

Oct. 25, 1938.

C. W. HAY

2,134,609

ELECTRIC SHAVER

Filed Feb. 7, 1938

2 Sheets-Sheet 1

Fig. 1.

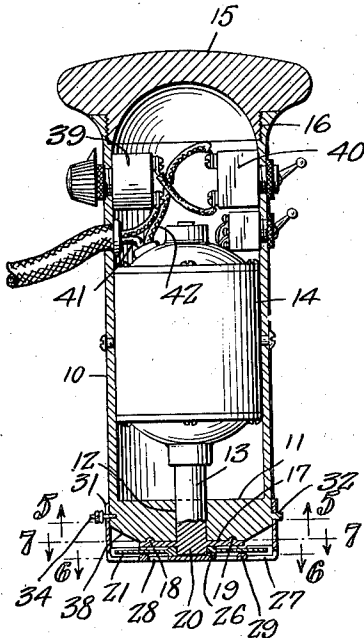


Fig. 2.

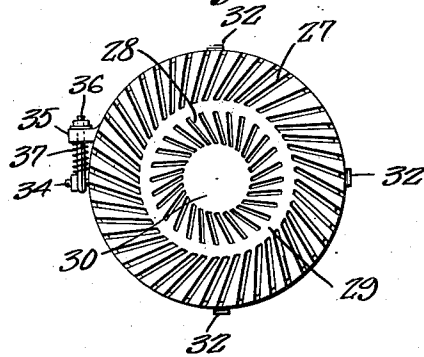


Fig. 3.

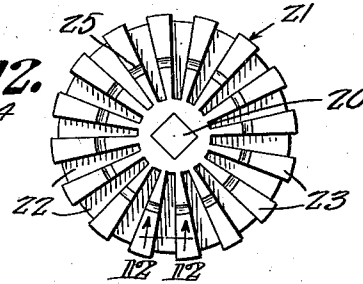


Fig. 12.

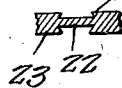


Fig. 4.

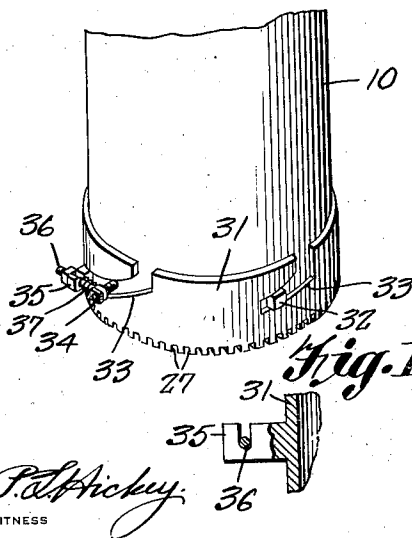


Fig. 5.

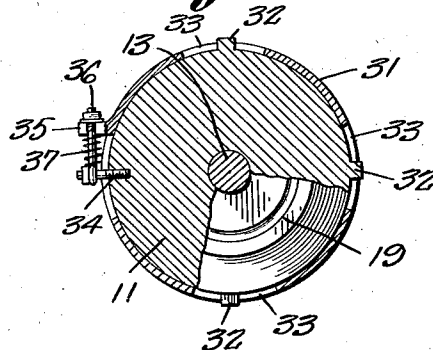


Fig. 11.

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2 Sheets-Sheet 2

Fig. 6.

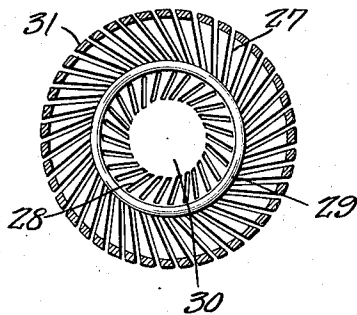


Fig. 7.

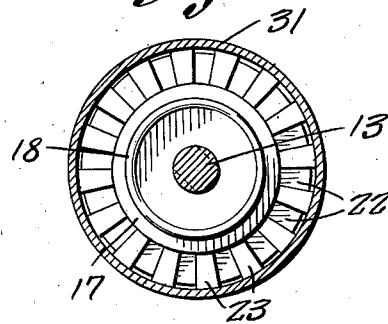


Fig. 8.

