May 25, 1943. C. T. BREITENSTEIN 2,319,916

ELECTRIC RAZOR

Filed Sept. 7, 1938 4 Sheets-Sheet 1

Fig. 1.

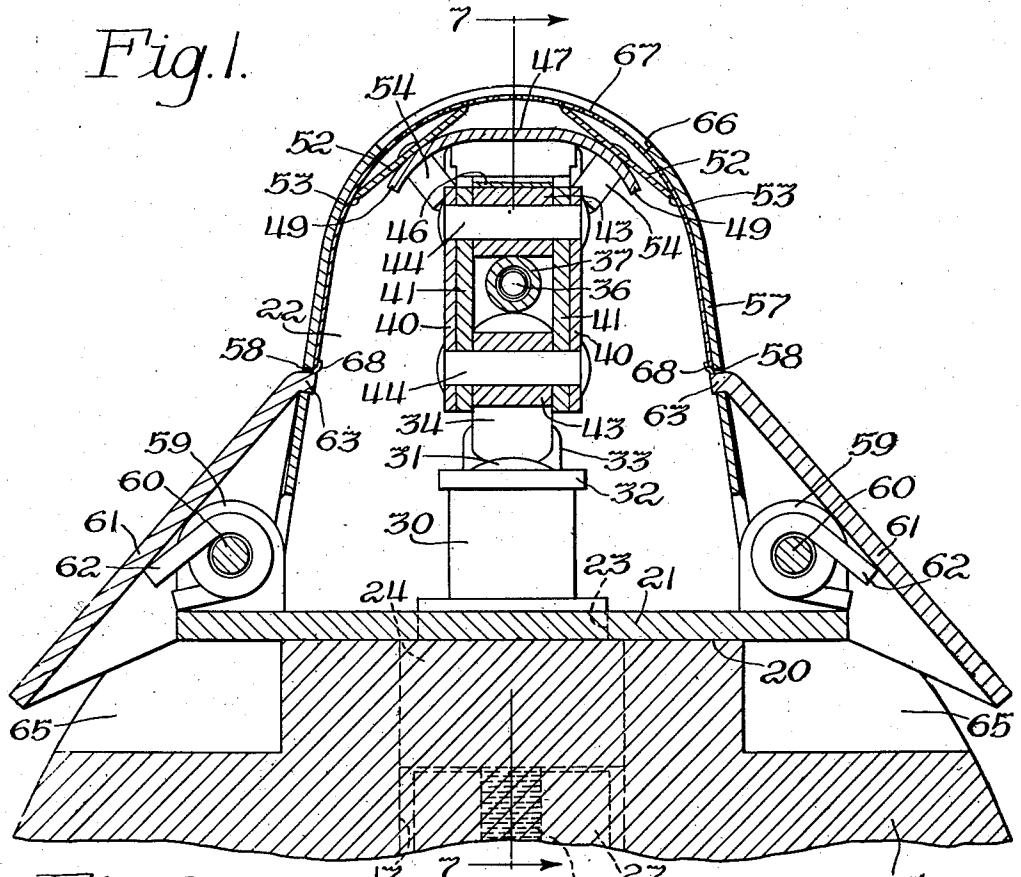


Fig. 2.

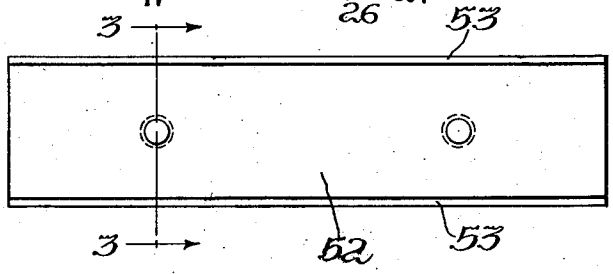
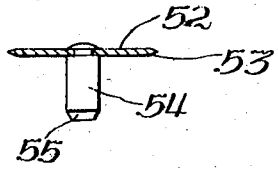


Fig. 3.



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Filed Sept. 7, 1938 4 Sheets-Sheet 2

Fig. 4.

