

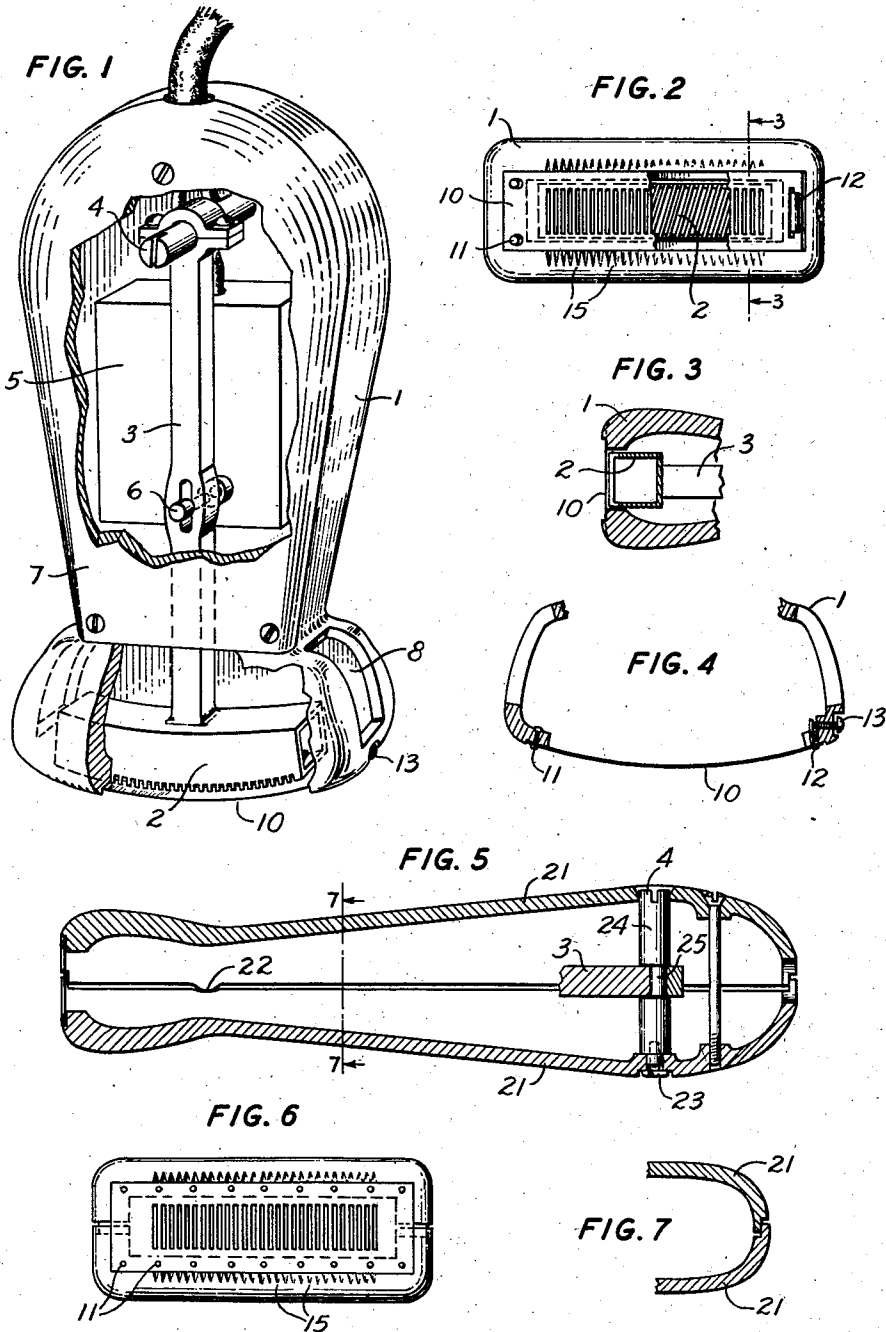
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RAZOR

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RAZOR

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The present invention relates to improvements in power driven razors. More particularly the invention bears relation to a type of razor known heretofore in which there is commonly provided one or more face plates or guards having slots or tooth-like openings therein for the admission of hair and a cutter member movable across the openings in such manner as to shear off the hair projecting therethrough.

In razors of the type described it is well known that various mechanical limitations ordinarily have required that the face plate be self-supporting and hence of substantial thickness, so that it is inherently impossible to cut the hair as short as is desired for a close shave.

A broad object of the present invention is to provide an improved power driven razor capable of closer shaving than has heretofore been possible with efficiently designed razors of the type described. A more specific objective is to provide a power driven razor so designed as to permit the use of a perforated face plate, so thin as to be non-self supporting yet so supported as to be rigid and operative with the cutter member for hair shearing purposes. Another and important object is to minimize unnecessary pressure and friction between the cutter member and face plate.

In accordance with the present invention the foregoing objectives are attained by providing an exceedingly thin perforated face plate or "blade" that is supported under tensile forces to render it rigid. An important feature of the invention lies in the manner in which the aforesaid tensile forces are applied to the thin blade, and in the manner in which the latter is supported so that the tension applied thereto does not result in excessive pressure and friction between the blade and the cutter member. The invention is further featured by means for independently adjusting the tension applied to the blade and the pressure between the blade and cutter. A subordinate feature of the invention lies in the means provided for easy changing of the blade, thus enabling blades to be provided for close shaves or only moderately close, for stiff, bristly hair or for soft, silky hair, etc., and for replacing worn or defective blades.

