Jan. 23, 1951 A. BARSAM, SR 2,539,049

DRY SHAVER

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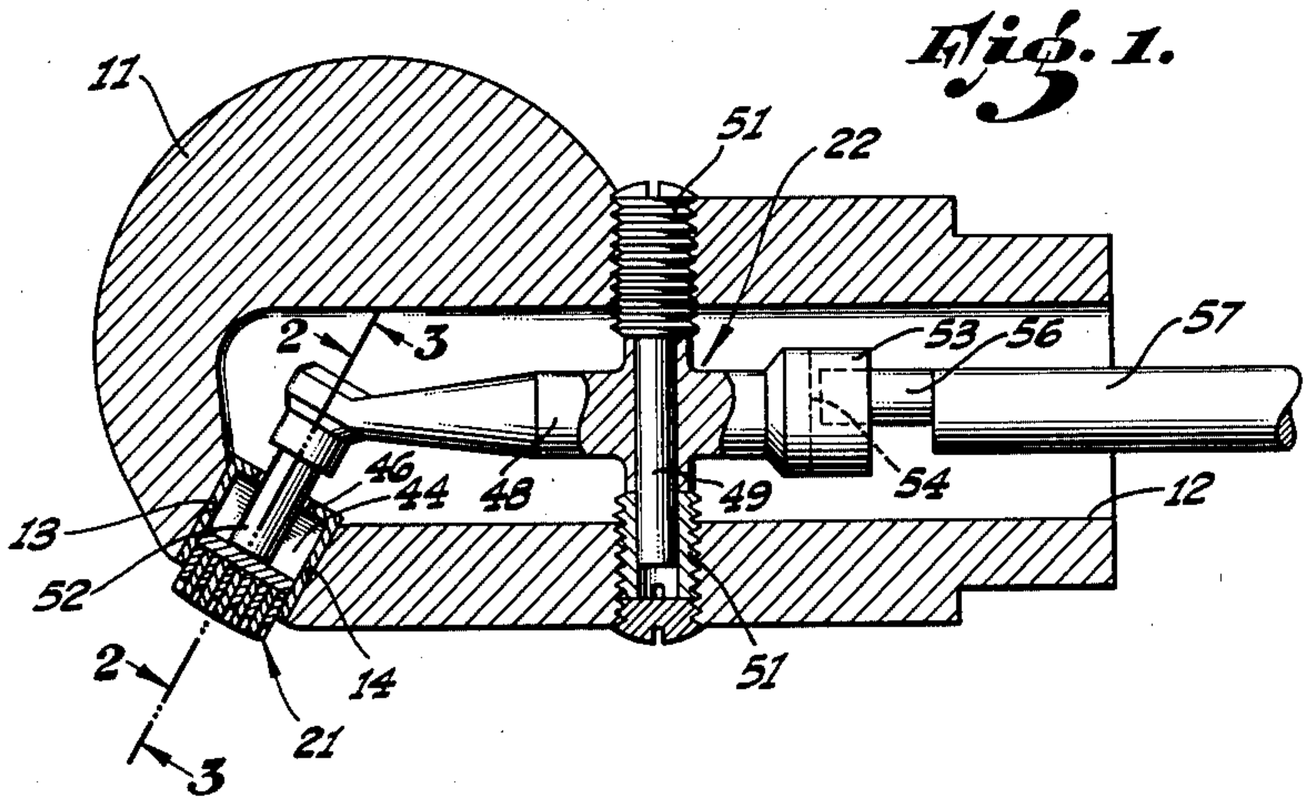
Fig. 1.