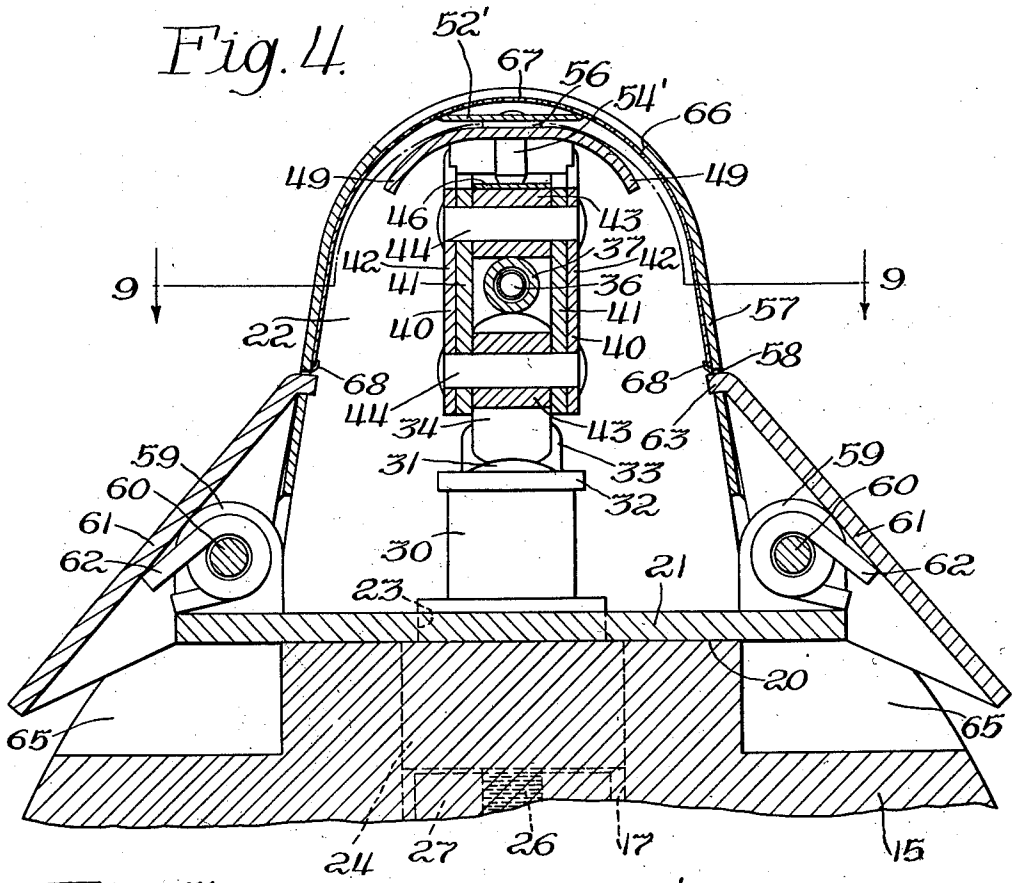


Fig. 5.

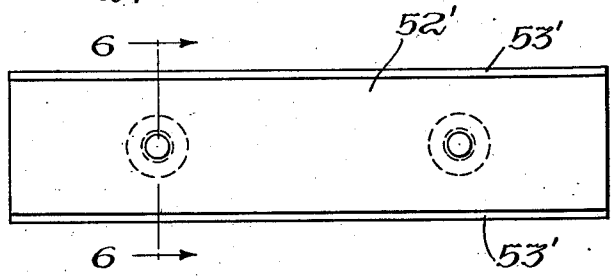
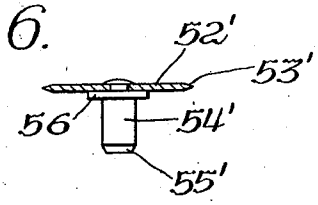


Fig. 6.



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ELECTRIC RAZOR

Filed Sept. 7, 1938 4 Sheets-Sheet 3

Fig. 7.

