Dec. 19, 1944. J. VERSCHUYL 2,365,368

ELECTRIC SHAVER

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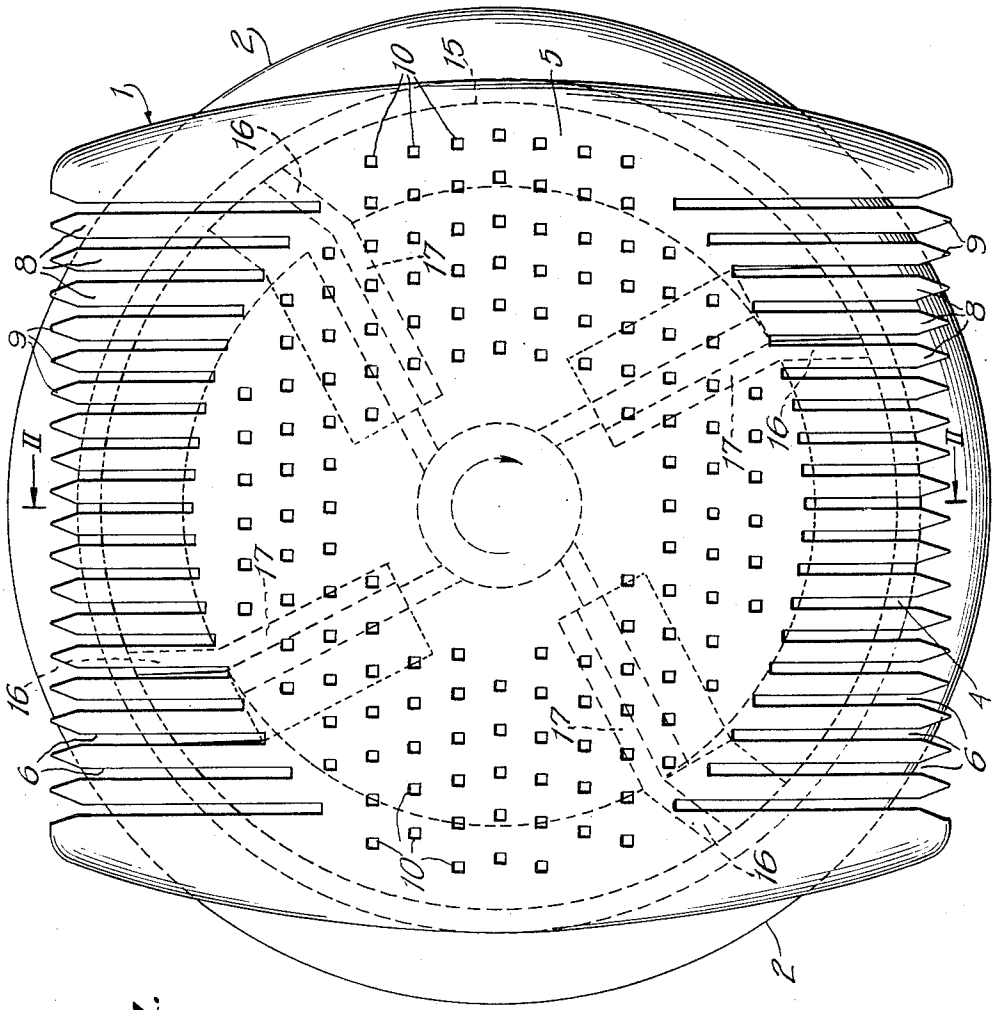


Fig. 1.

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Fig. 3.

