Jan. 14, 1958 A. LUSSIER 2,819,518

ELECTRIC HAIR CUTTER AND DRY SHAVER

Filed Nov. 16, 1955 2 Sheets-Sheet 1

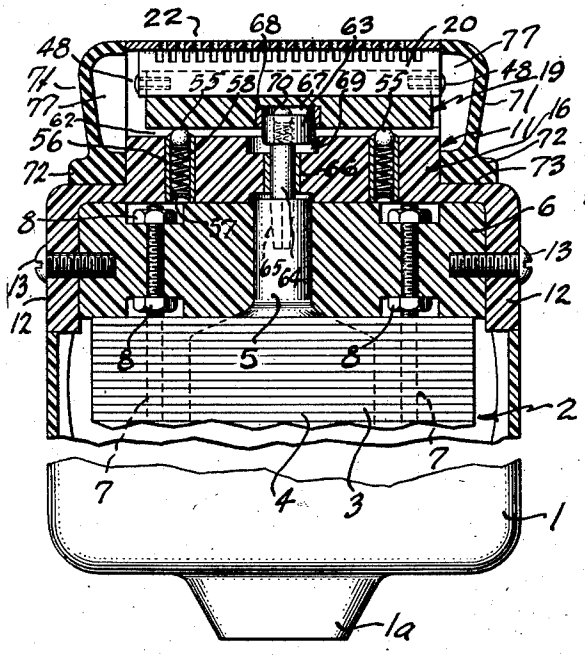

Fig. 1.

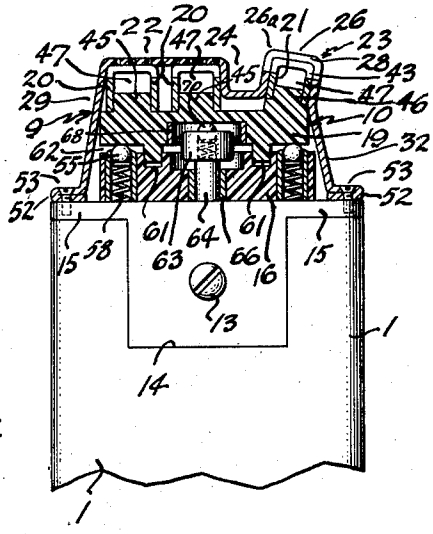

Fig. 2.

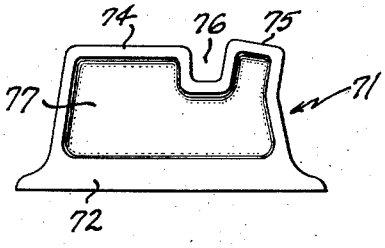

Fig. 4.

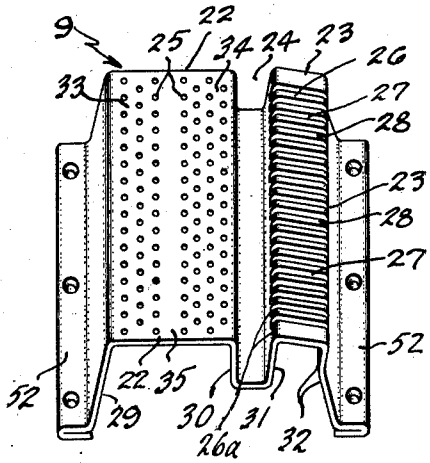

Fig. 3.

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ELECTRIC HAIR CUTTER AND DRY SHAVER

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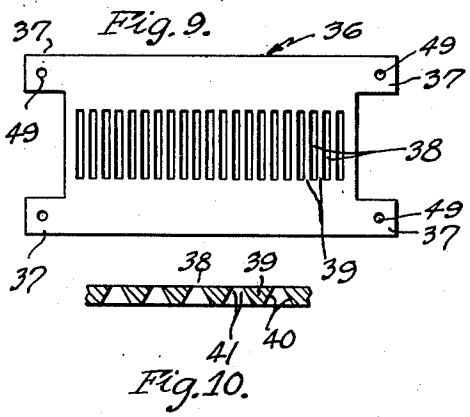


Fig. 9.

