

Aug. 20, 1946.

D. PINKAS

2,406,035

RAZOR

Filed Oct. 31, 1944

3 Sheets-Sheet 1

Fig. 1

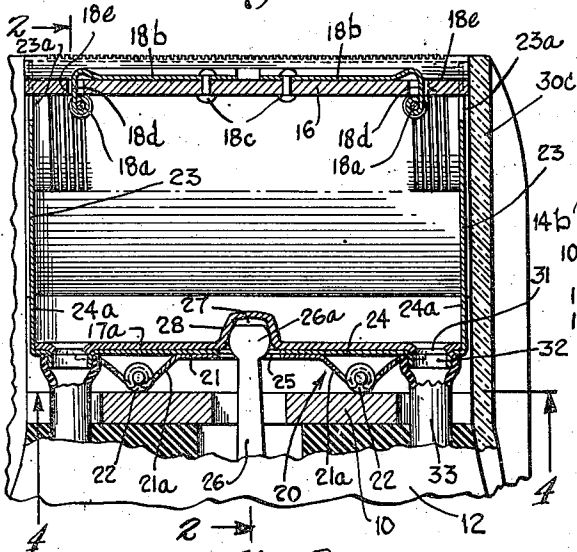


Fig. 2

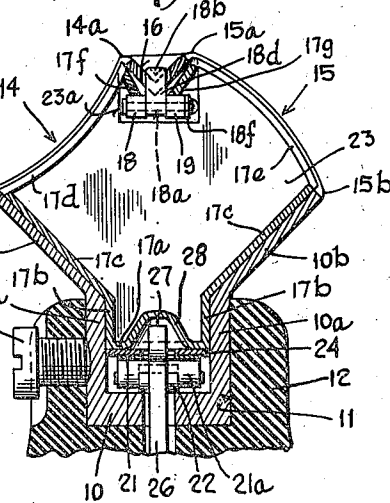


Fig. 3

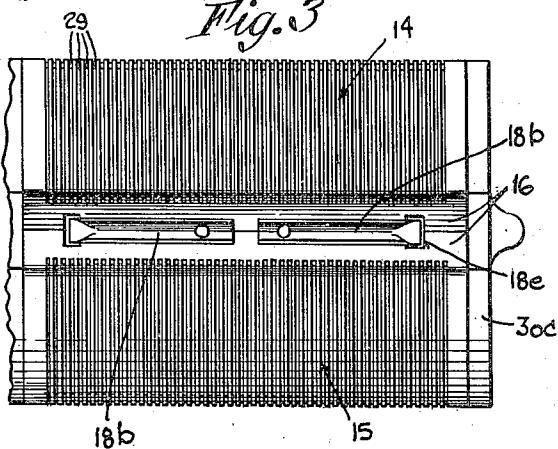


Fig. 7

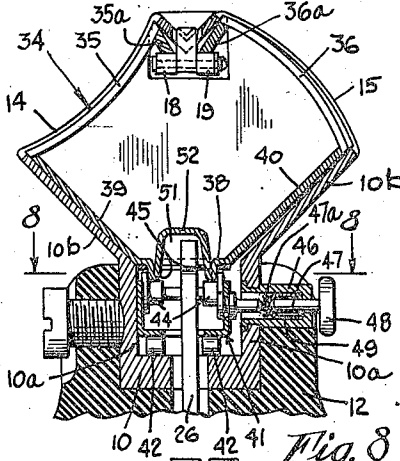


Fig. 4

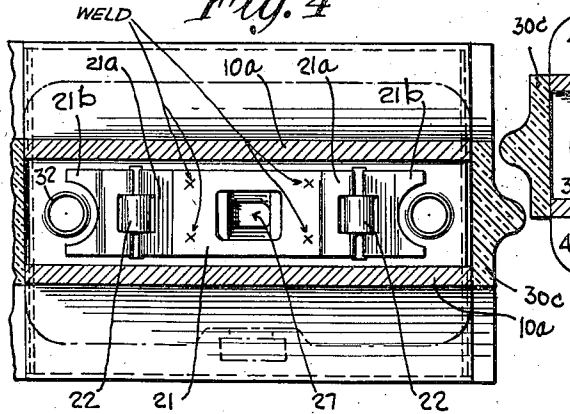
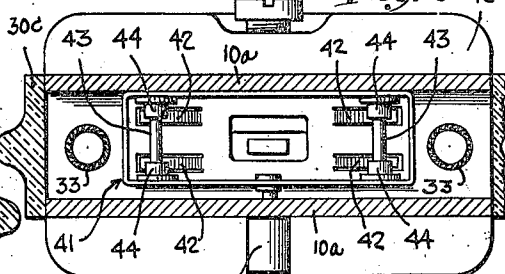


