Feb. 17, 1942. E. G. BERG 2,273,685

SHAVING DEVICE

Filed Oct. 15, 1936 2 Sheets-Sheet 1

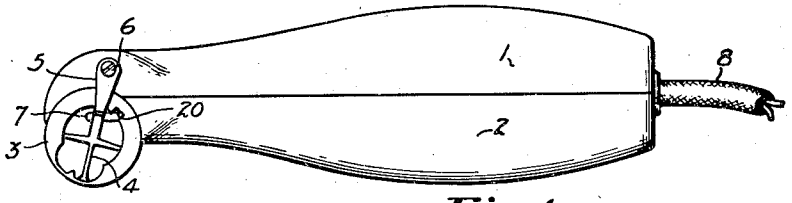



Fig. 1

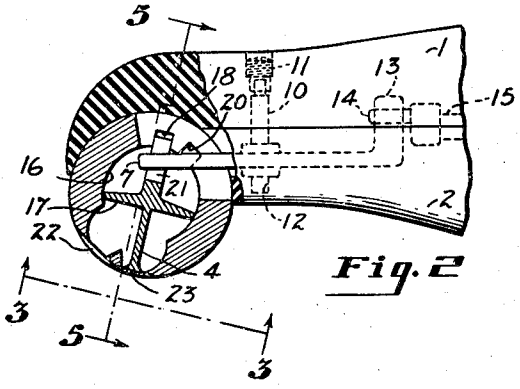



Fig. 2

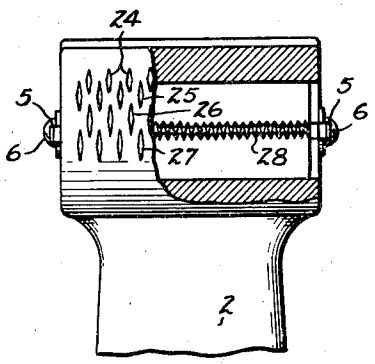



Fig. 3

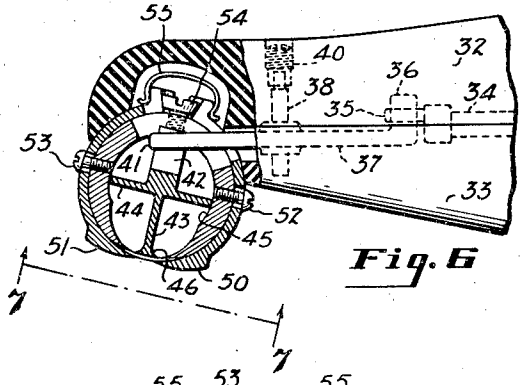



Fig. 6

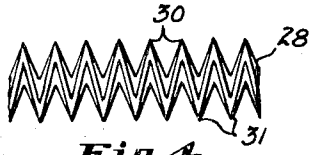



Fig. 4

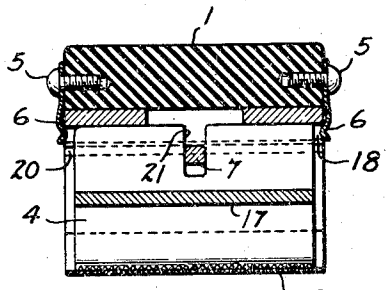



Fig. 5

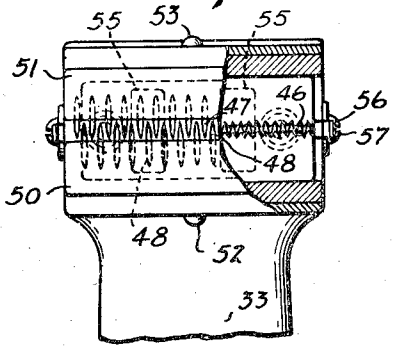



Fig. 7

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SHAVING DEVICE

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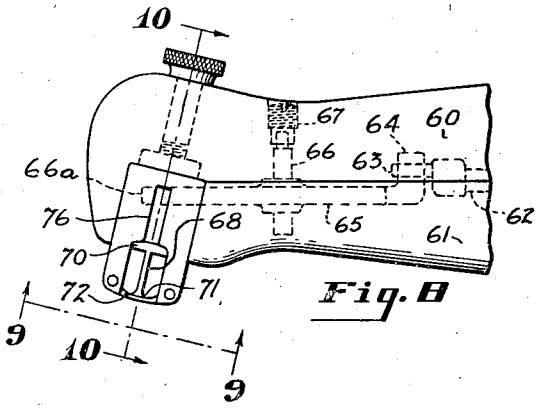