Fig. 10.

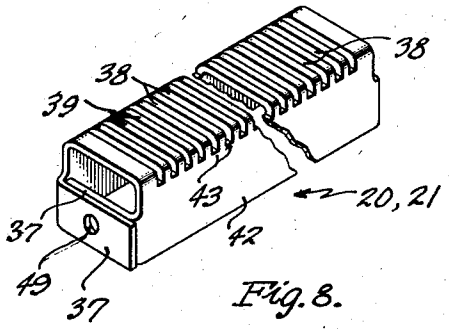


Fig. 8.

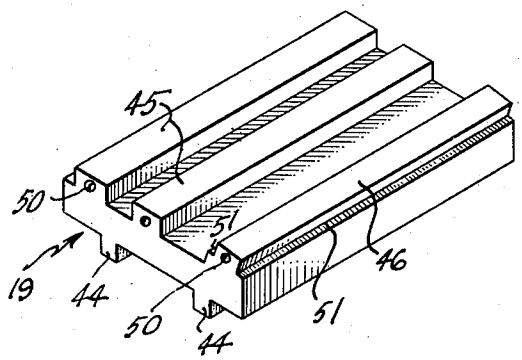


Fig. 5.

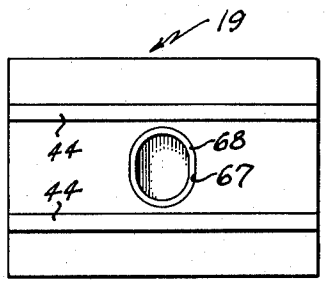


Fig. 6.

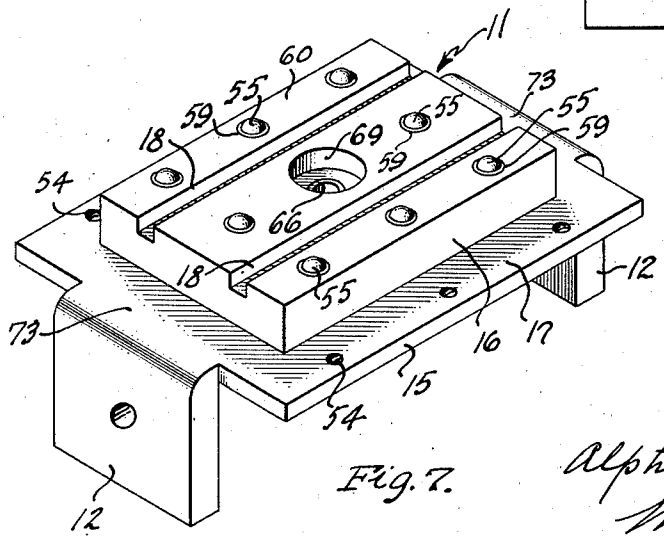


Fig. 7.

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2,819,518

# ELECTRIC HAIR CUTTER AND DRY SHAVER

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Application November 16, 1955, Serial No. 547,090

9 Claims. (Cl. 30—43)

This invention relates to an electric hair cutter and dry shaver, particularly of the type in which the device comprises a cutter head including an outer stationary cutter having perforated surfaces to engage the surface of the skin, and an inner movable cutter engaging the inner surface of the outer cutter and cooperating therewith for providing a shearing action for cutting the hairs. It has for an object to provide a device of this character which will trim or cut long hairs as well as shave the shorter hairs as in the usual close shaving operation, and has for another object to provide an improved cutter head of the type in which there is a single stationary outer skin engaging cutter or guard, but having two separated perforated cutter surfaces both of which are capable of cooperating for close shaving operations, and one of which has an additional capability of trimming or cutting long hairs either of a beard which has been allowed to grow, or the hair on the head including cutting or trimming the hair at the back of the neck or on the sides of the head, or cutting the hair from legs and arms.

