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2,309,431

SHAVER

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Fig. 1.

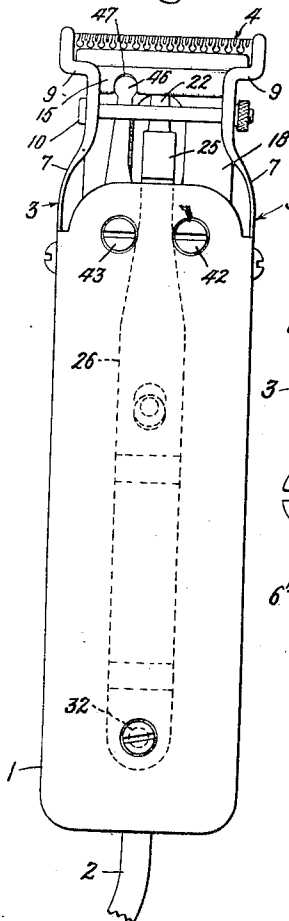


Fig. 2.

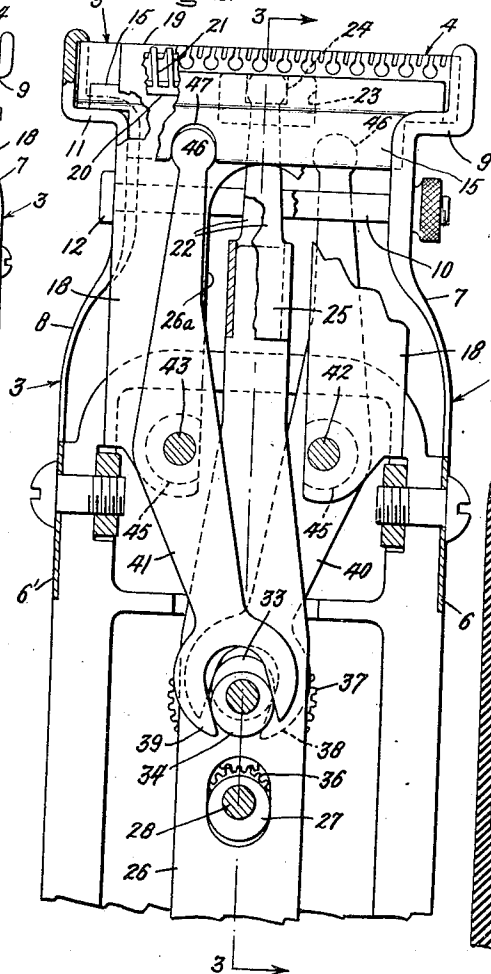


Fig. 3.

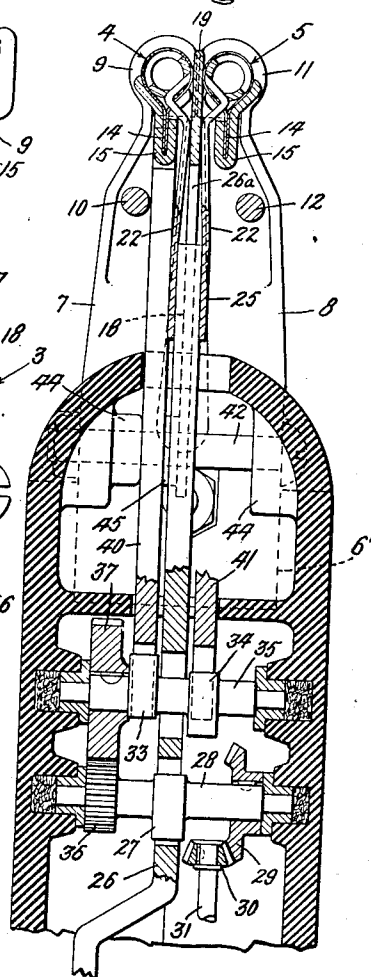


Fig. 4.

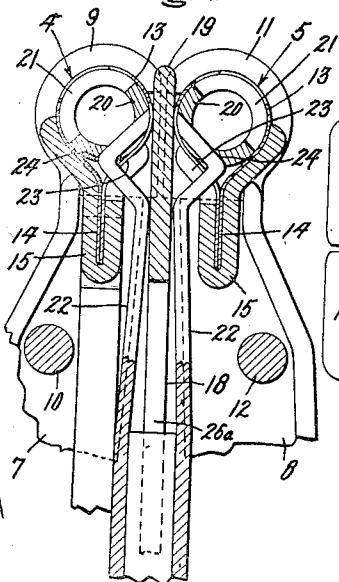
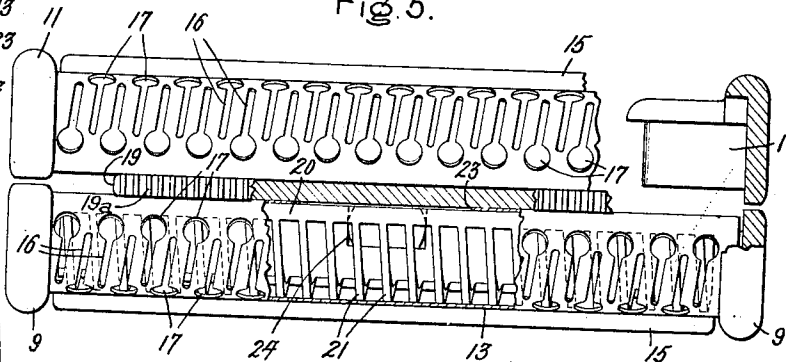


