Jan. 28, 1941. E. HAMMERLING 2,229,971

DRY SHAVING RAZOR

Filed Feb. 23, 1937

Fig. 1

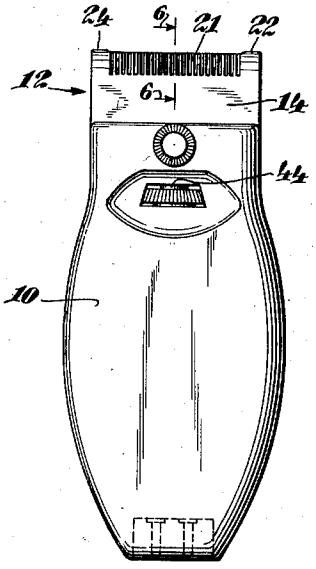


Fig. 3

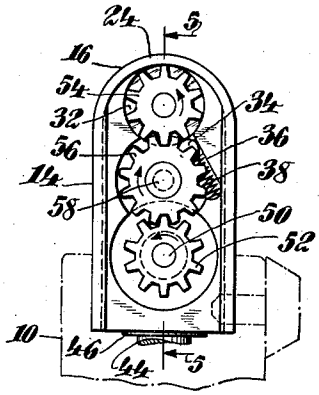


Fig. 4

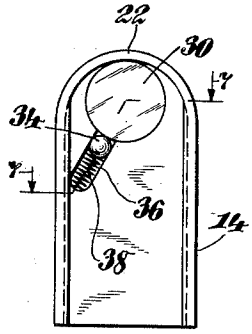


Fig. 5

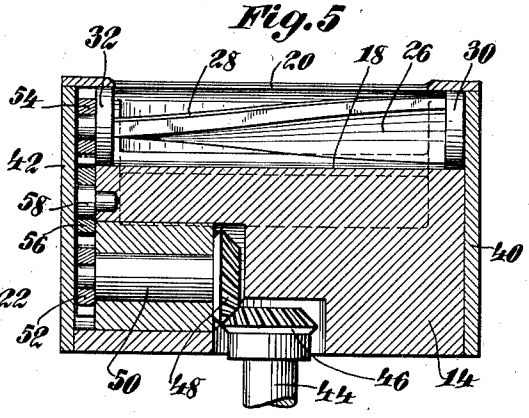


Fig. 2

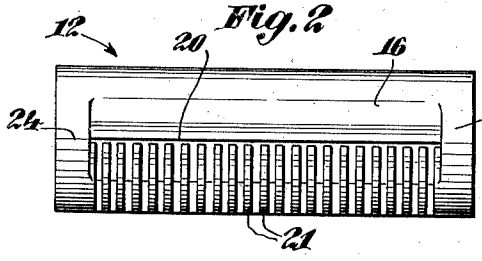


Fig. 6

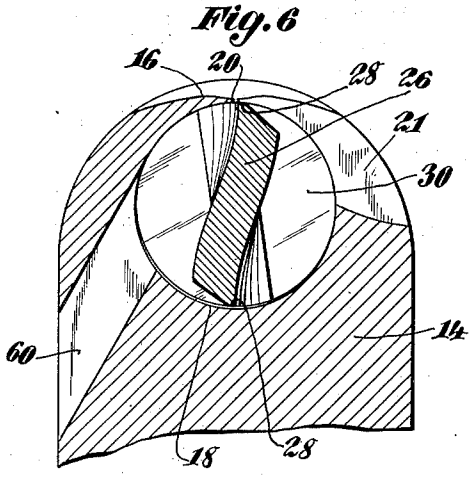
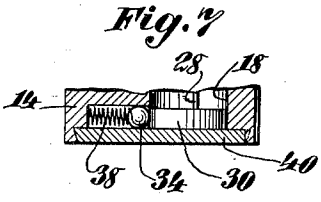


Fig. 7



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UNITED STATES PATENT OFFICE

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DRY SHAVING RAZOR

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Application February 23, 1937, Serial No. 127,031

3 Claims. (Cl. 30—43)

This invention relates to dry shaving razors of the type comprising a rotary cutting blade.

An object of the invention is to produce a dry shaving razor which is self-sharpening and has the ability to automatically adjust itself to compensate for wear of the cooperating shearing parts of the same.

A further object of the invention is to produce a dry shaving safety razor in which uniform contact is assured between the shearing elements thereof.

A still further object of the invention is to provide a dry shaving razor which affords full skin protection during the operation thereof and also one so constructed as to exert a skin tensioning effect, thereby presenting the hair to the shearing elements of the razor in a substantially erect position.

Other and further objects of the invention will appear from the following description of a razor embodying my invention.

The construction through which the objects of the invention are achieved may consist of a razor head having at its outermost end a curved surface adjacent the center of which is a longitudinally extending shearing edge. The head of the razor may be provided with an eccentric bore of substantially elliptical shape but including cylindrical surfaces adjacent the shearing edge upon which a rotary cutting blade may rotate to effect a shearing action.