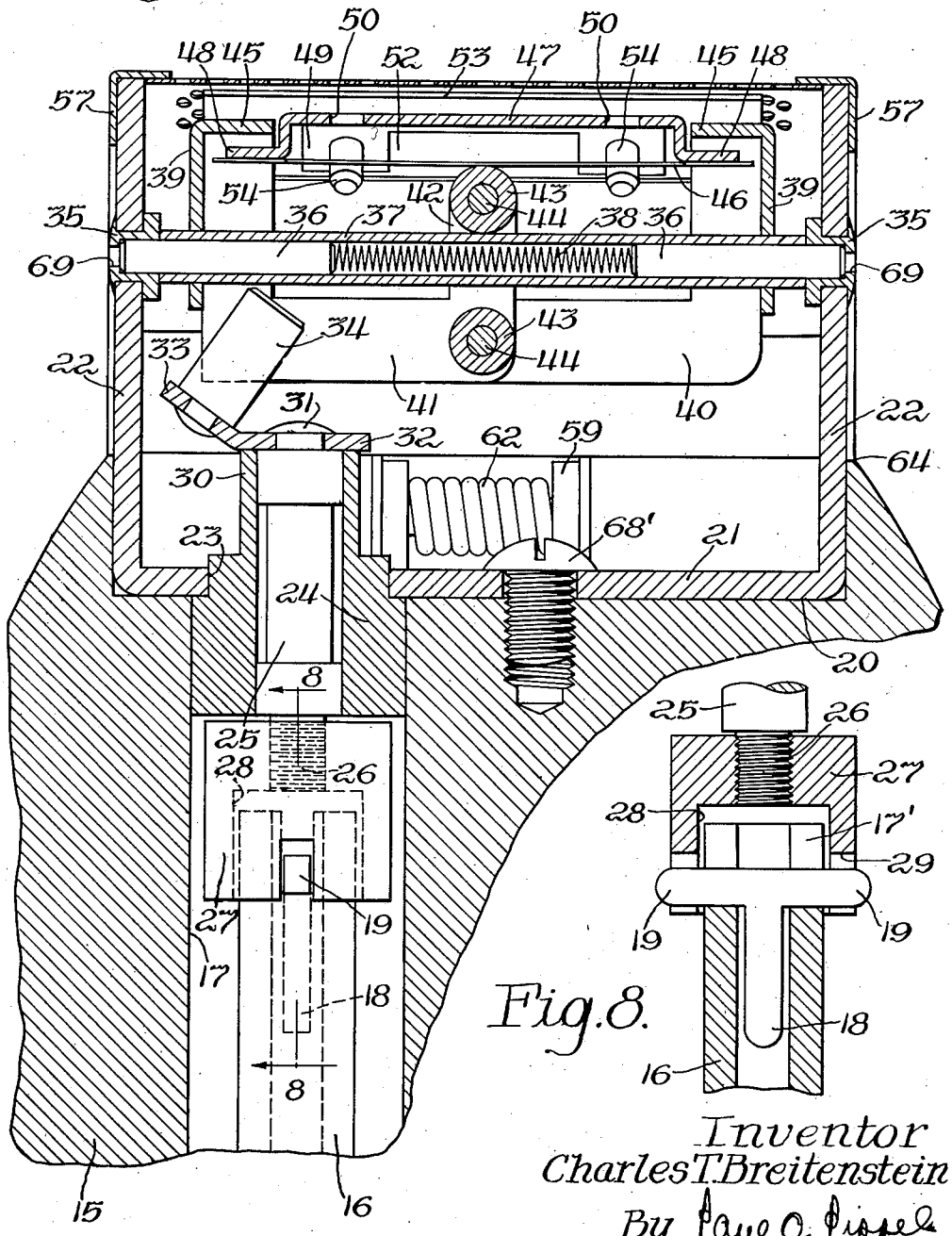


Fig. 8.

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ELECTRIC RAZOR

Filed Sept. 7, 1938 4 Sheets-Sheet 4

Fig.9.

