Aug. 15, 1944. H. E. PAGE 2,355,672

ELECTRIC SHAVER

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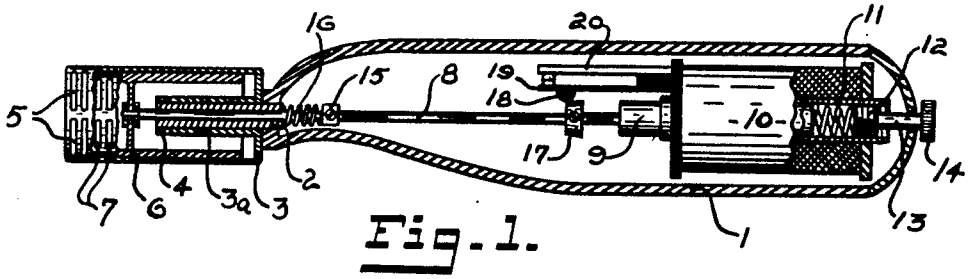


Fig. 1.

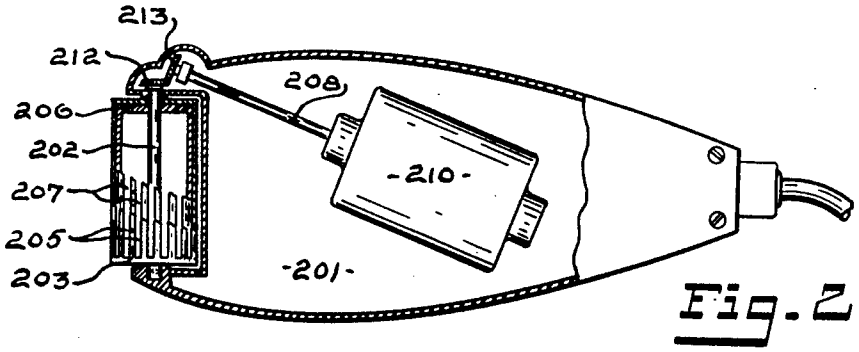


Fig. 2.

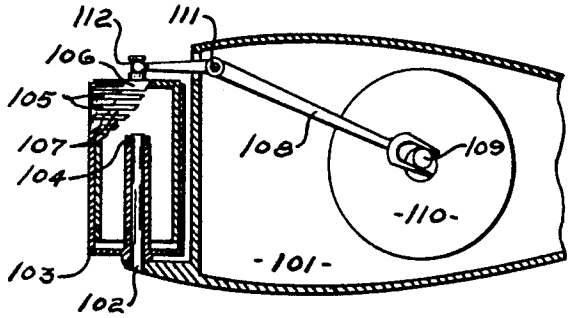


Fig. 3.

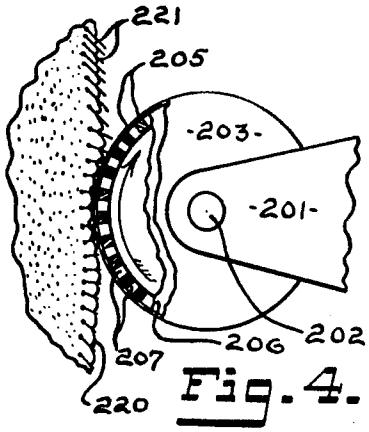


Fig. 4.

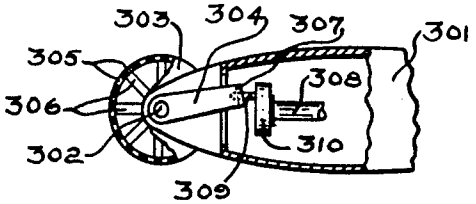


Fig. 5.

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ELECTRIC SHAVER

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11 Claims. (Cl. 30—43)

This invention pertains to a shaving device and more particularly to that type wherein power means is employed to operate the cutters or blades.