More specifically, the shearing edge on the head may be produced by forming a slot longitudinally of the head communicating with the bore and grinding or forming a portion of the head extending along the cutting edge to produce a shearing edge of the desired thickness, such as is disclosed in my co-pending application Serial No. 97,895, filed August 26, 1936. Extensions are provided at each end of the shearing edge by grinding the portion of the head adjacent the shearing edge. These extensions aid in guiding the razor head along the skin and exert a skin tensioning effect to properly draw the hair into an erect position. The razor head may further include guard teeth, the free ends of which are spaced from the shearing edge by the slot.

The bore through the head of the razor is preferably of generally elliptical form, although it may be suitably made by grinding or drilling a cylindrical bore through the head and then grinding away a portion of the walls of the head spaced from the shearing edge to produce curvatures of different radius in the bore.

Mounted within the bore is a rotary cutter which may consist of a twisted or spiral blade having shearing edges on its longitudinal edges to cooperate with the shearing edge on the head. Bearing members may be provided at the ends of the cutter blade of a diameter substantially equal to the width of the blade. The diameter of the disks or bearing members is preferably such as to fit accurately in the cylindrical portion of the bore adjacent the shearing edge on the head, but to loosely fit the remainder of the bore so that the cutter may move toward or away from the shearing edge. The comparatively large bearing surface area of the bearing disks or members results in a reduction of wear on these parts and in a reduction of wear on the shearing edges.

In order to maintain the cutter blades in operative shearing engagement with the shearing edge on the head, resilient means may be provided for urging the entire cutter structure toward the shearing edge and into the cylindrical portion of the bore.

The cutter is thus, in effect, a free floating construction having no portions fixedly connected to the head, thereby allowing the cutter to advance gradually as the head and the cutter blade wear, maintaining close engagement between them and tending to re-sharpen both the head shearing edge and the shearing edges of the cutter as they wear during operation.

Suitable means may also be provided for driving the floating cutter construction from a motor preferably mounted in the handle of the razor.

For better understanding of the present invention, reference may be had to the accompanying drawing in which:

Figure 1 is a side elevation of a typical form of razor embodying the present invention;

Figure 2 is an end view of a typical form of cutter head embodying the present invention;

Figure 3 is a side view of the cutter head with an end plate removed to show the gearing for driving the cutter element;

Figure 4 is a side view of the opposite end of the razor with an end plate removed to disclose a typical form of cutter advancing means;

Figure 5 is a sectional view of the razor taken on line 5—5 of Figure 3.

Figure 6 is an enlarged sectional view taken on line 6—6 of Figure 1; and

Figure 7 is a sectional view, partly broken away, taken on line 7—7 of Figure 4.

In the form of the invention disclosed in the drawing, the razor may consist of a handle member 10 containing a rotary motor of any

suitable type and carrying at one end a cutter head 12.

The cutter head 12 may suitably consist of a block of metal 14 such as, for example, steel, of generally rectangular shape and having at one end a curved or arcuate surface 16. If desired, the arcuate end of the block 14 may be formed independently of the remainder of the block and attached thereto in any desired manner. The block 14 may be provided with a bore 18 eccentrically formed with respect to the curved surface 16 to produce a gradually decreasing thickness of metal toward the center of the arcuate surface 16. A shearing edge 20 and guard teeth 21 of substantially the same thickness at their adjacent ends may be formed by slotting the metal longitudinally of the curved surface 16 and then grinding down the arcuate surface 16 to provide comparatively thin edges adjacent the slot. Guard teeth 21 may be formed by slotting the metal in a plurality of planes perpendicular to the shearing edge 20, thus providing a guard which will prevent the skin from passing inwardly of the shearing edge 20 but at the same time allowing whiskers to engage the shearing edge 20.

By grinding down the outer cylinder surface 16, as best shown in Figures 2 and 6, shoulders 22 and 24 are formed at opposite ends of cutting edge 20. The shoulders 22 and 24 engage the skin, stretching it along the cutting edge. By stretching the skin, the whiskers are extended in an erect position against the shearing edge, allowing them to be severed close to the skin. Also, the stretching action aids in preventing entry of the skin between the guard teeth 21 and into the slot between the shearing edge 20 and the free ends of the guard teeth 21.

The bore 18 is preferably of substantially cylindrical shape but is provided with an undercut portion which renders it somewhat elliptical in shape with its greatest diameter at an angle of about 60° to the shearing edge 20.

Mounted in the bore 18 is a cutter which may suitably consist of a spiral or twisted blade 26 of hardened steel having shearing edges 28 on its opposite longitudinal edges. It will be understood that the cutter 26 may be provided with more than two shearing edges, if desired. The diameter of the cutter 26 from shearing edge to shearing edge is substantially equal to the smallest diameter of the bore 18, that is, within limits of manufacturing tolerances. The blade 26 is preferably given a left-hand twist in order that the severed hair will be directed from the left end of the cutter as viewed in Figure 5, toward the right-hand end of the cutter, as it is rotated. The purpose of this construction will appear on further description of the construction.