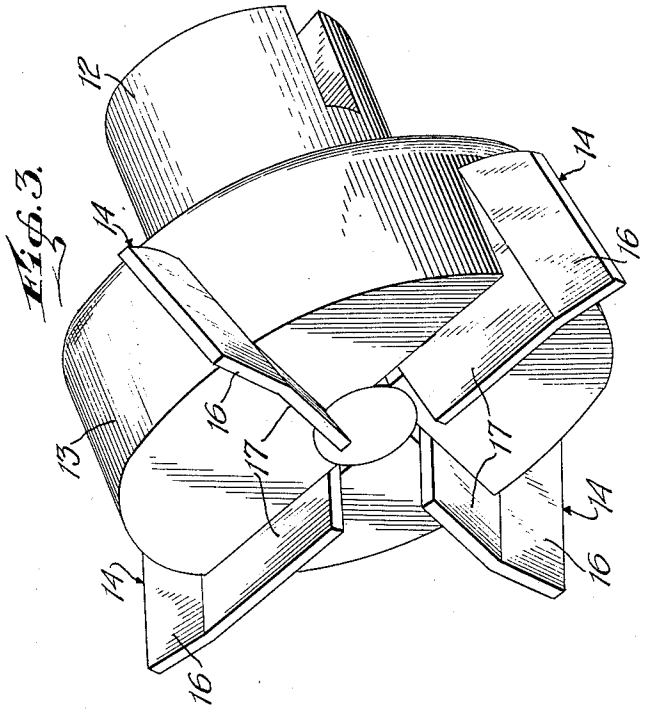
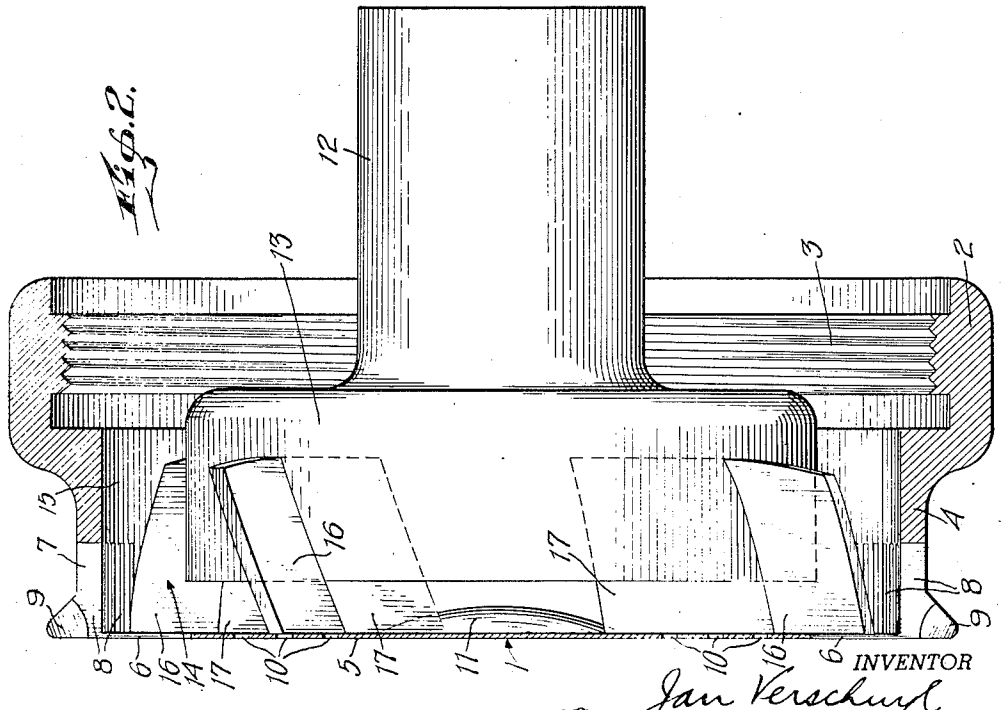


Fig. 2.



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ELECTRIC SHAVER

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7 Claims. (Cl. 30—43)

The object of the invention is an improved electric shaver of the so-called rotary type, by which expression is meant that type of shaver which utilizes a perforated or slotted shear plate for engagement with the skin and an inner cutter adapted to rotate or oscillate about an axis normal to the shear plate and having more or less radical cutting edges to engage and traverse a circular or annular path over the nether surface of the shear plate to sever the hairs projecting through the perforations or slots therein.

Various shavers of this type have been proposed and some have appeared on the market but, in spite of the high cutting speed readily attainable with rotating blades in a shaver of this kind, the actual shaving capabilities of such shavers have not come up to expectations, and particularly as respects their ability to cut long hairs. This statement applies not only to hairs of such length as may be encountered on the arms or legs (for the shaving of which special attachments have had to be devised) but, in many instances, even to hairs of the length resulting from a normal full day's growth of beard.

Some attempts have been made to meet this difficulty by utilizing slots in the periphery of the shear plate in lieu of perforations spread over the skin-engaging face of the plate but without satisfactory results. This is partly because of the difficulty of insuring the entry of the hairs into the slots (the usual round head frequently being unwittingly advanced across the face other than in the direction of the slots) and partly also because of the narrowness of the swath effectively sheared even when the hairs do enter the slots.

According to the present invention the shear plate is made substantially square, or at least is provided with two, opposite, parallel side edges which alternate as the leading and trailing edges during shaving and provision is made, as described in detail below, for highly efficient shaving of both long and short hairs, without any of the objections or disadvantages heretofore thought to be inherent in rotary type shavers.