Fig. 5.



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UNITED STATES PATENT OFFICE

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SHAVER

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4 Claims. (Cl. 30-43)

The present invention relates to shavers of the type having a face-engaging cutter or cutting head and a cooperating cutter. In prior shavers of this type only a relatively small part of the cutting surfaces has been effective.

The object of my invention is to provide a shaver in which the effective cutting surface is increased. For a consideration of what I believe novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a front elevation of a shaver embodying my invention; Fig. 2 is an enlarged view of the cutters and the driving mechanism therefor; Fig. 3 is a sectional view taken on line 3-3 of Fig. 2; Fig. 4 is an enlarged sectional view of the cutters; and Fig. 5 is a plan view of the cutters, partly broken away and with one of the cutters removed.

Referring to the drawing, there is shown a shaver having a split casing 1 housing a suitable electric motor which is connected to a conductor cord 2 extending through one end of the casing. At the opposite end of the casing are bolted spring supports 3 carrying adjacent cutting heads 4 and 5. As shown more clearly in Figs. 2 and 3, the spring supports 3 comprise base portions 6 and 6' which are bolted to the casing, and upwardly extending spring arms 7 and 8 respectively. The outer ends of the spring arms 7 are provided with seats 9 for receiving opposite ends of the cutting head 4, the cutting head being rigidly clamped between the seats by a through bolt 10. The cutting head 5 is similarly supported in seats 11 on the spring arms 8 and is clamped between the seats by a through bolt 12. The spring arms 7 and 8 support the cutting heads for reciprocating or vibratory movement relative to the casing. Each of the cutting heads comprises an outer cylindrical portion 13 and a shank 14 received in a stiffening member 15 which in effect constitutes a carrier for the cutting head. The stiffening member 15 is clamped between the spring supporting arms and constitutes a rigid support for the cutting head. The cutting head can conveniently be made from a single piece of thin sheet metal by forming the sheet so that the opposite edges provide the shank 14 and the intermediate part of the sheet provides the cylindrical portion 13. The cylindrical portion of the cutting head is provided with hair-receiving openings in the form of transverse slots 16 provided at alternate ends with circular openings 17. Since the face-contacting surface of the cutting head is convex, the

central part is pressed into closest engagement with the skin surface. This part of the cutting head is provided with the relatively narrow slots which may be from .007 to .010 of an inch wide.

The larger circular openings 17, being at opposite ends of the slots, are not pressed as tightly against the skin surface and there is accordingly no danger that the skin will enter the circular openings to an extent sufficient to cause injury.

Between the cutting heads 4 and 5 is a stationary guard or guide plate 18 having a rounded outer end 19 which engages the skin and holds it stationary. The inner end of the guide plate 18 is rigidly clamped between the parts of the casing. The rounded end 19 of the guard is slotted to provide teeth 19a which act as a comb for long hair and at the same time hold the skin effectively from moving sideways with the cutting heads.

Within the cutting heads are cylindrical cutters 20 each provided with spaced cutting bars 21 beneath the slots 16 and openings 17 of the cutting head. The cutters 20 are reciprocated through arms 22 the upper ends of which project through openings 23 in the cutting heads and are received in recesses 24 in the cutters. The arms 22 are preferably resilient and are arranged to exert an outward pressure on the cutters 20 so as to force the cutters tightly against the under side of the cutting heads. At the inner ends the arms 22 terminate in a sleeve 25 which fits over the upper end of a lever 26. The arms 22 and the lever 26 extend through an opening 26a in the guide plate 18.

The cutters 20 are reciprocated by a cam 27 on a shaft 28 which is driven through gears 29 and 30 by a shaft 31 connected to the driving motor. Rotation of the shaft 28 pivots the lever 26 about a pivot 32 at the lower end of the casing, causing high speed reciprocation of the cutters.

