Jan. 18, 1944. D. A. BURNS 2,339,677

ELECTRIC RAZOR

Filed Feb. 25, 1942

Fig. 1.

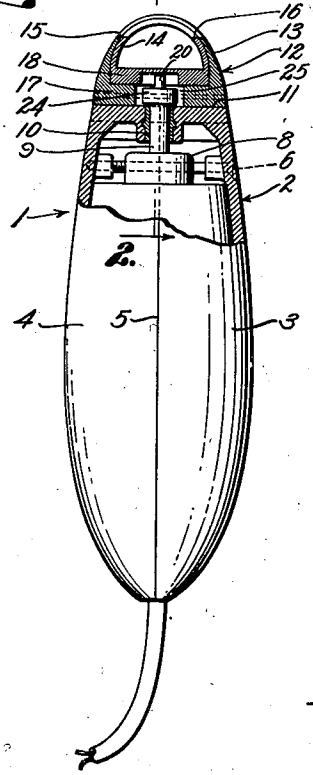


Fig. 2.

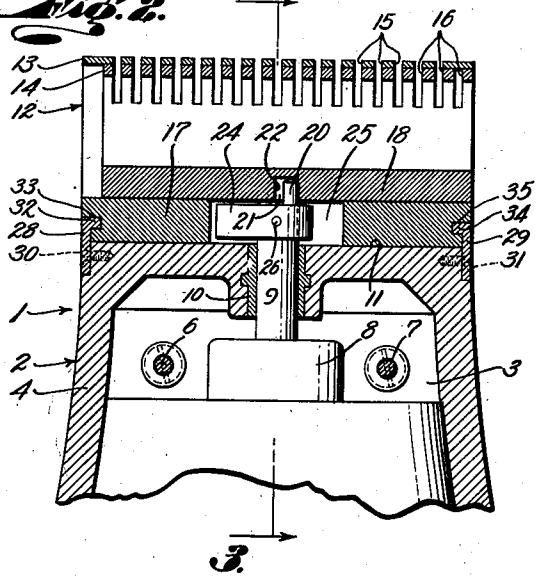


Fig. 3.

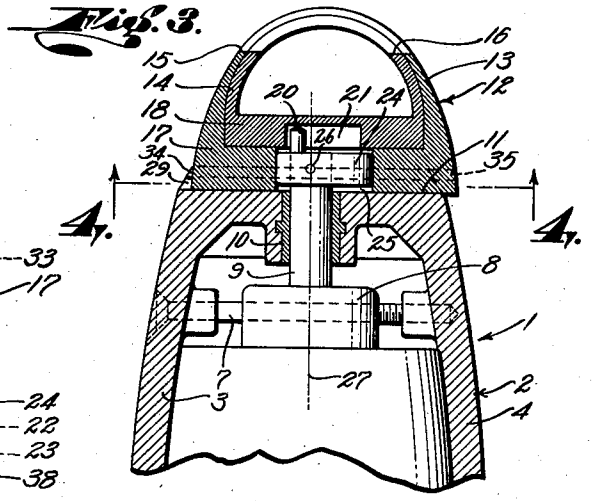
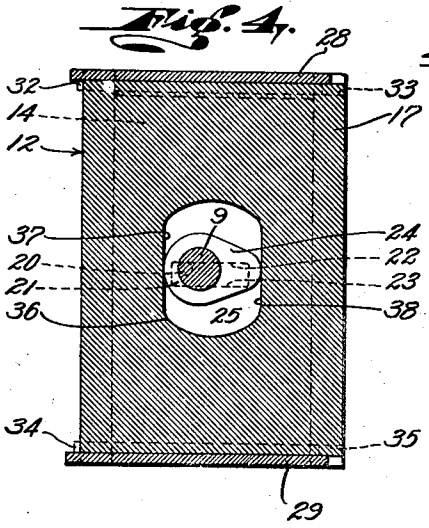


Fig. 4.



Inventor
DALMORE A. BURNS
W. W. Beatty
Attorney

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2,339,677

ELECTRIC RAZOR

Dalmore A. Burns, Los Angeles, Calif.

