May 6, 1941. O. C. KAVLE 2,240,890

SHAVER

Filed Oct. 11, 1938 3 Sheets-Sheet 1

Fig. 1.

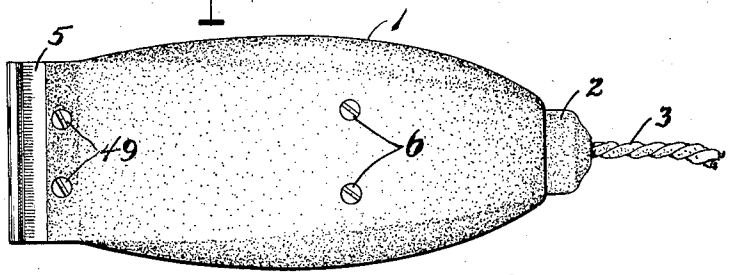


Fig. 2.

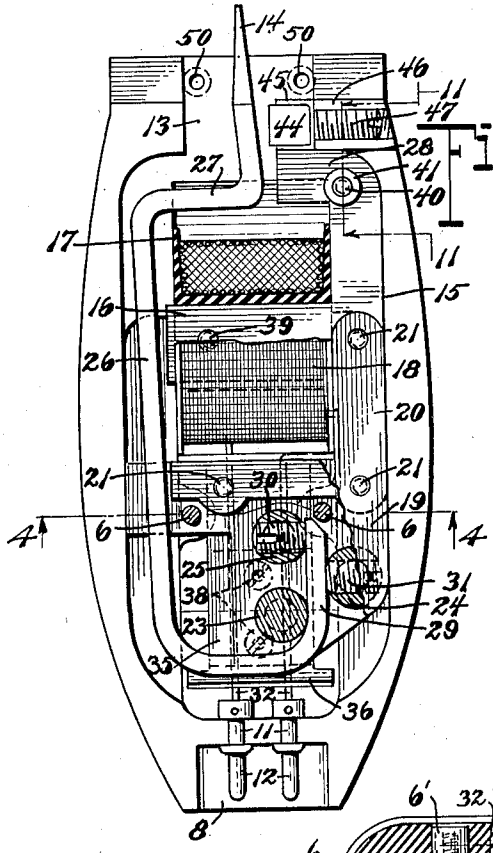


Fig. 3.

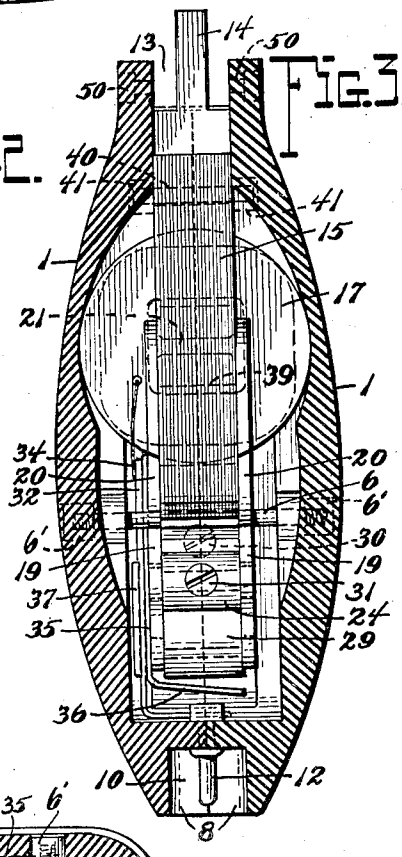
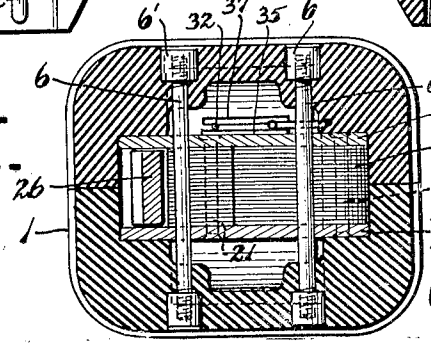


Fig. 4.



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May 6, 1941. O. C. KAVLE 2,240,890