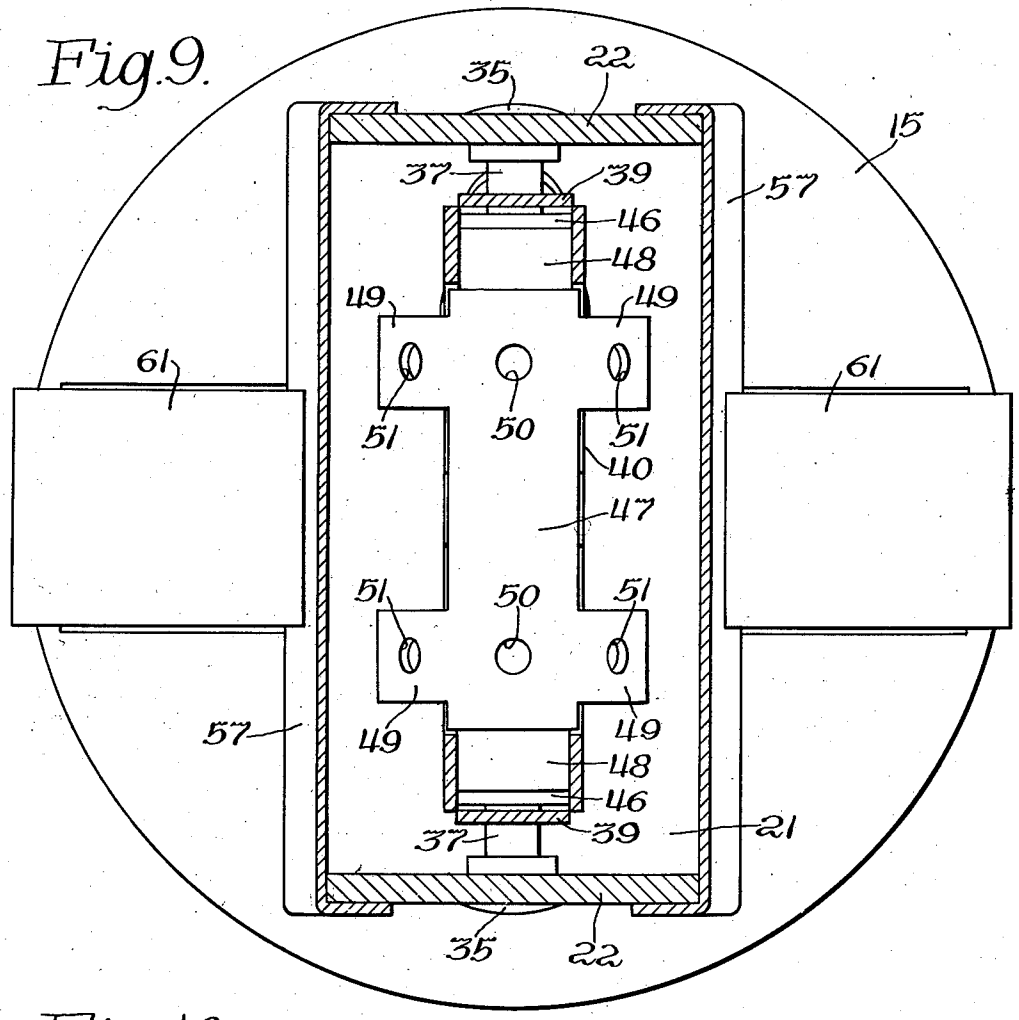
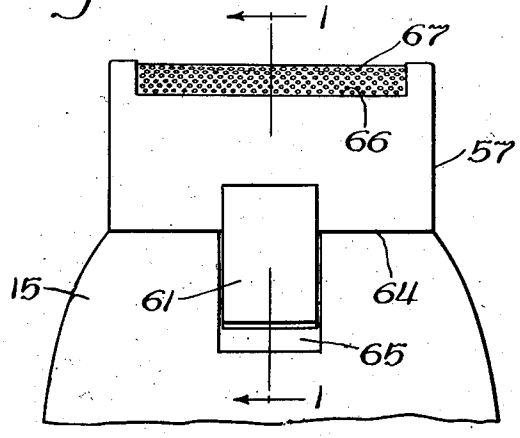


Fig.10.



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UNITED STATES PATENT OFFICE

2,319,916

ELECTRIC RAZOR

Charles T. Breitenstein, Chicago, Ill., assignor to Raymond T. Moloney, Chicago, Ill.

Application September 7, 1938, Serial No. 228,779

11 Claims. (Cl. 30—43)

The invention relates to an electric dry razor or shaver, the present application disclosing certain improvements over the subject matter of applicant's co-pending application filed May 19, 1938, Serial Number 208,813 for an Electric shaver, now Patent Number 2,283,038 dated May 12, 1942.