The foregoing objects and features and various other objects, features and advantages of the present invention will appear from a consideration of the following detailed description of specific embodiments thereof. It is to be understood that these embodiments are illustrative only and not limitative of the present invention, for

the various features thereof are, or may be, capable of application in identical or modified form to razors of substantially different design. What I conceive to be the limits of my invention are indicated in the appended claims.

Reference will be made to the accompanying drawing, in which:

Fig. 1 is a view, partially in section, of a razor in accordance with the invention showing the general relation of the parts thereof;

Fig. 2 is a front elevation of the razor illustrated in Fig. 1 with the tensioned blade partially broken away to show the cutter member;

Fig. 3 is a section through Figs. 1 and 2 showing the operative relation of blade, cutter and housing;

Fig. 4 is a transverse section through the cutter head showing the means for providing and adjusting longitudinal tension in the blade;

Fig. 5 is a longitudinal cross-sectional view of a razor in accordance with the invention illustrating a preferred arrangement for providing and adjusting transverse tension in the blade and for adjusting the clearance between the blade and the cutter member;

Fig. 6 is a front elevation of the cutter head shown in Fig. 5; and

Fig. 7 is a cross-section through Fig. 5.

Referring now more particularly to Figs. 1-4 which show a form of improved razor in accordance with my invention, there is provided a housing 1 and associated cover-plate 7 proportioned to form a convenient grip for holding the instrument and to accommodate the cutter and driving means. At the cutter head the housing is elongated transversely and an approximately rectangular opening is provided across which the perforated blade 10 is disposed in a manner shortly to be described. In operative relation with blade 10 and adapted to be oscillated underneath and in contact therewith is the cutter 2, which as disclosed comprises a light metallic member having slots cut in the outer face which bears against the blade.

In the preferred embodiments of my invention herein disclosed, the blade, cutter member and cutter head are arcuate in plan view, the center of curvature being pivot 4. The cutter 2, fastened to a light shaft 3 pivoted at 4, is driven by electrical means adapted to oscillate the shaft about the pivot. As disclosed, the driving means may be an electrically operated motor 5 that carries an eccentric pin 6 adapted to slide in a slot in shaft 3. Any other suitable means for reciprocating

ing the cutter 2, however, may alternatively be provided.

The blade 10, shown in Figs. 2 and 3, comprises a strong metallic tape that is perforated for the admission of hair, the perforations being preferably in the form of transverse, narrow slots. The slot width, exaggerated for the sake of clearness in the drawings, may be of the order of one-hundredth of an inch, and the distance between slots of the order of a few hundredths of an inch. The thickness of the blade may be of the order of one-thousandth of an inch, approximately one-tenth the thickness now commercially employed. Blades with different dimensions may be provided according to the coarseness or fineness of the hair that is to be cut and the closeness of shave desired.

The aforementioned rectangular opening in the housing at the cutter head is recessed slightly about the edges as indicated in Figs. 2 and 3 so that the blade 10 may be flush or slightly below the surface. One end of the blade is removably attached across one end of the rectangular opening as by means of pins 11 which project through corresponding openings in the end of the blade. At the other end of the blade a relatively heavy spring 12 projects through an opening in the housing and engages the blade so as to draw it tightly across the rectangular opening. The blade is thereby rigidly fixed in position for co-operation with the cutter member 2. Suitable means may be provided for adjusting the tension, as, for example, an adjusting screw 13 the end of which bears against the free end of the pivoted spring member.

The face of the hollow cutter member 2 is slotted so as to cooperate with the slots in the blade 10. Preferably the slots in the cutter member are not strictly transverse but slightly inclined as shown in Fig. 2. This feature has a double advantage, for the shearing action is thereby distributed over the reciprocatory cycle, and the possibility that the transverse strips comprising the blade will be caught by the cutter member is minimized inasmuch as between each strip and cutter tooth the point of shear sweeps from one rigidly fixed end of the strip to the other.

The slots in the cutter are deep enough that the hair clippings fall into its hollow interior, whence they may drop out of either end and fall through the openings 8 provided at each side of the housing.

In the embodiment last described the longer sides of the blade 10 rest in the recess in the rectangular opening; in view of the arcuate form of the recess, the lengthwise tension in the blade 10 secures the latter firmly in this recess. The distribution of the tensile forces across the end of the blade, the curvature of the recess and the width of the supporting shoulder provided thereby may be modified within limits to obtain the desired rigidity of the blade.

