooperates with the shear plate 7 to constitute a clipper for short hairs, suitable for use as a dry-shaver, and with the comb 8 to constitute a clipper for trimming longer hairs. The cutter 9 is constructed of metal sheet and is formed to have a cross sectional shape resembling the letter P with the straight portion of its loop missing, the projecting marginal portion 10 adopting a slight transverse curvature (convex in the same general direction as the arched portion of the loop) when pressed into contact with stationary comb 8. The movable cutter blade for the dry-shaver extends over the arched portion of the loop of the P and is formed with a plurality of elongated, parallel sided apertures 11 with rounded ends

which extend parallel to one another and transversely of the direction of reciprocation of the cutter across at least the major part of the width of the perforated shear plate. The sheet metal at the edges of each aperture is upturned to form a continuous flange 12 bounding the aperture, the edges of the upturned flanges being ground to form lands 12*a* having the same arched contour as the shear plate or foil 7. The projecting marginal portion 10 of the combined movable cutter has its longitudinal edge serrated to provide a row of comb teeth 13, which in the construction illustrated are of substantially rectangular form. A slot or slit 14 is provided longitudinally of the central portion of said marginal portion to give additional flexibility and even out the cutting pressure along the row of comb teeth.

The means for attaching said combined movable cutter blade to the armature of the electric motor comprises a driven member or plate 15 (shown separately in FIGURE 6), formed of a suitable synthetic plastic material preferably nylon. The cutter 9 is so mounted on the plate 15 that the latter completes the loop of the P over the centre portion of the movable cutter, i.e. it constitutes the straight side of said loop. For this purpose the arched portion of the metal sheet is formed adjacent the marginal portion 10 with a plurality of discrete slots 16 (FIGURE 3) extending in line longitudinally of the cutter, and the opposite edge of the cutter is formed with slots 17 (FIGURE 5). One longitudinal edge of the plate 15 is formed with a plurality of castellations, which are split or grooved horizontally to give two superimposed sets of tongues 18, 19, and the opposite edge is formed with tongues 20. The cutter is secured to the plate 15 by passing the upper tongues 18 through the slots 16 so that they overlie the marginal portion 10 of the cutter, while the lower tongues 19 project beneath that portion so that tongues 18 and 19 straddle portion 10, and then inserting the tongues 20 in slots 17, the resilient character of the cutter allowing it to be thus sprung into position and to be removed subsequently if necessary.

The driven plate 15 is coupled to the armature of the motor through a driving member 21, also formed of nylon or other suitable synthetic plastic material, the upper part of which forms a stem 22 extending towards the shear plate through an opening 23 in the plate 15. The parts are so dimensioned that the plate can move freely relative to the member 21 except in the direction of reciprocation of the cutter, i.e. to the left and right in FIGURE 1, such movement being controlled during operation by the engagement of the reciprocating cutter with the cooperating stationary shear plate 7 and comb 8. The cutter is urged into engagement with plate 7 and comb 8 by a wire spring 24 whose central portion engages a groove provided in the top surface of member 21. On each side the wire extends longitudinally of the cutter beyond the end of the plate 15 and is formed into a coil, the end being turned in to engage in a groove 25 provided on the underside of plate 15. Upward movement of the plate 15 relative to the member 21 under the influence of the spring is limited by an enlarged head 26 at the upper end of the stem 22, so that when the head frame 6, shear plate 7 and comb 8, are removed from the body casing, the reciprocable cutter is held captive.

As will be seen from FIGURE 2, the force of spring 24 urging the movable and stationary clipper members together, acts on a line close to that side of the arched portion of the movable cutter which lies nearer to the comb teeth 13. As also shown in that figure, the longitudinal margins of the arched portion of the movable cutter, containing the slots or apertures for engaging drive plate 15 are formed perpendicular to the plane of the drive plate to give "girder" strength to said edge

portions, especially to said edge portion adjoining marginal portion **10**. Strengthening of the movable cutter blade transversely thereof is derived from the flanges **12**, but by the construction illustrated and described sufficient lateral and torsional flexibility and resilience of the movable cutter blade are retained to ensure its even contact with the stationary cutters.