Fig. 8



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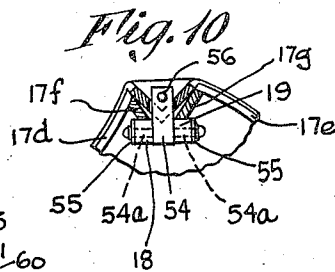
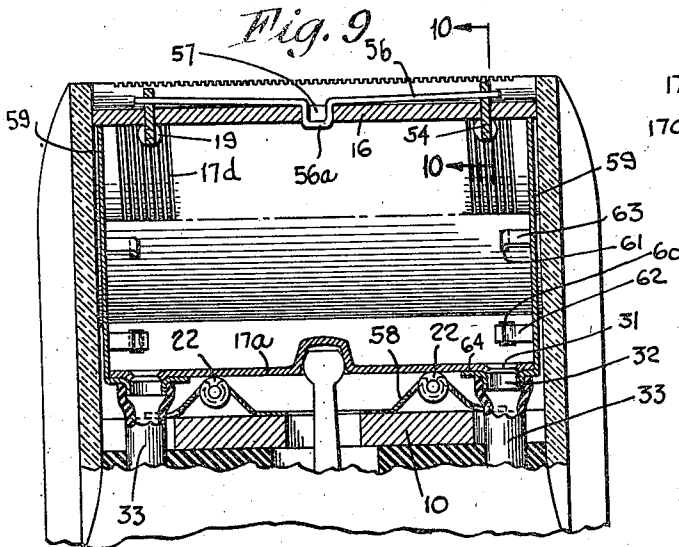
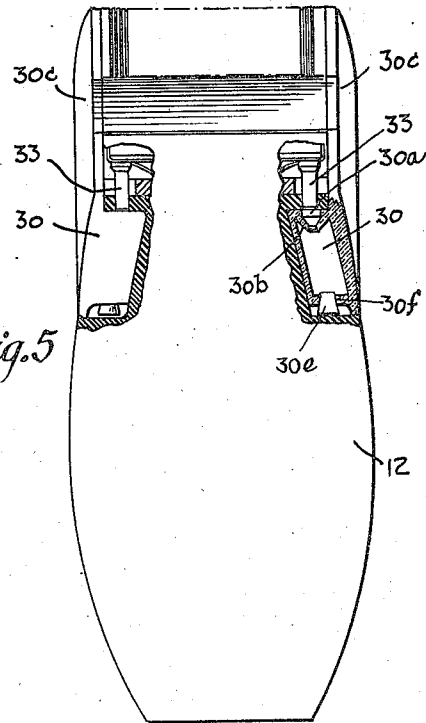
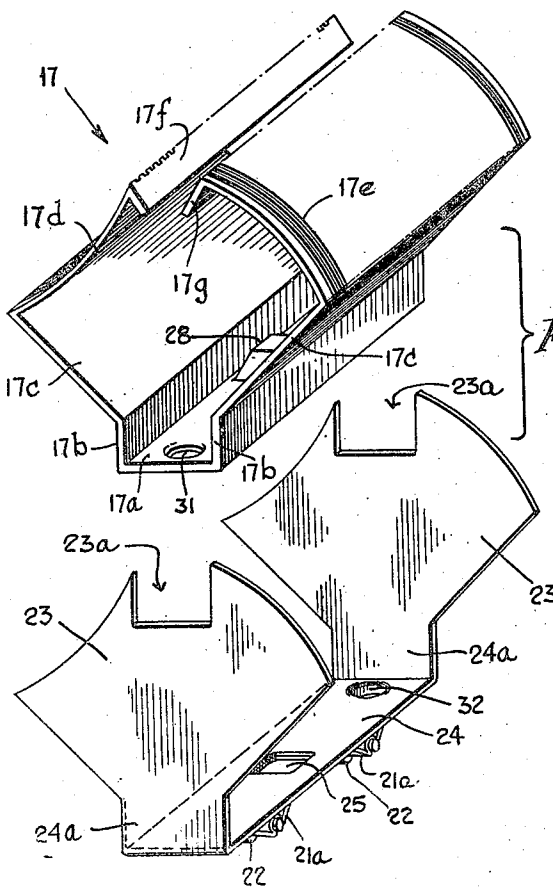
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Fig. 6



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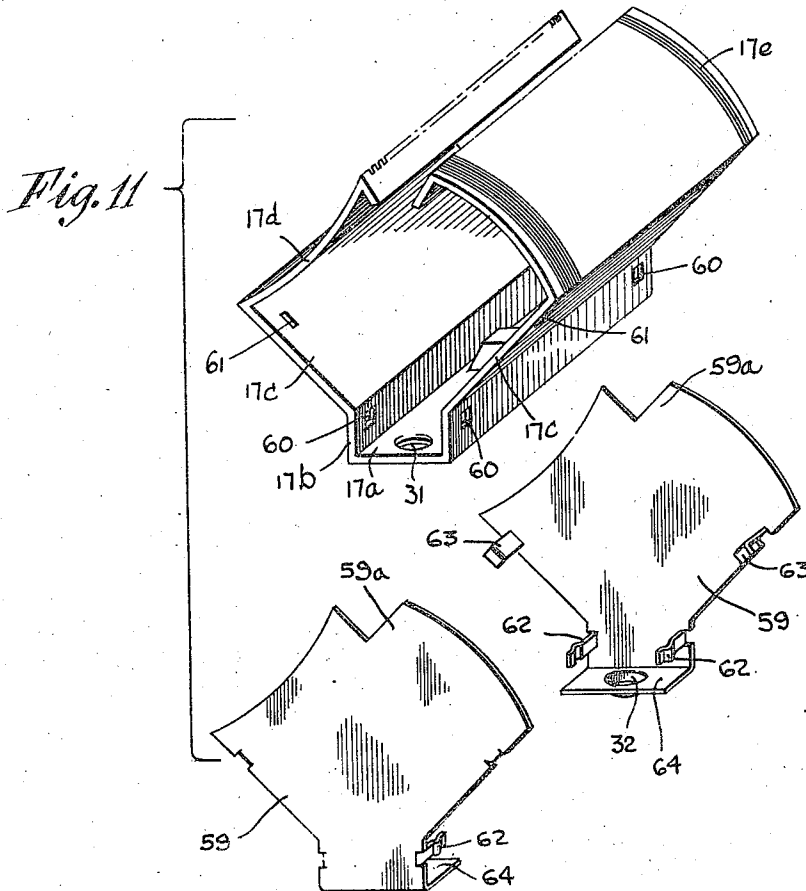
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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RAZOR