Fig. 8

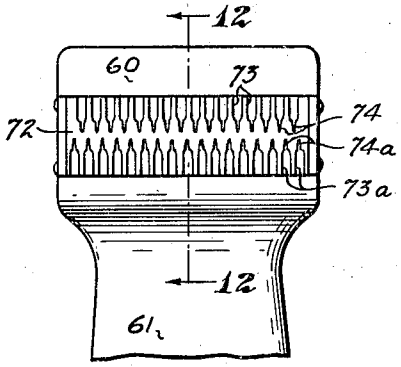



Fig. 9

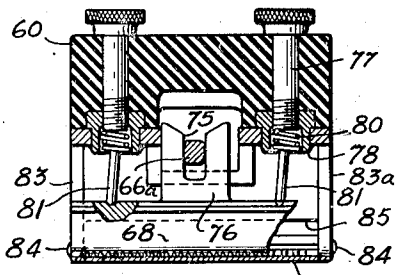



Fig. 10

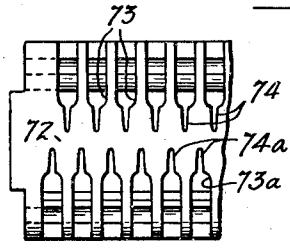



Fig. 11

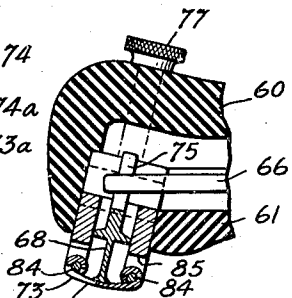



Fig. 12

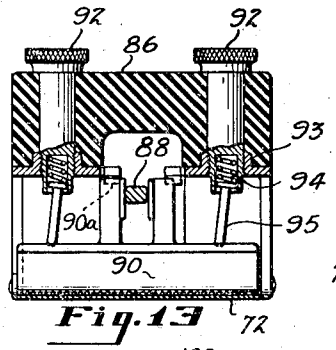



Fig. 13

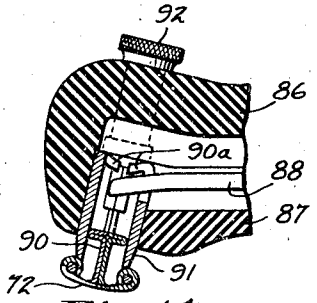



Fig. 14

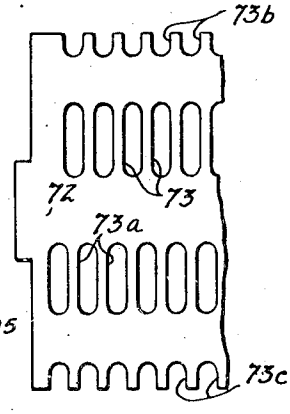



Fig. 15

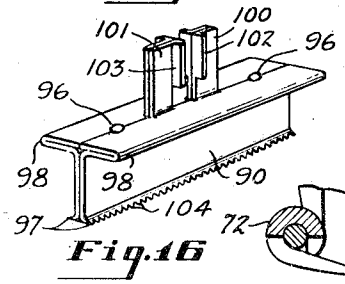



Fig. 16

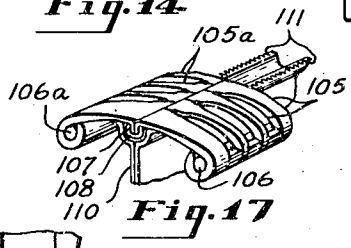



Fig. 17

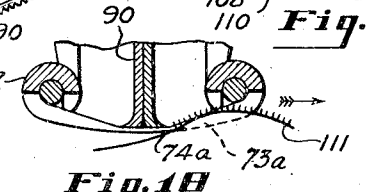



Fig. 18

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Patented Feb. 17, 1942

2,273,685

# UNITED STATES PATENT OFFICE

2,273,685

## SHAVING DEVICE

Emil G. Berg, Erie, Pa., assignor of one-twentieth to Edmund J. Te Pas, Euclid, Ohio