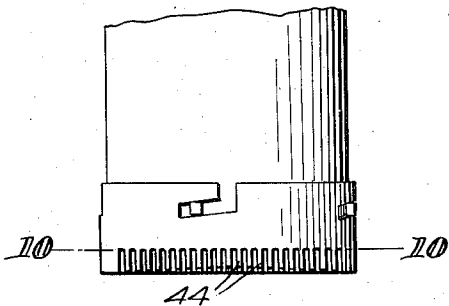


Fig. 9.

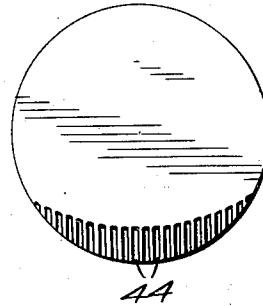
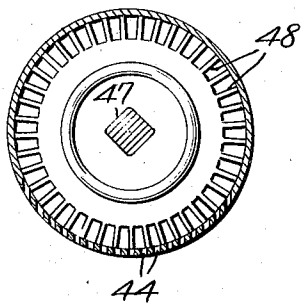


Fig. 10.



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UNITED STATES PATENT OFFICE

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ELECTRIC SHAVER

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Application February 7, 1938, Serial No. 189,197

8 Claims. (Cl. 30-43)

This invention relates to electric shavers and has for an object to provide a shaver which will promote a cleaner shave in less time than conventional shavers, this advantage being obtained by a novel stationary and a novel reversible rotary cutter, adapted to exert a shearing cut on beard close to the roots without irritating the skin.

A further object is to provide a shaver which will embody a housing for the motor, which housing forms a handle for the shaver and terminates in a novel enlarged knob of greater diameter than the housing, the knob forming a grip by means of which the shaver may be more readily manipulated over the beard than conventional shavers.

A further object is to provide an electric shaver having novel means for tensioning the cutters without the use of resilient devices of any type.

A further object is to provide novel cutters which by virtue of their construction are more rigid and have less thickness than conventional cutters.

A further object is to provide a shaver having a beveled surface on the base block which coats with the flange on the stationary cutter to provide a pocket for refuse beard.

A further object is to provide a shaver having a reversible motor by means of which the cutters may be kept self-sharpened.

A further object is to provide novel cutters, pillow plate and base block having interfitting half rings and grooves forming an oil and dust check as well as performing the additional function of properly aligning the parts.

A further object is to provide a shaver which will be formed of a few strong simple and durable parts, which will be inexpensive to manufacture, and which will not easily get out of order.

A further object is to provide a shaver having a rotary cutter mechanism with two sides and two sets of cutters, identical in design but having shoulders of different depth to meet the shaving requirements of different types of beard.

Another object is to provide a duplicate set of stationary cutters together with peripheral flanges integral therewith with cam slots and control lugs integral with the flanges, the duplicate parts being identical in design and telescopically interchangeable on the base block of the housing but otherwise differing in that the cutter bars and the slots between the bars are of different sizes as to width and depth to meet

the shaving requirements of different types of beard.

A further object is to provide a rotary hair clipping attachment interchangeable on the pillow plate and squared projection thereon, and also to provide a stationary hair clipping attachment together with the flange and that part of the tension mechanism integral thereto, this hair clipping attachment being interchangeable telescopically on the base block of the housing, the substitution of these two attachments transforming the machine into an efficient hair clipper.

With the above and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter fully described and claimed, it being understood that various modifications may be resorted to within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings forming part of this specification,

Figure 1 is a longitudinal sectional view of an electric shaver constructed in accordance with the invention.

Figure 2 is an enlarged bottom plan view of the stationary cutter.

Figure 3 is a bottom plan view of the rotary cutter.

Figure 4 is a perspective view showing the tensioning means for regulating the tension of the cutters.

Figure 5 is an enlarged cross sectional view taken on the line 5-5 of Figure 1 with parts broken away.

Figure 6 is an enlarged cross sectional view taken on the line 6-6 of Figure 1 and showing the reinforcing ring of the stationary cutter in top plan.

Figure 7 is an enlarged cross sectional view taken on the line 7-7 of Figure 1 showing the squared socket in the rotary cutter for receiving the square projection on the end of the motor shaft.

Figure 8 is a fragmentary side elevation showing a modified form of the stationary cutter together with a specially constructed clipper flange forming a stationary attachment telescopically interchangeable with the standard equipment on the base block of the housing, and suitable for the clipping of hair as distinguished from the shaving of beard.