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Application October 31, 1944, Serial No. 561,199

21 Claims. (Cl. 30-43)

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This invention relates to electric shavers, and more particularly to cutting heads for shavers.

An object of the invention is to provide a cutting head for a shaver which will enable a user to shave, closely and rapidly, all parts of the face and neck, whether the skin of these parts be flat, convex or concave, so that the overall shaving time is thereby reduced, and the shaving operation made more convenient and effective.

This is accomplished by the provision of an improved dual-shaving head having separated juxtaposed cutting surfaces of different curvature and comparatively large area, which are located in such a manner that they may be applied to the skin independently of each other. Thus, when the shaver is being used, the particular cutting surface of curvature most nearly conforming to the curvature of skin surface being shaved may be used, and as a result the hair is generally cut closer to the skin, and a greater skin area is covered by a cutter at any one time.

In the embodiments of the invention illustrated herein one cutting surface is made convex, and the other concave, and thus if the skin surface being shaved is convex, the concave cutting surface may be employed, and if the skin surface is concave, the convex cutting surface employed to advantage. By this arrangement the shaving of a given skin area may be done more thoroughly, quickly, and conveniently, than was heretofore possible. For example along the jaw bone where the skin is convex, the concave cutter will cover more skin area, and generally lie at all points closer to the skin, so that a closer shave will be obtained, as well as a faster shave. Under the jaw, at the neck where the skin is concave, the same is true when using the convex cutter, and by judicious choice of cutting surfaces a user may thereby shorten considerably the shaving time, in addition to obtaining a closer shave.

The curvature of each cutting surface is also made comparatively slight, so that when either surface is being used, the skin may to a great extent conform to it, with the result that practically all the cutting surface is operating to shear hair. By this construction, area for area, the cutters of the present invention are more effective than cutters of prior devices having substantially greater curvature.

In one illustrated embodiment of the invention the cutters are operative simultaneously, so that one or the other cutter surface may be employed by merely properly manipulating the shaver casing to bring the particular desired surface in engagement with the skin. In another embodiment,

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only one cutter at a time is operative for cutting, and manually operable means are provided for making operative either cutter as desired. According to this arrangement, overall friction is reduced so that the drag on the shaver motor is less, thereby enabling a given motor to operate at a higher, more satisfactory speed, and also the total wear of the cutters is lessened, since the cutter not being used is not therefore subjected to wear.

Another object of the invention is to provide a shaving head as above which will shave closely along border lines separating smoothly shaven portions of the face from portions where hair is intended to grow, as for instance around mustaches, sideburns, and the like, without interfering with the intended hair growth, yet the head may be used for trimming the latter if desired.

This is accomplished by the provision of comparatively sharp corners along the edges of both the convex and concave cutters, so that the latter may fit closely against the skin at the border lines, to shave the unwanted hair at these points, and also evenly trim the longer hairs without over-reaching and undesirably clipping the latter.

Yet another object of the invention is to provide a means for catching, storing, and disposing of cut hair whereby the inadvertent and continual dropping of hair particles is obviated, and whereby disposal of same may be conveniently done.

This is accomplished by the provision of closure means associated with the cutters, forming inside the latter a substantially closed chamber, and by the provision of removable containers carried by the shaver casing, having connections with the closed chamber so that hair particles caught by the latter may be deposited in the containers for later disposal.

In the illustrated and described embodiments of the invention, the closure means is secured to the inner reciprocating parts of the cutters, to move therewith, so that the hair particles may be closely confined and prevented from getting between the inner and outer cutters to jam same or retard their free relative movement. By this arrangement the cut hair particles are also continually agitated and caused to be discharged into the storage containers of the casing. In a preferred embodiment the closure means comprise end plates which closely fit the cutter structures at all points, and which are individually demountable without removing the reciprocable cutter structure from the head, so that access may be had conveniently to the inside of the head for cleaning with a brush if desired.

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Stationary guard walls or covers are provided, mounted on the casing, to cover the reciprocating closure means of the movable cutters and prevent inadvertent contact between the latter and a user's fingers.

A feature of the invention is the provision of novel bearing and spring means for the movable components of the cutters whereby inertia and friction are reduced, and but few, simple and economically-produceable parts are employed.

Other features and advantages will hereinafter appear. In the accompanying drawings:

Figure 1 is a longitudinal section of a cutter head made according to one form of the invention, mounted on a shaver casing, only a portion of the latter being shown.

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Fig. 3 is a top or plan view of the cutter head of Fig. 1.

Fig. 4 is a section taken on the line 4—4 of Fig. 1.