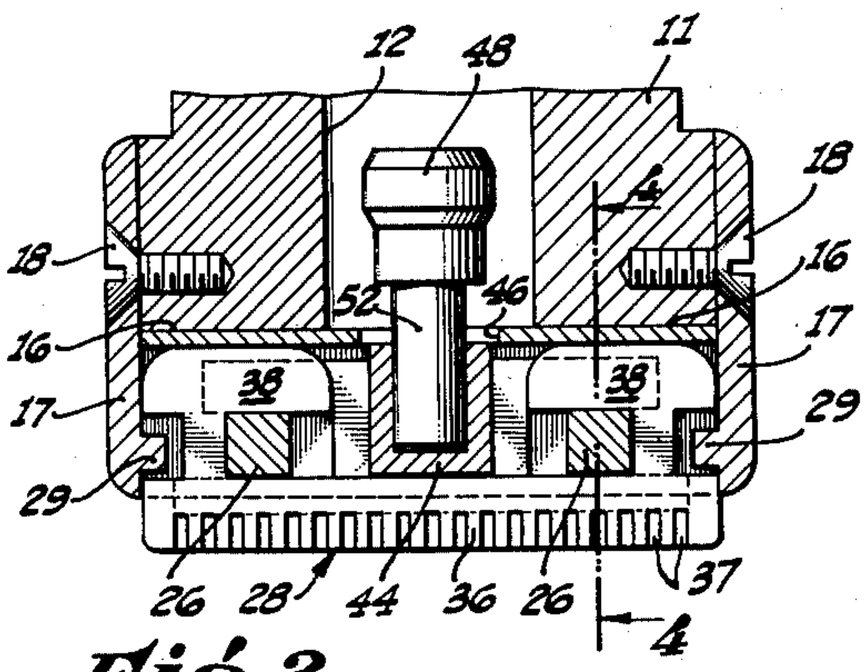


Fig. 2.

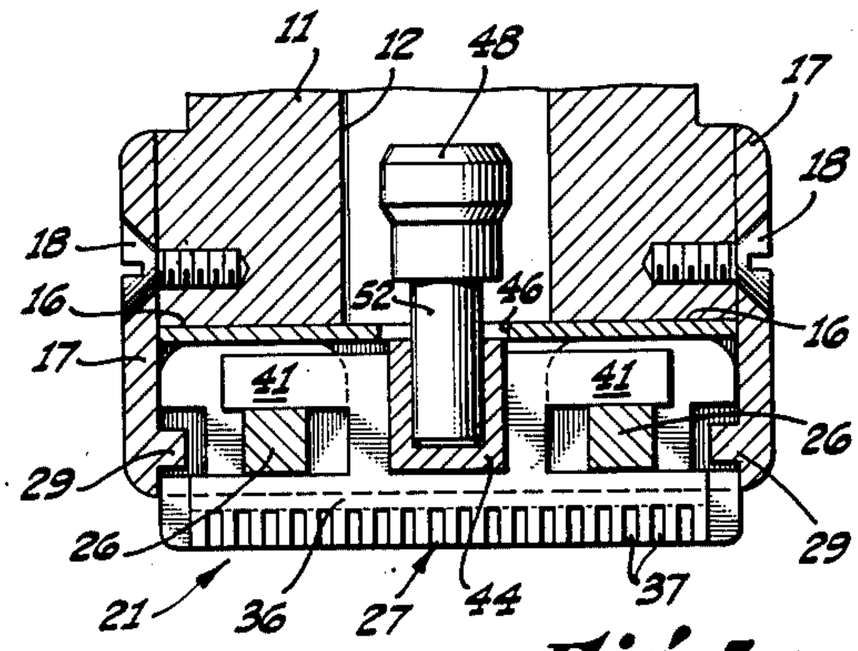


Fig. 3.