Member **21** has its lower or base portion of inverted U form, the two legs passing on opposite sides of spring **5**. The legs are moulded with cavities which fit slideably over the upper parts of a pair of plates **27**, secured on opposite sides of armature **2**. The part of each plate which enters member **21** is formed with a hole **28** and when member **21** is in position the material of that member is sheared into the holes in the plates, as indicated in FIGURE 2, thus securing the member in position.

It will be understood that many modifications are possible to the construction illustrated and described above, those mentioned below being examples only.

It will be appreciated with the cutter construction illustrated only the lands **12***a* formed by the upturned continuous edges of flanges **12** come into contact with the outer cutter or foil, thus decreasing the total contact area of the two cutter blades and increasing the force per unit area of the contacting portions of the two blades. If the movable cutter blade were to be provided with apertures having upturned flanges which terminate within the perforated area of the outer cutter or foil, the "sharp" ends at each termination would, owing to the flexibility of the outer cutter or foil, tend to engage the perforations, resulting in accelerated wear of both the outer and inner cutter, but especially of the very thin outer cutter or foil. By bounding the apertures with a continuous upturned flange, as described, such terminations and "sharp" ends are avoided.

However, this advantage can still be obtained with arrangements other than that illustrated. The apertures may be given various shapes and in addition to parallel sided apertures with curved end portions, circular apertures, curved convex- or concave-sided apertures with curved end portions, for example, have all been found suitable. The apertures may be arranged in rows extending across the movable cutter blade in said direction, two or more apertures being provided in a row with the apertures in adjacent rows being staggered.

It has been found most convenient to make the upturned continuous flanges perpendicular to the envelope of the movable cutter blade, but said flanges may be inclined at an angle thereto if desired.

Also, the height of the continuous flanges may be formed uniform throughout their length or the said lands may be given a different contour from that of the arched metal sheet by graduating the height of the flanges.

We claim:

1. A cutter blade assembly for a motor driven dry shaver, comprising a stationary shear plate made of thin flexible sheet metal, said shear plate having a circumferentially perforated arched portion and a toothed trimmer comb portion extending from one straight edge of said arched portion, the teeth of said comb portion being directed away from said arched portion, an arched cutter having a circumferentially perforated arched portion and a flat portion extending from a straight edge of the arch cutter portion and being toothed at its free edge, the arched cutter portion being nested in the arched shear plate portion and the flat cutter portion underlying the comb portion of the shear plate, said cutter being reciprocable lengthwise of the shear plate, an apertured driven plate member extending across the arch of the arched cutter portion and being detachably secured thereto, a driving member extending through the aperture of the plate member in driving engagement therewith, said driving member being adaptable to be reciprocated by the motor of the dry shaver, and spring means disposed between said plate member and said cutter to urge the arched cutter portion into engagement with the arched shear plate portion and the toothed edge of the flat cutter portion into engagement with the comb portion of the shear plate.

2. A cutter blade assembly according to claim 1 wherein said spring means comprise a wire spring having a central portion engaging the portion of the driving members protruding through said plate member and outer portions extending lengthwise of the arch of the arched cutter portion and beyond the plate member, the ends of said outer portions being turned over to engage the face of the plate member distant from the shear plate.

3. A cutter blade assembly according to claim 1 wherein said driving member comprises a stem protruding through the plate member aperture and terminating in an enlarged head to limit movement of the cutter lengthwise of the stem due to the action of said spring means.

4. A cutter blade assembly according to claim 3 wherein said spring means act upon said plate member opposite a portion of the cutter intermediate to the shear plate engaging portion thereof and the toothed edge of the cutter.

5. A cutter blade assembly for a motor driven dry shaver comprising a longitudinally reciprocable arched cutter of resilient sheet metal, a stationary shear plate cooperating with the cutter, a driving member reciprocated by the motor of the shaver, a driven rigid plate extending across the arch of the cutter, said cutter and said driven plate having at their side edges tongues and slots engageable with each other to secure the cutter resiliently to the plate so as to be fixed relative to the cutter, the said rigid plate loosely engaging the driving member so that the cutter can move freely relative to the driving member in all directions except the direction of reciprocation of the cutter, and spring means acting between the driving member and the driven plate to urge the cutter into engagement with the shear plate.

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