May 12, 1942. C. T. BREITENSTEIN 2,283,038

ELECTRIC SHAVER

Filed May 19, 1938 3 Sheets-Sheet 1

Fig. 1

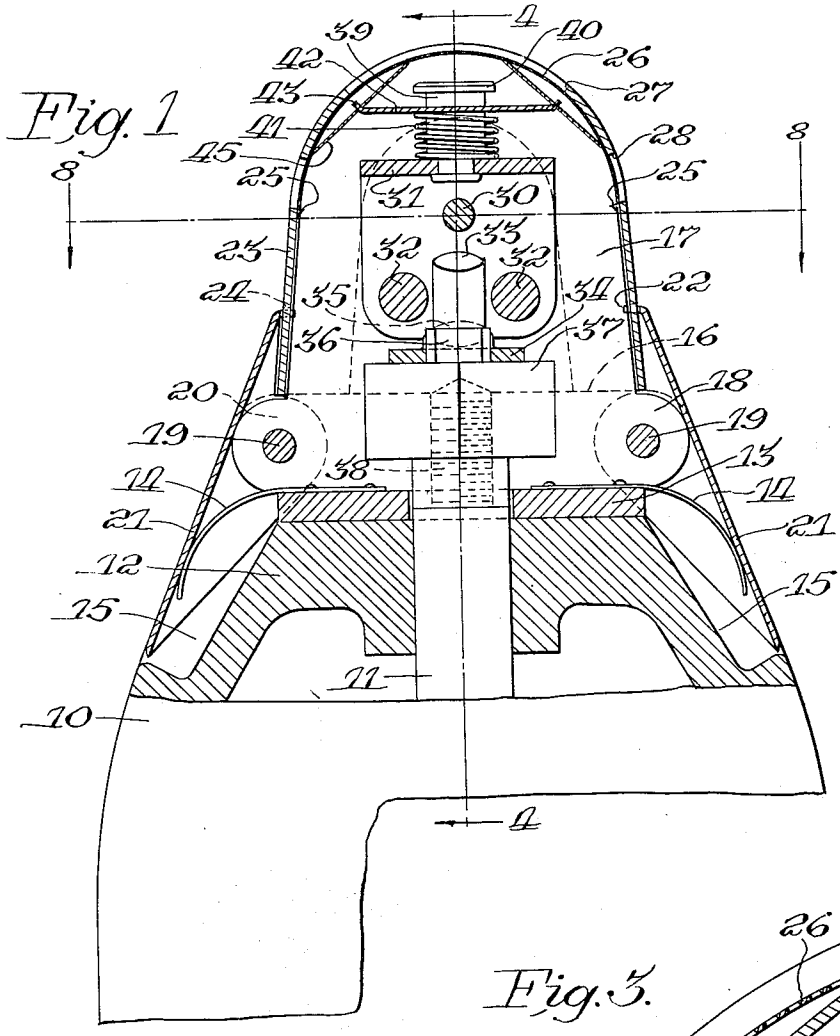


Fig. 2.

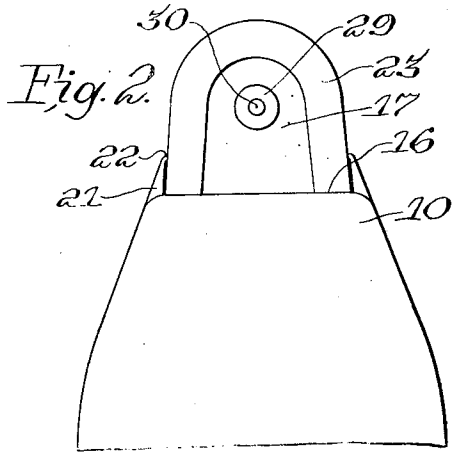
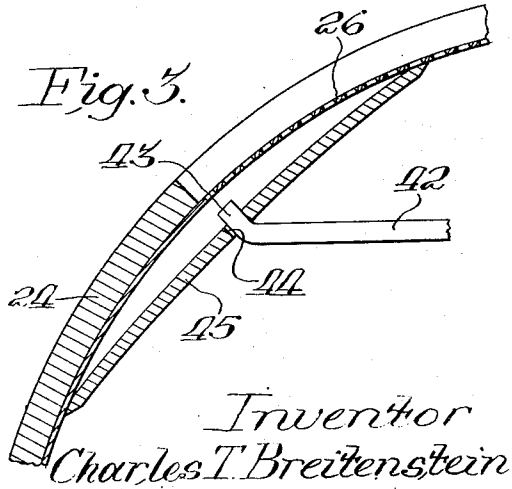


Fig. 3.