SHAVER

Filed Oct. 11, 1938 3 Sheets-Sheet 2

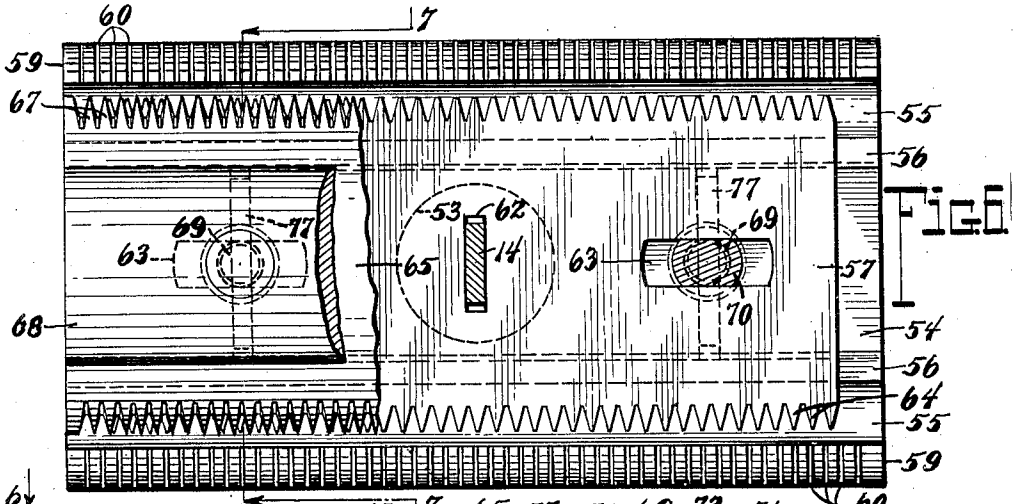


Fig. 6

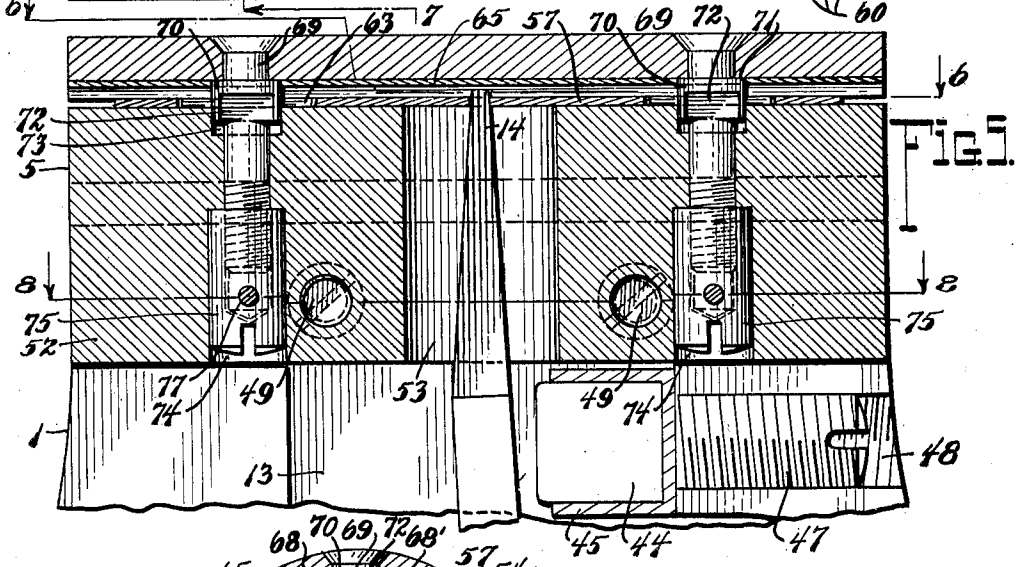


Fig. 5

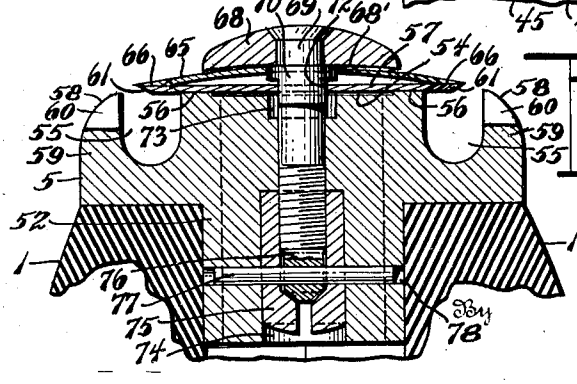


Fig. 7

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May 6, 1941. O. C. KAVLE 2,240,890

SHAVER

Filed Oct. 11, 1938 3 Sheets-Sheet 3

Fig. 8.

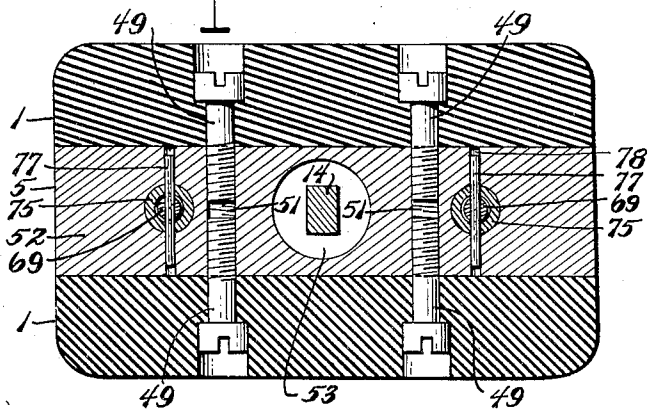


Fig. 9.