The cutting heads 4 and 5 are reciprocated in opposite directions through cams 33 and 34 on a shaft 35 driven from the shaft 28 through reduction gears 36 and 37, the reciprocation being permitted by the spring arms 7 and 8. The cams 34 and 35 cooperate with the forked ends 38 and 39 of bell crank levers 40 and 41 respectively pivoted on bolts 42 and 43 which extend through bosses 44 on the casing and bosses 45 on the stationary guide plate 18. In addition to serving as pivots for the arms 40 and 41, the bolts 42 and 43 serve to clamp the parts of the split casing together. The bell crank levers 40

and 41 are provided with rounded upper ends 46 which fit in recesses 47 in the carriers 13. Upon rotation of the shaft 35 the cams 33 and 34 oscillate the arms 40 and 41, causing reciprocation of the cutting heads. Due to the reduction gearing 36 and 37, the cutting heads, which are pressed into contact with the skin, are reciprocated at a much lower speed than the cutters 20. The speed of reciprocation of the cutting heads is from one-third to one-fifth that of the cutters. The cutting heads are reciprocated a distance of the order of the spacing between the slots 16. In the present construction where the slots 16 are approximately .010 of an inch wide and the pitch between the slots is about .030 of an inch, the travel of the cutting heads will be approximately .030 of an inch in order to expose every part of the skin beneath the cutting heads to the slots and scan the whole surface in one pass of the shaver over the skin. There is a limit to the speed of reciprocation of the cutting heads which is dependent upon the shape of the skin-engaging portion of the heads and the sensitivity of the skin. With the present construction it is inadvisable to reciprocate the cutting heads at more than 3,000 reciprocations a minute. The cams 33 and 34 are arranged so that the cutting heads are reciprocated in opposite directions. Each cutting head accordingly tends to stretch the skin between it and the rounded end 19 of the stationary guide plate 18. The teeth 19a on the guide plate are intended to grip the skin and hold it stationary. It is expected that there will be some slippage between the skin and the reciprocating cutting heads. The friction between the skin and the reciprocating cutting heads will, however, be sufficient to stretch the skin and cause the hair to protrude so that it may be more readily received in the slots 16. Due to the slippage of the cutting heads on the skin, the hair-receiving openings in the cutting head are moved over the skin surface with a "scanning" action, so that all parts of the skin beneath the cutting head are successively brought into register with the hair-receiving openings. This results in practically complete cutting of the hair beneath the cutting head. In shavers in which the cutting head is fixed on the casing the scanning action is absent, and it is accordingly necessary for the user to repeatedly move the shaver over the same portion of the skin surface in order to cut all of the hair.

Another advantage of the reciprocating cutting heads is more effective cutting of the hair entering the openings. The openings in the cutting head are much wider than the thickness of the hair. Hair at the center of the openings can not be cut close to the skin surface since it is spaced from the edges of the openings a

distance approximately equal to its diameter. The hair which is most effectively cut is that which is adjacent the edges of the openings. The edges of the openings in the cutting head may therefore be termed the "active" cutting surfaces of the head. The reciprocation of the cutting head brings the active cutting surface of the head into more effective cooperation with the hair.

While the stationary guide plate 18 assists the shaving action by holding the skin intermediate the cutting heads stationary, it may be omitted. The inertia of the skin, coupled with the fact that the cutting heads are moving in opposite directions, will tend to hold this portion of the skin stationary in the absence of the stationary guide.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a shaver, adjacent skin-engaging cutting heads having an outer face-engaging surface provided with hair-receiving openings and an inner shearing surface, means for reciprocating the heads at a relatively slow speed, the direction of movement of one of the heads being opposite to the direction of movement of an adjacent head, cutters cooperating with the shearing surface of said heads, and means for reciprocating said cutters at a relatively high speed.

2. In a shaver, a head comprising a stationary face-engaging part and an adjacent relatively thin part movable relative thereto having an outer face-engaging surface provided with hair-receiving openings and an inner shearing surface, means for moving said movable part of the head at a relatively slow speed, and a high speed cutter cooperating with the inner surface of said movable part for shearing hair projecting through said openings.

3. In a shaver, adjacent cutting heads having an outer face-engaging surface provided with hair-receiving openings and an inner shearing surface, a high speed cutter cooperating with said inner surface to shear hair projecting through said openings, and means for reciprocating the heads in opposite directions at a speed relatively slow compared to the cutter speed whereby the heads scan the skin surface.

4. In a shaver, a head comprising a face-engaging part and an adjacent part movable relative thereto having an outer face-engaging surface provided with hair-receiving openings and an inner surface for cooperation with a high speed cutter to shear hair projecting through said openings, and means for moving said adjacent part of the head relative to said face-engaging part whereby said adjacent part of the head scans the skin surface.

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