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Filed May 19, 1938 3 Sheets-Sheet 2

Fig. 1.

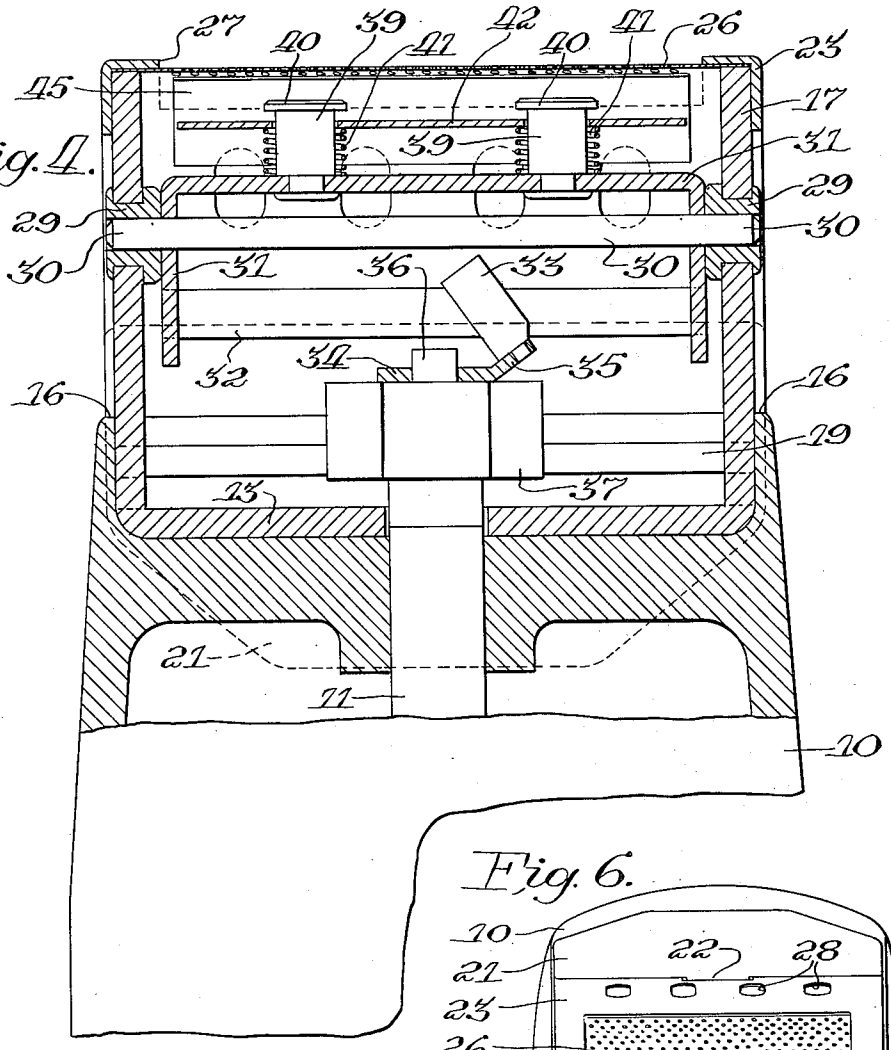


Fig. 6.