Another object is to provide a new construction in which the hair cutting action can be secured to effectively shear the hair in both up and down strokes of the device, and which will have an improved combing action to direct the hairs into direct cutting relation to the shearing elements for more efficient and effective cutting of the hair.

A further object is to provide an improved means for mounting and operating the inner movable cutter.

A still further object is to provide an improved construction for receiving and holding the cut hairs, and also one which is so constructed and arranged as to facilitate the cleaning of the shaver and the removal of the cut hairs.

With the foregoing and other objects, in view, I have devised the construction illustrated in the accompanying drawings forming a part of this specification. It is, however, to be understood the invention is not limited to the specific details of construction and arrangement shown, but may embody various changes and modifications within the scope of the invention.

In these drawings:

Fig. 1 is a partial side elevation and a partial vertical longitudinal section of the assembled device;

Fig. 2 is a partial end elevation and partial transverse section;

Fig. 3 is a perspective view of the outer stationary cutter;

Fig. 4 is an inner side view of one of the bins or so-called "whiskets" for receiving and retaining the cut hairs;

Fig. 5 is a perspective view looking toward the top of the carrier for the inner cutters;

Fig. 6 is a bottom view thereof;

Fig. 7 is a perspective view looking toward the top



of the support for the reciprocable carrier for the inner cutters;

Fig. 8 is a perspective view of one of the inner cutters;

Fig. 9 is a somewhat diagrammatical view of the blank for making the inner cutter, and

Fig. 10 is a transverse detail section on an enlarged scale.

The device comprises an enclosing housing 1 of any suitable material, preferably a suitable molded plastic material to enclose any suitable or standard type of electric motor 2 and form a hand grip for operating the device. The motor includes the usual rotary armature 3 in the laminated pole or field elements 4, and includes a shaft projecting from the armature at its upper end, as indicated at 5, adapted to be connected with the movable cutter for operating it. The cutter head is mounted on and secured to the motor to form a structural part thereof by means of a molded plastic block 6 secured to the upper end of the motor by any suitable means, such for example as the screws or bolts 7 securing the laminations together and having threaded projecting end portions passing through openings in the block and mounting the block on the motor by means of suitable nuts 8 in recesses in the upper and lower surfaces of the block. The improved cutter head comprises an outer stationary cutter 9 and an inner movable cutter assembly 10 within the outer cutter and having cutting means cooperating with the outer cutter to secure the shearing action for cutting the hair closely in the hair cutting operation. The means for mounting these cutter elements including both the inner and outer cutters, comprises a base or support 11 preferably of suitable molded plastic material seating on the top of the block 6 and having downwardly extending end members 12 lying against or embracing the opposite ends of the block 6 and secured thereto by any suitable means such, for example, as the screws 13, these end members 12 preferably seating in suitably shaped recesses or openings 14 in the upper end of the plastic housing 1 to provide a smooth outer finished surface. The base or support 11 includes a flange portion 15 seating against the outer end of the housing or casing 1 and having the same contour with the end portions 12 integral with the opposite end portions thereof, and on the top of this flange portion 15 is an upwardly extending body portion 16 molded in an integral one piece with the lower plate or flange portion 15. This body portion is of smaller size than the flange portion 15, thus providing ledges or shoulders 17 on which the outer stationary cutter 9 may be mounted. The upper surface or top wall of the body portion 16 is provided with laterally spaced longitudinal open channels or grooves 18 forming guide means for stabilizing and guiding the longitudinal reciprocating movements of the inner cutters. The inner cutter assembly comprises a support or carrier 19 preferably also molded of suitable plastic material and provided with means for mounting and carrying the inner cutter members 20 and 21.