Application October 15, 1936, Serial No. 105,765

5 Claims. (Cl. 30—43)

This invention relates to shaving devices and in particular to shaving devices of the type which are commonly known as "dry shavers" and it has for its objects the provision of a dry shaver which may be adjusted for cutting the hair closer to or farther away from the skin; the provision of a cutter head of simple and inexpensive construction in which costly machining operations have been reduced to a minimum; and the provision of an improved form of guard member for the cutter head of a dry shaver which is arranged to stretch the skin before the hairs are sheared.

Stated in general terms, the invention comprehends the provision of a slotted guard member and a toothed cutter which is reciprocable beneath the slots of the guard member so that hairs projecting beneath such slots will be sheared off by the cooperating edges of the cutter and the guard member.

In one form of the invention, the guard member has two series of slots and a single cutter is arranged to be operated selectively in connection with one or the other of the two series of slots. The thickness of the cutter bars, which form the sides of the slots of the guard member is relatively thinner for one series of slots than it is for the other, so that a closer degree of cutting may be achieved when the cutter operates beneath one series of slots than is accomplished when the cutter operates beneath the other series of slots.

In another form of the invention, there is provided a guard member having slots and a cutter reciprocable beneath such slots. Adjustable means are secured on the guard member to cover over a portion of the slots, and in this manner, it is possible to adjust the device to shear the hairs off at different distances from the skin.

In the third form of the invention, two series of slots are arranged in staggered relation with respect to each other, the remote ends of such slots being relatively wider than the adjacent end portions, so that the skin is stretched as it enters the wider portions of the slots and the hairs are presented in an erect position when they enter the narrower portion of the slots where the cutting action takes place.

In the latter form of the invention, the cutter head is arranged so that it may be constructed with a minimum of expense and effort. Both the guard member and the cutter member of the cutter head are formed from sheet metal stampings which may be cheaply and easily manufactured. In one modification of this form of the invention, the blades of the guard member are formed individually and then assembled to form the completed guard member. In this modification, the individual blades are formed so that when they are assembled, they will define slots of the proper width and thus eliminate the expensive operation of cutting the relatively narrow slots of such a guard member.

These and other objects of the invention will become more apparent and better understood after consideration has been given to the following detailed description of the invention taken in connection with the drawings which show, merely by way of illustration, structure adapted for carrying out the objects of the invention.

In the drawings, Figure 1 is a side elevational view of a shaving device illustrative of one form of the invention; Figure 2 is an enlarged view of the end portion of the shaving device shown in Figure 1, with the central portion thereof shown in section to better illustrate the details of the device; Figure 3 is a side elevational view taken on line 3—3, Figure 2, with certain of the parts broken away to illustrate the construction of the movable cutter of the device; Figure 4 is an enlarged detail view of the toothed portion of the movable cutter; Figure 5 is a detail sectional view taken on line 5—5, Figure 2; Figure 6 is a view corresponding to Figure 2, showing a modified form of shaver; Figure 7 is a side elevational view of the cutter head of the shaver shown in Figure 6, with a portion thereof broken away to better illustrate the details of this form of the device; Figure 8 is a side elevational view of another modification of the invention; Figure 9 is a side elevational view taken on line 9—9, Figure 8, showing the face of the cutter head; Figure 10 is a detail sectional view taken on line 10—10, Figure 8; Figure 11 is an enlarged detail view of the slotted guard plate used in connection with the form of the device illustrated in Figures 8 to 10; Figure 12 is a sectional view taken on line 12—12, Figure 9; Figure 13 is a detail sectional view of a modified form of cutter head taken on a line corresponding to the section line upon which Figure 10 was taken; Figure 14 is a central sectional view of the modification of the invention shown in Figure 13; Figure 15 is an enlarged plan view of the stamping which is used to form the slotted guard member of the shaver shown in Figures 8 to 14; Figure 16 is a perspective view of the cutter member which is used in the form of the invention shown in Figures 13 and 14; Figure 17 is a modified

form of slotted guard member in which the blades of the guard member are separately formed and then joined to each other to complete the guard member; and Figure 18 is a diagrammatical view illustrating the mode of operation of some of the various forms of the invention illustrated herein.