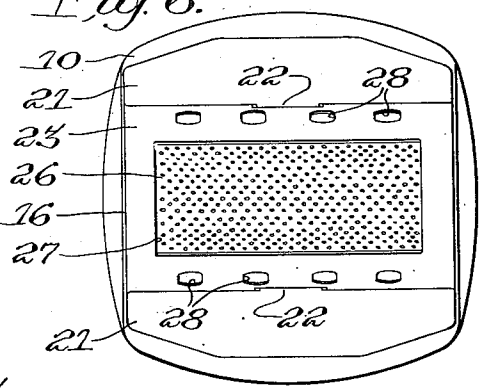
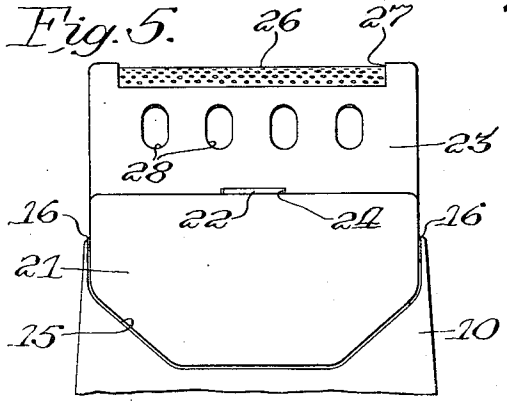


Fig. 5.



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ELECTRIC SHAVER

Filed May 19, 1938 3 Sheets-Sheet 3

Fig. 7.

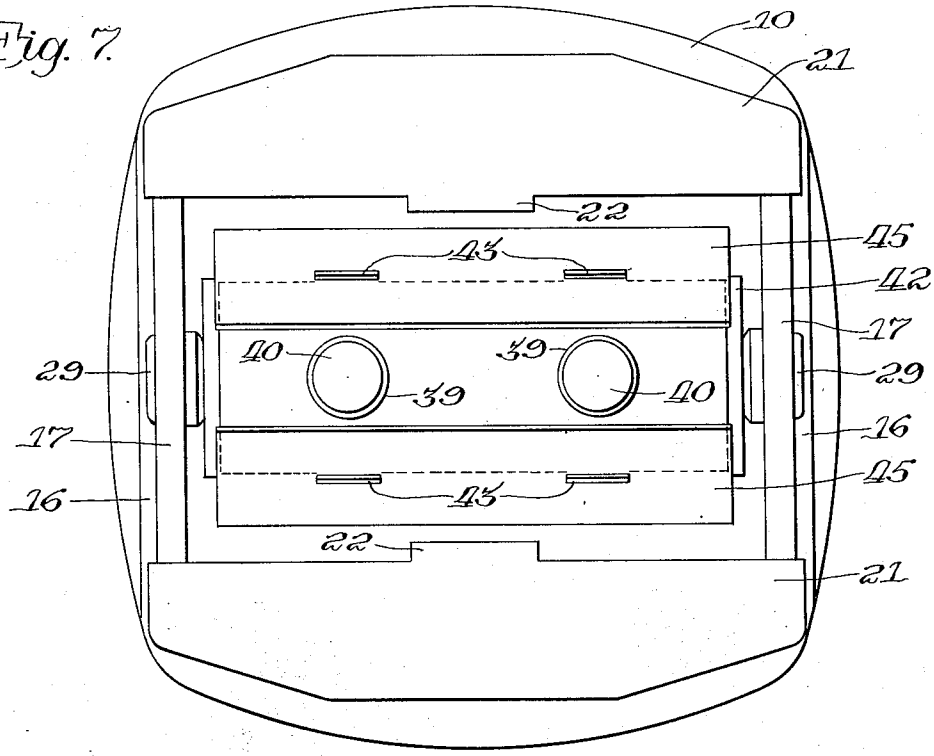
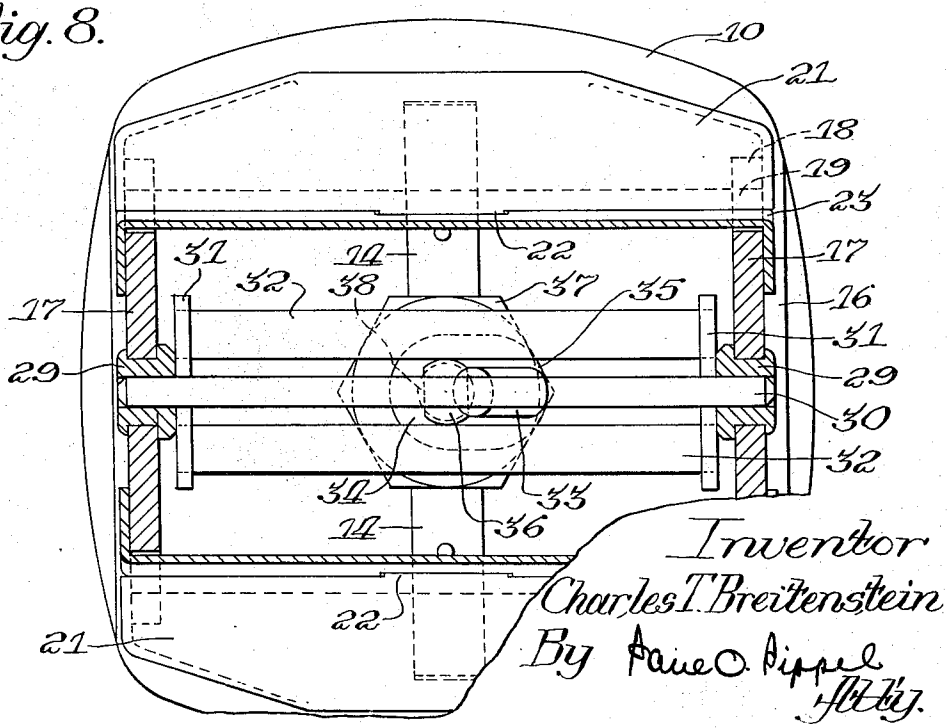