One of the objects is to provide simple and efficient means to allow the surface of the cutter to roll freely over the skin instead of being dragged over the skin as in the ordinary electric razor.

Another object is to provide means, actuated by power, for moving those hairs, which normally point at an acute angle with the surface of the skin, to a position approaching the perpendicular with said surface, so that the cutting blades can act more efficiently.

Another object is to provide a cutter which may be used at practically any point of its cutting surface of 360°, thus making unnecessary to use the razor in inconvenient positions in order to shave certain portions of the face or body.

Another object is to provide a freely turning cutting head regardless of the internal pressure existing between the cutting edges.

In the drawing:

Figure 1 is a side elevation, partly in section, of the oscillating and rotating cutting head type.

Figure 2 is a plan view, partly in section, of the rotating type.

Figure 3 is a plan view of the oscillating and rotating type.

Figure 4 is a side elevation showing the action of the rotating cutter on the angle of the hairs.

Figure 5 is a side elevation of another type of oscillating rotating cutter head.

In said drawing, 1 is the body of the shaving device at the left end of which is rigidly mounted a tube or bearing face 2 (Figure 1).

An outer cutting head 3 has a hub 3a rotatably mounted on the tube 2 and is held in place by the collar 4; said cutting head 3 having cutting slots as 5 pierced through its side walls (Figure 1).

An inner cutting head 6 is slidably mounted inside the outer cutting head 3 and the head 6 also has cutting slots 7 adapted to coincide with the slots 5 so that an oscillating motion of the inner cutting head 6 will tend to cut off any hairs which extend through the slots 5 and 7 (Figure 1).

The inner cutting head 6 is rotatably mounted on the shaft 8, said shaft 8 being journalled in and also being preferably slidably mounted in the tube or bearing 2 and having a solenoid plunger 9 mounted on its right end (Figure 1).

The solenoid plunger 9 is slidably mounted in the solenoid 10 and a spring 11 acts against the right end of the plunger 9 tending to move said plunger 9 to the left and the spring 11 also rests against the screw plug 12, said plug having a horizontally extending shaft 13 terminating in a knurled knob 14, and it will be evident that turning the knob to the right will increase the compressive force of the spring 11 while turning the knob 14 to the left will decrease the compressive force, for purposes presently described (Figure 1).

The shaft 8 has a collar 15 rigidly fixed to same and a spring 16 acts against the collar 15 and tends to move the shaft 8, and consequently the plunger 9, to the right against the action of the spring 11; thus the plunger 9 is held balanced between two spring actions (Figure 1).

A collar 17 is mounted on the shaft 8 and said collar engages with the insulated button 18 on the spring contact arm 19, said spring arm being so tensioned or constructed that it tends to move away from the upper rigid contact arm 20 and the engagement of the collar 17 with the insulated button 18 keeps the contacts at the end of the contact arms 19 and 20 together (Figure 1).

The contact arms 19 and 20 are in series with the circuit of the solenoid 10, so that when they are separated, current will cease flowing through the solenoid 10, and it will therefore be apparent that when current is supplied to the solenoid 10, the plunger 9 will be drawn to the right into the solenoid, and this movement of the solenoid plunger to the right will carry the collar 17 away from the button 18 and hence allow the contact arm 19 to move by its own spring action down away from the contact arm 20, thus separating the contacts and shutting off the current supply to the solenoid 10, and allowing the spring 11 to move the solenoid plunger 9 to the left until the contact arms move together again, when the above action is repeated, thus setting up an oscillating motion in the solenoid plunger 9 (Figure 1).

The oscillating motion of the plunger 9 is aided by the fact that it is balanced between the forces of the springs 11 and 16, and it can be varied in its period of oscillation by turning the knob 14 to the left or right, as previously described (Figure 1).

The oscillating motion of the plunger 9 is transmitted through the shaft 8 to the inner cutting head 6 and causes the inner cutting head 6 to

oscillate back and forth inside the outer cutting head 3, thus moving the slots 7 and 5 relatively by one another, and therefore cutting off any hairs thrust through them (Figure 1).