The shaver shown in Figure 1 comprises a hollow handle which is formed from mating halves 1 and 2. A cutter head comprising a slotted guard member 3 and a movable cutter 4 are detachably secured at one end of the handle by means of a pair of spring clips 5, one of which is secured to each side of the handle in any suitable manner such as by a screw 6. The cutter 4 is reciprocated in the guard member 3 by means of an oscillatable lever 7. An electric motor (not shown) is housed within the handle portion and current is supplied to this motor by means of a cable 8.

The oscillatable lever 7 is carried on a short shaft 10. One end of this shaft is journaled in a suitable bearing 12 carried by one portion of the handle and the other end of the shaft is journaled in an adjustable bearing 11 which is carried by the other portion of the handle. The end of the lever 7 remote from the cutter is of bifurcated construction for receiving an eccentric pin 14 which is attached to the end of the armature shaft 15 of the motor which is concealed within the handle portion of the device.

The outer guard member of the cutter head may be formed from a section of tubing 16, the interior of which provides a bearing surface for the flanges or ribs 17 of the toothed cutter 4. Longitudinally extending grooves 18 and 20 are formed inside the guard member to provide separately usable bearings or guideways for the cutter 4. The cutter 4 is slotted at 21 for receiving the end of the oscillatable lever 7.

Portions of the interior of the guard member are removed for defining relatively thin, longitudinally extending sections 22 and 23, the section 22 being slightly thicker than the section 23. Two rows of slots 24 and 25 are cut in the section 22 and similar rows of slots 26 and 27 are cut in the thinner section 23. The individual slots of each row are staggered with respect to the slots of the adjacent row. The cutter 4 is provided with a toothed edge portion 28 which is in contact with the rear face of the blades defined by the slots of the guard member. The teeth of the cutter terminate in sharp points 30 and 31 at the opposite sides of the cutter.

Figures 1 to 3 show the device when adjusted for obtaining a very close shave. When a medium shave is desired, the cutter head may be removed from the handle portion and the cutter is then removed from its guard member and inserted in position so that it operates in the guideway 20 with its toothed portion in contact with the slots which are formed in the portion 22 of the guard member. When the cutter head is reinserted in the handle, its position is rotated slightly so that the spring clips 5 engage the grooved portion 20 instead of the grooved portion 18.

In illustrating the details of this invention, the slots as shown in Figure 3 are spaced farther apart than they are in the actual shaver, in which as many as 15 or 16 slots may be provided in each row of the slots in a cutter head no larger than the one shown in Figure 1 of the drawings.

In the modification of the invention illustrated in Figure 6, the handle of the shaver is formed from mating halves 32 and 33. The motor (not shown) of the device is provided with an armature shaft 34 which carries an eccentric pin 35 at its outer end. This pin is received in the bifurcated end 36 of an oscillatable lever 37 which is carried on a pivotally mounted shaft 38, one of the bearings of which is indicated by the numeral 40.

The end 41 of the oscillatable lever is received in a slot 42 which is formed in the cutter 43 of the device. The cutter is provided with bearing ribs or flanges 44 which contact with the interior of the guard member 45 of the device. The cutter 43 is provided with a toothed edge portion 46 which moves in contact with the underside of the guard member beneath the ends of two series of slots 47 and 48. The slots of one row are arranged in staggered relation with respect to the slots of the other row.

A pair of secondary guard members 50 and 51 embrace the guard member 45. The exposed edge of the secondary guard member 50 overlies a portion of the slots 48 and the oppositely located exposed edge of the secondary guard member 51 overlies a portion of the slots 48. The secondary guard member 50 is slotted for receiving a guide screw 52 which is threaded into the guard member 45 and the secondary guard member 51 is slotted for receiving a similar guide screw 53 which is also carried by the guard member 45.