Fig. 8.



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UNITED STATES PATENT OFFICE

2,283,038

ELECTRIC SHAVER

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Application May 19, 1938, Serial No. 208,813

21 Claims. (Cl. 30—43)

The invention relates to improvements in an electric dry shaver of the type having an arcuate perforated or screen type skin engaging and hair receiving guard head.

In shavers of this type heretofore used, the arcuate head guard piece was more or less inflexible and a single radially related rigid cutter blade of the vane type was rapidly oscillated back and forth so that one edge only of the blade wiped against the inner face of the guard to shear off hairs extending inwardly into the head through the perforations or screen structure of the guard. Since the blade had opposite right angle cutting edges, these edges in time, because of the friction present, gradually dulled and in fact the square edge became rounded so that the shearing action necessarily suffered and the shaving efficiency was materially reduced. Also with this type of shaver it is found that if slight dents, from careless handling, were made in the guard head piece, the stiff radial blade or cutter could not closely follow the inner surface contour of the perforate guard, thus further reducing the effectiveness of the shaving or hair cutting action.

With these problems in mind, the main object of this invention is to provide a much improved shaver of the arcuate, perforate head type.

Another object is to provide in combination with such head, a blade, the cutting edge of which instead of being related radially to the inner surface of the guard, is tangentially related thereto so that instead of dulling the cutting edges of a blade, it is maintained constantly sharp by a self-sharpening action.

Still another object is to provide such a blade which is double edged.

Also it is an important object to provide such a blade which is flexible and of the wafer type, so that it combines with a perforate guard in a manner closely to follow the contour thereof, even when the latter may be slightly dented.

Another object is to provide an improved means for oscillating and carrying a plurality of tangent, flexible blades so that two cutting edges are always cooperating with the perforate guard head materially to speed up the shaver action.

Still another object is to provide a simple effective means for mounting one or more of these blades on the oscillator member in a quickly attachable and detachable manner.

Also it is an object to provide an effective means for always yieldingly pressing a plurality of wafer blades into tangent cutting edge engagement with the inner surface of the arcuate, perforate guard piece.

Other important objects are to provide generally for a simplified construction so that the head structure may be quickly and easily assembled and taken apart without the need of any special tools.

Other important objects will become apparent to those skilled in this art as the disclosure is more fully made.

Briefly, such desirable objects may be attained by the illustrative, but practicable example of the invention shown for sake of disclosure in the accompanying sheets of drawings, said shaver comprising a holder or body enclosing an electric motor which has a rotating shaft projecting from the head end of the body to drive a member for converting rotary to oscillatory motion. This motion is used to rapidly rock back and forth an improved pivot block which carries two spaced, double edged flexible or wafer type razor blades, said blades being yieldably pressed into engagement as chords of an arc with respect to an arcuate, flexible, perforate head guard member, so that the cutting edges of these blades are in tangent relation to the inner surface of the perforate guard member. The stroke of the oscillator is so proportioned through the arc of the perforate guard member that all four cutting edges of the two, double edged blades wipe or shear over the entire angular distance of the said perforate guard. The disposition of the blades relative to the perforate guard member is such that the cutting edges of the blades are self-sharpening. So much will suffice in presenting a general understanding of the improved shaver structure.