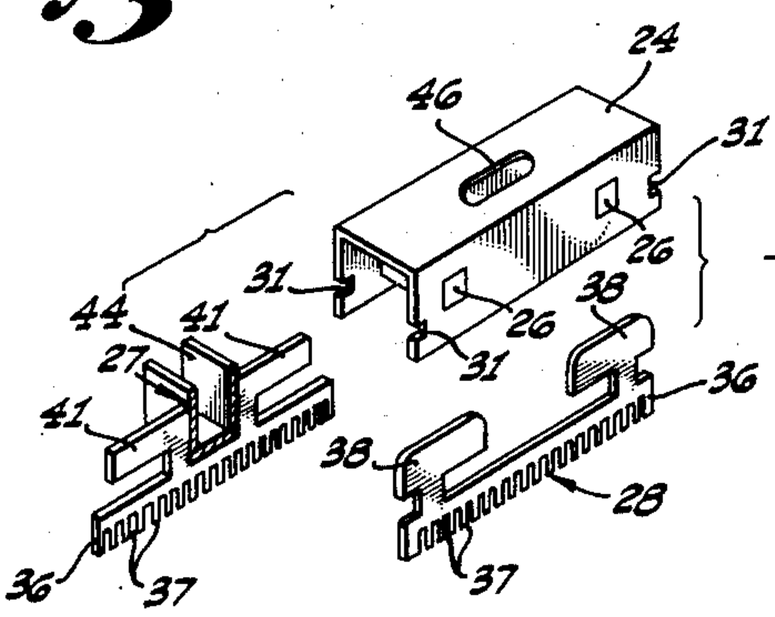


Fig. 5.

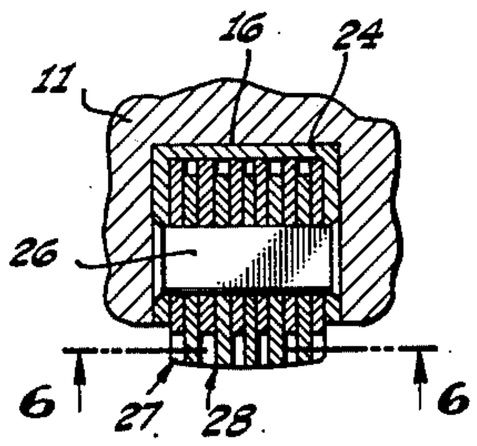


Fig. 4.

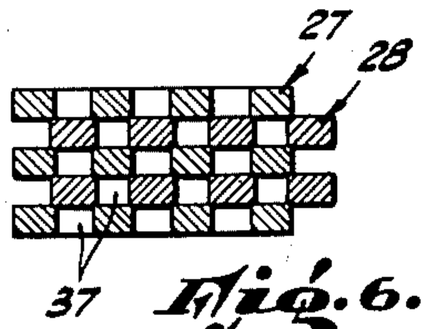


Fig. 6.

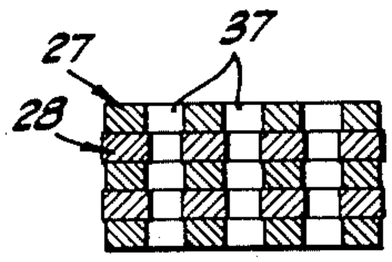


Fig. 7.

INVENTOR.
ARTHUR BARSAM, SR.
BY
ATTORNEY.

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DRY SHAVER

Arthur Barsam, Sr., Los Angeles, Calif.

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11 Claims. (Cl. 30—43)

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The present invention relates to electric shavers and particularly to electric shavers embodying a multiplicity of movable cutting members.

Electric shavers are today common and well known. Generically they have the advantageous characteristic of providing a satisfactory shave with complete absence of irritation to sensitive skins coupled with the ability to perform repeatedly over extended periods of time without the necessity of changing blades. Razors of this type are commonly actuated by rotating motors or reciprocating vibrators connected to a suitable source of current. They also may be connected to an outside prime mover through a Bowden wire although in the usual type found on the market this is not the case. In the usual electric shaver the actual shaving or cutting of the hair has been accomplished by the relative movement of two cutting edges one of which is carried by a stationary member slidable over and in direct contact with the surface to be shaved. Inevitably a certain height of the hair is left by such constructions protruding beyond the surface, the distance being dependent upon the thickness of the stationary member.