The outer or stationary cutter 9 is formed of hardened steel ground to a suitable finish with thin outer skin-engaging or cutting surfaces to secure a close shaving operation, the various thicknesses being, of course, greatly exaggerated on the drawing. It comprises a plurality of top perforated skin-engaging surfaces, preferably two, as indicated at 22 and 23, separated by a longitudinal open channel 24. The surface 22 may be provided with any suitable shape or form of perforations for securing a close shaving operation. In the form shown they comprise a series of openings 25 which may be either circular, oblong, elongated slots, or the like, and the surface 23 is in the

form of a substantially longitudinally extending rib shaped portion, preferably with a flat outer skin-engaging surface **26**, and provided with perforations comprising a series of transverse slots **27** separated by transverse cutting blades **28**. It will be seen from Figs. 2 and 3 that both the portions **22** and **23** are in cross section substantially inverted U shape, including substantially parallel side members **29** and **30** for the portion **22**, and **31** and **32** for the portion **23**. The inverted U or rib-shaped portion **22** is wider than the inverted U or rib-shaped portion **23**. This is so that the portion **22** may be provided with two sets of shearing surfaces **33** and **34** separated by an imperforate portion **35** each adapted to cooperate with a separate inner cutter member **20**, thus providing a larger shaving surface for engaging the skin and securing the shaving operation. The slotted portion **23** is of a width for cooperation with a single inner cutter element **21**, which, however, is the same as the cutter elements **20** cooperating with the separate portions of the wider cutting surface **22**. These inner cutter members are shown in detail in Figs. 8, 9 and 10, and are stamped from thin sheet hardenable steel to form a blank **36** with longitudinally projecting lugs **37** at its opposite end corners, and its intermediate portion provided with a series of transverse elongated slots **38** separated by the transverse bars **39**, which, however, are later ground from the lower or inner side with tapered side walls **40**, thus providing the transverse bars **39** for cooperation with the cutter surface **23** with sharp shearing edges **41**. The blank may be folded or formed into the hollow cutter of Fig. 8 of inverted U shape in cross section, with the lugs **37** folded inwardly and overlapped at the opposite ends thereof to strengthen and stiffen the cutter, and with the slots **38** and the cutter blades **39** at the top surface and connecting the side members. The slots **38** are of a length to extend at their opposite ends a suitable distance downwardly into the side walls **42** of this member, as indicated at **43**, to thus also carry the cutter blades **39** into the side walls and provide cutting edges at the upper portions of these side walls for a better shaving and cutting operation, particularly for longer hairs, as will later be described. These two different designs of shaving and cutting areas **22** and **23** also make it possible to shave with two differently perforated surfaces at the same time and thus gain greater speed for the shaving operation than could ordinarily be possible with present types of guards having only a single design of perforated guard shaving surfaces. This design also provides means for accomplishing a cleaner close-to-the-skin-line shave as a result of having the two differently designed outer cutter surfaces. It is a scientific finding that the beard is of triangular shape and lies in different directions, and the advantage of having two differently designed perforated surfaces and openings for receiving the beard permits the cutting edges of the different perforations to attack the beard from different angles during the exceedingly fast reciprocating movement of the synchronized cutting action.

The carrier **19** for these blades or inner cutters, as previously indicated, is preferably of molded plastic material, and has a pair of laterally spaced longitudinal ribs **44** on its under side guided for longitudinal sliding movement in the channels **18** of the block **6**, these being of a width to have good sliding fit in the channels **18** and properly guide and position the carrier **19** and cutters **20** and **21** in the shaving operation. On its upper side this carrier is provided with a plurality of longitudinally extending ribs **45** and **46**. The ribs **45** are laterally spaced to carry the inner cutters **20** under the perforated shaving portion **22** of the outer stationary cutter, while the rib **46** is to carry the cutter **21** under the perforated portion **23** of the outer cutter. The cutters **20** are seated on the ribs **45** and embrace them with their opposite side walls, the ribs **45** being of less height than the cutters so as to provide a clear space **47**, as shown in Fig. 2, between the cutting blades **39** and the top of these ribs to permit transverse passage of a suitable cleaning brush to clean out the



cut hairs from the inside of the inner cutters. The cutters are secured on these ribs by suitable means, such, for example, as screws **48** passing through the openings **49** in the lugs **37** and overlapped at the end walls of the cutter, and threaded into suitable tapped openings **50** in the end walls of the carrier.

