Aug. 29, 1950 R. G. AREY 2,520,487

SWINGING BLADE RAZOR

Filed Feb. 28, 1946

Fig. 1

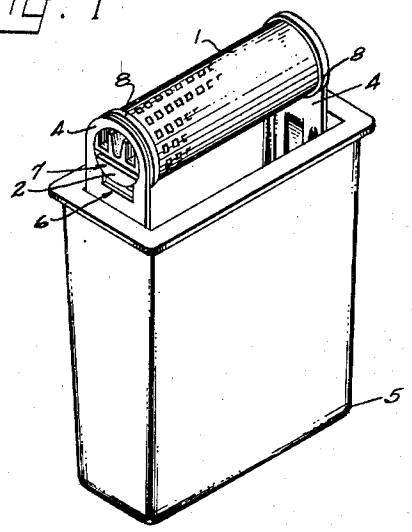


Fig. 3

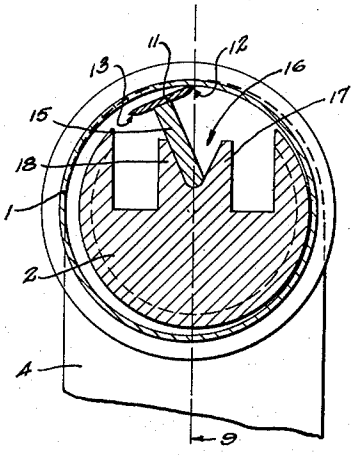


Fig. 5

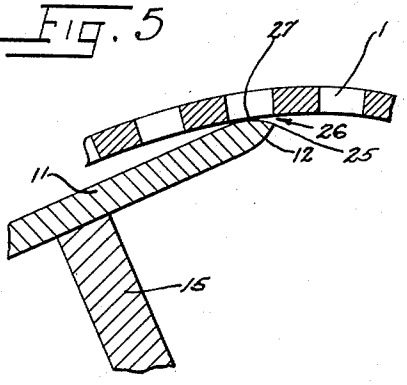


Fig. 4

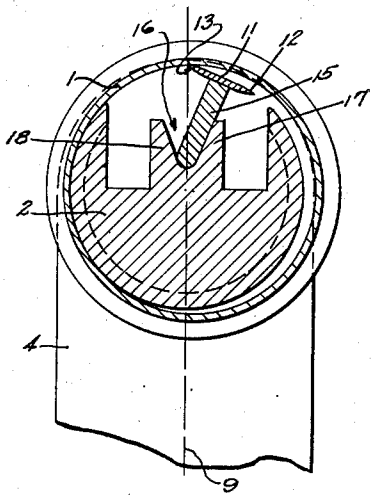
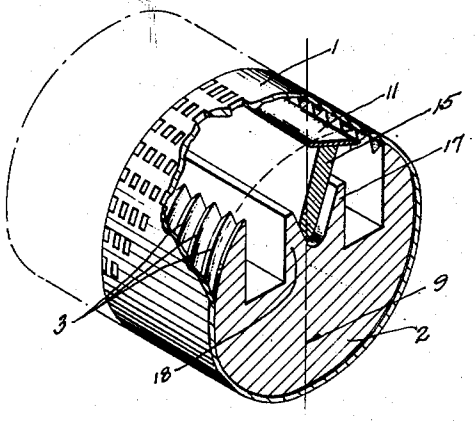


Fig. 2



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SWINGING BLADE RAZOR

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1 Claim. (Cl. 30—43)

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My invention relates to shavers of the type in which a cutting edge is disposed within a shell that is perforated to admit hairs to the cutting edge, and that, for example, rolls on the skin as the shaver is passed over the face.

Customarily the internal cutting edge bears on the inner surface of the shell so that the cutting of the hair may be substantially a shearing action so far as reasonably possible. Usually too the shell is mounted loosely so that it can move away from the cutting edge as the shaver is lifted from the skin; this releases partly cut hairs from the grasp of the shell and cutting edge and thus tends to avoid pulling partly cut hairs at such times. Usually also the blade or internal cutting implement is provided with two oppositely facing cutting edges so that both forward and back strokes of the shaver may be cutting strokes. The shell oscillates as it is stroked back and forth on the face of course.

According to the practice heretofore, the blade of the shaver is fixed in position, e. g. is fixed with respect to the handle by which the shaver is pressed to the skin. In the case of double-edged blades, the two cutting edges are disposed permanently at opposite sides of the center plane of the shaver, and each is placed a distance from that plane equal to one-half the width of the blade. Necessarily also by these practices both edges are pressed to the shell at all times during the shaving operation. The "center plane" referred to is that plane of the shaver which contains the axis of rotation (or oscillation) of the shell and extends lengthwise of the abutments that support the shell from the handle of the shaver. Examples of such shavers are shown in my prior U. S. Patents No. 2,331,646 and No. 2,354,657.