The exposed edges of the secondary guard members 50 and 51 are adjusted toward and from each other by means of a pair of screws 54 having tapered heads which contact with the opposite edges of the secondary guard members. A pair of springs 55 are located one adjacent to each of the screws 54 so as to hold the secondary guard members 50 and 51 in contact with the heads of such screws. Suitable spring clips 56 are provided for holding the cutter head in position in the handle. The spring clips 56 are secured to the handle in any suitable manner such as by means of screws 57.

It is apparent from a consideration of Figure 7, that as the secondary guard members 50 and 51 are adjusted with their exposed edges closer to or farther away from each other, that a lesser or greater portion of the slots 48 and 47 will be covered by these guard members. The slots 47 and 48 are of tapered outline, being narrower at their end portions than they are at their intermediate portion. Adjustment of the secondary guard members 50 and 51 controls the distance into which the skin may be projected into the slots 47 and 48, and in this manner, the closeness of the cutting of the device may be controlled.

In the form of the invention illustrated in Figures 8 to 12, the handle of the device is formed from mating halves 60 and 61. The motor (not shown) of the device is provided with an armature shaft 62 which carries an eccentric pin 63 adapted for reception in the bifurcated portion 64 of an oscillatable lever 65. The lever 65 is carried on a shaft 66 which is journaled in suitable bearings in the handle portion of the device, including an adjustable bearing 67 carried by the handle portion 60.

The end 66*a* of the oscillatable lever 65 is received in a suitable slot 75 formed in the portion 76 of the cutter member 68. This cutter member has guiding flanges or ribs 70 formed intermediate its opposite longitudinal edges. The edge 71 of the cutter is of toothed construction

and it is adapted for contact with a slotted guard plate 72.

Two series of slots are formed in the guard plate 72. One of these series of slots is indicated by the numerals 73 and 74, the numeral 73 indicating the wider portion of the slot and the numeral 74 indicating the narrower portion of the slot. The individual slots of the other series of slots are each provided with narrower portions 74a and wider portions 73a. As shown in Figure 9, the slots of one series are staggered with respect to the slots of the other series.

The purpose of staggering the slots is to insure that the shaver covers a greater area of skin for each up and down stroke along a given line. Because of this arrangement, the slotted portions of the shaver cover double the area which could be covered with similarly spaced slots extending completely across the width of the face of the guard member.

The toothed portion 71 of the cutter 68 does not extend beyond the narrow portions 74 and 74a of the slots. The purpose of arranging the slots of the guard member with wide and narrow portions is to stretch the skin in the manner shown in diagrammatical view, Figure 18. When the guard member is pressed against the face of the user, the skin and hairs extend into the wider portions of the slots and are thus stretched. This causes the hairs to assume an erect position and when they enter the narrower portions of the slots they are in position to be sheared off extremely close to the skin without, however, cutting the skin.

The slotted plate 72 of the guard member is stamped out from a piece of sheet metal in the form of a blank, such as illustrated in Figure 15. The wide portions 73 and 73a of the slots are formed at the same time that the plate is blanked. The end portions of the blank are notched at 73b and 73c, the notches thereof matching with the slots 73 and 73a respectively, the purpose of which will be described presently.

The cutter head is held in place on the handle portion 60 by means of a pair of screws 77, the threaded end portions of which are received in threaded cups 78, each of which constitute a retainer for a spring 80. Each of the springs 80 presses an oscillatably mounted pin against the cutter 68 and thus maintains the toothed portion of the cutter in contact with the underside of the slotted plate 72. The end portions 83 and 83a of the cutter head are adapted to receive pins 84 about which are embraced the notched portions 73b and 73c of the guard plate.

The sides of the cutter head are open at 85 beneath the slotted plate 72 so as to facilitate the removal of the hairs which are cut by the device. The provision of the notches 73b and 73c permits the opposite edges of the plate 72 to contact with the underside of the plate without obstructing the openings of the slots 73 and 73a respectively.