As the other cutter **21** is within the outwardly inclined portion **23** of the outer cutter the rib **46** has similarly inclined side walls and shoulders **51** on which the cutter **21** is seated, and it is secured the same as cutters **20** by screws **48** passing through the end walls **37** and threaded into the ends of the carrier. This portion **23** is inclined outwardly away from the portion **22** to secure a better guiding effect for the blades and slots of the outer cutter to better guide and direct the long hairs into these slots **27** for the cutting or shearing operation. This also inclines the top flattened wall **26** downwardly and outwardly, but the side walls **31** and **32** are made somewhat longer so that the top flattened wall **26** is spaced above the level of the perforated portion **22** to also facilitate the cutting of the longer hairs, and also to act as a guide for the perforated portion **22** and further act to stretch the skin and draw it flat to facilitate the shaving action of the portion **22**. As the side walls **31** and **32** of the portion **23** are longer to carry the perforated flat wall **26** above the level of portion **22**, the rib **46** is also somewhat higher than the ribs **45** to properly position the cutter **21** with respect to the higher portion **23**. This inclined arrangement of the portion **23** together with the channel **24** provides a device which can shear off hair in both the up and down strokes, the hair being combed into the cutting slots either through the channel or outer tilted edge. Also raising the handle up and down while the cutting edge is engaged, grades the hair. Turning the device over and using a down stroke with the handle in an upward position creates another different angle for cutting and grading the hair. Because of this easy maneuverability the device offers several new angles in which the tilted edge can be used for excellent hair grooming. Only the cutter used in the position for cutting hair uses the particular advantage of the extended side blades **43**. This is to permit the long hairs to lie down into the slots between the blades, and through the reciprocating action, the hairs cross the path of a similar pattern of cutter bars on the beveled edge of the guard for a very effective shearing action. As the guard is run through the hair it is also combed into the U-shaped channel **24** and directed into the path of the shearing edges of the guard. The inner cutters are interchangeable for longer service. The distance over which the inner cutters travel during their reciprocating movement should be far enough to have the inner hair clipper cutter travel across two complete slots in the guard. This distance will also be sufficient to apply to the other perforated shaving area **22**. From the fact that in cutting the hair the shearing edge of the guard acts as a comb, it is possible to grade or taper the cutting process to give a fully groomed appearance. To accelerate cutting long hairs close to the skin line, after trimming it short with the edge portion **23**, it is only necessary to make a flat contact with the shaver area **22** while moving the device back and forth. The upward and outward slanted hair cutting edge or portion **23** picks up the long hairs comb-like and lays them crosswise into the open slots between the blades for instant shaving. The tilted right angle edge plus the side cutting action of the inner cutters registering with the cutter blades in the outer guard or cutter insures excellent shearing results of long hairs.

The side walls **29** and **32** of the outer stationary cutter **9** are made of a height to enclose the base portion **16** and the inner cutter assembly **10** and are provided with outwardly extending flanges **52** on their lower edges seating on the top of the flange portion **17** and secured thereto by suitable screws **53** passing through these flanges and threaded into suitable tapped openings **54** in the flange portion **17**. These flanges **52** may be strengthened by

folding them backwardly on themselves as indicated in Figs. 2 and 3. The side walls 29 and 32 are inclined downwardly and outwardly to provide a clearance and prevent friction on the sides of the carrier 19 and also improve the appearance of the head.

