April 15, 1958 C. W. BARNARD 2,830,364

ELECTRIC SHAVER WITH OSCILLATING HEAD

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Fig. 1.

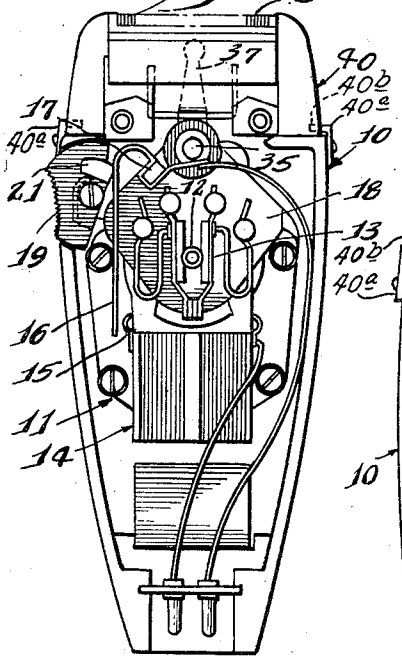


Fig. 2.

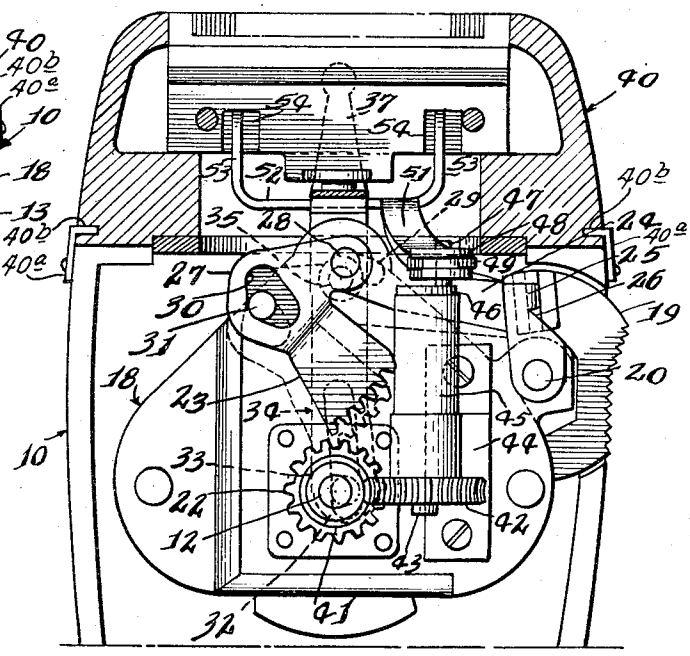


Fig. 3.

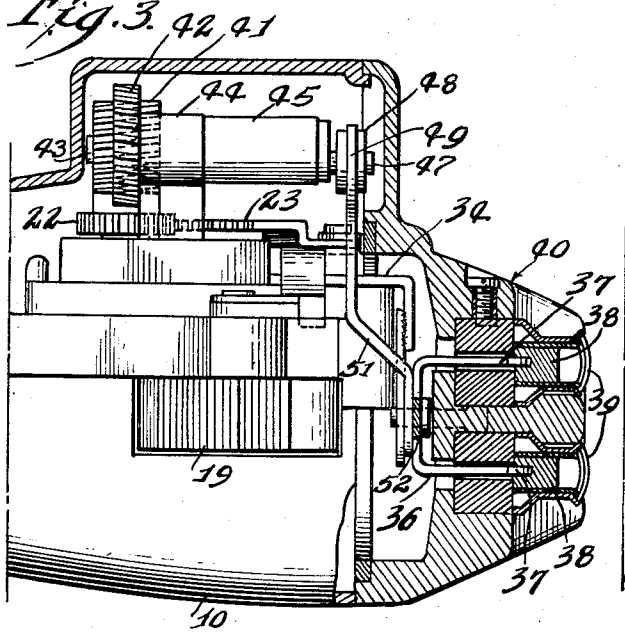
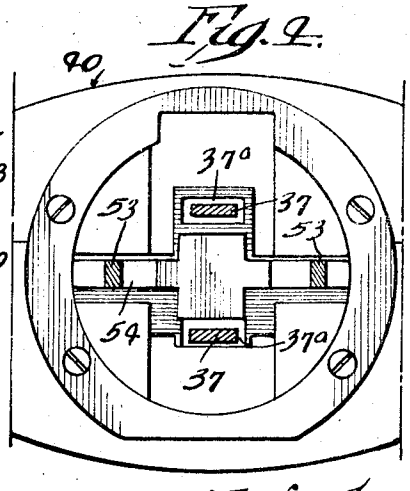


Fig. 4.



