

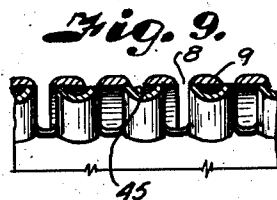
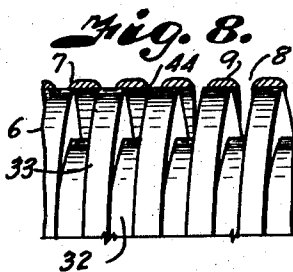
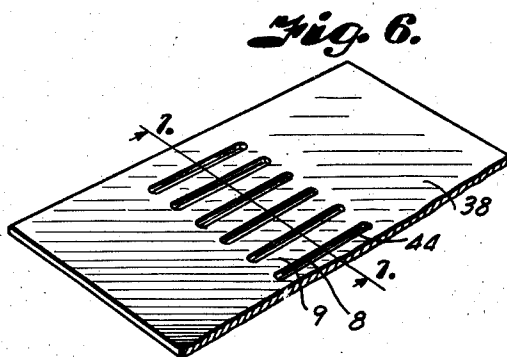
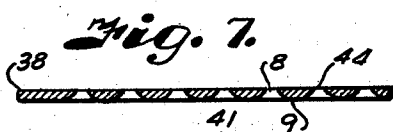
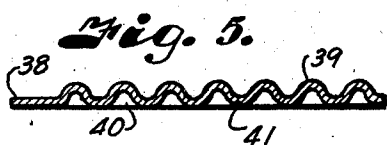
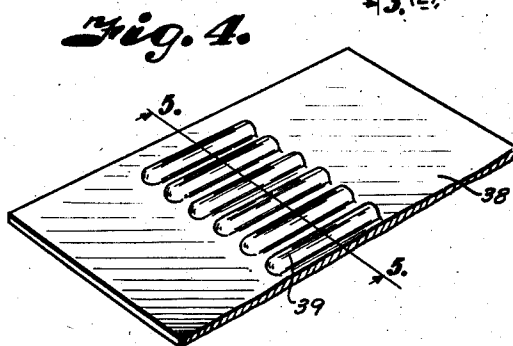
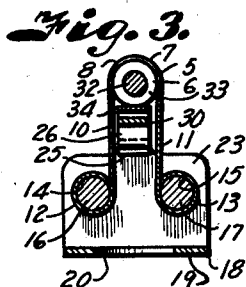
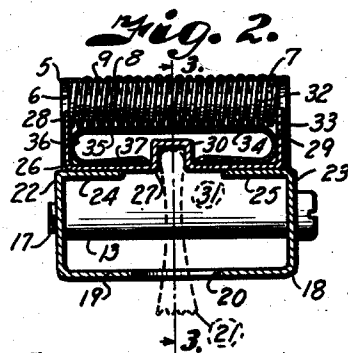
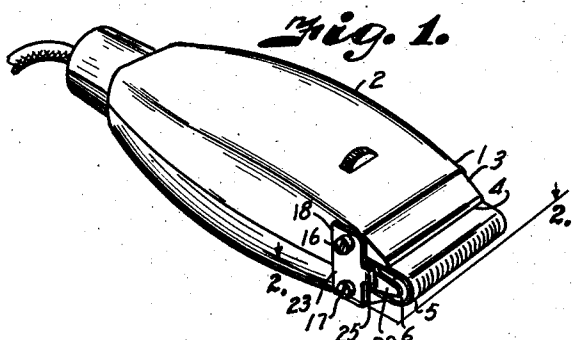
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2,168,406

METHOD OF MAKING CUTTING BLADES

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METHOD OF MAKING CUTTING BLADES

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4 Claims. (Cl. 76—104)

This invention relates to a method of making cutting blades for razors, clippers, and the like.

The principal object of the invention is to provide a simple, economical, and reliable method of accurately producing suitably shaped shearing teeth on cutters from relatively thin sheet material, such as razor blade stock.

Other important objects of the invention are to provide an inexpensive, light weight cutter, having teeth of uniform character and spacing; to provide teeth having smoothly rounding outer surfaces and flat or concave inner surfaces; to provide a cutter capable of extremely close cutting contact; to provide a cutter having internal, spring-like action for enhancing cooperation between the respective blades; and to provide a cutter that may be readily mounted on a motor driven razor or the like.

It is also an important object of the invention to provide a method of producing teeth in blanks which may be readily formed to provide a cutter of the desired shape.

In accomplishing these and other objects of the invention, I have provided an improved method and details of construction, illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a motor driven razor equipped with cutter blades constructed in accordance with the present invention.

Fig. 2 is a section through the head of the razor on the line 2—2 of Fig. 1.

Fig. 3 is a cross-section on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged perspective view of a part of a blank illustrating one of the steps in producing cutters in accordance with the present invention.

Fig. 5 is a cross-section through the blank on the line 5—5 of Fig. 4.

Fig. 6 is a similar perspective view showing another step in the formation of the cutter.