Suitable means are provided for supporting and reciprocating the inner cutter assembly 10 during the shaving operation. For this purpose there are mounted in the body portion 16 of the base 11 a series of spring-pressed balls 55. These are mounted in tubular sleeves 56, inserted in the openings in the member 16 with a tight fit or molded therein, and having their lower ends turned inwardly somewhat to provide a support for a thin metal disc 57 which when forced into position is dished somewhat, as shown in Fig. 1, so that as it tends to flatten it is pressed against the sides of the sleeve 56 and is held therein. Supported by this disc is a coil spring 58 pressing at its upper end against the under side of the ball 55, and the upper end of the sleeve 56 is extended inwardly somewhat at 59 to overlap the ball sufficiently to retain it in the sleeve with a portion of the ball projecting above the end of the sleeve and above the top surfaces 60 of the body portion 16. The carrier 19 for the inner cutters rests on the top of these balls with its guide ribs 44 in and guided by the side walls of the channels 18. In this position the inturned ends of the sleeves 56 are spaced above the balls or the balls are depressed somewhat so they are free and are yieldably held against the under side of the carrier 19 by the springs. The inner cutter assembly is therefore yieldably supported on these balls 55 for longitudinal reciprocating movement to reciprocate the inner cutters 20 and 21 at the inner sides of the perforated portions 22 and 23 of the stationary outer cutter for the cutting and shearing operation, and the springs supporting the balls 55 will secure the proper pressure of the inner cutter against the outer cutter for the proper cutting or shearing operation and will maintain this pressure indefinitely and to compensate for wear between the cutters. The balls 55 also provide a rolling or antifriction bearing support for the inner cutter assembly to reduce friction and facilitate the reciprocation of this assembly. Suitable clearance is provided at 61 between the lower edges of the ribs 4 and the bottoms of the channels 18, and a similar clearance 62 between the under sides of the carrier 19 and the top of the body portion 16 to permit downward yielding movement of the inner cutter assembly and provide free movement of this assembly. With this arrangement the three separately spaced identical inner cutters are reciprocated in synchronism while mounted upon and carried by a single resiliently mounted plastic supporting member.

This inner cutter assembly is reciprocated longitudinally within the outer cutter 9 by an eccentric cam 63 secured to the upper end of the armature shaft 5 of the motor for operation thereby. It is mounted on a downwardly extending supporting stem or shaft 64 having a square tapered lower end 65 set into a similarly shaped and tapered opening or socket in the end of the shaft 5, and this stem or shaft is supported in a suitable bearing sleeve 66 in the base 11. The eccentric cam 63 extends into an elongated recess 67 in the under side of the carrier 19 which is lined with a metal sleeve 68 for a bearing for the eccentric cam, and the cam is wide enough to extend a short distance into a recess 69 in the top of the base 11, but is spaced from the bottom of this recess for proper clearance. Mounted in this eccentric cam 63 is a spring-pressed ball 70 mounted in a suitable sleeve and supported by a spring the same as the balls 55, to press against the top of the recess 67 to help support the carrier 19 and also to retain the stem or shaft 64 of the cam in its socket in the shaft 5 of the motor. This provides a noiseless cam action for operating the inner cutter.

At the opposite ends of the outer and inner cutters are bins or so-called "whiskets" for receiving the cut hairs and retaining them until they are removed by the cleaning operation. An effective form for these bins or "whiskets"



is shown in Figs. 1 and 4. It comprises a member 71 of soft resilient rubber provided with a flanged base 72 to seat on and be cemented to the top 73 of the end portions of the flange 15 of the base member 11, and the upper portion of these members 71 is given an outline, as shown in Fig. 4, to correspond with the end outline of the outer stationary cutter 9, including a wider flat rib portion 74 to correspond with the end of the perforated portion 22, and a narrower outwardly inclined higher portion 75 to correspond with the rib portion 23 of the outer cutter and separated from the portion 74 by an upward facing recess 76 corresponding to the channel 24 in the outer cutter. On its inner wall is a recess to provide a chamber or pocket 77 to receive and hold the cut hairs and retain them. The flexible resilient rubber, however, permits the upper end or edge of these members 71, by merely pressing downwardly and outwardly on their upper end edges, to be shifted downwardly and outwardly to expose the cavity 77 for easy removal of the hairs accumulated therein, and when released the resilient action of the rubber will shift them back to the closed position of Fig. 1. The open recesses 76 permit the passage of a suitable cleaning brush through the channel 24 for a cleaning operation, and after these members 71 are swung downwardly and outwardly this or a similar brush may be easily passed longitudinally through the clearance spaces 47 within the inner cutters for a similar cleaning operation. These soft rubber bins will also act to greatly dampen the chatter commonly developed in this type of device.