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Fig. 5.

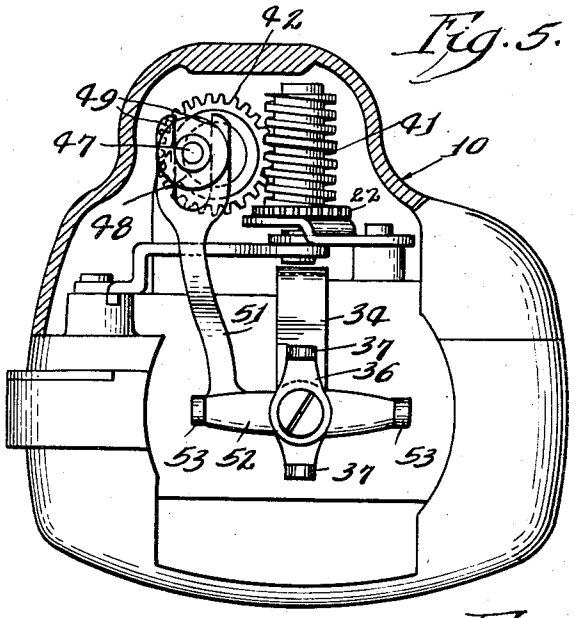


Fig. 10.

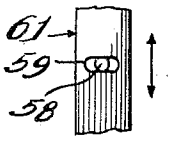


Fig. 6.

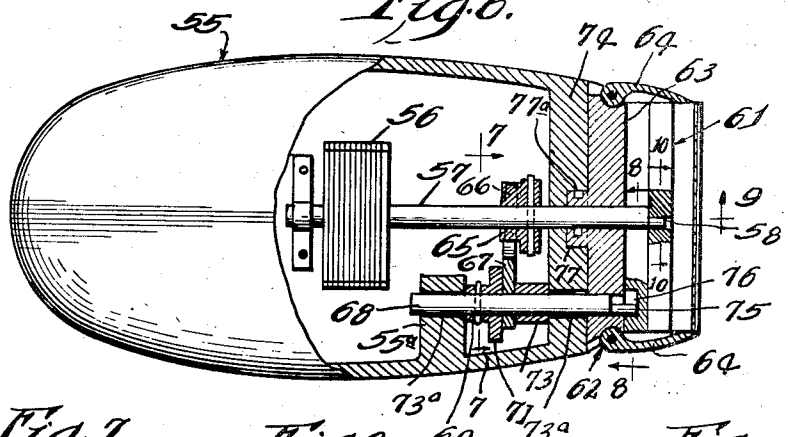


Fig. 7.

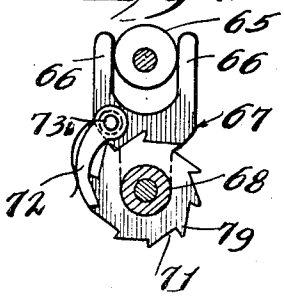


Fig. 8.

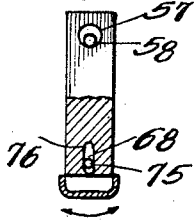
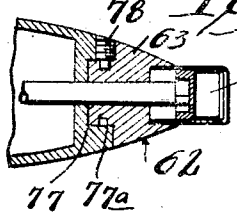


Fig. 9.



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ELECTRIC SHAVER WITH OSCILLATING HEAD

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Application December 29, 1954, Serial No. 478,310

3 Claims. (Cl. 30—43)

The present invention relates to an electric shaver and more particularly to an electric shaver in which the head of the shaver is oscillated or vibrated synchronously with reciprocating movement of the cutting means for an electrically-operated shaving mechanism.