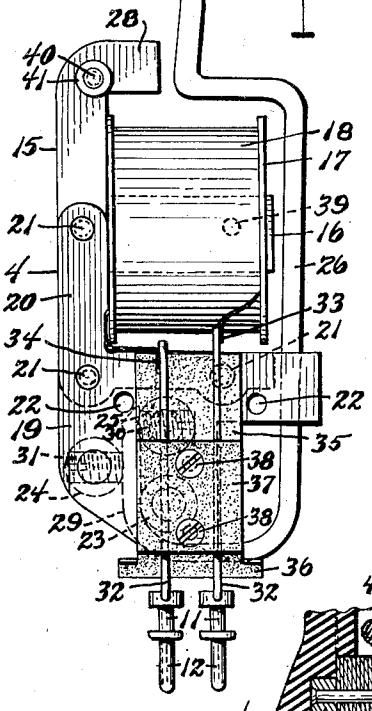


Fig. 10.

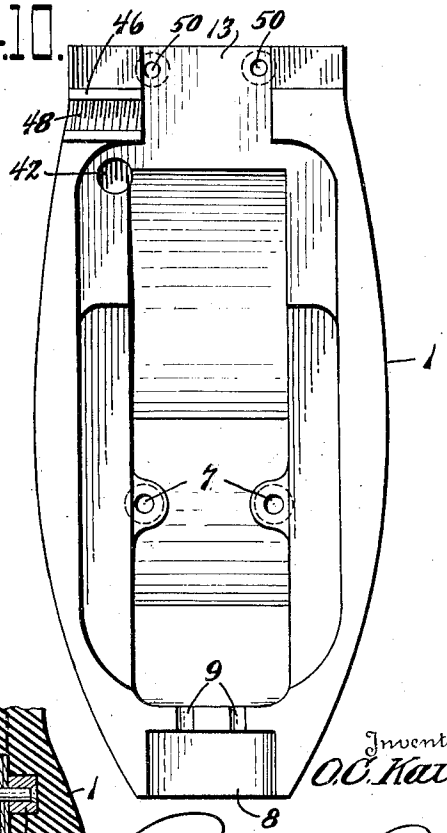
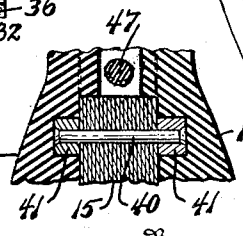


Fig. 11



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UNITED STATES PATENT OFFICE

2,240,890

SHAVER

Oscar C. Kavle, Syracuse, N. Y.

Application October 11, 1938, Serial No. 234,451

6 Claims. (Cl. 30—43)

This invention appertains to shaving devices, and more especially, to an improved razor embodying relatively reciprocal blades as distinguished from rotary or oscillatory blades. The invention readily lends itself to power operation, and more particularly, to operation by an electrical motor, although it is to be understood that certain of the features thereof have equally great utility irrespective of the type of operating instrumentalities which may be availed of, as will hereinafter be more fully apparent.

One of the primary objects of the invention is to provide a razor of the clipper type which is endowed with a materially improved shaving quality and produces a closer and cleaner shave than has heretofore been possible with the power driven shavers now on the market. In practically all of the power operated shavers which are available at the present date, considerable difficulty is experienced in obtaining a close and uniformly clean shave, especially at the commencement of use thereof following long use of the so called safety or straight razors. In other words, it has been found that the hairs have to have time enough to adapt themselves to the power driven razors before a reasonably close shave can be even approximately obtained, and this time may vary anywhere from several months to a year or more. My new razor has been found to be fully effective at all times, and regardless of the condition of the hairs resulting from the previous use of other types of razors.

Another difficulty which is particularly experienced in the use of the present day shavers heretofore available is that they will not give a clean shave if the hairs are allowed to grow relatively long. As a matter of fact, some of the shavers will not cut long hairs at all, and others only if great pains are taken and considerable time is expended in the manipulation of the shaver so that the individual hairs are removed bit by bit. My new shaver completely avoids these difficulties, and will cleanly cut long as well as short hairs, and with a minimum of effort and expenditure of time.

A further object of the invention is to provide a pair of relatively reciprocal blades in combination with a special guard or guide, which is so arranged in relation to the blades as to permit the blades to be brought into close contact with the skin at the base of the hairs, and to be drawn over the skin with a smooth and pleasant feeling and without scratching, abrading or otherwise injuring even the most tender skin.

A still further object of the invention is to provide an improved assembly of relatively reciprocal clipper blades which are maintained under a uniform tension so that the same will cleanly sever the hairs relatively closer to the skin than has heretofore been possible, and at least one of said blades being normally transversely arcuate and flexible.