The razor of said above identified application is of the type having a skin engaging guard, which is generally arcuate in cross section and perforated for the uncut hairs to project therethrough so that one or a plurality of oscillatable cutter blades disposed along the chord of the arc of said guard may shear or cut the hairs to produce the shaver action. The blade or blades were double-edged and by virtue of their chordal disposition, self-sharpening; also they were of the flexible wafer type.

The present invention relates to a shaver of this type and more particularly to certain improvements to facilitate the use of either one or two cutter blades; and, generally to facilitate taking the cutter head apart and putting it together again, thus making it easy to keep the parts clean and readily inspectable.

The main object of the present invention is to provide an improved electric dry shaver.

Another object is to provide a novel cutter head structure for such a shaver, in which the parts are simple and inexpensive, and designed for commercial production.

Another object is to provide such a cutter head which may, as a unit, be bodily removed from the body or holder of the shaver.

Still another object of the invention is to provide a novel cutter head in which the movable knife or knives are associated with a separately removable mounting means.

Also it is an important object to provide an improved movable cutter blade structure and means for easily mounting and detaching said blade.

Still another object is to provide an improved drive means for converting rotary into oscillatory motion to drive the movable cutter.

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

Briefly, the improved shaver has a body enclosing an electric motor with a drive shaft disposed offset with respect to the axis of the body. The body has a socketed end to receive the improved shaver head formed as a unit, including the drive motion converting means as a part thereof. Thus, said latter means may include a shaft having a quick attachable clutch connection with the offset motor shaft when the unit is operatively associated with the body. A single, accessible screw serves to retain the head unit attached to the body. The head unit embodies a novel oscillatory mounting means to receive one or two flexible, double edge, cutter blades, which blades per se are of novel construction and are disposed within an arcuate skin engaging guard which is part of said head unit. The blade or blades are disposed chordally relative to the inner surface of the arcuate guard to produce a self-sharpening relationship for the cutting edge of each blade with respect to the guard. The guard, too, may be flexible and is perforated to receive the uncut hairs. So much will suffice in giving a general understanding of the improved shaver, which is shown in detail in the accompanying sheets of drawings, wherein:

Figure 1 is an enlarged sectional view through the head end of the shaver taken along the line 1—1 of Figure 10, looking in the direction of the arrows, the head in this instance using two cutter blades;

Figure 2 is a plan view of a movable cutter blade used in Figure 1;

Figure 3 is a cross sectional view through the same blade taken along the line 3—3 of Figure 2 looking in the indicated direction;

Figure 4 is a view similar to Figure 1, but showing a modification using only one cutter blade;

Figure 5 is a plan view of the cutter blade, per se, used in Figure 4;

Figure 6 is a cross sectional view through the same blade, taken along the line 6—6 of Figure 5, looking in the indicated direction;

Figure 7 is an enlarged cross sectional view through the shaver taken along the line 7—7 of Figure 1, looking in the direction of the arrows;

Figure 8 is a detail sectional view of the drive clutch coupling taken along the line 8—8 of Figure 7 looking in the indicated direction;

Figure 9 is a head end section taken along the line 9—9 of Figure 4 with the cutter blade or blades removed; and,

Figure 10 is a general, full size, side elevational view of the head end of the improved shaver.

The improved shaver comprises a body 15 suitably shaped to fit the user's hand grip, the body enclosing a suitable electric motor, not shown, but having a drive shaft 16 offset from the lengthwise central axis of the body and parallel therewith. This motor shaft, as appears in Figures 7 and 8, extends through a bore 17 formed in the body, as shown. The shaft 16 is hollow and at

its upper end has a cross slot 17' cut therein, in which slot is placed a T-shaped member having a tail 18 extending into the hollow shaft 16, and opposite ears 19 disposed diametrically through the slot 17' as seen in Figure 8. The T-member thus turns with the motor shaft 16.