Suitable electrical connections to the motor may be provided in the usual manner, as for example by providing the lower end of the shell or casing 1 with a suitable hollow boss 1*a* to receive a plug-in connection (not shown) by which the shaver may be plugged into any suitable electric wall or other outlet for operation of the shaver.

It will be understood from the above that this provides a very effective and simple construction for performing the dual operations of close shaving the face or other surfaces, and either simultaneously or separately permitting the cutting of longer hairs such, for example, as whiskers which have been allowed to grow, or the hair of the head, including trimming at the back of the neck and the sides of the head. Both perforated portions 22 and 23 of the cutter head may be used for close shaving of the face, the narrower outwardly inclined slotted portion 23 not only shaving with the wider portion 22 but also acting as a guide for the portion 22 and as a means for drawing or stretching the skin taut and flattening it for a more effective shaving by the portion 22. The perforated portions will operate with movements of the cutter in both directions, but in cutting the hair the narrower portion 23 may be used either above or below the portion 22. Also by varying the angle of inclination of the cutter head as it is moved upwardly and downwardly in the hair cutting operation, the action of cutting the hair may be effectively controlled. The separating channel 24 and the narrower shape and inclined raised portion 23 as well as the inclined outer surface 26 of this transversely slotted portion 23 has an effective combing effect to raise and position the longer hairs and properly direct them to and place them in the slots 27 in the outer cutter for most effective cutting and shearing by both the portions 43 in the sides of the inner cutter and the transverse portions or blades on the top flattened portion of the cutter. The inclined hair cutting portion 23 will stretch the skin ahead of the trailing shaving surface 22 and thereby render the skin taut prior to the actual cutting action while shaving. The inclined portion 23 and slightly elevated edge 26*a* gives the effect of a double stroke each time the shaver is moved once over the skin. The facial contours are flattened out and the beard sheared ahead of the actual close shaving action. It will be seen the structure is a very simple one, involving a minimum number of parts which may be manufactured and assembled at relatively low cost,

and as the mounting and carrying portions may be made of suitable plastic materials such, for example, as the phenolic condensation products, vinylites, acetates and like materials, they are of light weight to facilitate proper operation and use of the device and also to reduce its manufacturing and maintenance costs. It permits easy assembly and disassembly for inspection, cleaning and repair. While this device provides an excellent shaver which will give a very satisfactory close shave, it also provides means for the user to easily cut or trim long hairs with the same good results as obtained from a conventional hair clipper. The hair cutting edge portion 23 of the guard is especially designed to lift and guide the long hairs into the cutting slots and blades. This device is also particularly adapted for removing hair from legs and arms.

Having thus set forth the nature of my invention, I claim:

1. An electric shaver comprising a cutter head including a stationary outer cutter having two perforated operating sections separated by a longitudinally extending open channel, one section comprising a perforated surface to engage the surface of the skin for close shaving and the other section in the form of a longitudinal rib of inverted U shape in cross section with laterally spaced sides inclined outwardly away from the other section and a flat outer connecting wall between them inclined downwardly and outwardly with its inner logitudinal edge somewhat higher than the first perforated section, said outer connecting wall and the upper portions of the adjacent side walls provided with longitudinally spaced transverse slots for entrance of long hairs and separated by cutter blades between them, a reciprocable inner cutter in the outer cutter comprising a set of cutter blades engaging and cooperating with the inner surface of the first perforated section and a section of elongated inverted U-shape engaging the connecting and side walls of the second perforated section provided with longitudinally spaced transverse cutter blades extending across the top wall and down into the upper portions of the side walls to cooperate with those in the outer cutter, and means for connecting the inner cutter with an operating motor for longitudinal reciprocation of the inner cutter.