For the best results however, I believe that any cutting edge in action at any moment should be pressed directly toward the face as it were. That is to say, at every moment a cutting edge in action should lie in the plane that joins the shell axis to that line on the skin whereat the skin is drawn most tightly to the cylindrical shell. Where this is not achieved, the closer the approximation to this position the better are the results. In conformance with this my present invention permits each edge of a multi-edged-blade, when in action, to be disposed at substantially any selected shaving position. Thus for example, by this invention each cutting edge may be caused to stand in line with the center plane on a diameter of the shell and of the shaver when in action, or be disposed say, a little in advance of the center

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plane and more or less approximating the position where the joint action of pressing the shaver to the face and rolling the shell on the face may cause the skin to be drawn a little more tightly than at the exact center plane.

Further, the double-edge-blade construction heretofore employed has two other effects that may well be avoided. On occasion hairs may enter perforations in the shell after the advance or active cutting edge has passed them but before the cutting edge that is non-active or trailing at the moment has reached those perforations. These hairs are bent over subsequently by striking the face of the blade, and must pass between the inactive trailing cutting edge and the inner surface of the shell. As pointed out before however, the act of shaving not only presses the active advance cutting edge against the inner wall of the shell, but also, ordinarily, presses the trailing cutting edge against the shell as well. As a result the trailing edge and the shell tend to grasp these passing hairs and pull them. Additionally this drawing of hair between the trailing cutting edge and the shell tends to move the shell from the blade as a whole, and accordingly displace the shell from contact with the forward or active cutting edge of the blade. This last tends to change the cutting action from at least partially a shearing action to entirely a cutting by the blade alone, and the cuts are not wholly as close to the skin as otherwise. My invention avoids such effects of the hair passing between the shell and the trailing or inactive cutting edge.

Primarily I accomplish the foregoing results by mounting the blade movable in such a manner that its cutting edges come alternately to active cutting positions, and the cutting edge that is trailing for the moment is held out of contact with the shell. This can be accomplished readily by mounting the blade to swing bodily on a radius appropriately less than the radius of the shell and, therefore, eccentrically on a pivot line appropriately placed; the proper radius length and the proper placement of the pivot line for any situation will be understood from the embodiment of my invention shown in the accompanying drawings and which is described hereafter. Ordinarily no mechanism to swing the blade from one side to the other is required. Ordinarily the shell is flexible and the distortion to which the shell is subject while changing from a forward to a reverse stroke and vice versa, will serve to assure reversal of the position of the blade should this be necessary.

Further important features of the present in-

vention include means to prevent dulling contact of the cutting edges of the blade when in contact with the inner surface of the rotary shell; means to mount a double-edged blade on an oscillating and swinging support, which support reinforces the blade lengthwise; means to provide for ready removal of a used blade and its support, and replacement of a new blade; and means to limit the movement of the blade and support in a non-concentric swinging relation with the rotating shell to present each cutting edge of the blade alternately in best shaving position.

The accompanying drawings illustrate the form of my invention which I now prefer. Fig. 1 is an elevation of the shaver as a whole. Fig. 2 is a perspective of a portion of the shell, its internal support and the blade member of Fig. 1, parts being broken away. Figs. 3 and 4 are sections showing substantially positions the parts of the shaver may assume when the shaver is moving to the right and to the left respectively. Fig. 5 is a section drawn to a larger scale to illustrate the preferred relation of each cutting edge to the shell.

Except for matters of the invention, the shaver illustrated is quite substantially like prior shavers having stationary blades. Briefly a cylindrical shell 1, quite thin and hence flexible, and perforated for example in accordance with present practices throughout substantially the whole of its length and circumference, to admit hair projecting from the skin, is mounted on an inner member 2. This member 2 may be cylindrical except for a longitudinal slot to receive the blade and corrugated at its outer surface as indicated at 3. The corrugations reduce the area of contact with the shell 1 but at the same time give the shell adequate support over the whole of its length and substantially the whole of its circumference except at the slot wherein the blade operates. The interior diameter of the shell 1 may be a little greater than the external diameter of the support 2 as illustrated and as has been the practice heretofore, so that the shell is loose radially on the support and accordingly is movable to and from the blade as the shell is pressed to the face and moved from it; this reduces pull on partially cut hair as the shaver is lifted from the skin as will be understood from prior practices. The two ends of the support 2 are reduced in diameter and mounted in abutments 4 which are carried, when in use, in a handle 5 of convenient form. The form shown in the drawing is one in which the two opposite ends of the abutments 4 are joined by a cross bar and the frame thus formed is held in the case-like handle 5 by friction; the case 5 is of such size that the frame can be pulled out of the case and reinserted with the shaver head inside the case for protective reasons as will be understood from prior practices. Since the abutments 4 surround reduced portions of the support 2, they prevent, normally, the escape of the blade structure per se from the support by lengthwise movement; at the same time however one of the abutments is provided with a subsidiary opening 6 through which the blade can be extracted longitudinally when the barrel or support 2 is rotated, in the abutments 4, 180° from the position shown in the drawing; the barrel or support 2 may have a slot 7 in one end into which a screw driver, coin or the like can be inserted for turning the barrel to or from the blade-releasing position. Bands 8, for example of rubber, may be applied to the outer surface of the shell 1 to increase its traction as it is pushed over the face. As will be recognized the matters so far described are conventional, and while preferred may be modified. The broken lines 9 in various figures indicate the "center plane" of the shaver before mentioned.