It will now be observed that since the inner cutting head 6 is freely rotatable about the shaft 8, said inner head 6 is free to revolve along with the outer cutting head 3 about the bearing provided by the tube 2, and even though there might be considerable friction between the outer and inner cutting heads, this will, in no way, affect the ease with which the outer head 3 can rotate when rolled across the surface of the skin, as both heads will roll practically as a unit in spite of the fact that the inner head 6 is being rapidly oscillated along the longitudinal axis of the outer head 3 (Figure 1).

Therefore, it is possible to roll the cutting head 3 easily over the surface of the skin in either direction, while the inner cutting head is being oscillated (Figure 1).

Figure 3 illustrates a similar oscillating-roller head construction, except that in this case, the axis of the cutting heads is at right angles to the longitudinal axis of the body instead of being parallel thereto, as in Figure 1.

In Figure 3, 101 is the body at the left end of which is mounted a shaft 102 and an outer cutting head 103 is rotatably mounted on said shaft 102 and is held in place by the collar 104 (Figure 3).

An inner cutting head 106 is slidably mounted inside the outer cutting head 103 and both heads have cutting slots, as 107 and 105 respectively, adapted to coincide with one another, so that an oscillating motion of the inner cutting head 106 along the longitudinal axis of the outer cutting head 103 will cut off any hairs which protrude through the cutting slots 105 and 107 (Figure 3).

A rotary motor 110 is mounted in the body 101 and a lever 108 pivoted at 111 has a forked opening at its right end which engages with the eccentric cam 109 so that upon rotation of said eccentric cam 109, an oscillatory motion is transmitted to the arm 108 (Figure 3).

The left end of the arm 108 is forked and fits into a groove 112 on an upwardly extending projection of the inner cutting head 106, and it will be noted that any oscillating motion of the arm 108 is thus transmitted to the inner cutting head 106 and yet said head is free to turn with the outer cutting head 103 due to the groove 112, even though the inner cutting head 106 is being oscillated along its longitudinal axis by the arm 108 (Figure 3).

Figure 2 illustrates an outer rotating cutter head type in which the inner head also rotates and 201 is the body at the left end of which is rotatably mounted a shaft 202 to which is fixed the inner cutting head 206, so that the shaft 202 and the inner cutting head 206 revolve as a unit (Figure 2).

An outer cutting head 203 is freely rotatably mounted on the shaft 202 but said head is not fixed to the shaft and therefore the outer cutting head 203 can, for purposes presently described, be held relatively still while the inner cutting head 206 revolves inside the head 203 (Figure 2).

The cutting heads 203 and 206 have cutting slots 205 and 207 respectively and said slots are adapted to coincide with one another in such a manner that if the outer cutting head 203 is held still or slowly rolled along the surface of the skin while the inner cutting head is rapidly revolving, then any hairs which protrude through the cutting slots will be sheared off (Figure 2).

The upper end of the shaft 206 has fixed to it a gear 212 and said gear engages with another gear 213 on the left end of the motor shaft 208, said shaft terminating at its right end in the motor 210 (Figure 2).

It is now evident that when the motor 210 rotates the motor shaft 208, this rotating motion is transmitted through the gears 213 and 212 to the shaft 202, and thus to the inner rotating cutting head 206, and it will also be noted that any rotation of the inner cutting head 206 will, due to the natural friction existing between the cutting heads, tend to revolve the outer cutting head 203 in the same direction as the inner cutting head 206 (Figure 2).

If, with both heads revolving, the outer cutting head 203 is brought into contact with the surface of the skin 220 as in Figure 4, the friction between the cutting heads will tend to draw the skin in an upward direction with the inner cutting head 206 revolving in a clockwise direction, as shown by the arrow, and the outer cutting head 203 held in contact with the surface of the skin 220, and this upward thrust will draw the hairs 221 from their normal position of an acute angle, as shown at the top of the drawing to a position of approximately 90°, where the outer cutting head 203 is actually in contact with the skin surface 220 and with the hairs in this position they can pass much more easily through the slots 205 and 207 and are thus sheared off close to the skin surface 220 (Figure 4).