Figure 9 is a bottom plan view of the hair clipping attachment shown in Figure 8.

Figure 10 is a view of a special rotary hair

clipping attachment suitable for the clipping of hair as distinguished from the shaving of beard and interchangeable as an attachment with the standard equipment on the pillow plate and squared projection thereon.

Figure 11 is a detail sectional view showing the slotted control lug and eye bolt for supporting the electrical compression spring.

Figure 12 is a detail cross sectional view taken on the line 12-12 of Figure 3 showing the contour of both faces of the rotary cutter.

Referring now to the drawings in which like characters of reference designate similar parts in the various views, 10 designates a cylindrical housing, the same being closed at one end by a base block 11 which is provided with a central bearing opening 12 to rotatably receive the shaft 13 of a reversible electric motor 14. A knob 15 of greater diameter than the housing is screw threadedly engaged, as shown at 16, or otherwise mounted upon the opposite end of the housing.

The housing forms a handle and the knob forms a grip by means of which the shaver may be conveniently and accurately manipulated over the contours of the operator's face.

The motor shaft 13 is provided with an integral pillow plate 17 having a ring 18 of semi-circular cross section disposed on one face near the peripheral edge thereof which ring fits in a similar shaped annular groove 19 formed in the outer face of the base block, these parts being best shown in Figures 1 and 7. The ring and groove form an oil and dust check between the motor shaft and pillow plate, and also perform the additional function of properly aligning the parts. The motor shaft terminates in a square lug 20 below the pillow plate for attaching the rotary cutter to the shaft.

The rotary cutter 21 is best shown in Figure 3 as a disc having on each face alternate radially disposed segmental shaped flat surfaces 22 and segmental shaped shoulders 23, the longitudinal edges 24 of which are beveled to provide cutting edges. As best shown in Figure 12, the shoulders on one face of the cutter are of greater height than the shoulders on the opposite face so that the cutter may be reversed and either face of the cutter selectively used to operate on beards of different characteristics.

It will be noted that the segmental shaped shoulders 23 extend diametrically beyond the alternate radially disposed segmental shaped flat surfaces 22. This is for a two-fold purpose, first to provide apertures of escape for the refuse beard into the pocket, and second to provide cutting edges at the outer circumferential edges of the shoulders.

In this connection it will be noted that the slots in the stationary cutter commence at the lower edge of the peripheral flange and extend downwardly in a rounded manner to form the flat portion of the stationary cutter, thus forming cutter bars on the edge as well as on the bottom. Thus the flange portion of the slots 27 form cutter bars thereat which, working in conjunction with the circumferential edges of the segments 23 provide cutter edges around the outer circumference of the cutter to insure greater facilities in shaving the more difficult places on the face.

The cutter is provided on both faces with an annular groove 25 formed in the shoulders to selectively receive a reinforcing ring of the stationary cutter as will be presently described and preserve the alignment of these parts while at the same time permitting of the parts being made thinner and of more rigid material than hitherto

possible. The rotary cutter is provided with a centrally disposed rectangular opening 26, to receive the similar shaped projection on the bottom side center of the pillow plate and detachably, invertly mount the cutter on the pillow plate.

The stationary cutter is in the form of a reticulate disc having two annular concentric series of slots 27 and 28, to admit the beard, and reversed in direction with respect to each other, as best shown in Figure 2. The slots of each series provide cutter bars between adjacent slots to coact with the rotary cutter. Between the inner ends of the outer series of slots and the outer ends of the inner series of slots the stationary cutter is provided with an annular reinforcing ring 29 of semi-circular cross section which, as heretofore stated, is received in the groove 25 on either face of the rotary cutter. The slots of each series do not extend radially but are arranged at a predetermined angle to radius lines, as best shown in Figure 2, so that the beard entering the slots will be sheared off by the rotary cutter, said shearing operation corresponding to the action of a pair of shears. The central portion of the stationary cutter is imperforate and is of sufficient diameter to provide a working support 30 for the central portion of the rotary cutter, Figure 3, and the flush end of the squared projection in the center of the bottom side of the pillow plate on which the rotary cutter is invertly pillowed.