Fixed to the opposite ends of the cutter blade 26 are disks 30 and 32 of a diameter equal to the diameter of the cutter blade from edge 28 to edge 28 and equal to the smallest diameter of the bore 18. The disks 30 and 32 form the bearings for the cutter blade and normally bear against the cylindrical surface of the bore 18 adjacent the cutting edge, although the entire cutter assembly of blade 26 and disks 30 and 32 is capable of limited movement away from the shearing edge 20 because of the elliptical shape of the bore 18.

The cutter 26 and disks 30 and 32 construction thus is, in effect, a free floating construction which is not in a fixed coaxial relationship with respect to the shearing edge 20 or the bore 18.

The cutter assembly 26, 30 and 32 may be maintained in proper relationship to the shearing edge 20 of the cutter head by resilient means normally urging the cutter 26 outwardly and the disks 30 and 32 against the surface of the bore adjacent the shearing edge 20. While any suitable means may be used for this purpose, I prefer to use the construction best shown in Figures 4 and 7 consisting of an anti-friction ball 34 at each end of the cutter assembly and bearing against the disks 30 and 32. The balls 34 may be mounted in suitable angularly arranged grooves 36 in opposite ends of the block 14 and are normally urged against the disks 30 and 32 by means of coil springs 38. The grooves 36 lie in the plane of the greatest diameter of the bore 18. The ends of the head 14 are preferably recessed, as best shown in Figure 5, to receive at one end the end plate 40 for covering the ball 34 and spring 38, and at the opposite end for receiving gearing and a suitable cover plate 42 for covering the same.

The cutter 26 may be rotated by the rotary motor shaft 44 carrying a bevel gear 46 at its outer end. The bevel gear 46 meshes with a similarly beveled gear 48 carried on a stub shaft 50 journaled in a transverse bore in the head block 14. The outer end of the shaft 50 may be provided with a spur gear 52 which, upon rotation, drives a third pinion 54 fixed to the disk 32 through an idler spur gear 56 mounted on stub shaft 58. The gear 54 and its drive gear 56 may be suitably ground so that a relative movement toward and from each other will not affect their driving relationship.

It will be seen from the foregoing description that the construction disclosed assures positive and uniform engagement between the shearing edges 28 of rotary cutter blade 26 and the shearing edge 20 on the cutter head. Also, the spring tension means will advance the entire cutter assembly as it and the cylinder surface of the bore 18 adjacent the shearing edge 20 wear away through use.

In order to eliminate the severed hairs from the bore with the greatest facility, I have provided a slot 60 extending from the bore 18 outwardly and downwardly through the head block 14. The slot 60 is preferably arranged tangentially to the bore 18 so that as the cutter 26 rotates it will tend to throw the severed hairs tangentially out through the slot 60. The slot 60 in conjunction with the left-hand twist of the spiral blade 26 will prevent any of the severed hairs from being thrown into the train of gears 52, 54 and 56.

It will be understood from the foregoing that I have thus produced an effective and efficient dry shaving razor capable of long life without replacement of parts.

It will further be understood that many variations may be made in the specific construction of the device without departing from the invention. The embodiment disclosed should therefore be considered as illustrative only and not as limiting the scope of the following claims.

I claim:

1. In a dry shaving razor, the combination of a housing, a curved blade on said housing terminating in a longitudinal shearing edge, a rotatable twisted cutter of substantially uniform thickness in said housing, two oppositely directed spiral shearing edges on said cutter cooperating with the edge of the blade to sever hair, means connected to one end of the cutter for rotating it, gearing and means to drive the gearing, to rotate the cutter in such a direction as

to sever hair and cause the spiral edges to direct the severed hair away from said gearing.

2. In a dry shaving razor, the combination of a housing, a curved blade on said housing tapering in thickness to a longitudinal shearing edge, a longitudinal bore in said housing, a rotatable cutter in said housing, oppositely directed helical shearing edges on said cutter, cooperating with the edge of the blade to sever hair, a hair discharge opening extending tangentially from the bore adjacent the shearing edge through the housing and means including gearing connected to one end of the cutter for rotating the cutter to sever and direct hair away from the gearing through said discharge opening.

3. In a dry shaver, a housing, a bore in said housing having its wall slotted, and provided with a shearing edge, a cutter mounted for rotation in said bore, the mounting for said cutter comprising journals in the form of disks having play relatively to said bore, a groove in each end of said housing directed toward one of said disks and opening into said bore, and resilient means within said groove adapted to urge a disk toward a point on the wall of said bore in advance of said shearing edge and a cover for said groove slidably mounted in said end.

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