In the drawings:

Figure 1 is vertical, central cross sectional view through the head end of the improved electric shaver on a much enlarged scale;

Figure 2 is a normal size, end elevational view of the head end of the shaver;

Figure 3 is a much enlarged cross sectional view to illustrate clearly the operative association of a blade with the perforate head member guard;

Figure 4 is an enlarged cross sectional view taken through the head along the line 4—4 of Figure 1, looking in the direction of the arrows;

Figure 5 is a full size side view of the head end of the shaver;

Figure 6 is a full size head end view of the shaver;

Figure 7 is an enlarged top end plan view of the head structure with the perforate guard and end plates removed to expose the interior parts; and,

Figure 8 is a cross sectional view taken through the head along the line 8—8 of Figure 1, looking in the direction of the arrows.

The improved shaver comprises a suitable holder or body 10 shaped conveniently to conform to the hand grip of the user, said body housing a suitable electric motor, not shown, for

driving a shaft 11 suitably passed through an end wall 12 of the body as shown in Figure 1. An apertured plate 13 is secured to the exterior face of the wall 12 and suitably carries oppositely disposed curved flat springs 14, for a purpose presently to appear. Adjacent each spring 14 the proximate portion of the holder 10 is formed with respective niches 15, as shown. The body or holder extends upwardly to the edge 16 so that the exterior surface of the end wall 13 is in a recess.

As shown in Figures 1 and 2 the plate 13 has end walls 17 provided with opposite sets of ears 18 carrying opposite rigid parallel cross shafts 19. These opposite cross shafts 19 constitute pivot shafts for pivotally receiving the ears 20 formed on the inner face of side clamp plates 21 for holding said latter plates in a position as shown in Figure 1 to be pressed against by the respective side springs 14. The lower edges of these plates 21 are thus positioned to be pressed inwardly into the niches 15 while the upper edges of these plates are each formed with a bent tang portion 22 for a purpose to appear. Thus, it can be seen that the user by pressing the opposite side plates 21 inwardly, below the pivots 19, into the niches 15 against the press of the springs 14, causes the tangs 22 to be spread apart, for a purpose presently to appear.

Resting down against the edge 16 of the body is an inverted U-shaped head piece 23 having on each side a slot 24 to receive the respective tangs 22 whereby said head piece may be detachably but firmly held in place. The opposite inner faces of the piece 23 are provided with small seats 25 on which rests the legs of an arcuate, perforate, screen guard piece 26 of thin, flexible steel, which piece 26 is suitably snapped into place to bear on the rests 25, with the arcuate surface thereof conforming to the contour of the head piece 23, the top portion of the latter being cut away to provide a large opening 27 whereby to expose a relatively wide angle of the perforate guard 26 as best seen in Figure 6. The sides of the piece 23 are provided with spaced, oval shaped slots 28 to permit escape of hair clippings.

In cross alinement the end walls 17 carry bearings 29 for journaling a cross pivot shaft 30 on which is mounted for rapid, oscillatory movement, an inverted U-shaped, or channel member 31 the opposite leg portions of which carry two, spaced parallel cross rods or shafts 32 disposed below the pivot 30, as best shown in Figure 1. Between these rods 32 is disposed an upwardly extending inclined crank or eccentric pin 33 suitably anchored in a carrier plate 34, as shown. This plate which has an angular extension 35 to obtain the angled position of the pin 33 has an elongated, round-ended and parallel-sided, slot to fit over an upstanding pin 36 having a complementary shape, the plate 34, of course, fitting down as tightly as possible on said pin 36. The pin 36 may be part of a hexagonal nut 37 securely thread fastened to the upper threaded end 38 of the motor shaft 38.