Application February 25, 1942, Serial No. 432,295

10 Claims. (Cl. 30—43)

The invention relates to an electric razor or dry shaver wherein an electric motor is employed to relatively move a pair of shear elements. The shear elements form a cutting head which is rigidly secured to the handle of the razor when it is in use, whereby it is necessary to move the razor as a whole by hand over different portions of the skin to cut the hairs therefrom. The outer shear element of the cutter head is commonly provided with a plurality of cross-slots, and the usual procedure is to move the razor across the skin in a direction lengthwise of these slots.

An object of the present invention is to automatically move the cutter head with respect to the handle, and preferably in a direction parallel to the slots, so that while the handle is held stationary, the cutting takes place under a given small area of the skin instead of cutting practically only on a line as heretofore. This not only reduces to a substantial extent the amount of movement which must be given to the handle in order to cover a given area, but also the vibrating cutter head serves to massage the skin.

Another object of the invention is to move the cutter head as a unit with respect to the handle by means of the same motor which operates the shear.

Another object of the invention is to operate the shear when the cutter head is stationary, and to move the cutter head when the shear is idle.

Another object of the invention is to automatically vibrate the cutter head with respect to its handle.

For further details of the invention reference may be made to the drawing wherein

Fig. 1 is a view in elevation, partly in section, of an electric dry shaver according to the present invention.

Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a sectional view on line 3—3 of Fig. 2 looking in the direction of the arrows.

Fig. 4 is a sectional view on line 4—4 of Fig. 3 looking in the direction of the arrows.

Referring in detail to the drawing, the electric dry shaver 1 comprises a handle 2 made in two parts 3 and 4 having meeting edges 5 secured together by screws 6 and 7. Suitably mounted in the handle 2 by means not shown, is an electric motor 8 having a shaft 9 provided with a bearing 10 which may be made in halves or may be tubular. The top of handle 2 is flat as shown at 11 and it provides a slide bearing for the cutter head 12. The cutter head 12 comprises an outer shear element 13 and an inner shear element 14 which are nested together and slide along an axis parallel to the plane of the drawing as seen in Fig. 2. The shear elements 13 and 14 have cross-slots 15 and 16, respectively. The shear elements 13 and 14, as seen in Figs. 1 and 3, are at their outer portions semicircular in shape, the inner portion of the shear element 13 having a flat base 17 which rests on the slide bearing 11, and the shear element 14 having a flat base 18 which nests with and slides on the top of the base 17.

The shaft 9, above the slide bearing 11, terminates in an eccentric pin 20 which fits in a recess 21 in the underside of base 18 of the inner shear element 14. The recess 21 is rectangular in shape and has parallel side walls 22, 23 which extend at right angles to the line of movement of the inner shear element 14 as seen in Fig. 4. Below the eccentric pin 20 is an eccentric arm 24 which fits in a recess 25 in the base 17 of the outer shear element 13. The pin 20 may be screwed into the top of arm 24, or otherwise secured thereto, and the arm 24 may be secured to the shaft 9 by means of a pin 26.

Referring to Fig. 3, it will be seen that the pin 20 is offset to the left of the axis 27 of the motor shaft 9 when the arm 24 is offset to the right thereof, whereby the eccentrics 20 and 24 are operative at different times.

The cutter head 12 is slidable as a unit on the slide bearing 11 and it is guided in this movement by means of the plates 28 and 29 (Fig. 2) secured to the handle 2 by screws 30 and 31, respectively. The plate 28 has an inwardly projecting flange or guide rail 32 which fits in a correspondingly shaped groove 33 in the base of the cutter head 12 as shown in Fig. 2. Plate 29 is similarly provided with a flange 34 fitting in a groove 35. The direction of movement of the cutter head 12 is at right angles to the plane of the drawing as shown in Fig. 2, namely at right angles to the path of movement of the shear element 14 which is along an axis in the plane of the drawing.