Whereas Figs. 1-4 show how lengthwise tension in the blade may be adjusted, Figs. 5-7 illustrate a further and preferred modification whereby transverse tension in the blade may be provided and controlled. This embodiment may optionally also incorporate the longitudinal tensioning means of Figs. 1-4. An important advantage inherent in the application of tension to the blade in a direction transverse to the direction of movement of the cutter teeth lies in the added resistance of the blade to distortion. It will be evident that the stresses incident to the

shearing of hair tend to displace the blade material that surrounds the apertures. That is, and with reference now to the embodiments illustrated herein, such stresses tend to bend or otherwise distort the narrow strips comprising the blade and thereby to impair the hair shearing action. Tension applied at right angles to the direction of movement of the cutter shearing edges, however, is highly effective in resisting the tendency for the blade portions to be deformed, so that the blade is maintained in more effective shearing relation with the cutter, and it is feasible to employ a thinner blade than would otherwise be possible.

The razor shown in Fig. 5, which illustrates one manner in which transverse tensioning may be applied to a blade in accordance with the invention, includes means for fixing the longer sides of the blade firmly to the sides of the recessed portion of the housing and means for adjusting the distance between said sides. More specifically, the housing 21 is split from end to end, a fulcrum 22 is provided at an intermediate point lengthwise of the housing, and means are provided near the pivoted end of shaft 3 for forcing the two portions of the housing toward each other. The edges of the two housing portions may overlap as indicated in Fig. 7 so that the interior is completely enclosed for all angular positions of the housing portions.

The blade is fixed along its sides to the two sides of the rectangular opening as by means of undercut pins projecting from the recessed surfaces through corresponding holes in the blade. So also the blade may be fixed at one end as in Fig. 4 and the lengthwise tensioning means shown in detail in that figure may be provide at the other. The holes through which the blade-supporting pins project may be slightly elongated to permit slight movement of the blade under the tensioning forces.

Fig. 5 shows also one manner of journaling the shaft 3 so as to provide means for adjusting the position thereof and consequently the clearance between the blade and cutter. This feature is applied also to the razor shown in Fig. 1. Specifically, there is provided a cylindrical pin 24 an intermediate portion 25 of which provides an eccentric journal for the shaft 3. The upper end of the pin 24 is slotted and projects through an opening in the housing so that it may be turned for adjusting purposes. The other end of the pin is of reduced diameter and fits snugly into a bearing provided by the housing. To lock the pin in position after it is adjusted a screw 23, threaded into the lower end of the pin, is tightened down onto the housing. With the eccentric bearing in the position illustrated a very sensitive control is had of the blade-cutter clearance. The driving pin 5 (Fig. 1) and slot are proportioned to accommodate the slight movement of the pivot transverse to the axis of shaft 3 that follows from the turning of the pin.

A feature of both of the shaving instruments herein described is the provision of hair guides on the operating end of the cutter head, these guides being in the form of fine grooves 15 lying parallel to and aligned with the slots in the blade and with the direction of movement of the razor across the skin in shaving. Hair bristles entering these grooves are thereby aligned with the blade slots and more effectively guided into the slots for shearing.

Various modifications of and improvements

upon the specific instruments herein described to illustrate my invention may occur to those skilled in the art, and I desire to claim such other embodiments as may come within the spirit and scope of the appended claims.

What I claim is:

1. An instrument of the character described comprising a blade so thin as to be incapable of self-support and having openings therein for the admission of hair, a cutter member, means for supporting said blade in contact with said cutter member, means for moving said cutter member across said blade for hair shearing purposes, and means exclusive of said cutter member for tensioning said blade in a direction substantially at right angles to the direction of movement of said cutter member, whereby distortion of said blade incident to shearing is opposed by the cross-tension applied to said blade.

2. A combination in accordance with the claim next preceding comprising means for adjusting the said tensioning of the blade.

3. A dry shaver comprising an apertured blade of the order of one-thousandth of an inch in thickness, a pair of rigid supports each in substantially continuous engagement with said blade along a respective edge thereof, means for forcing said supports away from each other so as to maintain said blade under tension between them and rectilinear in the direction of said tension, and a cutter member having teeth movable in hair shearing relation across said blade in a direction at substantially right angles to said direction of tension.

4. In an instrument of the character described, a thin blade having a multiplicity of apertures for the admission of hair, a pair of rigid

supporting members disposed along opposite edges of said blade, means for detachably fixing said blade substantially continuously along said edges to said supporting members, means for forcing said supporting members apart so as to support said blade under tension between them, a cutter member having shearing portions in operative relation with said blade, and means for rapidly moving said shearing portions substantially parallel to said opposite edges.

5. A dry shaver comprising a metallic blade of the order of a thousandth of an inch in thickness having a multiplicity of apertures for the admission of hair, means for supporting said blade, a movable cutter member having shearing edges in operative relation with said blade, and means exclusive of said cutter member tensioning said blade in a direction at substantially right angles to the direction of movement of said shearing edges, whereby the tendency for the shearing parts of the blade to yield under the shearing stresses is resisted by the cross-tension applied.

6. A power-operated razor comprising a two-part housing, a thin, elongated apertured blade disposed transversely at one end of said housing, said housing parts being pivoted together so as to be capable of relative angular movement about a transverse axis, supports at the said one end of said housing in engagement with the sides of said blade, the separation between said supports being determined by the angular relation of said housing parts, means for adjustably fixing the said angular relation whereby said blade is tensioned transversely between said supports, and a cutter member in operative relation with said blade so tensioned.

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