2. An electric shaver comprising a cutter head including a stationary outer cutter having two perforated operating inverted U-shaped shaving sections separated by an open channel and open at its opposite ends, an inner movable cutter comprising separate sets of cutter blades engaging and cooperating with the perforated surfaces of the outer cutter for the shearing cutting action, resilient yieldable rubber bins extending across and closing the open ends of the outer cutter provided with hair receiving chambers in their inner sides, and said bins secured at their lower edges with their upper portions yieldable downwardly and outwardly to expose said chambers for removal of the contents thereof.

3. An electric shaver comprising a cutter head including a hollow stationary outer cutter having perforated outer skin engaging surfaces and open at its opposite edges, a movable inner cutter having blades cooperating with said perforated surfaces for a shearing operation, resilient yieldable rubber bins extending across and closing the open ends of the outer cutter and provided with hair receiving recesses in their inner surfaces, and said bins secured at their lower edges with their upper portions yieldable downwardly and outwardly to expose said recesses for removal of the contents thereof.

4. An electric shaver comprising a cutter head including a block, means for mounting the block on an operating motor, a base comprising a flange portion and an upwardly extending body portion on the top of the flange portion, said base seated on the block and secured thereto, the top wall of the body portion provided with laterally spaced longitudinal channels, a carrier provided with ribs on its under side guided for longitudinal movement in said channels, an inverted U-shaped outer stationary cutter having an outer preforated skin engaging wall and downwardly extending side walls mounted at their lower portions on the base, inner cutters mounted on the carrier engaging and cooperating with the inner sides of the perforated wall of the outer cutter for cooperation therewith for a shearing operation, a series of spring supported balls mounted in the base and engaging the under side of the carrier to support the carrier and press the inner cutter against the outer cutter, and means for connecting the carrier to the motor for operation thereby to reciprocate the inner cutters.

5. An electric shaver according to claim 4 in which the block, base and carrier are of a molded plastic material, and the outer and inner cutters are of hardened steel ground to size and finish.

6. An electric shaver comprising a cutter head including a base including a body portion provided with a pair of laterally spaced longitudinal channels in its top wall, means for mounting said base on an operating motor, a carrier provided with ribs on its under side guided for longitudinal movement in said channels, an inverted U-shaped outer stationary cutter having outer perforated skin engaging walls and downwardly extending side walls secured to the base, inner cutters mounted on the carrier and engaging the inner surfaces of the perforated walls of the outer cutter for cooperation therewith, spring supported balls mounted in the base and engaging the under side of the carrier to yieldably support the carrier for longitudinal reciprocating movement and press the inner cutters against the outer cutter, and means for connecting the carrier with the motor for operation of this carrier and the inner cutters.

7. An electric shaver according to claim 6 in which the means for operating the carrier and inner cutters includes an elongated recess in the under side of the carrier, an eccentric cam in the recess, a shaft extending downwardly from the cam and provided with means at its lower end for connecting it to the armature of the motor for operation thereby, and a bearing for the shaft in the base member.

8. An electric shaver comprising a cutter head including a base including a body portion provided with a pair of laterally spaced longitudinal channels in its top wall, means for mounting said base on an operating motor, a carrier provided with ribs on its under side guided for longitudinal movement in said channels and a plurality of laterally spaced upwardly extending longitudinal ribs on its top side, a hollow stationary outer cutter including different perforated skin engaging upper surfaces on inverted U-shaped portions separated by an open channel and downwardly extending side walls secured to the base member, inner inverted U-shaped inner cutters mounted on said ribs on the top of the carrier and provided with transverse cutter blades in their top walls at the inner sides of the perforated walls of the outer cutter for cooperation therewith, a plurality of spring supported balls mounted in the base, said carrier resting on said balls and yieldingly supported thereby with the springs retaining the inner cutters against the outer cutter, and means for connecting the carrier with the motor for operation of the carrier and the inner cutters thereby.

9. An electric shaver according to claim 8 in which the base member and the carrier for the inner cutters are formed of molded plastic material.

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