Another object of the invention is to provide in the blade assembly above referred to an improved blade tensioning means which is preferably adjustable, and which is of such a character that when once adjusted to impose the proper tension upon the blades, the blades cannot get out of adjustment and the tension will be maintained irrespective of careless handling of the shaver.

The invention further contemplates an improved electric motor assembly which serves to drive the relatively reciprocal blades of the shaver, said motor assembly being preferably of unitary compact form adapted to be housed within a hollow handle, upon one end of which the relatively reciprocal blades are adapted to be mounted. The motor is further characterized by its simplicity of construction, few parts and freedom from wear and the necessity for periodic adjustments or repair.

Other and further objects and advantages of the invention will be hereinafter described, and the novel features thereof defined in the appended claims.

In the drawings:

Figure 1 is a view in elevation of an electrically operated razor embodying my invention;

Figure 2 is an enlarged plan view of the razor shown in Figure 1 with the head and one side of the handle or motor casing removed to show the manner in which the motor is mounted, portions of the motor being broken away to better disclose the interior construction thereof;

Figure 3 is a longitudinal sectional view through the complete assembly of the motor and casing therefor, substantially at right angles to the view in Figure 2, the motor being shown in elevation;

Figure 4 is a transverse sectional view, taken on the line 4—4 of Figure 2;

Figure 5 is an enlarged longitudinal sectional view, taken through the head end of the shaver, and illustrating the blade assembly and the mounting head therefor;

Figure 6 is a sectional view, taken approximately on the line 6—6 of Figure 5;

Figure 7 is a sectional view, taken on the line 7—7 of Figure 6;

Figure 8 is a transverse sectional view, taken on the line 8—8 of Figure 5;

Figure 9 is a view in side elevation of the motor assembly, and particularly illustrating its unitary compact form;

Figure 10 is a view in elevation of one of the complementary halves of the two-part motor casing which constitutes the handle for the shaver, the same being viewed towards the interior thereof; and

Figure 11 is a sectional view, taken approximately on the line 11—11 of Figure 2.

Like reference characters designate corresponding parts in the several figures of the drawings. As shown in Figure 1, the shaver in its electrically driven form for use as a razor preferably comprises a housing, generally designated 1, of any suitable shape and size, which may be conveniently grasped in one hand of the user so as to constitute a handle. At one end of the handle 1, provision is made for receiving an electrical connector plug 2 for connecting the conductor cord 3 leading from the source of electrical energy to the terminals of the motor, which has been generally designated 4 in Figure 9. At the opposite end of the handle or motor casing 1, there is mounted a cutter head, generally designated 5, said cutter head including a pair of relatively reciprocal blades or shear plates which are driven by the motor in a manner hereinafter more specifically described.

The handle or casing 1 is preferably of two-piece construction so as to provide two similar complementary halves, each of which is suitably hollowed out and recessed for receiving the various parts of the motor assembly, as will be best understood from reference to Figures 2, 3, 4 and 10. The complemental handle sections are adapted to be secured together in back to back relation by means of suitable fastenings 6, which may have the form of small tie-bolts having removable heads 6' threaded thereon and suitably socketed or recessed in the handle, the tie-bolts passing through apertures 7 formed in the respective halves of the handle. The handle is preferably made of insulating material such as hard rubber, "Bakelite," or the like, which can be conveniently molded in the shape and form desired. At one end of each of the handle sections, there is provided a recess 8 of generally rectangular form and a pair of semi-circular grooves or recesses 9, as best shown in Figure 10, the former providing a socket 10 for the reception of the electrical connector plug 2 when the two halves of the handle are assembled together, and the latter receiving the shanks 11, 11 of the motor terminals 12, 12. Accordingly, when the handle is assembled with the motor assembly 4 and terminals 12, 12 enclosed therein, the terminals act as dowels and serve to restrain the sections of the handle 1 against relative transverse displacement.

At the opposite end of each of the handle sections, there is provided another generally rectangular recess 13, which leads inwardly to the hollow central portion of each section and affords a space to permit free movement of the operating lever 14 of the motor assembly.

The motor assembly comprises a laminated core 15, having the general configuration of the letter E, and upon the central leg 16 of the core, there is mounted a spool or form 17 of suitable winding 18. At each side of the laminated core 15, there is provided a side plate 19, having an arm 20 overlapping the long side of the laminated core 15, the side plates being suitably secured to the core as by means of three rivets 21 extending transversely through both plates and the intermediate core laminations, as will be best understood from reference to Figures 2, 3 and 9. The side plates 19, 19 together constitute a frame for the motor armature, and they are suitably apertured as at 22, 22 for the reception of the tie-bolts 6, 6 which extend through the handle 1. Extending transversely between the plates 19, 19, and suitably secured to the same, are three abutment members of cylindrical form, respectively designated 23, 24 and 25, and which are arranged in spaced relation to each other with their central axes lying at the apexes of a triangle. As seen in Figure 2, the abutment member 25 lies substantially directly above the abutment member 23, and the abutment member 24 is displaced laterally respecting both abutment members 23 and 25 and lies substantially midway therebetween. The purpose of this arrangement of the abutment members will now be described.