In the drawings, Fig. 1 is a plan or end view of a shearing head embodying the principles of the invention, Fig. 2 is a cross-section on the line II—II of Fig. 1 showing the inner cutter in situ, and Fig. 3 is a perspective view of the inner cutter only.

The shearing head, generally designated 1, has a cylindrical base 2 by which it may be attached to the shaver handle containing the usual electric motor, and, to that end, is shown as interiorly threaded at 3. The wall or neck 4, upstanding from the threaded base, supports the face-engaging portion or shear plate 5 which, as shown and preferred, is approximately square. While so designated herein, it will be understood that the precise shape and dimensions are not critical, the important consideration being the provision of two parallel side edges (the working edges below described) of a substantial length. In common with the familiar round-headed rotary shaver, the shear plate may be either domed or flat, as shown.

Along each of the two opposite working edges the shear plate is provided a row of closely spaced, parallel slots 6, the slots extending down into the wall or neck 4, as indicated at 7 in Fig. 2, and the bars or teeth 8 between the slots provided with suitable combing, as at 9. The central portion of the shear plate, between the rows of slots, is provided with a large number of perforations 10, preferably square, as shown in Fig. 1. The zone immediately surrounding the actual center of the shear plate, being of little value so far as shaving is concerned, in this or any other rotary shaver, may be left blank. The under side of this zone is shown reinforced, as at 11 in Fig. 2.

The inner cutter, as stated, is designed to rotate or oscillate about an axis normal to the shear plate and is adapted for ready application to the end of the motor drive shaft (not shown). As illustrated it comprises a stem 12 having a head 13 which supports the blades or cutting edges which engage the nether surface of the shear plate to sever the hairs protruding through the perforations and slots. Four blades are shown, generally designated 14 (Fig. 3) the outer ends of which describe a circle, indicated by the reference 15 in Fig. 1, which approaches relatively close to the inner end of the center slot of each row and the slots are of increasing length, outwardly in both directions from these center slots, so that all of the slots intersect the circle 15. Each blade includes an outer section 16 and an inner section 17, each section preferably being straight.

In rotary shavers as heretofore constructed, the circular head employed has seriously restricted the number of parallel slots which could be arranged in its periphery and, therefore, the width of the swath which could be cut; but, as will be recognized, the head of the present invention permits considerable extension of the length of the row of slots which can be provided, thereby much increasing the width of the swath; and, at the same time, it affords a straight edge of such length as to be felt, on the face, to a degree suffi-

cient to insure the proper manipulation of the shaver, i. e., its movement back and forth in a direction generally parallel to the length of the slots.

Provision is made whereby the cutting action of the blades is efficient throughout the entire row of slots and not merely in the region of the few central slots of each row. To this end, the outer section 16 of each blade is set at an angle to the radius of circle 15 and two of these sections are set at a different angle from the other two.

As shown in Fig. 1, the blades which at the moment occupy the upper left and lower right positions have their outer sections 16 angled forwardly of their inner sections 17 (the inner cutter rotating in the direction of the arrow), the angle of advance being such that the two outer sections of the blades in question assume positions parallel to the slots when they are approximately half way between the slot they first traverse as the cutter rotates and the center slot of the row. Thus these two cutting edges are always at a quite acute angle to the edges of all of such slots, i. e., to the edges of all those between the slot first traversed and the center of the row; and consequently they cooperate effectively with the edges of the bars between such slots to sever hair protruding therethrogh.

As also shown in Fig. 1, the outer sections 16 of the two other blades, which occupy the upper right and lower left positions, are angled rearwardly of their inner sections 17, so that these two outer sections effectively cooperate with the other half of each row of slots. As will be understocd, these two outer sections are so angled that they assume positions parallel to the slots when they are approximately half way between the center slots of the rows and the slots which they traverse last as the cutter rotates.

The inner sections 17 of all four blades may be arranged substantially radially of the cutter, their forward or cutting edges cooperating with the sheer plate perforations except the few indicated at the sides of the head which are served by the outer cutter sections 16. As shown in Figs. 2 and 3, the blades are preferably canted forward, bodily, so that their bevelled cutting edges are somewhat undercut for most efficient shearing of the hair.

While the invention has been shown and described in its preferred form, it will be understood to be susceptible of embodiment in various forms within the scope of the appended claims.