The stationary cutter is provided with a peripheral flange 31 which telescopically receives the closed end of the housing 10 and the latter is provided with outstanding lugs 32, best shown in Figure 5. These lugs are received in cam slots 33 and the tension between the rotary cutter and the stationary cutter may be increased or diminished by turning the stationary cutter to cause the lugs to ride from the high ends to the low ends, or vice versa, of the cam slots and retract or advance the stationary cutter with respect to the rotary cutter.

A pin 34 is substituted for one of the lugs 32, arranged a quadrant distance apart, and extends outwardly from the peripheral flange or casing, as best shown in Figures 4 and 5. The casing is provided with an openly slotted control lug 35 at the closed end and in line with one of the cam slots which receives an eye bolt 36, the eye of which encircles the pin 34 on which the eye bolt pivots. A helical compression spring having a resiliency strength greater than the required tension between the rotary and stationary cutters is sleeved on the eye bolt between the control lug and the pin, and a positive and predetermined tension is maintained between the rotary and stationary cutters by means of adjusting nuts on the threaded end of the eye bolt, when the slotted control lug engages the eye bolt.

It will be here stated that the angle of incidence of the slots in the stationary cutter with respect to the segmental shaped cutting shoulders of the rotary cutter is preferably 30 degrees to radius lines, and that the cutter bars between adjacent slots of the stationary cutter are slightly wedge shaped, the greatest width being at the outer ends, to compensate for the greater circumference at their outer ends with respect to the circumference at their inner ends.

It should be noted that the flange 31 is an integral part of the stationary cutter and that the cam slots 33 and control lug 35 are integral parts of the flange.

For the purpose of this description these three integral parts are called the stationary cutter

mechanism, and it is intended to provide this stationary cutter mechanism in duplicate units of exact design telescopically to engage the base block on the closed end of the housing in an interchangeable manner. It is also intended to provide each duplicate unit with specially constructed cutters of different width and thickness and with slots between them of different width in order to provide a wider range of shaving equipment for different types of beard.

By referring to Figure 1 it will be noted that the base block 11 is beveled as shown at 38 to provide a pocket between the base block and the flange of the stationary cutter for refuse hair.

A conventional speed regulator 39 is mounted in the casing and also a conventional toggle switch 40 is mounted in the casing to control the motor circuit illustrated as wires 41 and 42. By reversing the motor from time to time the cutting edges of the stationary and of the rotary cutter may be self-sharpened.

While the control shown in Figure 1 shows a hand reversing switch, it is to be understood that this invention is not restricted to this manner of motor reversing control but that any conventional and satisfactory automatic electric motor reversing control may be substituted for the hand control.

Attachments that may be used in connection with this invention for hair clipping as distinguished from beard shaving are shown in Figures 8, 9 and 10. These attachments consist of two parts, a specially constructed stationary hair clipper, a flange integral thereto with cam slots and a control U-slotted lug integral with the flange which is also of special design, but interchangeable with the hereinbefore described stationary cutter mechanism as an attachment on the base block at the closed end of the housing, as partly shown in Figure 8.

This stationary clipper attachment is provided with a crescent shaped series of slots 44 arranged in a limited portion of the circumference of its bottom part as best shown in Figure 9. The bars formed by these slots are combination guards and clippers of the conventional hair clipper type that slant from the toe to heel as do conventional hair clippers. That portion of the flange directly above the crescent shaped clipper is cut away to permit free ingress of the hair to be clipped, but having protecting ribs spaced apart as best shown in Figure 10. The stationary clipper takes the place in all essential manner to the bottom clipper of a conventional hair clipper of a motor driven type.

The second clipper attachment is a rotary clipper as shown in Figure 10 having a centrally disposed rectangular opening 47 to engage a similar shaped projection also centrally located on the bottom side of the pillow plate on which plate it is interchangeable with the regular equipment. The ribs are combination guards and clippers essentially similar to the upper cutter in conventional power driven hair clippers, and differing only that they are annular in shape and rotary in action, instead of being rectangular in shape and oscillating in motion.

From the above description it is thought that the construction and operation of the invention will be fully understood without further explanation.

What is claimed is:

1. An electric shaver comprising a housing forming a handle, an electric motor in the housing, a base block carried by the housing and hav-

ing a bearing opening, a shaft for the motor projecting through said opening, a pillow plate integral with the shaft bearing upon the outer face of the block, an interfitting annular groove and ring between the block and the pillow plate forming an oil and dust check between the shaft and the plate, a rotary cutter secured to the shaft, and a stationary cutter secured to the housing.