The motor armature 26 is disposed beside the laminated core 15 so as to extend across the legs of the core, the forward end of the armature being laterally offset, as at 27, and terminating in the operating lever 14, which is preferably an integral part of the armature and disposed substantially centrally of the corresponding end of the motor casing or handle 1. To this end, the outer leg 28 of the core 15 is shorter than the other legs to permit the offset 27 of the armature 26 so as to dispose the operating lever 14 substantially at the center of the end of the casing 1 as previously described.

The opposite end of the armature 26 is of substantially U-form, and the short leg 29 thereof is adapted to be received between the abutment members 23 and 25 on the inner side and the abutment member 24 on the outer side. Each of the abutment members 24 and 25 is provided with a transversely disposed set-screw 30, 31, respectively, which is adjustable to firmly clamp the leg 29 of the armature 26 between the abutment members in an obvious manner, the adjustment being preferably such that the main or central portion of the armature 26 is normally disposed in slightly spaced relation to the free extremities of the legs of the core 15 (see Figures 2 and 9). The spacing may be varied by suitably loosening one of the set-screws 30, 31 and tightening the other, as will be obvious.

Suitable electrical connection is made between the terminals 12, 12 and the winding 18, as by fastening short relatively stiff pieces of wire 32, 32 to the terminals 12, 12 at one end, with the wires disposed along one side of the motor assembly and terminating at their opposite ends near the winding 18. One end of the winding 18, which is normally composed of many turns of relatively fine wire, is connected to the adjacent end of one of the stiff wires 32, as at 33, and the other end of the winding is connected to the adjacent end of the other stiff wire 32, as at 34. A piece of suitable insulating sheet material 35 is preferably interposed between the wires 32 and the contiguous frame plate 19 of the motor assembly to prevent grounding or short-circuiting of the winding 18, one end of the insulating material 35 being bent transversely, as at 36, to extend across the end of the motor assembly between the latter and the terminals 12, 12. The insulating material 35, 36 may be fastened in place by placing another small piece 37 of the same material over the wires 32 at the opposite side to the piece 35 and securing the two together by suitable fastening instrumentalities 38, which may or may not be fixed to the adjacent frame plate 19.

It will be observed that when the winding 18 is energized, as by connecting the motor terminals 12, 12 to the plug 2 on the end of the conductor 3 which leads to a source of alternating electrical energy, the armature 26 will be set into motion, causing the operating lever 14 to reciprocate back and forth within the opening formed by the recesses 13 in the ends of the

handle or motor case sections. It will be understood, of course, that the armature is constructed of metal which will be influenced by the magnetic field established by the winding 18 through the core 15, and the armature is of such size and resilient characteristic as to permit the same to flex back and forth at its fixed end which is clamped between the abutments 23, 24 and 25, the abutment 23 constituting the fulcrum.

In order to minimize vibration of the laminations of the core 15, additional rivets 39 and 40 may be extended respectively through the center leg 16 near its free extremity and through the base of the short leg 28. The rivet 40 has preferably mounted on its opposite ends at the side of the core 15 a pair of sleeves or collars 41, which will thus become rigidly assembled onto the core so as to project at opposite sides thereof. Each of the motor casing or handle sections is provided with a recess 42 for receiving the corresponding collar 41, so that when the motor is assembled in the handle and the two halves of the handle are secured together by the fastenings 6, 6, the collars 41 will act as dowels and positively prevent the outer end of the core from moving within the handle. This construction is especially advantageous where the fastenings 6, 6 which extend through the handle 1 are located relatively closer to the terminal end of the motor than to the operating lever end thereof, and the entire assembly can thus be made rigid even though not more than two tie-bolts 6, 6 are employed to hold the assembly together. It will be accordingly understood that the construction herein shown and described materially contributes to ease of assembly of the motor within the handle and removal of the same from the handle. Moreover, the motor may be completely assembled into a unitary form before it is placed in the handle or casing 1, as will be best understood from reference to Figure 9.

To prevent any likelihood of the operating lever end of the motor armature 26 from striking the short leg 28 of the core 15 and producing an objectionable noise, buffer means is preferably provided to cushion the armature. This buffer means, as shown in the drawings, comprises a small block 44 of resilient material, such as rubber, cork or the like, the same being mounted in a generally U-shaped frame 45 which is slidable in an opening 46 extending inwardly of each of the handle sections at the parting line (see Figures 2, 10 and 11). An adjusting screw 47, disposed in a threaded opening 48 correspondingly formed in the handle sections at the parting line, serves to adjustably project the buffer material 44 to the desired inward position limiting the movement of the armature to the desired amount, which falls short of permitting the armature to engage the leg 28 of the core. The buffer accordingly contributes to the quietness of operation of the motor, which incidentally does not have any parts which tend to wear out or get out of order.