The following is claimed:

1. In an electric shaver, the combination of an approximately square shear plate, an inner cutter adapted to rotate about an axis normal to the shear plate and including a plurality of straight cutting edges the outer ends of w! ich describe a circle of a diameter to approach relatively close to the mid-points of each of two opposite parallel side edges of the shear plate, each of said two edges being slotted throughout its length by a series of parallel slots extending into the face of the shear plate at right angles to the edges and closed at their inner ends, the slots adjacent the said mid-points of the edges being relatively short and the remaining slots being of progressively increasing length outwardly in both directions from said mid-points whereby all of said slots intersect the circle described by the outer ends of said cutting edges, the latter being at such angles relative to radii of said circle that during the rotation of the inner cutter one of said edges passes through a position parallel to the slots when it is between the mid-point and one end of each row of slots and another of said edges passes through a position parallel to the slots when it is between the mid-point and the other end of each row of slots.

2. In an electric shaver, the combination of an approximately square shear plate, an inner cutter adapted to rotate about an axis normal to the shear plate and including at least two outwardly extending cutting edges the outer ends of which describe a circle of a diameter to approach relatively close to the mid-points of each of two opposite parallel side edges of the shear plate, each of said two edges being slotted throughout its length by a series of parallel slots extending into the face of the shear plate and closed at their inner ends, the slots adjacent the said mid-points of the edges being relatively short and the remaining slots being of progressively increasing length outwardly in both directions from said mid-points whereby all of said slots intersect the circle described by the outer ends of said cutting edges, the latter being at such angles relative to radii of said circle that during the rotation of the inner cutter one of said edges passes through a position substantially parallel to the slots when it is between the mid-point and one end of each row of slots and another of said edges passes through a positicn substantially parallel to the slots when it is between the mid-point and the other end of each row of slots.

3. In an electric shaver, the combination of a shear plate having two opposite parallel side edges, an inner cutter adapted to rotate about an axis normal to the shear plate and including at least two outwardly extending cutting edges the outer ends of which describe a circle of a diameter to approach relatively close to the mid-points of said side edges of the shear plate, each of said two edges being slotted throughout its length by a series of substantially parallel slots extending into the face of the shear plate a distance sufficient to intersect the circle described by the outer ends of said cutting edges, the latter being at such angles relative to radii of said circle that during the rotation of the inner cutter one of said edges passes through a position substantially parallel to the slots when it is between the mid-point and one end of each row of slots and another of said edges passes through a position substantially parallel to the slots when it is between the mid-point and the other end of each row of slots.

4. In an electric shaver, the combination of a shear plate having two opposite parallel side edges, an inner cutter adapted to rotate about an axis normal to the shear plate and including at least two outwardly extending cutting edges the outer ends of which describe a circle of a diameter to approach relatively close to the mid-points of said parallel side edges of the shear plate, each of said two edges being slotted throughout its length by a series of parallel slots extending into the face of the shear plate substantially at right angles to the edges and closed at their inner ends, the slots adjacent the said mid-points of the edges being relatively short and the remaining slots being of progressively increasing length outwardly in both directions from said mid-points whereby all of said slots intersect the circle described by the outer ends of said cutting edges, and a plurality of spaced perforations in the shear plate between said rows of slots, the inner ends of said cutting edges being adapted to sever hair projecting through said perforations.

5. In an electric shaver, the combination of a shear plate, an inner cutter adapted to rotate about an axis normal to the shear plate and including at least two outwardly extending cutting edges, said shear plate having two opposite series of parallel slots extending into the face of the shear plate from the edges thereof and closed at their inner ends, a plurality of spaced perforations in the shear plate intermediate the inner ends of said rows of slots, the said cutting edges being at such angles relative to radii of the circle described by the outer ends of such edges that during the rotation of the inner cutter one of said edges passes through a position parallel to the slots when it is between the mid-point and one end of each row of slots and another of said edges passes through a position parallel to the slots when it is between the mid-point and the other end of each row of slots.

6. In an electric shaver, the combination of a shear plate provided with a plurality of closely-spaced parallel slots, an inner cutter adapted to rotate about an axis normal to the shear plate and including at least two outwardly extending cutting edges, the said cutting edges being at such angles relative to radii of the circle described by the outer ends of such edges that during the rotation of the inner cutter one of said edges passes through a position parallel to the slots when it is substantially half way between the center slot and the end slot on one side thereof, and another of said edges passes through a position parallel to the slots when it is substantially half way between the center slot and the end slot on the other side thereof.

7. In an electric shaver, the combination of an approximately square shear plate, an inner cutter adapted to rotate about an axis normal to the shear plate, two opposite edges of the shear plate having rows of slots therein extending into the shear plate to a distance to intersect the circle described by the inner cutter.

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