It will also be obvious that with the inner cutting head 206 revolving as shown, the outer cutting head 205 can be rolled up and down over the surface of the skin, but the drawing effect of the skin will always be in the direction of the arrow, and therefore whether the shaver is moved either upwardly or downwardly, the hairs will be raised into the proper cutting position, as previously described (Figure 4).

For purposes of clearness and in order to avoid confusion, the slots are not shown in the inner walls of the cutting heads, but it is understood that the cutting slots are pierced through all the available space on the side walls of the cutting heads.

In Figure 5 is shown a side elevation of an oscillating rotating cutter head in which 301 is the body in the left end of which is rotatably mounted an outer cutting head 303 having cutting slots 305, and said cutting head 303 can revolve freely on the shaft 302 (Figure 5).

A series of inner cutting blades 306 are rigidly attached to the shaft 302 and said shaft has fixed to its ends arms 304, one of which is shown (Figure 5).

The right ends of the arms 304 are joined by a cross piece and a pin 309 is adapted to engage in an elongated slot in the cross piece or yoke 307; the pin 309 being fixed in the disk 310 fixed to the motor shaft 308 (Figure 5).

It is now evident that if the shaft 308 is rotated, this will rotate the disk 310 and the pin 309, and this rotating motion of the pin 309 in the elongated slot in the cross piece or yoke 307 will alternately raise and lower this cross piece in an oscillating motion, and this motion will be transmitted through the arms 304 to the shaft 302 and thence to the inner cutting blades 306, and these blades passing over the slots 305 in the outer cutting head 303 will shear off any hairs protruding through said cutting slots (Figure 5).

It is also apparent that while the cutting blades **306** are oscillating back and forth about the axis of the shaft **302**, the outer cutting head **303** can be rolled across the surface of the skin, thus constantly presenting new hairs to be sheared off, as they protrude through the cutting slots (Figure 5).

In any form of my invention, there are freely rotatable perforated hollow rollers for rolling over the skin, by reason of friction or traction when being pressed on the skin, and an inner perforated cutter in the form of a roller nested in the outer roller, and power mechanism, as a solenoid or rotary motor, connected to the inner roller through suitable motion transmitting means to reciprocate, oscillate or rotate it relatively to the freely rotatable rollers to shear off the hairs projecting through perforations or slots of the inner and outer rollers.

What I claim is:

1. In a power operated shaving device, a suitable supporting body, a freely-rotatable, outer, substantially cylindrical, cutter head for rolling over the skin surface, and an inner cutter head nested in the outer cutter head and movable relatively thereto, power means for actuating the inner cutter head independently of the outer freely-rotatable cutter head, the cutter heads being formed with peripheral slots for receiving the hairs to be cut, the slots of the inner cutter head being movable into and out of alinement with those of the outer cutter head to effect the cutting operation during rolling of the outer cutter head and movement of the inner cutter head relatively thereto.

2. In a power operated shaving device, a suitable supporting body, a freely-rotatable, outer, substantially cylindrical, cutter head for rolling over the skin surface, and an inner rotatable cutter head nested in the outer cutter head and movable relatively thereto about its axis, power means for rotating the inner cutter head independently of the outer freely-rotatable cutter head, the cutter heads being formed with peripheral slots for receiving the hairs, the slots of the inner cutter head being movable into and out of alinement with those of the outer cutter head to effect cutting operation during relative rotation of the inner cutter head about its axis relatively to the outer cutter head.