Fig. 7 is a cross-section on the line 7—7 of Fig. 6.

Fig. 8 is an enlarged detail view illustrating cooperation of the cutter teeth in the form of the invention illustrated in Figs. 1 to 3 inclusive.

Fig. 9 is a similar detail view but showing a modified form of movable cutter.

Fig. 10 is a cross-section through a further modified form of cutter head.

Fig. 11 is a section through another form of head employing cutter blades constructed in accordance with the present invention.

Referring more in detail to the drawing:

1 designates a razor including an electric motor 2, having a cutting head 3 provided with a transverse recess 4 for mounting fixed and movable cutter blades 5 and 6 respectively. The fixed cutter blade 5 is formed of relatively thin sheet material, such as razor blade stock, and is shaped to provide a substantially semi-cylindrical cutter portion 7, having a series of transverse slots 8 forming cutter teeth 9. The cutter also includes parallel side portions or wings 10 and 11, terminating in reversely rolled ends 12 and 13 forming openings 14 and 15 for passing fastening devices 16 and 17 whereby the cutter is secured to an anchoring bracket 18. The anchoring bracket illustrated includes a base plate portion 19, having an opening 20 through which an actuating lever 21 projects for operating the movable cutter 6, as later described. The plate portion extends across the width of the motor housing, and is provided with laterally extending end flanges 22 and 23 that are secured to the motor housing by the fastening devices 16 and 17 which also attach the fixed cutter 5. The flange portions 22 and 23 are of shorter dimensions than the recess 4, and are provided with inwardly extending tongues 24 and 25 to form a seat for mounting a carriage 26 which reciprocates the movable cutter 6. The carriage 26 includes a base portion 27 having laterally extending ends 28 and 29, of suitable width to slide freely between the plate portions 10 and 11 of the fixed cutter. The intermediate portion of the carriage is shaped to form a recess 30 for receiving the head 31 of the actuating lever 21.

The movable cutter in the construction illustrated in Figs. 1 to 3 inclusive, includes a shaft-like portion 32 having a spiral thread-like cutter 33, the pitch of which substantially conforms to the spacing of the slots 8 in the fixed cutter. The diameter of the movable cutter is such that the flights thereof move in cooperative contact with the inner face of the cutter teeth 9. The movable cutter is supported in yielding contact with the fixed cutter by a spring leaf 34, having a supporting portion 35 engaging under the movable cutter and of sufficient width to move freely between the plate portions 10 and 11 of the fixed cutter. The ends of the spring leaf are reversely bent on substantially semi-circular curves, as indicated at 36, to terminate in inwardly extending spring-like terminals 37 bearing upon the plate portion of the carriage at opposite sides of the recess 30.

With the construction above described, opera-

tion of the lever 21 causes reciprocation of the carriage to effect movement of the movable cutter across the teeth of the fixed cutter, the movable cutter being of sufficient length so that the laterally extending ends 28 and 29 snugly engage the ends of the shaft-like portion 32.

The fixed cutter in the form of the invention illustrated in Figs. 1 to 3 inclusive is formed of a sheet metal blank 38, of sufficient dimensions to produce the cutter as above described. In producing the cutter, the blank 38 is sufficiently annealed to permit forming thereof to the shape desired and to allow selected portions of the plate to be offset from a side thereof to form a series of rib-like projections or bosses 39, the projections being formed by a die of suitable shape (not shown), to press the metal from one side of the blank and through to the opposite side to form a series of corrugations as indicated in Fig. 5. The concave portions 40 of the corrugations are shown of a depth only slightly in excess of the thickness of the blank. Formation of the corrugations effects rounding of the intermediate portions 41 on the opposite face of the blank so that a series of corrugations are also produced on that side but they are located so that the apices thereof are flush with the surface of the metal. The next step in forming the teeth includes the removal of the offsets or corrugations to the level of the surface of the plate, by grinding or the like, as shown in Fig. 6, so that the concaves 40 form elongated, round ended slots 8 between the teeth of the cutter as shown in Fig. 7. Attention is directed to the fact that the width of the slots may be regulated by varying the size of the corrugations or by the depth to which the material is removed. When the corrugations are removed flush with the surface of the plate, cutting edges 44 are provided along the edge of the teeth 9. The blank is then formed intermediate the length of the grooves to provide the semi-cylindrical portion of the fixed cutter, with the blank being bent so that the cutting edges 44 are innermost and the rounded edges of the teeth are on the exterior side of the cutter. The ends of the blank are then rolled so as to provide the attaching portions for the fastening devices 16 and 17. The formed blank is then tempered to the proper hardness to provide the desired wearability of the cutting edges. When thus formed the teeth and slots therebetween are accurately shaped, and of uniform character and spacing, of suitable cross-sectional shape, and due to the thinness of the material, the razor is capable of extremely close cutting contact to leave a minimum stubble.