A pair of rivet posts 39 having enlarged caps 40 is rigidly carried in spaced relation on the horizontal, flat, bight portion of the channel pivot member 31, as shown, each post being encircled by a coil spring 41 resiliently to push upwardly toward the caps 40, a pressure plate 42. This plate 42 is rectangular in shape and along opposite edges has a pair of angularly extending tongues or tangs 43, which as shown in Figures 3 and 7 are extended loosely into a pair of complementary slots 44 formed in a double-edged, flexible, thin, wafer type of razor blade 45. Thus, two such blades are provided and, as seen in Figure 1, each blade in its cooperative position with respect to the arcuate guard piece 26 describes the chord of an arc. It follows necessarily that each cutting edge of each blade 45 as best shown in Figure 3 is tangentially related to the curvature of the inner surface of the guard 26, and consequently a self-sharpening action on the cutting edges of the blades is produced.

Further, the width of the blades is such that for each to and fro movement thereof across the head guard 26, two leading edges cut one way and the other two leading edges cut the other way. This materially speeds up the hair cutting action and each hair projecting through the guard perforations can be cut from opposite directions.

Another feature is that the blades 45 are flexible and so is the perforate guard 26 and as a result with the spring pressed follower plate 42 the blades and guard tend yieldingly to conform to each other so that minor dents in the guard will not affect the efficiency of the hair severing action.

In operation, the motor runs to turn the shaft 11 and nut 37. This spins the eccentric, angled pin 33 between the rods 32, thereby rapidly rocking or oscillating the member 31 to and fro, with the result that the flexible blades 45 are rocked therewith because the pressure holder plate 42 must rock with the member 31. The blades 45 tangentially wipe the inner surface of the arcuate guard piece 26 and since they are yieldably pressed at all times by the springs 41 it follows that the blades shear hairs projecting through the guard very closely and also the blades are self-sharpening. The shaver is held substantially perpendicular to the skin surface being shaved in a manner well known in the art. By using two blades with double cutting edges the cutting action is speeded since for each stroke two cutting edges sweep the inner surface of the guard 26. Hair clippings fall out of the head through the larger openings 28.

The head structure is easily taken apart by means of the pinch sides 21 whereby the piece 23 with the thin steel guard 26 are quickly removed. This exposes the blades and oscillator mechanism for cleaning and inspection. An advantage resides in the fact that the wafer blades are cheap and easily replaceable, if for any reason it becomes necessary to do so.

From this detailed disclosure it must now be plain that an improved electric dry shaver has been provided which attains the objects for the invention heretofore recited.

It is the intention to cover all changes and modifications of the example herein chosen for purposes of illustration which do not depart from the spirit and scope of the invention, as hereinafter claimed.

What is claimed is:

1. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a substantially flat cutter blade disposed flatwise in a plane chordally to the arc of the inner surface of the member and having a cutter edge, means for moving the blade across said inner surface in such chordal planes in a manner to cause said edge to be self-sharpening, and a blade holder included in said means and resiliently pressed toward the guard for carrying said

blade at selected points only, to leave a maximum surface of the blade free for yieldable floating accommodation of its cutting edge to the inner surface of said guard.

2. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a substantially flat cutter blade disposed flatwise in a plane chordally to the arc of the inner surface of the member and having a cutter edge, means for moving the blade across said inner surface in such chordal planes in a manner to cause said edge to be self-sharpening, said blade being of the flexible wafer type, and a blade holder included in said means and resiliently pressed toward the guard for carrying said blade at selected points only, to leave a maximum surface of the blade free for flexing and yieldable floating accommodation of its cutting edge to the inner surface of said guard.

3. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a substantially flat cutter blade disposed flatwise in a plane chordally to the arc of the inner surface of the member and having a cutter edge, means for moving the blade across said inner surface in such chordal planes in a manner to cause said edge to be self-sharpening, said blade being flexible and having two separate cutting edges both of which contact the inner surface of the guard along lines spaced the width of the blade, and a blade holder included in said means and resiliently pressed toward the guard for carrying said blades at selected points only, to leave a maximum surface of the blades free and unencumbered for flexing and yieldable floating accommodation of their cutting edges to the inner surface of said guard.

4. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a substantially flat cutter blade disposed flatwise in a plane chordally to the arc of the inner surface of the member and having a cutter edge, means for moving the blade across said inner surface in such chordal planes in a manner to cause said edge to be self-sharpening, both the guard member and blade being extremely thin and flexible, and a blade holder included in said means and resiliently pressed toward the guard for carrying said blade at selected points only, to leave a maximum surface of the blade free and unencumbered for flexing and yieldable floating accommodation of its cutting edge to the inner surface of the flexible guard.

5. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a thin flexible blade having opposite cutting edges with the blade held flatwise and chordally in engagement with the inner arcuate surface of the member, means for rapidly moving the blade in relation to the member, and a blade holder included in said means and resiliently pressed toward the guard for carrying said blade at selected points only, to leave a maximum surface of the blade free and unencumbered for flexing and yieldable floating accommodation of its opposite cutting edges to the inner surface of said guard.

6. In an electric shaver having a head including a rounded perforate skin engaging guard member, the combination with said member of a pair of flat, thin, dougle edged flexible cutting blades each held chordally flatwise in spaced relation but in engagement with the inner arcuate surface of the member, means to hold the blades chordally to the said surface, and means for oscillating the blades in relation to the member, said blade holder means being resiliently pressed toward the guard and engaging said blades at selected points only, to leave a maximum surface of each blade free and unencumbered for flexing and yieldable floating accommodation of its opposite cutting edges to the inner surface of said guard.

7. In an electric shaver having a head including a rounded flexible perforate skin engaging guard member, the combination with said member of a flexible rectangular blade having opposite cutter edges flatwise engaging the inner surface of the member, means holding the blade chordally to the inner arcuate surface of the member and for yieldably pressing the blade to hold its edges against said surface, and means to move the blade relative to the member, said blade holder means engaging said blade at selected points only, to leave a maximum surface of the blade free and unencumbered for flexing and yieldable floating accommodation of its opposite cutting edges to the inner surface of said guard.

8. In an electric shaver having a head including a rounded flexible perforate skin engaging guard member, the combination with said member of a thin flexible blade having opposite cutter edges engaging the inner surface of the member, means to hold the blade as the chord of an arc relative to said surface with opposite cutter edges contacting said surface, means resiliently pressing the blade to hold its edges against said surface, and means to oscillate the blade, said blade holder means engaging said blade at selected points only, to leave a maximum surface of the blade free and unencumbered for flexing and yieldable accommodation of its opposite cutting edges to the inner surface of said guard.

9. In an electric shaver having a head including a rounded flexible perforate skin engaging guard member, the combination with said member of a pair of separate flexible cutter blades, means to hold said blades in spaced relation to each other and respectively along chords of the arc of the member, means yieldably to press said blades with their edges wiping the inner surface of the member, and means rapidly to move the blades relative to said surface, said blade holder means engaging said blades at selected points only, to leave a maximum surface of each blade free and unencumbered for flexing and yieldable accommodation of their cutting edges to the inner surface of said guard.

10. In an electric shaver having a head including a rounded flexible perforate skin engaging guard member, the combination with said member of a pair of flexible cutter blades, means to hold said blades in spaced relation to each other and respectively along chords of the arc of the member, means yieldably to press said blades with their edges wiping the inner surface of the member, and means rapidly to move the blades relative to said surface, each of said blades having two separate cutting edges so held and moved relative to said surface, said blade holder means engaging said blades respectively at selected points only in a manner to leave a maximum surface of each blade free and unencumbered for flexing and yieldable accommodation of their cutting edges to the inner surface of said guard.

11. In an electric shaver having a head including a rounded flexible perforate guard, the combination with the guard of a flexible cutter blade, means to hold said blade along the chord of an arc relative to the inner surface of the guard, means for moving the blade relative to said surface, and means for detachably holding said blade in such position, said blade holder means engaging said blade at selected points only in a manner to leave a maximum surface of the blade free and unencumbered for flexing and yieldable accommodation of its cutting edges to the inner surface of said guard.

12. In an electric razor having a body including a motor and a head including a rounded guard, a blade positioned for oscillation over the inner surface of the guard, the combination with the blade of an inverted U-shaped blade holder having downturned ends, means associated with said ends for pivotally carrying the holder in the head, a pair of spaced parallel rods mounted lengthwise of and in the ends of the holder, and a rotary shaft driven from the motor including an angularly disposed eccentric pin positioned between said rods to rock the holder and move the blade in relation to the guard, said fin having an axis intersecting the projection of the axis of the rotary shaft.