The head end of the body 15 is formed with a recess or socket 20 in which is disposed a U-shaped head piece 21, the bottom of which fits flatly down on the socket surface 20, while its opposite ends 22 extend outwardly, as shown. The floor part 21 is apertured as at 23 and has press fitted thereinto a bearing collar or sleeve 24 slidably fitted down into the bore 17 in the body 15. In this sleeve 24 is journaled a shaft part 25 having a lower threaded end 26, threadedly fitted into a block 27, which is formed with a socket 28, providing a skirt portion which has a diametrical cross slot 29 cut thereacross to fit down over and detachably engage the ears 19 to establish a quickly detachable drive clutch coupling between the motor shaft 16 and the shaft part 25.

The sleeve or collar 24 has an upstanding extension 30 and the free end of the shaft part 25 terminates substantially flush therewith. Secured by a rivet 31 to the upper end of the part 25, as seen in Figure 7, is a plate 32 having an angularly extending end 33 in which is mounted an inclined eccentric driver, or wrist pin 34. This pin 34 is rotated by the shaft 25 in an obvious manner.

The end wall parts 22, at the points shown, carry cross alined, fixed bearing collars 35 and in said collars are carried for rocking movement, the outer ends respectively of a pair of coaxial pins or rods 36 located in a long sleeve 37 which further supports the pins 36 between the bearings 35 in an obvious manner. These pins are relatively short as shown, and a coil spring 38 between the inner ends of the pins is disposed in the sleeve 37 and acts, of course, to keep the outer ends of said pins lightly pressed respectively into the bearings 35. Opposite ends of the sleeve 37 have respectively press fitted thereonto the ends of a channel piece 39 in a manner to make said piece rockable as a unit with the sleeve 37 about or with the pins 36.

As shown also in Fig. 7 the piece 39 includes lower opposed side plate portions 40, which adjacent the driver pin 34 carry non-metallic inner liner plates 41 which in practice may be made of Bakelite. The driver pin 34 is straddled by these two plates 40 and their facings 41, as shown. The plates 40 as well as the liners 41 may include centrally disposed upstanding ears 42 and be spaced by collars 43. Pins 44 cross connect the parts through the collars 43 as shown in Figure 4, with the sleeve 37 passed between the collars 43.

Each end of the part 39 has an inturned upper extension 45. Resting with its mid-portion on the upper collar 43 is a flat spring 46 the ends thereof going under the extensions 45, as shown in Figure 7. Resting on this spring 46 is a blade holder comprising a main flat portion 47 (see also Figure 9) having down-turned ends 48 tucked loosely under the extensions 45. This holder 47 has opposite pairs of curved ear extensions 49 integral therewith, so that in cross section the holder is generally arcuate in shape, as best seen in Figure 4. The flat central portion has opposite holes 50 formed therein and the ears have holes 51 formed therein. The flat surface 47 is normally positioned outwardly of the end extensions 45, as seen in Figure 7.

This blade holder is constructed to carry either one or two flexible, wafer razor blades of the double cutting edge type. In Figures 2 and 3 a flat blade 52 of this type is shown, the same being of wafer construction and flexible with opposite cutting edges 53. Adjacent each end on its center line, the blade has secured thereto by riveting or welding, a perpendicularly extending pin 54 with a tapered free end 55. This type blade will be used as shown in Figure 1 when two blades are desired, said blades having their pins 54 inserted into the holes 51 in the ears 49 in an obvious manner.

When a single blade is to be used we see that such blade as appears in Figures 5 and 6 is the same, it being designated by the numbers 52', 53', 54' and 55' to show the correspondence with the blade of Figures 2 and 3. However, in the blade of Figures 5 and 6 a spacer collar 56 is used as shown in Figure 4, so that the blade will be kept clear of the center flat face of the holder 47, the pins 54' being inserted into the holes 50 in an obvious manner. In this case the blade 52' is kept clear of the flat part 47 so that it can have the necessary flexibility.

It should be clear now that one blade may be carried on the center portion of the holder 47 when a one-bladed shaver is desired, or alternatively two blades may be carried by said holder, one at each set of ears 49 to provide a two-bladed shaver.

An external housing or shell part 57 is provided to enclose the structure so far described, which part 57 is generally U-shaped and has opposite side slits 58 therein, as seen in Figure 4. The base plate 21 at its middle on each side is provided with ears 59 carrying a hinge pin 60 for pivotally mounting finger pressable, side latch members 61. Springs 62 encircling the pins 60 act to engage a hook end 63 on each latch part 61 in the slit 58, whereby normally to hold the shield piece 57 down tightly on a shoulder edge 64 delineating the edge of the body recess 20. The opposite sides of the body are notched as at 65 to receive the lower ends of the latches 61 when they are inwardly pressed to free the shell 57 from the body 15.