Fig. 5 is an exploded perspective of the movable cutter structure, and the end closure, mounting assembly for the structure.

Fig. 6 is a side elevation of the cutter head mounted on a shaver, portions of the shaver casing being broken away to show the containers for the cut hair particles.

Fig. 7 is a tranverse section of a modified form of cutter head, wherein only one cutter at a time is operative for cutting.

Fig. 8 is a section taken on the line 8—8 of Fig. 7.

Fig. 9 is a longitudinal section of a cutter head illustrating another modification of the invention.

Fig. 10 is a fragmentary transverse section taken on the line 10—10 of Fig. 9, and

Fig. 11 is an exploded perspective view of the reciprocating cutter and demountable end-closures of the modification of Figs. 9 and 10.

Referring to Figs. 1, 2, and 3, the improved cutter head of the present invention comprises a channel-shaped stationary body or base 10 adapted to be received and held in a recess 11 of a shaver casing 12 by means of a set screw 13. The side walls 10a of the base 10 have angularly outwardly-directed integral extensions 10b which carry integral apertured cutter plates 14 and 15, one substantially concave and the other substantially convex. The plates 14 and 15 extend generally angularly inward toward each other, the inner edges 14a and 15a of the plates being rigidly joined together by an integral V-shaped reinforcing rib of connector 16.

For cooperation with the cutter plates 14 and 15 a movable cutter structure 17, Fig. 5, is provided having an elongate base 17a with side walls 17b slidably fitting within the side walls 10a of the stationary base 10. Integral with the side walls 17b of the movable cutter structure are outwardly-directed extensions 17c lying closely adjacent and inside the extensions 10b, the extensions 17b having inwardly-directed cutter plates 17d and 17e respectively engaging the inner surfaces of the cutter plates 14 and 15. The inner ends of the cutter blades 17d and 17e have integral bearing strips or flanges 17f and 17g respectively, these flanges being respectively engaged and carried by pairs of rollers 18 and 19, Figs. 1 and 2, rotatably mounted on headed pins 18a in turn resiliently carried by spring arms 18b. As shown in Figs. 2 and 3, the arms 18b are formed with a V-section so that they fit snugly in the groove of the reinforcing rib 16, and are secured

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to the latter by rivets 18c. Each arm has a depending portion 18d extending through a clearance aperture 18e in the rib 16, the ends of the portion 18d being formed into eyes through which the pins 18a extend. Referring to Fig. 2, washers 18f are carried by the pins 18a adjacent the rollers 19, and the ends of the pins are flattened to hold the various parts against separation.

Preferably the arms 18b are biased slightly outwardly so that continuous pressure is exerted by the rollers 18 and 19 on the flanges 17f and 17g, to cause the cutters 17d and 17e to press against the undersides of their respective apertured plates.

As seen in Fig. 2, the curvature of the cutter blades 17d is such that they closely conform to the inner surface of the concave cutter plate 14 and cooperate therewith to shear hair extending through the plate. Similarly, the cutter blades 17e are curved to conform to the inner surface of the cutter plate 15 for the same purpose.

To further cause the cutter blades 17d and 17e to press against the inner surfaces of the plates 14 and 15 a spring carriage 20 is provided, Fig. 1, mounted on the underside of the base 17a. This carriage comprises a resilient metal plate 21, Figs. 1 and 4, shaped to provide legs 21a carrying rollers 22 engaging the inner top surface of the base 10. The plate 21 is secured, as by spot welding at the points marked x, Fig. 4, to a carrier plate 24 having upturned ends 24a by means of which it is clamped to the underside of the base 17a. The extremities 21b of the plate 21 are free, however, so that they may slide an extent on the carrier plate 24, so that a yielding mounting is thereby provided for the rollers 22.

According to this invention closure means are provided at the ends of the cutter structure 17 in the form of substantially diamond-shaped plates 23 integral with the upturned ends 24a of the carrier plate 24. The closure plates 23 are cut away at their top portions to provide clearance openings 23a so that the entire movable cutter assembly may be inserted in the stationary cutter without interference between the rollers 18 and 19, and the closure plates 23.

In operation, the closure plates 23 reciprocate with the cutter 17, and function to contain the cut hair particles inside the latter. Comparatively few if any hair particles pass out through the openings 23a due to their locations close to the top corners of the cutters. As seen in Figs. 1 and 2 the plates 21 and 24 are apertured at 25 to provide access for the driving lever 26 from the shaver motor, the lever having a circular head 26a extending into and engaging the walls of a recess 27 formed by embossing the central portion 28 of the base 17a as indicated.

According to this construction the movable cutter structure 17 may be reciprocated by the driving lever 26 while the cutter blades 17d and 17e are being pressed against the plates 14 and 15 by the spring carriage 20. The rollers 22 function to materially reduce the friction of the cutter structure 17 so that most of the load imposed on the driving lever 26 is the result of, first, the friction between the respective pairs of cutter surfaces, and second, the shearing of hair during the shaving operation.

The apertures in the plates 14 and 15 may have any suitable shape, round or elongate, but at present I prefer to make the apertures in the form of slots 29 as indicated in Fig. 3. Also, I prefer to make the cutters 17d and 17e in the form of elongate plates to cooperate with the slotted plates for shearing hair.