In the form of the invention illustrated in Figs. 9, 10 and 11, the movable cutters are produced in the same manner as the fixed cutter of the type illustrated in Figs. 1 to 3. In the form shown in Fig. 9, the corrugations are preferably drawn to a greater depth whereby the inner curvatures 45 extend beyond the surface of the plate at the side which is to be removed, so that the teeth of the cutter are of substantially arcuate cross-section, thus greatly increasing the strength of the teeth to keep the cutting edges in positive contact with the cooperating cutting edges of the teeth on the fixed cutter.

In the form of movable cutter shown in Fig. 10, the portion of the blank carrying the teeth is shaped to form a complete cylinder, having an outer circumference to engage the inner periphery of the fixed cutter. The ends of the blank, after forming the cylinder, are brought into face to face contact and the edge of one of the ends

is bent retractively over the other, as illustrated at 46, Fig. 10. In this form of the invention the fixed cutter is similar to the fixed cutter in the first form, except that the wing portions are ribbed as indicated at 47, to enhance the rigidity of the cutter. The ends of the plate terminate in flanges 48 that are secured to spaced blocks 49 by fastening devices 50, extending therethrough and through the blocks as shown in Fig. 10. The movable cutter is kept in cutting relation with the fixed cutter by a split cylindrical spring 51 having ends 52 bearing against the cylindrical head of the movable cutter.

In the form of the invention illustrated in Fig. 11, the fixed cutter 53, after formation of the teeth, is bent retractively on itself intermediate the length of the teeth, as at 54, and spaced apart so that the adjacent faces of the teeth extend in spaced relation to form a passageway 55 for the movable cutter. At the base of the teeth the blank is provided with stamped out ribs, having substantially V shaped cross-section, forming guide tracks 56 for mounting the movable cutter. The ends of the plate are bent adjacent the ribs to provide flexible attaching wing portions 57 and 58, which correspond to the wing portions 10 and 11 in the preferred form, the wing portions terminating in the rolled ends 59 and 60 by which the fixed cutter is attached to the head of the razor. In this form of the invention the blank forming the movable cutter is bent retractively intermediate the length of the teeth, as at 61, and provided with a rib 62 engaging the guide tracks 56, as clearly shown in the drawing. When thus bent the ends of the blank lie in face to face contact and both are then bent at an angle corresponding to the angle of the fixed cutter, to form an actuating wing 63 extending between the wing portions of the fixed cutter, and which is provided with a stamped rib 64 engaging the guide tracks of the wings. The actuating wing preferably extends beyond the attaching portions of the fixed cutter, and one of the ends is cut longer to bend back over the other as illustrated at 65. This form of the invention is particularly adapted for clipper construction, however, it is also suitable for razors, for the reason that the relatively thin character of the material allows for close cutting contact.

From the foregoing it is obvious that I have provided a simple and reliable method of producing toothed cutters from relatively thin sheet material, such as razor blade stock. It is also obvious that the cutters may be inexpensively constructed to form teeth of uniform character and spacing. The cutters are also light weight and are capable of relatively close cutting contact. The inherent spring-like tension in the material also enhances the cutting operation between the respective blades to take up any wear that may occur therebetween.

When the blades constructed as described are used in razors, the teeth move freely and smoothly over the skin because of their convex or round surfaces. The convex teeth also guide or deflect the whiskers into cutting contact with the shearing edges and provide easier entrance thereof into the slots. They also permit pressing on the skin so that it bulges into the tooth spaces to bring the base of the whiskers into closer contact with the cutting edges thereby leaving a shorter stubble and providing a closer shave.

For the above reasons, close shaves may be effected without abrasion or chafing of the skin.

What I claim and desire to secure by Letters Patent is:

1. The method of forming toothed cutters of a dry shaver including offsetting portions of the metal completely from one side of a blank, removing the offset portions from the other side of the blank to a point flush with the surface of the blank to form slots in the blank having cutting edges in a plane of said blank, and bending the blank transversely of said slots to form the cutter.

2. The method of forming toothed cutters of a dry shaver including offsetting a series of equally spaced portions of metal from one side of a blank to a depth greater than the thickness of the blank, removing the offset portions down to the surface of the blank to form slots in the blank having cutting edges in the plane of the surface of said blank and having rounded edges at the opposite surface of the blank formed incidental to offsetting of said metal, and bending the blank transversely of said slots to form the cutter.

3. The method of forming toothed cutters of

a dry shaver including forming a series of equally spaced parallel corrugations in spaced relation with edges of a blank by displacing the metal completely from the opposite side of the blank to a depth greater than the thickness of the metal, removing the corrugations to form a series of slots having cutting edges in the plane of the surface of said blank, and bending the blank transversely of said slots to form the cutter.

4. The method of forming toothed cutters of a dry shaver from thin sheet metal including displacing parallel portions of the metal completely from one side of the sheet to a depth greater than the thickness of said sheet to provide spaced cavities having rounded edges on one side of the sheet and spaced elongated corrugations on the opposite side of the sheet, removing the corrugations down to the surface of the sheet and in intersecting relation with said cavities to form a series of parallel cutting edges on the side of the sheet opposite said rounded edges, and bending the blank to the desired form of the cutter.

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