The shell 57 at its bight portion is provided with a large cut out opening 66 and the inner surface of the shell above the slits 58 is lined with a separable, spring steel, flexible, perforate guard 67 which is arcuate and covers the opening 66 in the manner shown. Lugs 68 are formed on opposite inner faces of the shell 57 to carry the perforate skin engaging guard 67. The blades 52 or 52' whether one or two are used, it can now be seen, are so positioned on the holder that they lie chordally with respect to the arc of curvature of the guard 67. Consequently, the cutting edges of the blades are tangent and self-sharpening as they rub yieldably over the inner surface of the guard 67. Since both the blade or blades and guard are flexible a close shearing fit and relationship is always maintained between these parts. The flat spring 46 always exerts a force yieldingly to urge the blade or blades against the inner surface of the guard member in an obvious manner.

A single cap screw 68' passed through an opening in the piece 21 and into a threaded bore in the body 15 serves detachably to hold the part 21 in the socket 20 of the body 15. Of course, this screw is located in a manner to be readily

accessible when the cover shell **57** has first been removed by means of the spring snap members **61**. It is also to be noted that the bearings **35** for the pins **36** are open to the outside as at **69** to permit entry of a tool such as a nail or thin wire, whereby to make it possible to push the pins **36** inwardly toward each other to free the outer ends thereof from the bearings **35**, thus making it possible after the shell **57** has been removed, to remove the sleeve **37** and movable cutter and supporting parts **39**, **40** as a sub-unit. This completes the detailed description of the razor parts. The operation will next be described.

The head parts are assembled to the body in the manner shown in Figure 7 where it can be seen that a detachable driving connection is established between the motor shaft **16** and razor head shaft **25** by means of the clutch coupling shown in Figure 8. The motor, not shown, rotates these shaft parts, in turn, rotating the crank pin **34** at high speed. This crank pin rotates between the non-metallic side plates **41** to rock or swing in sidewise oscillation, the side plates **40** about the axis of the journal pins **36**. Thus, rotary motion is converted into oscillating motion and the blade holder **47**, which is part of the rocker head **40**, oscillates rapidly. Since the blades **52** (or blade **52'**) are carried on the holder, they too oscillate back and forth in a readily understandable manner. Each blade, whether one or more is used, lies on the chord of an arc relative to the inside surface of the rounded perforate skin engaging guard member **67**, with the result that the cutting edges are self-sharpening. The spring **46** acts to press the holder **47** with its blade or blades yieldably against the guard **67** always to insure a conforming contact between blade and guard. Since both the blade and guard are inherently flexible this conforming contact is further enhanced and a good shearing action necessary to perfect shaving is insured.

The razor construction of this invention is especially desirable for its features of disassembly, thereby making manufacture, cleaning and inspection as simple as possible. For instance, the finger snap parts **61** permit instant removal of the shell **57** and guard **67** together as a unit. This exposes the screw **68'** which is quickly taken out by an ordinary screw driver and thereupon the entire remainder of the head can be removed at the clutch coupling **29**, **19**, the shaft **25** coming off with the parts **24** and **21**. In other words the rotary shaft **25** is part of the head so that it may be said the motion changing means is complete in the head itself and removable therewith. By pressing in on the pins **36** the oscillating parts of the cutter can be separately removed as a sub-unit, should it be desired to so so.

From this description it should now be clear that an improved electric razor or dry shaver has been provided which achieves the desirable objects heretofore recited.

It is the intention to cover all changes and modifications of the example herein chosen for the sake of the disclosure which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. For an electric razor having an elongated body with an end thereof formed with a recess and a motor shaft in the body; a cutter head positioned in the recess and comprising a support, a shaft part carried by the support, said support with the shaft part adapted for endwise removal from the recess, and a separable clutch coupling between the motor shaft and shaft part to permit aforesaid removal, said motor shaft being on an axis parallel with but offset from the lengthwise axis of the body.