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It will be noted that by the above arrangement I have provided a pair of separated cutters having surfaces which are substantially angularly disposed with respect to each other whereby either cutter may be applied to the skin independently of the other, the curvatures of the cutters being such that practically any portion of the skin of the face or neck may be made to closely conform to one or the other of the cutter surfaces. As a result, by so conforming the skin and cutter surfaces, a closer and quicker shaving of the skin is made possible. The concavity and convexity of the plates 14 and 15 are preferably substantially slight as indicated so that practically all of the surface of the cutter being applied to the skin will come into use for shearing hair. Therefore a larger area of skin is covered during application of either of the cutter plates. In use, the shaver of this invention may be quickly manipulated to bring either of the cutters into engagement with the skin as desired. For instance, along the jaw bone where the skin surface is convex the concave cutter 14 may be advantageously employed. Under the jaw where the skin surface is concave the convex cutter 15 would be most advantageous, and by judicious use of the concave and convex cutters a user may considerably reduce the time required for shaving while at the same time obtaining a closer shave.

According to the present invention improved means are provided for catching, storing, and disposing of cut hair whereby the inadvertent dropping of hair particles is eliminated, and disposal of same may be quickly and conveniently done. As already pointed out above, the space inside the movable cutter structure 17 is substantially enclosed by the closure plates 23 so that cut hair particles passing through the cutters will be contained and prevented from dropping out. Referring to Fig. 6 the casing 12 of the shaver is provided with a pair of containers 30 which may be mounted for convenient removal in any suitable manner, the upper end walls of the containers having apertures 30a with depending trapping flanges 30b through which hair particles may be deposited. Referring to Fig. 1 the base 17a of the movable cutter structure is provided with apertures 31 at each end, and the carrier plate 24 correspondingly apertured so that hair particles dropping inside the movable cutter structure may be discharged therefrom. The plate 24 is extruded at the said discharge apertures to provide dependent flanges 32 to which are secured rubber hose connections 33. As seen in Fig. 6 the hose connections 33 extend through apertures in the casing 12 substantially aligned with the apertures 30a of the containers 30. During the reciprocating movement of the cutter structure 17 the hose connections 33 will flex and bend, due to their lower ends being restrained by the stationary casing 12. However, the restraint on the movable cutter 17 due to the hose connections is slight, because of the small total movement of the cutter structure, and therefore no appreciable additional loading is imposed on the shaver motor.

By this construction the movement of the cutter structure 17 is utilized to cause the hair particles to be quickly discharged through the hose connections 33 into the containers 30, since the agitation given these particles causes them to traverse the base 17a until they drop through the apertures 31 therein. This is an important feature of the invention since it obviates the necessity of cleaning out hair particles from inside

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the cutter structure 17 as by a brush, but instead permits all the cut hair particles to be conveniently and neatly disposed of by merely emptying the containers 30 by removing the corks 30c in the discharge apertures 30f.

As seen in Figs. 1 and 6, the outer walls of the containers 30 are extended upward and shaped to function as stationary cover plates 39c, which prevent inadvertent contact between a user's fingers and the movable closure plates 23.

It will be noted that each of the cutter plates 14 and 15 has comparatively sharp corners along its upper and lower cutting edges. As seen in Fig. 2 the cutter plate 14 has a sharp corner 14b at its lower outer edge and a sharp corner 14a at its upper inner edge. Likewise, the cutter plate 15 has a sharp corner 15b at its lower outer edge and a sharp corner 15a at its upper inner edge. These sharp corners are an important feature of the invention since they permit shaving close to hair fringes, such as around mustaches, sideburns, and the like. At these places the skin may be closely shaved adjacent to the fringes without undesirably cutting the hair of the fringes, and also the latter may be easily trimmed where desired.

The reinforcing rib 16 also has an important function since it is made sufficiently strong to adequately support and reinforce the cutter plates 14 and 15 without additional intermediate reinforcements being required. The span of the stationary blades of the plates 14 and 15 is not so great as to weaken these any substantial amount, and since they are supported rigidly at each end the necessity for intermediate reinforcements is obviated.

Of importance, also, the rollers 22 of the carriage 20, and the rollers 18 and 19 supporting the upper ends of the movable cutters 17d and 17e, are spring-urged through their spindles instead of by spring means engaging them on their peripheries. As a result, these rollers are unhindered in their turning, providing thereby a system having comparatively small frictional retarding forces.

A modified form of the invention is shown in Figs. 7 and 8. In this form the movable cutter structure is so arranged that only one set of cutter blades is operated for cutting at any one time, there being manually operable means for shifting from one to the other set of cutters at will. By this arrangement the friction on the movable cutter structure may be materially reduced, thereby reducing the load on the shaver motor without adversely affecting the shearing action of the cutters.

Accordingly, as shown in these figures, a movable cutter structure 34 is provided having concave cutter blades 35 and convex cutter blades 36 for engagement with the cutter plates 14 and 15, the cutter blades 35 and 36 being so located that only one set at a time may engage its associated cutter plate. The cutter structure 34 is constructed so that it may be shifted laterally within the stationary cutter frame, to thereby cause one or the other of the cutters to become operative for shearing hair.

As seen in Fig. 7 the cutter structure 34 has an elongate base 38 with angularly outwardly directed extensions 39 and 40 extending parallel with the stationary extensions 10b of the cutter head. The base 38 is narrower than the stationary base 10 so that the cutter structure may be shifted laterally, the resiliently mounted rollers 18 and 19 supporting the flanges 35a and 36a at

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the upper edges of the cutters 35 and 36 in such a manner that the effect of a pivot is had at these upper edges, the flanges having a rotative rather than a translational movement during the shifting of the cutter.