3. In a power operated shaving device, a suitable supporting body, a freely-rotatable, outer, substantially cylindrical, cutter head for rolling over the skin surface, and an inner cutter head slidable axially in the outer cutter head, power means for reciprocating the inner cutter head independently of the movement of the freely-rotatable outer cutter head, the cutter heads being formed with peripheral slots for receiving the hairs, the slots of the inner cutter head being movable into and out of alinement with those of the outer cutter head to effect the cutting operation during the rolling of the outer cutter head and reciprocating movement of the inner cutter head.

4. In a power operated shaving device, a suitable supporting body, a freely-rotatable, outer, cylindrical cutter head for rolling over the skin surface, and an inner cutter head nested in the outer cutter head and movable relatively thereto, power means for actuating the inner head including an electro-magnetic device within the hollow body and having a movable armature, and motion transmitting means extending within the body between the armature and the inner cutter head, and a make-and-break device in the feed circuit for the electro-magnetic device, the make-and-break device being operable by the movement of the armature.

5. In a power operated shaving device, a suitable supporting body, a freely-rotatably, outer, cylindrical, cutter head for rolling over the skin surface, and an inner cutter head nested in the outer cutter head and movable relatively thereto, power means for actuating the inner head including an electro-magnetic device within the hollow body and having a movable armature, motion transmitting means extending within the body between the armature and the inner cutter head, and a make-and-break device in the feed circuit for the electro-magnetic device, the make-and-break device being operable by the movement of the armature, and vibration-absorbing means acting on the armature, and said motion transmitting means, to balance the throw thereof.

6. In a power operated shaving device, a suitable supporting body, inner and outer substantially cylindrical cutter heads formed with peripheral perforations, the outer cutter head being freely rotatably in either direction during the movement of the cutter head over the skin surface, due to the traction of the outer head on said surface when under the pressure applied to hold the outer head against the skin, the inner cutter head being rotatable within the outer cutter head for moving the slots thereof into and out of alinement with the slots of the outer cutter head, motor means within the body, and motion transmitting means between the motor means and the inner cutter head only.

7. In a power operated shaving device, a suitable supporting body, inner and outer substantially cylindrical cutter heads, the inner cutter head being nested within the outer cutter head, the outer cutter head being freely rotatable, the cutter heads being formed with slots therethrough for receiving the hairs, and the inner cutter head being movable relative to the outer cutter head independently of the rolling motion of the outer cutter head, motor means within the body, and motion transmitting means between the motor means and the inner cutter head.

8. In a power operated shaving device, a suitable supporting body, a freely-rotatable, outer, substantially cylindrical, cutter head for rolling over the skin usrface, and an inner cutter head slidable axially in the outer cutter head, and also freely rotatable about its axis in the outer cutter head, power means for reciprocating the inner cutter head independently of the free rotating movement of the outer cutter head, the cutter heads being formed with peripheral slots for receiving the hairs, the slots of the inner cutter head being movable into and out of alinement with those of the outer cutter head to effect the cutting operation during the rolling of the outer cutter head and reciprocating movement of the inner cutter head.

9. In a dry shaver, a cutter head including a driven rotatory cutter element having radially disposed blades, and a hollow perforated cylindrical cutter element mounted in surrounding relation to and adapted for free turning movement with reference to the driven cutter element and for rolling engagement with the skin while the driven cutter element is being driven to turn independently of and with reference to said hollow cylindrical cutter element.

10. In a dry shaver, a cutter head including a

substantially cylindrical driven rotatory cutter element having peripherally disposed cutting edges, a hollow perforated cylindrical cutter element mounted in surrounding relation to and adapted for free turning movement with reference to the driven cutter element and for free rolling engagement with the skin while the driven cutter element is being driven.

11. In a dry shaver, a cutter head including a driven rotatory cutter element having radially disposed blades, and a hollow perforated cutter element circular in cross-section mounted in surrounding relation to and adapted for free turning movement with reference to the driven cutter element and for rolling engagement with the skin while the driven cutter element is being driven to turn independently of and with reference to said cutter element.

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