2. For an electric razor having an elongated body with an end thereof formed with a recess and a motor shaft in the body; a cutter head positioned in the recess and comprising a support, a shaft part carried by the support, said support with the shaft part adapted for endwise removal from the recess, and a separable clutch coupling between the motor shaft and shaft part to permit aforesaid removal, said coupling being located within the head, said motor shaft being on an axis parallel with but offset from the lengthwise axis of the body, a bearing for the shaft part, said bearing fixed in the support, and a single screw connection between the body and support disposed to one side of the shafting and constituting the sole internal connection for securing the support to the body.

3. An electric razor having a body, a head secured thereto having end walls, a drive shaft entering the head, hollow bearings respectively carried fixed in the end walls, said bearings being open to the outer faces of said walls, pins respectively carried in the bearings, a sleeve rockably carried on the pins, a blade holder rockable with the sleeve, means between the shaft and holder to rock the latter from the former, a skin engaging guard carried on the head, a blade carried on the holder to cooperate with the guard, and a spring carried in the sleeve between the pins, said pins being movable toward each other by means insertable through the open bearings whereby the sleeve and blade holder may be removed as a unit from the head.

4. A cutter head for electric razors comprising a part having end walls, a shaft means carried thereby, a member rockable about the axis of the shaft means and having opposite inturned ends, means to rock the member, a cross piece spanning the shaft means, a flat spring lying over the cross piece with its ends respectively disposed under the said inturned ends, a blade holder member floatably carried on the spring, a blade carried on the holder, and a skin engaging guard carried on the first part to cooperate with the blade.

5. A cutter head for electric razors comprising a part having end walls, a rockable support mounted on the walls including a blade holder, an arcuate guard on the first part over the holder, means yieldably pressing the holder toward the inner curvature of the guard, and a flat blade carried flatly on the holder to cooperate with and be positioned chordally relative to the inner curvature of the guard.

6. A cutter head for electric razors comprising a part having end walls, a rockable support mounted on the walls including a blade holder, an arcuate guard on the first part disposed over the holder, means yieldably pressing the holder toward the inner curvature of the guard, and a flat flexible double edged blade detachably carried flatwise on the holder to cooperate with the guard, said blade being disposed chordally with respect to the inside curvature of the guard.

7. A cutter blade for cooperation with an electric razor having a rounded skin engaging guard, said blade being of the flexible double edged wafer type and carrying a mounting pin normal to the surface of the blade.

8. An electric razor having a head including an arcuate perforate guard member, a holder, means carrying the holder for rocking movement within the guard member, said holder being generally arcuate and disposed proximate the inner curvature of the guard member and having a surface formed with spaced holes, a flat blade having pins on a surface thereof with the pins arranged to fit the aforesaid holes, and means for mounting the blade on the holder in a position chordally of the inner surface of the guard and with opposite edges of the blade engaging said inner guard surface.

9. An electric razor having a head including an arcuate perforate guard member, a holder, means carrying the holder for rocking movement within the guard member, said holder having a portion providing a surface closely adjacent the inner surface of the guard and formed with spaced holes adapted to receive a flat blade having pins to fit said holes, and means for mounting the blade on said surface and chordally of the inner surface of the guard, said holder having opposite angularly related portions providing opposite additional apertured surfaces adapted also to receive flat blades having pins to fit the apertures of the latter surfaces for optionally mounting blades chordally of the inner guard surface on said latter portions.

10. A dry shaving head comprising a semi-circular outer shear plate having perforations forming cutting elements, a carrier movable about a pivotal axis concentric with said shear plate, a cutter bar mounted in said carrier against movement relative thereto in the direction of movement of the carrier, said cutter bar having oppositely disposed spaced blades contacting the inner surface of said shear plate along two laterally spaced cutting edges.

11. A dry shaving head comprising an outer semi-circular shear plate formed with cutting elements, a carrier movable about a pivotal axis concentric with said shear plate, cutting means carried by said carrier and having separated end portions projecting laterally to contact the inner surface of said shear plate along two laterally spaced cutting edges, and spring means acting between said carrier and said cutting means to simultaneously press both of said cutting edges into engagement with the inner surface of said shear plate.

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