13. In an electric shaver having a head including a rounded guard, the combination with the guard of a member rockably carried in the head, spaced pins carried on the member, a pressure plate resiliently carried on the pins, a blade carried by the plate, said blade positioned along the chord of the arc of said guard and having a cutter edge to wipe the inner surface of the guard, and means to oscillate the member, plate and blade.

14. In an electric shaver having a head including a rounded guard, the combination with the guard of a member rockably carried in the head, spaced pins carried on the member, a pressure plate resiliently carried on the pins, a pair of blades detachably carried by the plate, said blades positioned in spaced relation and each disposed along respective chords of the arc of the guard and each having cutter edges to wipe the inner surface of the guard, and means to oscillate the member, plate and blades as a unit.

15. In an electric shaver having a head including a rounded guard, the combination with the guard of a member rockably carried in the head, spaced pins carried on the member, a pressure plate resiliently carried on the pins, a blade carried by the plate, said blade positioned along the chord of the arc of said guard and having a cutter edge to wipe the inner surface of the guard, and means to oscillate the member, plate and blade, the head and blade both being flexible.

16. In an electric shaver having a head including a rounded guard, the combination with the guard of a member rockably carried in the head, spaced pins carried on the member, a pressure plate resiliently carried on the pins, a pair of blades detachably carried by the plate, said blades positioned in spaced relation and each disposed along respective chords of the arc of the guard and each having cutter edges to wipe the inner surface of the guard, and means to oscillate the member, plate and blades as a unit, the head and blades both being flexible, with the blades each having two separate cutting edges.

17. An electric shaver having an arcuate perforate guard, the combination therewith of an oscillatable thin flexible double edged blade positioned along the chord of an arc of the guard and wiping the inner surface thereof in a manner to cause the edges to be self-sharpening, and a resiliently supported blade holder positioned within the guard and including means engaging said blade at selected points only in a manner leaving substantially the entire area of the blade free and unencumbered for flexing and yieldable accommodation of its cutting edges to the inner surface of the guard.

18. An electric shaver having an arcuate flexible perforate guard, the combination with the guard of an oscillatable support carrying a plurality of thin flexible double edged cutter blades positioned along respective chords of the arc of the guard with their cutting edges wiping the inner surface thereof, said support including means engaging the blades respectively at selected points only in a manner leaving substantially the entire area of each blade free and unencumbered for flexing and accommodation of its cutting edges to the inner surface of the guard.

19. For an electric shaver having an arcuate perforate guard through which growing hairs may protrude, an oscillatable motor driven blade holder carried on the inner side of the guard, a flexible, rectangular, flat blade, means for mounting the blade at a point between its edges on the holder in a manner to dispose the blade in a plane chordally to the inner surface of the guard with opposite edges of the blade simultaneously engaging said guard in shearing relationship thereto and leaving substantially the entire area of the blade free and unencumbered for flexing in relation to the guard.

20. For an electric shaver having an arcuate perforate guard through which growing hairs may protrude, an oscillatable motor driven blade holder carried on the inner side of the guard, a flexible, rectangular, flat blade, means on the holder for detachably mounting the blade at a plurality of spaced selected points only and between its edges on the holder in a manner to hold the blade in planes chordally disposed to the inner surface of the guard with opposite edges of the blade simultaneously engaging said guard in shearing relationship thereto and leaving substantially the entire area of the blade free and unencumbered for flexing in relation to the guard.

21. For an electric shaver having an arcuate perforate guard through which growing hairs may protrude, an oscillatible motor driven blade holder carried on the inner side of the guard, a flexible, rectangular, flat blade, means on the holder for detachably mounting the blade at a plurality of spaced selected points only and between its edges on the holder in a manner to hold the blade in planes chordally disposed to the inner surface of the guard with opposite edges of the blade simultaneously engaging said guard in shearing relationship thereto and leaving substantially the entire area of the blade free and unencumbered for flexing in relation to the guard, and means included in the holder for yieldably holding the blade pressed into self sharpening contact with said guard surface.

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