Electric shavers of the type provided with a shaving head having one or more laterally reciprocating cutting bars or elements are now in general use, but in all such electric shavers the head is maintained stationary or in fixed position relative to the body of the shaver and its cutting or shearing means. To secure best results with such commercial devices, the operator will frequently manually move the shaver assembly so as to alter the position of the head of the shaver with respect to various portions of the face in an endeavor to more effectively reach the hair to be removed and secure a more efficient shave than obtainable if the shaver is retained in approximately the same relative position with respect to various parts of the face as it is moved thereover.

Whereas in the operation of prior types of electric shavers it is essential that the shaving head be manually moved or advanced against the grain or direction of growth of the hair or beard to direct the hair into the slots or openings of the comb or fixed part of the cutter head, with the present novel electric shaver where the head oscillates or pivots simultaneously with the reciprocation or oscillation of the cutter or cutting bar, the head may be manually moved over the face with or against the grain for while one portion or approximately one-half of the head is moving in one direction with the grain, the other portion is moving in the other or opposite direction against the grain, and at the next instant the direction of oscillation of the head is reversed. Thus for each complete oscillation of the head the latter moves automatically back and forth with and against the grain or direction of growth and thereby assures a smooth shave without manually rotating the body or portion of the shaver that is grasped and held by the operator.

Because of the above shortcoming of prior types of electric shavers, the stationary comb-like teeth of the cutter head may rest upon many of the hair which are not guided or directed into the slots of the teeth or openings in the comb or fixed part of the cutter head, so that the operator or user requires several strokes of the shaver over each area of the face to be shaved to secure a clean shave.

In view of the shortcomings of various commercial types of electric shavers which I have purchased, tested and operated over extended periods of time, much time and effort has been expended by me in an effort to increase the efficiency of such shavers but with little success until I discovered that by oscillating or vibrating the cutter head simultaneously with reciprocation of the cutter bar or bars, whiskers or hair may be readily and easily reached and directed into the slots or openings of the head and the hair removed from any shaving area and particularly from those portions or areas of the face or neck that are now considered difficult to shave.

It is, therefore, an important object of the present invention to provide a novel electric shaver provided with conventional cutting means, such as one or more cutter bars and shaving head, but in which the head is mounted for and oscillated or vibrated in unison or simultaneously with the reciprocation of the cutting means whereby I am enabled to shave more effectively and in a substantially shorter period of time than with prior types of electric shavers.

The present invention further comprehends the provision of a novel means and mechanism for operating the reciprocating cutting means and simultaneously oscillating the shaving head from the motor with which such electric shavers are equipped.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

Figure 1 is a view in side elevation of an electric shaver embodying my new invention, one-half of the housing or casing being removed to disclose the interior mechanism.

Fig. 2 is a fragmentary enlarged view in side elevation of the shaver but taken from the side opposite to that shown in Fig. 1.

Fig. 3 is a fragmentary view in side elevation of the upper part of the shaver when viewed from the right side of Fig. 2.

Fig. 4 is a fragmentary bottom plan view of the shaver head assembly of the electric razor removed from the body, and showing the slots or openings for receiving the upstanding prongs or projections on the oscillating arm for reciprocating the cutting means and the upstanding projections or prongs on the oscillating member for simultaneously oscillating or vibrating the head.

Fig. 5 is a fragmentary top plan view of the shaver with the shaver head assembly of Fig. 4 removed to show more clearly the mechanism for oscillating or vibrating the head simultaneously with the reciprocating movement accorded the cutting means.

Fig. 6 is a view in side elevation of another embodiment of electric shaver to which my novel mechanism has been applied for oscillating the shaver or cutter head assembly simultaneously with the reciprocation of the cutter bar, a portion of the housing or casing having been removed for more complete disclosure of the mechanism.

Fig. 7 is an enlarged view in vertical cross section taken in a plane represented by the line **7—7** of Fig. 6 and viewed in the direction of the arrows.

Fig. 8 is a view in vertical cross section taken in a plane represented by the line **8—8** of Fig. 6 and viewed in the direction of the arrows.

Fig. 9 is a view in horizontal cross section taken in a plane represented by the line **9—9** of Fig. 6 and viewed in the direction of the arrows.

Fig. 10 is a view in vertical cross section taken in a plane represented by the line **10—10** of Fig. 6 and viewed in the direction of the arrows.