In the shaver constructed in accordance with the present invention the stationary surface-contacting member is eliminated and the relatively movable cutting edges extend to the surface being shaved, no stationary element being interposed between the cutting edges and the hair-bearing surface. Accordingly, a closer shave is possible than can be obtained with the better known type of construction. In the present invention the cutting edges are provided by a multiplicity of slots extending parallel in a plurality of parallel blade members arranged for relative sliding movement. The hairs growing from a surface are pressed flat by the blades passing thereover, extend horizontally into these slots, and are sheared off between the edges of adjacent slots as the shaver is moved thereover and the blades are reciprocated relative to each other at high velocity.

It is an object of the present invention to provide an improved electric shaver capable of cutting hairs closer to their supporting surface than has been possible in the past.

It is a further object of the invention to provide an electric shaver in which the actuated cutting blades move in direct contact with the surface being shaved.

Referring now to the drawings in which a

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preferred embodiment of the invention is disclosed:

Figure 1 is a partial section through the forward end of a shaver constructed in accordance with the present invention;

Figure 2 is a section upon the line 2—2 of Figure 1 showing the mounting of a fixed blade within the removable cutter assembly unit;

Figure 3 is a view similar to Figure 2, being a section on the same plane but looking in the opposite direction, and shows the mounting of a movable blade within the removable unit;

Figure 4 is a transverse section through the shaving head upon the line 4—4 of Figure 2;

Figure 5 is an exploded view of the cutter assembly unit showing both fixed and movable cutting blades;

Figure 6 is a partial view looking in the direction of the arrows upon the line 6—6 of Figure 4 and shows the movable blades at one end of the cutting stroke; and

Figure 7 is a view similar to Figure 6 with the movable cutting blades at the opposite end of their travel.

Referring again to the drawings, a preferred embodiment of the invention is illustrated and is seen to comprise a one piece body 11, preferably of plastic or metal and formed with a longitudinally extending central chamber 12. Head or casing 11 comprises the forward end of a complete electric shaver and houses the working parts of the unit driven by an unshown motor positioned within a casing to which body 11 is adapted to be secured. The shape and design of the motor casing, and the type of actuating motor which may be of any well known type, form no part of the present invention. Chamber 12 opens rearwardly and at its forward end is widened into a mouth extending completely across body 11 and having front and rear walls 13 and 14, respectively, and a top wall formed by shoulders 16. The open sides of the mouth are closed by removable end plates 17 held in place by screws 18 removably secured in the body 11.

Within the body structure described are the working parts of the shaver which comprise the removable cutter assembly unit indicated generally at 21, and the actuating means therefor, indicated generally at 22. Turning first to the cutter assembly unit, this element is seen to comprise a U-channel cage or housing 24 open at its ends and on its underside. Square rivets 26 extend between its side walls and support therein a plurality of alternating fixed and mov-

able cutting blades indicated generally by the reference characters **27** and **28**, respectively, in Figure 5. Cutter assembly unit **21** is retained within the body **11** by the cooperation of transverse shoulders **29** on the inner side of the removable end plates **17** of body **11** with recesses **31** in the extremities of its own side walls.

As is shown most clearly in Figure 4, the fixed and movable cutting blades **27** and **28** are alternated within the cage or housing **24** in closely packed relationship which however permits of relative sliding movement. The movable and stationary blades are quite similar but differ in important points which will now be described. Each includes a lower elongated cutting edge **36** provided with regularly spaced parallel slots **37** which extend upwardly therein. T-brackets **38** extend upwardly from the cutting edge **36** of stationary blade **28** and are spaced from edge **36** by the height of the supporting rivets **26** which they partially encircle as shown in Figure 2. The width and spacing of the T-brackets **38** is such that they abut the outer sides of rivets **26** and also the removable end plates **17**. The movable cutting blades **27**, however, are provided with oppositely directed L-shaped brackets **41**, the upper extensions of which are spaced from its edge **36** by the exact width of the rivets **26**, as is shown in Figure 3, but the vertical extensions of which are spaced inwardly therefrom. This fact, together with the fact that the cutting edge **36** of blade **27** is of lesser length than the corresponding edge of stationary blade **28** makes possible the longitudinal sliding movement of blades **27** upon the pins **26** as guides. Between the vertical extensions of the L-brackets **41** of movable blades **27** a transversely extending U-sectioned channel member **44** is provided. The side extremities of member **44** slidingly abut the inner walls of the unit cage **24** and it faces upwardly toward an elongated slot **46** in the top wall thereof. Member **44** extends through all of the parallel movable blades **27** and relates them for conjoint movement.