As previously described, the cutter head 5 is mounted on the end of the handle or motor casing 1, opposite to the socket 10 in which the terminals 12 are disposed, the cutter head being a rigid body composed of a good quality hardened metal and being generally T-shaped in transverse cross-section, as will be best understood from reference to Figure 7. The head 5 is preferably removably attached to the handle 1 by means of screws 49 extending through apertures 50 in each of the complemental handle sections, there being preferably a pair of screws disposed in each side of the handle, with their inner extremities threadedly received in opposite ends of the spaced transverse openings 51 in the leg 52 of the head 5, as will be best understood from reference to Figures 6 and 8, inclusive. The head is further provided with a central opening 53 extending perpendicularly with respect to the threaded openings 51, 51, and disposed midway therebetween. This opening 53 is of sufficient size to afford clearance for the operating lever 14 of the motor unit 4 and to permit the operating lever to freely reciprocate within the same without interference. When the head 5 is mounted on the handle 1, its outer end lies slightly inwardly with respect to the outer extremity of the operating lever 14, as shown in Figure 5. Extending lengthwise across the outer face of the head 5 is a shallow recess 54 of substantial width, and transversely spaced therefrom at opposite sides of this recess 54 is a pair of generally U-shaped grooves 55, 55, also extending lengthwise of the head 5 and being of substantial depth. By virtue of the construction just described, there is provided on the outer end of the head 5 a pair of transversely spaced shoulders 56, 56 having flat faces which constitute bearing surfaces for one of a pair of relatively reciprocal blades or shear plates designated 57.

The material of the head 5 at the outer sides of the grooves 55, 55 is preferably rounded off, as at 58 to provide a smooth curved surface. The outwardly extending rounded marginal ribs 59 resulting from the removal of the material to form the grooves 55, 55 constitute guards or guides when brought into engagement with the skin from which the hair is to be removed, and thus preventing the cutter blades from biting into the skin or otherwise scratching or abrading the same, as will hereinafter become more fully apparent. The ribs 59, 59 are preferably transversely slotted to a depth approximately half the depth of the slots 55, 55, the transverse slots being designated 60 and being disposed relatively close together to create a comb effect, as will be understood from reference to Figures 1, 6 and 7.

The cutting or clipping action of the shaver is created by a pair of relatively reciprocal blades or shear plates, as previously described, one of the blades or shear plates being the member 57 above referred to. This blade or shear plate 57 is of flat and relatively rigid form, having its opposite longitudinal edges beveled, as at 61. At the center of the blade, there is a slot 62 for snugly receiving the upper extremity of the operating lever 14. Adjacent to each of the opposite ends of the blade 57 is a slot 63, having their major axes disposed lengthwise of the blade and constituting guide slots as hereinafter described. The longitudinal edges of the blade 57 are serrated to provide laterally projecting teeth 64 having any suitable pitch, as for example, on the order of .030". The edges of the teeth 64 are preferably beveled so that the opposed edges of any two adjacent teeth converge towards the outer face of the blade opposite to the face which bears against the bearing surfaces 56, 56 of the head 5. From the foregoing, it will be understood that the blade 57 is adapted to be rapidly reciprocated by the motor unit 4 through the medium of the operating lever 14, and the blade 57 is of such width as to substantially overhang the grooves 55, 55 in the outer end of the head 5, as will be best seen in Figures 6 and 7.

At the outer side of the blade or shear plate 57 and bearing against the same, is another blade or shear plate 65, which is fixed against movement

in a manner now to be described. The blade 65 is flexible, resilient and normally transversely arcuate. The opposite longitudinal edges of the fixed blade 65 are provided with flat surfaces 66 at the inner side of the blade so that when the blade 65 is mounted against the blade 57, the longitudinal edges of the blades will be in substantially flat contact with each other for a substantial distance transversely inwardly from the edges of the respective blades. The flat faces 66 are preferably formed by lapping the blade while held in a jig or fixture under the same contact tension which it is intended to have when assembled with the blade 57. The fixed blade 65 has its longitudinal edges also serrated to provide teeth 67, the edges of which are preferably beveled oppositely to the teeth 64 of the blade 57, as will be best understood from reference to Figure 6. The pitch of the teeth 67 is preferably slightly less than the pitch of the teeth 64, being on the order of .025", the purpose of this being to prevent the cutting or shearing action of the relatively reciprocal blades from taking place simultaneously at each tooth, and thereby affording an improved cutting action and reducing the load on the motor unit to a minimum. The lapped surfaces 66 on the inner side of the blade 65 preferably extend inwardly from the opposite longitudinal edges of the blade for a distance approximately equal to the depth of the teeth 67.