The blade 11 is sharpened to a cutting edge 12, 13 at each of its two longitudinal edges. In accordance with the invention it is fixed to a support that is hinged to swing circumferentially of the shell. For example, and preferably, the blade can be fixed on one edge of a more or less flat bar 15 that extends lengthwise within the perforated shell 1, and the opposite edge of which is rounded and rests within a round-bottom groove 16 extending lengthwise in the barrel or support 2. Relative to the width of the blade 11, the bar 15 is of such a width (its width is the radius of oscillation of the blade 11 of course, and is less than the radius of the shell 1), and the bottom of the groove 16 is so placed (preferably in the center plane 9), that the cutting edge 12 can be brought to whatever position one may desire it to occupy with respect to the center plane 9 when active; and at the same time the cutting edge 13 held some distance from the shell 1 when the shell is in corresponding shaving position; and likewise vice versa, the cutting edge 13 brought to whatever position one may desire the edge 13 to occupy with respect to the center plane 9 when 13 is active, and at the same time the cutting edge 12 held well away from the shell 1 when the shell is in position for cutting at the edge 13. Additionally, stops or abutments may be provided to confine the swinging movement of the swinging element to movement between these two limits. Preferably to this end the groove 16 is made substantially triangular in vertical section, as seen in Fig. 4 for example, and its two walls 17 and 18 so placed as to form stops which limit the oscillating or swinging movement of the bar 15 to the two desired operating positions of the blade 11. For example, 15, 16, 17 and 18 can be so made and positioned that the cutting edge 12 is movable to and supported substantially at the center plane 9, as shown in Fig 3, or somewhat to the right of that plane; and the cutting edge 13 is movable to and supported substantially at the center plane 9, as shown in Fig. 4, or somewhat to the left of that plane. The bar 15, or other support for the blade 11 may be free to oscillate between these two extreme positions.

The operation of the shaver as thus described is quite like those of the same general type heretofore known, except for the positioning and action of the oscillating blade 11 and the consequences of such positioning and action. To shave with it, it is stroked on the face, preferably with the center plane 9 held substantially perpendicular to the surface of the skin. This causes the shell 1 to rotate on its support 2 as before. When stroked toward the right, the cutting edge 12 becomes active, the blade 11 and shell 1 taking more or less the positions in Fig. 3. When the direction is reversed and the razor stroked to the left, the blade 11 swings over, the cutting edge 13 becomes active and the blade and shell take more or less the positions of Fig. 4. Hair entering perforations in the shell in advance of whichever cutting edge, 12 or 13, is active at the moment, is cut as that cutting edge comes to it. At the same time however, hair that may have to pass between cutting edge 13 and the shell in the Fig. 3 position, or between cutting

edge 12 and the shell in the Fig. 4 position, can do so freely and without being pulled and without disturbing the position of the shell or the shaving at the respectively active cutting edge.

Fig. 5, drawn to a somewhat larger scale than the other figures, illustrates particularly the relation that I prefer between the inner surface of the shell and the cutting edge that is in action at any moment. The cutting edges 12 and 13 can be assumed to be related to the shell 1 in this manner when in their respectively active positions. Briefly in this preferred arrangement the very edge, i. e., the extreme edge 25 of the sharpened portion, is so disposed (when it is in active or shaving position), that this extreme edge 25 is spaced very slightly from the adjacent inner surface of the shell 1. The spacing referred to is indicated at 26 in Fig. 5. The figure is not intended to be in correct proportions however. This spacing should be a fraction, and preferably a small fraction, of the diameter, or average of the diameters, of the hairs of the face. Usually I make this spacing at 26 from about 0.00015 to about 0.00025 of an inch. An appropriate spacing can be secured by, for example, shaping the face of the blade a little back of the cutting edge, e. g. at 27, in such a manner that it strikes the inner wall of the shell 1, in shaving position while the extreme edge 25 is still the desired distance from the shell wall, as shown in Fig. 5. E. g. the part 27 can be given a convex shape, the radius of curvature of which is so much less than the radius of the curvature of the shell 1, at least when the shaver is pressed against the face as in shaving, that the cutting edge 25 is stopped at the desired distance from the shell.

It will be understood of course that my invention is not limited to the details of construction and operation described above and illustrated in the accompanying drawing, except as appears hereafter in the claim.

I claim:

In a dry shaver of the kind described, a perforated flexible freely rotatable shell, a substantially cylindrical body within the shell to support said shell in rotatable relation, a V-shaped groove in said body lengthwise of the cylindrical body, and with the bottom of the groove intermediate the shell and its axis of rotation, a bar carrying a double-edged blade along one edge and with the opposite edge adapted to rest in the bottom of said V-shaped groove and to oscillate therein limited by the angle of the V-shaped groove, said blade having oppositely fixed cutting edges, and alternately positioned in shaving cooperation within the interior of said shell when the blade-supporting bar is at the limit of its rocking movements fixed by the angle of said V-shaped groove.

RALPH G. AREY.

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The following references are of record in the file of this patent:

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