Referring more particularly to the disclosure in the drawings in which there is disclosed illustrative embodiments of two types of electric shavers equipped with my novel means and mechanism for oscillating their cutter heads, the embodiment selected to illustrate the present invention in Figs. 1 to 5, inclusive, is of the type disclosed in the Kahn Patent No. 2,502,048, of March 28, 1950. In this type of electric shaver in the housing or casing **10** there is provided a motor **11** including an armature shaft **12** and cam-actuated contact mechanism **13** by means of which the circuit of the field coil **14** is made and broken, these parts being arranged and operating in the usual manner. A switch including a fixed con-

tact 15 and a spring blade 16 biased to open position, controls the field circuit. A boss 17 on the usual bridge piece 18 in which the armature shaft 12 is journalled and upon which the contact mechanism is mounted locates the switch blade 16. A thumb-actuated button 19 controls operation of the motor, the button being pivotally connected by means of a stud 20 (Fig. 2) with the bridge piece 18, and being movable from the stop position shown in Fig. 2 to its start position in which the button is depressed or moved inwardly.

As shown in Fig. 1, a lug or arm 21 projects from one face of the starter button 19 which serves to flex the switch blade 16 into engagement with the contact 15 when the starter button 19 is moved from its stop to its start position and to permit the switch blade 16 to disengage itself from the contact 15 and break the motor circuit when the starter button 19 is moved in the opposite direction. This starting movement is also adapted to impart a spin to the armature shaft 12 with the closing of the switch.

The armature shaft 12 is rotated by a pinion 22 secured to one end of the shaft and a button-operated, gear sector or quadrant 23 so that when the push button 19 is moved to start the motor, the gear sector or quadrant moves into mesh with the pinion 22 as shown in dotted outline in Fig. 2, and sweeps through a sufficient arc to pass clear of the pinion 22 on the far side, but when the push button 19 is moved to stop the motor the gear sector or quadrant 23 moves to its initial or inoperative position along a different path to avoid clashing with the teeth of the still rotating pinion 22.

A lever 24 is mounted to pivot about the axis of the stud 20, and provided with a laterally bent ear 25 engaged in a slot 26 in one side of the starter button 19 whereby movement of the button from stop to start positions swings the lever 24 counterclockwise about the stud 20. A lever arm 27 carrying the gear sector or quadrant 23 is pivotally mounted upon a stud 28 in a slot 29 in the outer end of the lever 24. This lever arm 27 is provided with an internal cam slot 30 receiving a pin or stud 31 projecting from the bridge piece 18. This slot 30 constitutes a track which by engagement with the stud 31 limits movement of the lever arm 27.

The armature shaft 12 is provided with a crank 32 adapted to rapidly oscillate a forked end 33 of an oscillating lever 34 pivotally mounted at 35. The upper or outer end of this lever is provided with an upstanding U-shaped bar or member 36 having spaced projections or prongs 37 each adapted to be received within a slot 37a and reciprocate a cutting bar 38 within a cutter head 39 of the head assembly 40 in a conventional manner.

The present invention is directed more particularly to the novel mechanism for oscillating or vibrating the head assembly 40 simultaneously with the reciprocation of the cutting bars 38. In this novel embodiment there is mounted at an end of the armature shaft 12 adjacent the pinion 22, a worm 41 having meshing engagement with a worm wheel 42 on the lower end of an upright shaft 43 journalled in a bearing block 44 and bushing 45. To the upper end of this shaft 43 is affixed a crank 46 with its eccentric crank pin 47 projecting through and journalled in a collar 48. This collar is slotted or grooved at its opposite sides to receive spaced tynes or bifurcations 49 on the end of a connecting arm 51 secured to and carrying a U-shaped member 52 having spaced prongs or projections 53 received in spaced slots 54 in the shaver head assembly 40. These prongs or projections 53 are disposed at substantially a right angle to the prongs or projections 37 on the U-shaped member 36.

The shaver head assembly 40 is oscillated or vibrated at a speed substantially less than the speed of reciprocation of the cutter bars 38. In this form of the invention, the cutter bars 38 are preferably reciprocated at a speed of approximately ten to forty times that of the shaver or cutter head assembly 40 which oscillates or vibrates through a limited arc of travel.