The blade 65 is mounted upon the head 5 and held stationary by means of a keeper plate 68 which is of substantial thickness to insure rigidity. The keeper plate is transversely arcuate at its inner side 68', but the arc of this side of the keeper plate preferably has a slightly greater radius than the arc of the blade 65 when in its normal untensioned condition. Thus, when the keeper plate 68 is disposed against the outer side of the blade 65, the contact therebetween is substantially a line contact extending lengthwise of the blade 65 and about midway between its opposite longitudinal edges.

The keeper plate 68 has riveted thereto a pair of studs 69 located adjacent to its opposite ends, the studs projecting through the same and terminating at a substantial distance from the concave side thereof. Next to the concave side of the keeper plate 68, the studs 69 are provided with an enlarged circular body 70, forming an annular shoulder 71 abutting against the inner arcuate face of the keeper plate. The blade 65 is provided with circular apertures adjacent to its opposite ends, which snugly receive the enlarged circular bodies 70 on the studs 69, as will be obvious from reference to Figures 6 and 7. The enlarged bodies 70 are of substantial length and are provided with flats 72 on opposite sides so as to fit in the slots 63 of the reciprocal blade 57 and thereby guide the blade 57 in its reciprocal movement. As shown in the drawings, the length of each slot 63 in the blade 57 is slightly greater than the diameter of the enlarged portion 70 on the studs 69, plus the throw of the operating lever 14, the latter being preferably on the order of .033" at each side of its central or neutral position. This allows the reciprocal blade 57 to freely move the full stroke of .076" without interference, while its movement is accurately guided by the substantial contact of the flats 72 with the long edges of the slots 63.

The head 5 is suitably apertured to receive the inner extremities of the studs 69, and the outer face of the head is recessed, as at 73, to receive the inner extremities of the enlarged bodies 70 on the studs. The depth of the recesses 73 should be great enough to allow for axial adjustment of the studs 69 relative to the head 5 as when adjusting the tension of the blade 65 against the blade 57 in a manner now to be described.

The inner end of the leg 52 of the head 5 is socketed, as at 74, to a substantial depth coaxially with the openings which receive the studs 69, these sockets being adapted to loosely receive internally threaded nuts 75 which screw onto the inner threaded extremities of the studs 69, as will be best understood from reference to Figures 5, 6 and 7. The inner threaded extremity of each of the studs 69 is preferably diametrically slotted, as at 76, and its nut 75 is diametrically apertured to receive a lock-pin 77 adapted to be inserted through a transverse opening 78 in the leg 52 of the head 5, the opening 78 registering with the diametrical opening in the nut 75 when the latter is turned to the proper position. The lock-pins 77, one for each stud 69, are preferably loosely disposed in the openings previously described so that they can be readily removed to permit adjustment of the nuts 75 when the head 5 is removed from the handle 1. However, in the assembled condition of the shaver, the lock pins are inaccessible and unnecessary tampering with the tension adjustment of the blades is minimized. Obviously, when the head 5 is removed from the handle 1, and the lock pins 77 withdrawn, the nuts 75 may be turned in one direction to cause the studs 69 to be drawn inwardly of the head 5, thereby moving the keeper 68 relatively closer to the outer end of the head and correspondingly increasing the tension of the blade 65 against the blade 57. Turning of the nuts 75 in the opposite direction effects a corresponding reduction of the blade tension. Once the tension has been set properly, as when the shaver is assembled at the factory, it may be indefinitely maintained uniform without any need for further adjustment, excepting under unusual or abnormal circumstances. As previously mentioned, the tension adjustment of the blades 65 is preferably such that the lapped surfaces 66 of the blade 65 have substantially flat contact with the upper flat side of the relatively rigid reciprocal blade or shear plate 57. By reason of the fact that the keeper 68 bears against the blade 65 with substantially a line contact at the center of the blade, the blade 65 can flex transversely the full distance from the center of the blade to its opposite longitudinal edges. This materially contributes to the accuracy of adjustment of the tension and the maintenance of a substantially uniform tension indefinitely.

The cutting instrumentalities of the relatively reciprocal blades 57 and 65 are so disposed with relation to the outer extremities of the guard or guide ribs 59 at the opposite longitudinal sides of the head 5 that the shaver may be moved over the skin without discomfort, and will produce a smooth, close hair clipping or shearing action, yet without pinching the skin between the edges of the blades and the guard ribs or otherwise scratching or abrading the skin. The blades or shear plates are substantially self-cleaning and will not clog up by reason of the provision of the grooves 55. Any hair which may collect or which does not automatically fall out of the grooves 55 may be readily removed therefrom in an obvious manner.