A novel spring carriage is provided for the movable cutter structure 34, the carriage comprising a rectangular box-like body 41 located between the side walls 10a of the stationary base 10. The bottom of the body 41 is lanced to provide a plurality of resilient downwardly extended fingers 42 for engaging the upper surface of the base 10, and spindles 43 carrying flanged rollers 44 are mounted in the side walls of body 41. The base 38 of the cutter structure 34 is crimped to provide a pair of tracks 45 engaging the rollers 44 so that the cutter structure is thereby supported on the body 41 yet longitudinally movable relative thereto.

To provide for manual shifting of the cutter structure a sleeve 46 is rigidly mounted to extend laterally from one of the side walls 10a of the stationary base 10. The sleeve 46 slidably carries a rod 47 anchored at its inner end to an adjacent side wall of the body 41, at its outer end the rod having a knurled finger piece 48. Also, the rod 47 is provided with a pair of annular grooves 47a adjacent to each other for engagement with resilient fingers of a detent 49, affixed to the sleeve 46. It will be noted that the case 12 has a slot 50 to provide clearance for the sleeve 46.

According to this construction the detent 49 operates to hold the movable cutter structure 34 in either of its two shifted positions, and shifting of the cutter structure is accomplished by pushing or pulling the rod 47 by means of the finger piece 48.

The bottom of the body 41 is apertured to admit the drive lever 26 of the shaver, which lever extends into a recess 51 provided by forming the central portion 52 of the base 38 as shown. Referring to Fig. 7, when the finger piece 48 is pulled, the body 41 is shifted laterally, carrying with it the lower portion of the movable cutter structure 34 so that the latter pivots about the upper edges of its cutters, causing the cutter blades 36 to engage the cutter plate 15, and causing the cutter blades 35 to separate from the cutter plate 14. For either shifted position of the cutter structure 34, the resilient fingers 42 will provide the necessary pressure for the cutter which is in operative position, together with one of the rollers 18, 19.

As thus provided by this form of the invention, only one cutter of the shaver head is operated at any one time, and during this time the other cutter does not suffer any appreciable wear. Also, since only one cutter is operative at one time the total load on the shaver motor is considerably reduced. As a result, the cutter will operate at a high speed for a given motive power, and the overall life of the cutters will also be extended considerably.

Another modification of the invention is shown in Figs. 9, 10, and 11. In these figures characters similar to those in the previous figures indicate similar parts.

Referring first to Figs. 9 and 10, a novel swivel-type resilient bearing means is provided for engaging and supporting the adjacent free edges of the reciprocating cutters 17c and 17e. This means comprises a pair of blanked carrier plates 54 extending through the apertures 18e in the reinforcing rib 16, the apertures preferably being of a width to provide a snug sliding fit for the plates.

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Each plate 54 has a pair of rounded oppositely-extending integral spindle portions 54a on which the rollers 18 and 19, and washers 55 are carried, the ends of the spindle portions 54a being flattened or headed to retain the washers and rollers.

The carrier plates 54 are apertured to receive a spring wire 56 which extends along the groove of the rib 16, and is locked against turning by a central off-set portion 53a extending into an aperture 57 in the rib. The carrier plates 54 are thereby mounted so that they may swing or pivot a limited extent on the wire 56, and the apertures 18e, through which the plates extend, are made sufficiently great in length to permit this limited swivel-like movement of the plates. Preferably the spring wire 56 is biased upwardly an extent to cause the rollers 18 and 19 to engage the flanges 17f and 17g of the cutters with a certain amount of pressure, which is thus transmitted to the co-engaging cutter surfaces. This form of bearing for the reciprocating cutter structure may be particularly advantageous where a shiftable arrangement is provided as in Figs. 7 and 8.

A modified form of resilient carriage is also provided between the base portions of the movable and stationary cutter frames. Referring to Fig. 9, a carriage plate 58 is shown, the central portion of which is welded to the stationary base 10. The plate 58, which is resilient, is formed at its end portions to angularly extend adjacent the base 17a of the movable cutter structure 17, the pair of rollers 22 being resiliently carried thereby for engagement with said base portion. By this construction the carriage plate 58 and rollers 22 are not reciprocated with the movable cutter 17, and therefore the inertia of the reciprocating structure is correspondingly decreased.

According to this form of invention the reciprocating cutter 17 is provided with end plates 59 which are readily demountable independently of each other without first requiring removal of the cutter from the head. These plates at their lower portions carry the flexible connector hoses, and by being individually attachable, permit easy assembly of the shaver head without greatly bending or distorting the hoses. Referring to Fig. 11, the side walls 17b of the movable cutter base are provided with apertures 60, and the extensions 17c with apertures 61 for engagement respectively with pairs of resilient fingers 62 and 63 integrally formed on the end plates 59. Thus, the end plates may be clamped against the ends of the movable cutter structure 17 and securely held thereon, and when desired may be quickly removed for cleaning or other purposes. When removing the plates 59, a sharp flat tool is inserted between the fingers 63 and the walls 17c, to lift the hook portions of the fingers out of the apertures 61. The lower portions of the plates 59 have inwardly-extended flanges 64 which are apertured and extruded to carry the flexible connector tubes 33, as shown in Fig. 9. The base 17a of the movable cutter 17 is slightly flanged about the hair discharge apertures 31 thereof, the flanges nesting in the apertures 32 of the flanges 64 as shown in Fig. 9, thereby providing a more rigid assembly.