The actuating means **22** for the movable cutting blades **27** comprises a lever or toggle arm **48** centrally pivoted upon a shaft **49** extended vertically across channel **12** to seat rotatably within removable bearings **51** screw-threaded into the body **11**. A pin **52** at the forward end of lever **48** extends downwardly through the slot **46** to seat within the U-sectioned drive element **44** of the unit **21**. The opposite end of lever **48** is provided with an enlarged head **53** having a vertical slot **54** in its outer face. Into this slot extends the eccentric end **56** of a rotatable drive shaft **57**. The rotation of shaft **57** under the actuation of a suitable unshown driving motor causes the eccentric **56** to pivot the lever **48** about its supporting shaft **49** as it revolves. The pivotal movement of the lever **48** in turn effects the arcuate reciprocatory movement of pin **52**, and with it the channel member **44**, the component of travel transverse of the cage **24** resulting in the pin merely sliding in the channel. As the movable blades **27** abut the member **44** its movement is directly transferred to the latter.

The operation of the shaver constructed in accordance with the invention is believed to be clear from the foregoing but will be briefly set forth. The user energizes the unshown electrical motor to effect the rotation of the drive shaft **57**. Thereupon lever **48** is reciprocated in the manner described and pin **52** moves with an arcuate rotary motion, the component of its displacement longitudinally of the unit **21** effecting the shifting of the channel member **44** and the movable blades **27**. The shaver is held in the operator's hand in such manner that the edges of cutting blades **27** and **28** rest against the surface to be shaved and the hairs to be cut extend into the slots **37**. The high speed rotation of the shaft **57** effects the reciprocation of the movable blades **27** at high frequency and as the cutter assembly **21** is drawn over the surface the hairs pass alternately through blades **27** and **28**, the relative positions of which shift between the end positions shown in Figures 6 and 7. In the relationship shown in Figure 7 a hair is permitted to pass between the blades while in the position shown in Figure 6, the adjacent edges of the blades have passed each other to shear off the hairs positioned therebetween. The surface contacting area provided by the cutting edges **36** of blades **27** and **28** is sufficiently great as to slidably support the head so that the flesh from which the hair grows is not injured while the hair itself is sheared off at a point immediately adjacent that surface. The general rounding of the contacting surface as shown in Figure 4 aids in this result, the edge of each blade being slightly rounded.

Following extended use the blades **27** and **28** may tend to become less effective and in that event it becomes desirable to replace the unit **21**. This is accomplished easily by loosening the screws **18** and removing the end plates **17**. Thereupon the old unit **21** is displaceable downwardly from body **11** and a new unit inserted in place thereof.

While the particular device herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of my invention, and that I do not mean to limit myself to the details of construction or design herein shown, other than as defined in the appended claims.

I claim:

1. In an electric shaver, a shaving head, a plurality of flat parallel adjacent blades mounted in said head and extended therefrom to make contact with a surface to be shaved, each of said blades having a multiplicity of slots opening to its surface-contacting edge, means to reciprocate alternate blades to move the sides of said slots into cutting contact.

2. In an electric shaver, a shaving head, a cutter assembly unit positioned in said head and including a plurality of flat parallel blades carried by a cage, said blades extending from said head into surface-contacting position, means mounting alternate blades for sliding movement in said cage, and means to reciprocate alternate blades parallel to a contacted surface.

3. In an electric shaver, having a shaving head, a cutter assembly unit positioned in said head including a U-sectioned cage and a plurality of flat blades positioned parallel therein, the outer edges of said blades being slotted and forming a bearing surface adapted to rest upon a surface to be shaved, and means formed in edges of said blades to reciprocate certain of the same to move said slots relative to one another to effect a cutting action, said means being adapted to be moved by a rocker arm pivoted in said head and a pin carried on the end thereof extended into operative relationship with the movable blades in said cage.