The head 40 is shown attached to and retained upon the housing or casing 10 by suitable means such as the spaced clips 40a attached to the casing 10 and provided with inturned tongues 40b received in elongated slots in the shaver head 40, the slots being of a length to permit the head to oscillate.

In Figs. 6 to 10, inclusive, there is disclosed another type of electric shaver having a housing or casing 55 provided with the usual operating mechanism including an armature 56 and a motor driven shaft 57 having an eccentric pin 58 operable in a slot 59 to reciprocate the cutter 61 in the shaving head assembly 62. This construction and operation is similar to that disclosed in the Schick Patent No. 1,922,824, of August 15, 1933.

Unlike the Schick patent, the head assembly 62 is not fixed but mounted for oscillatory or vibratory movement and provided with a base 63 upon the opposite ends of which there is mounted a pivoted plate or closure 64 for opening either end of the head assembly and permit effective cleaning. To oscillate the shaver head assembly 62, there is mounted on or pinned to the shaft 57 the hub of an eccentric 65 which is disposed between the spaced bifurcations 66 of a yoke member or connector 67 having one end pivotally mounted on a driven shaft 68. On this driven shaft is pinned the hub 69 of a ratchet 71. This ratchet 71 and the driven shaft 68 are rotated by means of spring pawl 72 pivotally mounted at 73b on the yoke member or connector 67.

The driven shaft 68 projects through a spacer 73 and is journalled in bushings 73a in the end wall 74 of the housing or casing 55 and in an offset 55a, with the upper end of this driven shaft 68 being provided with an eccentric pin 75 received in a slot or opening 76 to oscillate or vibrate the shaving head or assembly 62 whereby it moves to and fro through a limited arc of travel.

The motor shaft 57 adjacent its upper end is journalled in a depending hub 77 on the base 63 of the shaver head 62, the hub having an annular groove or channel 77a for receiving the end of a set screw 78 whereby the head 62 is detachably mounted or affixed to the end wall 74 of the housing or casing 55.

By this construction and arrangement, the shaver head or assembly 62 is oscillated simultaneously with the reciprocation or operation of the cutter 61. In the disclosed illustrative embodiment, the ratchet 71 is shown provided with ten teeth 79 and for each revolution of the motor shaft 57 the pawl 72 engages a tooth and rotates the driven shaft 68 through one-tenth of a revolution. In other words, as disclosed, the shaft 68 rotates at one-tenth the speed of revolution of the shaft 57 and the cutter 61 reciprocates or operates at ten times the speed of oscillation or vibration of the shaver head 62. However, this ratio of the speed of reciprocation of operation of the cutter bar 61 to the speed of oscillation or vibration of the shaver head assembly 62 may be varied from that disclosed by varying the number of teeth 79 on the ratchet 71.

Having thus disclosed the invention, I claim:

1. In an electric shaver, a shaver head assembly including a cutter head and a reciprocating cutter bar movable beneath and longitudinally of to the cutter head for removing hair, a drive shaft having eccentric means for rapidly reciprocating the cutter bar, a driven shaft rotated by said drive shaft, and eccentric means carried by the driven shaft for rapidly oscillating the cutter head and reciprocating cutter bar of said shaver head assembly about an axis transverse to the path of movement of and simultaneously with the reciprocation of the cutter bar by said drive shaft.

2. In an electric shaver, a shaver head assembly including a cutter head and a cutting bar adapted to be reciprocated in said assembly relative to and beneath said cutter head, a drive shaft and an eccentric operated there-

by for rapidly reciprocating said cutting bar, and means driven by said drive shaft and connected to said head assembly for oscillating the head assembly including the contained cutting bar and cutter head about the axis of said shaft as the cutting bar is reciprocated by the drive shaft.

3. In an electric shaver, a shaver head assembly including a cutter head and a cutter adapted to be rapidly reciprocated in said assembly beneath and relative to said cutter head, a drive shaft and an eccentric operated thereby for rapidly reciprocating said cutter relative to the cutter head, and driven means actuated by said drive shaft for simultaneously oscillating the assembly including the cutter head and the cutter about an axis at right angles to the path of movement of the cutter and about the axis of said drive shaft as the cutter is reciprocated relative to the cutter head by said drive shaft.

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