By this construction the closure plates 59 may be fitted closely against the edges of the reciprocating cutter structure 17, and may be made to conform at their upper portions 59a to the shape of the inner surface of the rib 16. The close fit thus provided insures against hair particles inadvertently being discharged past the end plates 59.

Variations and modifications may be made

within the scope of this invention and portions of the improvements used without others.

I claim:

1. A cutter head unit for an electric shaver having a pair of juxtaposed cutters thereon, one cutter having a surface curvature different from the other so that the cutters may respectively conform to differently curved parts of the face and neck.
2. The invention as defined in claim 1 in which one cutter presents substantially a concave surface for conforming engagement with a convex skin surface.
3. A cutter head unit for an electric shaver having a pair of juxtaposed cutters thereon, one presenting substantially a convex surface and the other substantially a concave surface for conforming engagement respectively with concave and convex parts of the face and neck.
4. A cutter head for an electric shaver, comprising a set of stationary blades having inner surfaces for engagement with a movable cutter, and outer surfaces for engagement with the skin; a support for said blades, having a body spaced from said inner surfaces; a movable cutter located between the body of the support and the stationary blades for cooperation with the latter, said cutter having a body adjacent said body of the support; and means for yieldably holding the movable cutter against the said stationary blades during the cutter movement, said means including a resilient plate secured to one of said bodies, and rollers resiliently mounted by the plate for engagement with the other of said bodies.
5. In an electric shaver, a cutter head comprising two separate juxtaposed sets of stationary blades for engagement with the skin; sets of movable cutter blades connected together for simultaneous movement and associated respectively with the sets of stationary blades; and means, including a manually operable member, for causing either one of the sets of movable cutter blades to bear against its associated set of stationary blades and cooperate with same for cutting, the other set of movable cutter blades being thereby separated from its associated set of stationary blades so that friction between same is eliminated.
6. The invention as defined in claim 5 in which there is an elongate base carrying the sets of stationary blades, said base being shaped to be received and held in a recess of the shaver casing, and said base having fixed thereon a laterally projecting bored boss to extend through the side of the casing, said boss slidably carrying the said operable member.
7. A cutter head for an electric shaver comprising a set of elongate stationary blades arranged side by side; a support for said blades comprising a channel-shaped body the side walls of which are connected with the ends of the blades; a movable cutter carried within said body for engagement with the stationary blades; and means for yieldably holding the cutter against the stationary blades during its movement comprising a resilient metal plate secured to the cutter, and roller means carried by said plate for engagement with the inside of the said channel-shaped body.
8. A cutter head for an electric shaver comprising a stationary cutter frame having an elongate base, opposite angularly outwardly directed extensions secured to opposite side edges of the base, and angularly inwardly directed apertured plates, for engagement with the skin, respectively secured to the extensions, the inner edges of the

said plates extending adjacent each other and being rigidly secured together, one of said plates being substantially convex and the other substantially concave; a movable cutter structure slidably carried within the frame, comprising an elongate base and angular extensions adjacent respectively the base and extensions of the frame, the extensions of said cutter structure carrying angularly inwardly directed cutters conforming to and cooperating with the convex and concave plates of the frame for shearing hair; bearing means between the inner ends of the cutters and inner edges of the apertured plates; and means for yieldably urging the cutters against the apertured plates during the movement of the cutter structure.

9. A cutter head for an electric shaver comprising a stationary cutter frame having an elongate base, opposite angularly outwardly directed extensions secured to opposite side edges of the base, and angularly inwardly directed substantially flat apertured plates, for engagement with the skin, respectively secured to the extensions, the inner edges of the said plates extending adjacent each other and being rigidly secured together; a movable cutter structure slidably carried within the frame, comprising an elongate base and angular extensions adjacent respectively the base and extensions of the frame, the extensions of said cutter structure carrying angularly inwardly directed cutters conforming to and cooperating with the plates of the frame for shearing hair; roller bearing means between the inner ends of the cutters and inner edges of the apertured plates; and means for yieldably urging the cutters against the apertured plates during the movement of the cutter structure.

10. In an electric shaver, a cutter head comprising two juxtaposed sets of stationary blades, one set presenting substantially a convex surface and the other substantially a concave surface for engagement with the skin; sets of movable cutter blades connected together for simultaneous movement and associated respectively with the sets of stationary blades; and means including a manually operable member, for causing either one of the sets of movable cutter blades to bear against its associated set of stationary blades and cooperate with same for cutting, the other set of movable cutter blades being thereby separated from its associated set of stationary blades so that friction between same is eliminated.