2. An electric shaver comprising a housing, an electric motor in the housing, a base block carried by the housing having a bearing opening, a shaft for the motor projecting through said bearing opening, a pillow plate integral with the shaft and bearing upon the base plate, an interfitting groove and ring between the shaft and pillow plate aligning the shaft properly, a rotary cutter removably secured to the shaft in advance of the pillow plate, an interfitting annular groove and ring between the cutter and the pillow plate forming an oil and dust check and properly aligning the cutter with the pillow plate, and a cutter fixed to the housing in advance of the rotary cutter.

3. An electric shaver comprising a housing, a base block closing one end of the housing and having a bearing opening, an electric motor in the housing, a shaft for the motor projecting through said opening, a rotary cutter secured to the shaft in advance of the block, a stationary cutter secured to the housing in advance of the rotary cutter and having concentric annular series of slots providing a reinforcing ring between both series, and an interfitting groove and ring between said reinforcing ring and the rotary cutter forming a combined oil and dust check and aligning the rotary cutter with the fixed cutter.

4. An electric shaver comprising a housing, a base block in the housing having a bearing opening, a shaft for the motor projecting through said motor, a rotary cutter on the shaft in advance of the block, a fixed cutter confronting the rotary cutter, a flange for the fixed cutter telescopically receiving the housing, interfitting cam projections and obliquely disposed cam grooves between the housing and the flange permitting of the fixed cutter being advanced toward or retracted from the rotary cutter to vary the tension between the cutters, and means connected to the flange for locking the fixed cutter in adjusted positions.

5. An electric shaver comprising a housing, an electric motor in the housing, a base block in the end of the housing having a bearing opening, a shaft for the motor projecting through said opening, a rotary cutter on the shaft in advance of the base block, the edge of the base block being beveled outside of the cutter, a stationary cutter having a flange fixed to the casing and coacting with the beveled edge of the base block in forming a pocket for refuse beard, alternately disposed segmental shaped shoulders, and flat surfaces on the rotary cutter, the segmental shaped shoulders extending diametrically beyond the flat surfaces to provide apertures for the escape of refuse beard into the pocket and providing cutting edges at the outer circumferential edges of the shoulders.

6. An electric hair clipper comprising a housing forming a handle, an electric motor in the housing, a base block carried by the housing and having a bearing opening, a shaft for the motor projecting through said opening, a pillow plate integral with the shaft bearing upon the outer face of the block, a rotary cutter secured to the shaft, a stationary cutter, a flange for the cutter

having cam slots, cams on the housing engaging the cam slots for varying tension between the stationary cutter and the rotary cutter, said stationary cutter being provided with a crescent shaped series of slots arranged in the limited portion of the circumference of its bottom and forming bars to provide guards of the conventional hair clipper type, said guards being inclined relatively to the axis of the shaft, the portion of the flange above the crescent shaped clipper being cut away to permit free access of the hair to be clipped, and protecting ribs in said cut away portion.

7. An electric shaver comprising a handle member, a shaft rotatably mounted in the handle member, a disc-shaped stationary cutter detachably mounted on the handle member, a cooperating disc-shaped rotary cutter detachably secured to said shaft behind the stationary cutter, said rotary cutter adapted to rotate in a plane normal to the axis of rotation of said shaft and formed on its opposite faces with alternate radially disposed segmental shaped shoulders and flat surfaces of progressively increasing width from their inner ends to the periphery of the rotary

cutter, the shoulders being under cut to provide cutting edges in the planes of the outer faces of the shoulders and the latter being of greater depth on one face of the rotary cutter than on the opposite face, and the rotary cutter being reversible on the shaft to present the cutting edges of either set of shoulders to the stationary cutter.

8. An electric shaver comprising a handle member, a shaft rotatably mounted in the handle member, a rotary cutter mounted on the shaft and adapted to rotate in a plane normal to the axis of rotation of said shaft, a stationary cutter secured to the handle member over the rotary cutter, said stationary cutter being formed with two concentric annular series of slots defining intervening teeth and an intermediate unslotted portion, said slots extending from the intermediate portion in equal angles less than ninety degrees, and the angular dispositions of the slots of one series being opposite to those of the other series.

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