The motor 8 therefore serves to move the cutter head 12 as a unit in the direction of the slots 15, 16, while also serving to move the shear 14 relatively to the shear 13, and these movements take place at different times as will be seen from Fig. 4. Assuming the shaft 9 to be rotating in a clockwise direction, the arm 24 has already pushed the cutter head 12 to its extreme right position where it remains for the next 135° movement approximately, and until the arm 24 reaches the point 36 in the recess 25. As shown in Fig. 4,

the recess 25 has parallel side walls 37 and 38 which extend at right angles to the side plates 28, 29. As soon as the arm 24 starts to move from the position shown in Fig. 4, and while the cutter head 12 remains stationary, the pin 20 contacts the wall 22 to shift the shear 14 upwardly as seen in Fig. 4, and this upward movement continues for about the first 90° movement of the pin 20. In other words, the shear 14 has been shifted while the cutter head 12 stands still. When the arm 24 has moved about 135° to contact the point 36 to thereafter shift the cutter head 12 to the left, during the next 45° of movement, the pin 20 is moving between the walls 22, 23 which are now elevated above the position shown in Fig. 4. Hence, the cutter head 12 substantially completes its movement to the left before the shear 14 starts again to operate. This cycle of movements continues, the cutter head 12 and shear 14 operating alternately, or in out of phase relation as the eccentric pin 20 and arm 24 are out of phase on shaft 9.

The cutter head 12 in vibrating back and forth with respect to the handle 2 serves to massage the skin, and also cuts the hairs over a larger area of skin, with the handle 2 in a fixed position than would otherwise be the case if the cutter head 12 were fixed to the handle 2.

Various modifications may be made in the invention without departing from the spirit of the following claims.

I claim:

1. A dry shaver comprising a base, a cutter head having shear elements relatively movable in a certain direction transversely of said base, means movably supporting said cutter head on said base for movement as a unit in another direction transversely of said base, a motor having a rotatable shaft, and means comprising said shaft for relatively reciprocating said shear elements in said certain direction and moving said cutter head as a unit in said other direction.

2. A dry shaver comprising a base, a cutter head having shear elements relatively movable in a certain direction transversely of the longitudinal axis of said base, means movably supporting said cutter head on said base for movement at right angles to said direction transversely of the longitudinal axis of said base, a motor having a driven element, and means comprising said driven element for relatively reciprocating said shear elements in said certain direction and moving said cutter head and both of said shear elements as a unit at right angles to said certain direction.

3. A dry shaver comprising a cutter head having shear elements relatively movable into cutting position, a base movably supporting said cutter head as a unit, and means for shifting said cutter head as a unit transversely with respect to said base to shift the cutting position of said elements transversely of said base from one place to another place, and means for operating said shear elements in each of said places.

4. A dry shaver comprising a cutter head having relatively movable shear elements, a base movably supporting said cutter head for transverse movement thereon as a unit, and means for operating said shear elements in a plurality of different lateral positions on said base.

5. A dry shaver comprising nested inner and outer shear elements relatively movable in a certain direction, means for relatively moving said shear elements in said direction, a base supporting said outer shear element for movement transversely of said direction and a motor drive for reciprocating said outer shear element in said transverse direction.

6. A dry shaver comprising relatively movable shear elements, one of said shear elements having a slide bearing supporting said other shear element for reciprocation in a certain direction, means supporting said supporting shear element for reciprocating movement transversely of said direction, motive means for relatively reciprocating said shear elements in said certain direction, and motive means for reciprocating said supporting shear element (and thereby said supported shear element) in said transverse direction.

7. A dry shaver comprising relatively movable shear elements, motive means for relatively moving said elements on a line of cut, means supporting said elements for vibrating movement as a unit to laterally shift the line of cut, and motive means for vibrating said elements as a unit on said supporting means.

8. A dry shaver comprising shear elements, motive means for relatively reciprocating said elements on a line of cut, and motive means for reciprocating said elements as a unit to shift the line of cut, one of said motive means being inactive to operate said elements at certain times when the other is active to operate said elements.

9. A dry shaver according to claim 8 wherein both of said motive means comprises out of phase eccentrics on a common motor shaft.

10. A dry shaver according to claim 8 wherein said motive first means is active for relatively reciprocating said elements is active when said other motive means is inactive to shift the line of cut.

DALMORE A. BURNS.