11. A cutter head for an electric shaver, comprising a stationary cutter frame having a channel-section base, opposite angularly outwardly directed extensions secured to the walls of the base, and angularly inwardly directed apertured plates for engagement with the skin, respectively secured to the extensions, the inner edges of the said plates extending adjacent each other, and being rigidly secured together, one of said plates being substantially convex and the other substantially concave; a movable cutter structure slidably carried within the frame, comprising a channel-section base and angular extensions adjacent respectively the base walls and extensions of the frame, the extensions of said cutter structure carrying angularly inwardly directed cutters conforming to and cooperating with the convex and concave plates of the frame for shearing hair; bearing means between the inner ends of the cutters and inner edges of the apertured plates; and means located between the walls of the base of the frame and the base of the cutter structure for yieldably urging the cutters against

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the apertured plates during the movement of the cutter structure.

12. A cutter head for an electric shaver, comprising a stationary cutter frame having a channel-section base, opposite angularly outwardly directed extensions secured to the walls of the base, and angularly inwardly directed apertured plates, for engagement with the skin, respectively secured to the extensions, the inner edges of the said plates extending adjacent to each other, and being rigidly secured together, one of said plates being substantially convex and the other substantially concave; a reciprocating cutter structure slidably carried within the frame, comprising an elongate base and angular extensions adjacent respectively the base walls and extensions of the frame, the extensions of said cutter structure carrying angularly inwardly directed cutters shaped to conform to and cooperate with the respective convex and concave plates of the frame for shearing hair, said cutter structure being arranged so that it may be shifted between either of two positions wherein one or the other of the cutters engages its associated apertured plate; rollers between the bases of the frame and cutter structure, engaging one of said bases for movably supporting the cutter structure in either shifted position; manually operable means for shifting and holding the cutter structure in either of its said two positions; means for yieldably mounting the rollers so that one of the cutters is held against its associated apertured plate during the reciprocating movement of the cutter structure; and bearing means between the inner edges of the apertured plates and the inner ends of the cutters, for supporting the latter during their reciprocating movements.

13. In an electric shaver, a casing; and a cutter head unit secured to the casing, said unit having a pair of cutters of rectangular outline, located so that their surfaces are at an angle with respect to each other, the cutters being adjacent each other along one edge of each, and having sharp cutting corners along said adjacent edges to enable the cutters to shave closely at a hair fringe.

14. In an electric shaver, a casing; and a cutter head unit secured to the casing, said unit having a pair of cutters of rectangular outline, located so that their surfaces are at an angle with respect to each other the cutters being adjacent each other along one edge of each, and having sharp cutting corners along the edges opposite to said adjacent edges to enable the cutters to shave closely at a hair fringe.

15. The invention as defined in claim 5 in which the means for causing the sets of movable cutter blades to bear against the stationary blades comprises a carriage connected to the manually operable member and shiftable to either of two positions with respect to the stationary blades, spring means associated with the carriage and stationary blades, and rollers mounted on the carriage for carrying the sets of movable cutter blades.

16. A cutter head for an electric shaver, comprising a set of stationary blades having inner surfaces for engagement with a movable cutter, and outer surfaces for engagement with the skin; a support for said blades, having a body spaced from the inner surfaces thereof; a movable cutter located between the body of the support and the stationary blades for cooperation with the

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latter, said cutter having a body adjacent the body of the support; and means for yieldably holding the movable cutter against the said stationary blades during the cutter movement, said means including a pair of spindles, means for yieldably mounting the spindles on one of said bodies, and rollers carried by the spindles, engaging the other of said bodies.

17. A cutter head for an electric shaver, comprising a stationary cutter structure having a substantially channel-shaped base and blade means supported on the walls of the base; a movable cutter carried within the stationary cutter structure for engagement with the said blade means, having a body adjacent the said base; and means for yieldably holding the movable cutter against the blades means during its movement, comprising a resilient metal plate secured to the base, and roller means carried by the plate for engagement with the body of the movable cutter.

18. A cutter head for an electric shaver comprising a stationary cutter structure having an elongate base and blade means supported on the side edges of the base above the latter; a movable cutter carried within the stationary cutter structure for engagement with the said blade means, having a body adjacent the said base; and means for yieldably holding the movable cutter against the blade means during its movement, comprising an elongate resilient metal plate at its center secured to the said base and rollers carried by the plate, portions of the latter on opposite sides of the center extending angularly toward the body of the movable cutter, said portions resiliently mounting the rollers for engagement with said body.

19. A cutter head for an electric shaver, comprising a pair of stationary perforated cutter plates having inner surfaces for engagement with movable cutters and outer surfaces for engagement with the skin, said plates being mounted so that they are closest to each other along one edge of each; a center support extending along and connected to the adjacent edges of the plates; a pair of reciprocating perforated cutter plates located broadside to and for engagement with the inner surfaces of the stationary plates; means connecting the furthest removed edges of said reciprocating plates together for simultaneous movement, the adjacent edges of the reciprocating plates being free of each other; and bearing means mounted on the center support, engaging the adjacent edges of the reciprocating plates whereby the latter may be yieldably held, during their movements, in engagement with the inner surfaces of the stationary plates.

20. The invention as defined in claim 19 in which the bearing means comprises rollers resiliently mounted on the center support, and in which the reciprocating plates have flanges at their adjacent edges, engaging said rollers.

21. The invention as defined in claim 19 in which the center support has a pair of spaced slots, and in which the bearing means comprises a pair of apertured carrier plates slidably mounted in said slots, a pair of rollers rotatably carried by each carrier plate for engagement with the adjacent edges of the reciprocating plates, and a spring wire extending along the center support and into the apertures of the carrier plates for resiliently mounting same.

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