By reason of the relation of the blades or shearing plates as herein disclosed, it has been

found that it is perfectly possible and practical to employ blades of a thinness which heretofore could not be employed with any degree of success in shavers of this general type. Moreover, the provision of the beveled cutting edges on the reciprocal blade **57** and the beveled edges of the transversely arcuate flexible blade **65** resulting from lapping the flat surfaces **56**, enable the cutting edges of the coacting teeth **64** and **67** to be brought closer to the skin at the base of the hairs and thereby cleanly severing the hairs at a point having the optimum closeness to the skin, which has heretofore been unattainable in a power driven shaver.

In the use of the shaver, it is drawn over the skin with the guard ribs **59** pressing lightly against the same, the latter being so formed as to glide over the skin with a smooth and pleasing feeling, while the contiguous teeth **64**, **67** of the relatively reciprocal blades are disposed in a position to clip the hairs in an obvious manner. As the shaver is drawn over the skin, the hairs are guided into the teeth of the blades by the comb effect resulting from the transverse slotting of the guard ribs **59**. These transverse slots or kerfs **60** in the ribs **59** are preferably arranged directly opposite the indentations between the teeth **67** of the stationary blade **65** whereby to facilitate the guiding of the hairs into position to be cut by the blades or shear plates.

While the specific details have been herein shown and described, the invention is not confined thereto as changes and alterations may be made without departing from the spirit thereof as defined by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is—

1. A device of the class described, comprising a support, a pair of thin relatively reciprocable blades mounted thereon, each having shearing instrumentalities on at least one edge thereof, one of said blades being relatively rigid and flat, and the other of said blades being flexible and normally transversely arcuate in its inert condition and being bevelled along the edge in the zone of its shearing instrumentalities to provide a substantially flat surface having substantially flat bearing contact with the other blade in the zone of the shearing instrumentalities, and means for continuously urging the blades into contact with each other in the zone of the shearing instrumentalities aforesaid while imparting reciprocating motion to one of said blades.

2. A device of the class described, comprising a support, a pair of thin relatively reciprocal blades mounted thereon, each having shearing instrumentalities on at least one edge thereof, one of said blades being relatively rigid and flat and being beveled on one side in the zone of the shearing instrumentalities, and the other of said blades being flexible and normally transversely arcuate in its inert condition, said latter blade being bevelled along its edge in the zone of its shearing instrumentalities to provide a substantially flat surface adapted to engage the first blade in the zone of the shearing instrumentalities at its flat side which is opposite to the beveled side.

3. A device as claimed in claim 1, wherein the last named means includes pressure means acting upon the transversely arcuate blade substantially at the center thereof along a line extending generally parallel to the edge of the blade on which the shearing instrumentalities are provided, for pressing the arcuate blade against the other blade.

4. A device as claimed in claim 1, wherein the means for urging the blades into contact with each other comprises a keeper plate having a transversely arcuate face, the radius of which is somewhat greater than the radius of the transversely arcuate blade, said keeper plate serving to produce pressure substantially on a line at approximately the center of the transversely arcuate blade, while permitting said latter blade to flex from the center to its edge which is provided with the shearing instrumentalities.

5. A device as claimed in claim 1, wherein the means for urging the blades into contact with each other comprises a keeper plate having a transversely arcuate face, the radius of which is somewhat greater than the radius of the transversely arcuate blade, said keeper plate serving to produce pressure substantially on a line at approximately the center of the transversely arcuate blade, while permitting said latter blade to flex from the center to its edge which is provided with the shearing instrumentalities, and means for varying the distance between the keeper plate and the relatively rigid flat blade, whereby to vary the flexure of the transversely arcuate blade and consequently the tension of the same upon the relatively rigid flat blade.

6. A device of the class described comprising a rigid body constituting a support, a generally rectangular thin flat blade mounted on one face of said body in slidable engagement therewith, said blade having shearing instrumentalities provided on at least one longitudinal edge thereof and having an elongated substantially rectangular slot therein adjacent to each of its opposite ends, a second blade disposed contiguous to the outer face of the first blade, said second blade also being thin and flexible and generally rectangular in contour, with shearing instrumentalities provided on a corresponding longitudinal edge thereof, but being normally transversely arcuate in its inert condition and bevelled along its edge in the zone of its shearing instrumentalities to provide a flat surface for engagement with the first blade in the zone of the shearing instrumentalities of the latter, a keeper plate disposed against the outer face of the second blade and contacting therewith only along the longitudinal center line of the latter, a pair of studs respectively fixed to the keeper plate adjacent to the opposite ends of the same and projecting through both blades into the body aforesaid, said studs passing through the elongated slots of the first blade and having flat surfaces engaging the opposite sides of the slots to permit longitudinal movement of the first blade while restraining the same against transverse movement, nuts recessed in the body and threadedly engaging the respective studs for adjusting the keeper plate towards and away from the body to impart a predetermined tension between the engaging surfaces of the blades, and means for imparting reciprocating motion to the first blade in the longitudinal direction of the latter to produce a shearing action in the zone of the shearing instrumentalities on the blades.

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