4. A cutter assembly unit for an electric shaver comprising a U-sectioned cage slotted in its top, a plurality of parallel adjacent blades each having a slotted edge and being positioned in said cage with said edge extended from one side thereof, transverse pins extended across said cage, to support said blades therein, and a small U-sectioned channel carried by alternate blades within said cage and movable therewith, said channel opening to the slot in said cage and adapted to seat an actuating element extended therethrough.

5. A blade for an electric shaver comprising a thin flat metallic element formed with a surface-contacting edge from one edge of which extend thin supporting brackets in the plane of said element and which is itself provided with a multiplicity of edge slots exposed to the surface to be shaved and the sides of which form cutting edges.

6. In a dry shaver of the class described: a plurality of relatively thin, flat, blades having slotted lower edges; means to support said blades in a stack with said slotted edges aligned; means in the upper edges of alternate blades in said stack to retain the same for longitudinal reciprocal movement in said supporting means; means in the upper edges of the balance of said blades to immovably retain same in said supporting means, while permitting said motion of said alternate blades; and means to reciprocate said movable blades whereby to effect shearing action between edges of the slots in said movable and immovable blades.

7. In a dry shaver of the class described: a plurality of flat, stationary blades, each having supporting means extending from an upper edge thereof and a plurality of slots in the lower edge thereof; a plurality of movable blades having means projecting from an upper edge thereof adapted to support said movable blades for longitudinal reciprocal motion, said movable blades having a plurality of slots in the lower edge thereof substantially identical in size and spacing to the slots in said stationary blades; means to support said movable and stationary blades in alternate stacked relationship with said slotted edges aligned; and means to reciprocate said movable blades.

8. In a shearing device having a head and handle-like means to support it, a blade unit in the head having a plurality of laminations with one edge of each lamination adapted to be glided along a surface to be sheared, cutting edges extending from the said one edge inwardly of each lamination to present a larger number of cutting edges along the length of the unit, alternate laminations having a fixed relation with the head and other laminations having means for their reciprocation, said means to support the head having a motor with eccentric pin means extending from a shaft thereof which pin means passes through all the blades, the reciprocal blades each having an opening with perimetrical walls that engage the pin means only on two opposed surfaces thereof, and the fixed blades each having an opening that is provided with walls that are well spaced from said pin means.

9. In a shearing device, a body, a plurality of superimposed blades presenting a common gliding surface for contact with a surface to be sheared, alternate blades having fixed relation with a portion of the device and the other blades having means for rapidly reciprocating them, a plurality of cutting edges on said blade at an angle with respect to the gliding surface, and a resilient plate at one side of the blades having means for securing the blades in operative position with respect to the body.

10. In a shearing device having a head and handle-like means to support the head, a blade unit in the head having a plurality of fixed laminations and other laminations connected to a motor means in the handle-like means for reciprocating them snugly against the fixed ones, one edge of all the laminations having a common plane, and cutting edges extending from the common plane inwardly to present a large number of cutting edges along the length of the unit, eccentric pin means extending from a shaft of the motor which passes through all the blades, said other laminations being movable ones and having aligned walls about an opening therethrough which engage the pin means only along opposed sides thereof, and fixed blades having aligned walls about an opening which walls are permanently spaced from all surfaces of the pin means.

11. In a razor device having a handle-shaped body, a blade unit, and means for holding the unit to the body, the unit comprising a lamination of blades superimposed in side-by-side relationship and presenting a common gliding surface, said body housing an electric motor having a shaft with means including an eccentric pin extending therefrom, a central opening through all the blades, alternate blades being fixed blades and having the walls of their openings in perfect alignment and spaced from said pin means in all its positions, the other blades having the walls of its openings in alignment but with two of its opposed walls in contact with opposed surfaces of said pin means and its other walls spaced from said pin means.

ARTHUR BARSAM, SR.

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