In the form of the invention illustrated in Figures 13 and 14, a slotted guard plate 72, identical to the one just described is used. In this form of the invention, the cutter head is carried by a handle formed from mating halves 86 and 87. An oscillatable lever 88 is provided for reciprocating a toothed cutter 90. In this form of the invention, the part 91 of the cutter head which supports the slotted guard plate 72 is formed from a plate of sheet metal which is bent up to form a channeled shaped member which is U-shaped in cross-section.

Portions in the base of the member 91 are pressed out to form collars 93 which are threaded for receiving the screws 92 by means of which the cutter head is held in place in the handle. The threaded ends of the screws 92 are each hollowed out for receiving a spring 94 which serves to press the opposite end of a pin 95 against a notch 96 of the cutter 90 for the purpose of holding the toothed portion of the cutter in contact with the underside of the slotted plate 72 in much the same manner as for the devices previously described. The base of the member 91 is slotted and bent up at 90a to form guiding bearings for one edge of the cutter 90.

In this form of the invention, the cutter 90 is formed from two similarly shaped pieces of sheet metal which may be spot welded to each other in the manner shown. The intermediate portion of each of the stampings of the cutter is folded over upon itself to define a bearing flange 98. The individual elements of the cutter are each provided with laterally extending parallel arms 100 and 101, one edge of each of which is bent over at 102 and 103 respectively to form bearing surfaces for the oscillatable lever 88.

The individual portions of the cutter are bent over at 97 along one edge and the face of this edge of the cutter is ground or cut down to form oppositely facing sharp edges which are then notched to form the cutter teeth 94. In this manner, the cutter teeth are provided with very sharp points which effectively serve to shear off the hairs which project between the narrow portions 74 and 74a of the slotted guard plate 72.

Figure 17 illustrates a modified form of slotted guard plate. In this form of the invention, the blades 105 and 105a are each formed separately, thereby eliminating the need of cutting the narrow slots of the guard member. Corresponding ends of the blades 105 and 105a are bent down at 107 and embraced and clamped together by a channeled member 108. The opposite ends of the cutter blades are bent around suitable supporting rods 106 and 106a.

In this form of the invention, the toothed edge of the cutter 110 is configurated so as to extend to either side of the channeled member 108 and the oppositely facing toothed portions 111 of the cutter are adapted to move across the narrow portions of the slots which are defined by the cutter blades.

In all of the different forms of the invention, the thickness of the guard member and the width of its slots are proportioned so that the hairs may be sheared off extremely close to the skin without injuring the skin. For example: in the case of the guard member 72, the central unslotted longitudinal section of the guard member may be made eight thousandths of an inch thick along the medial of the guard member. The thickness of this portion of the guard member may be tapered or ground down to three thousandths of an inch along a line defined by the end points of the movable cutter. The thickness of the guard member is then progressively increased as its edge is approached where the thickness of the metal may be thirty thousandths of an inch.

The portions 73 and 73a of the slots may be made twenty-eight thousandths of an inch wide and the communicating narrower portions 74 and 74a of the slots may be made nine thousandths of an inch wide where they connect with the wider portions 73 and 73a tapering down to seven thousandths of an inch at their other ends.

The foregoing description and the accompanying drawings to which it relates, describes what might be termed the preferred mode of practicing the invention. It is to be clearly understood, however, that the invention includes each and every novel feature or combination of novel features herein disclosed, subject only to the restrictions of the prior art, and that the invention may assume other forms and it is not to be limited to the particular and specific structure shown and described herein.

Having thus described my invention what I claim is:

1. A cutter for a shaving device comprising a pair of similarly formed stampings which are secured face-to-face with each other; said stampings forming a bearing slot for receiving an operating member, a pair of longitudinally extending bearing flanges and a toothed cutting portion at one edge of the cutter.

2. In a cutter head for a shaving device of the type described, an apertured face plate adapted to contact with the surface being operated upon and having a plurality of hair receiving openings with a portion at least of the margins of such openings defining cutting edges at the underside of the face plate, said face plate being formed from a relatively thin piece of sheet metal with a turned-over edge for stiffening and reinforcing the same, a supporting structure, and means including a rod embraced by the turned-over edge of said face plate for attaching said face plate to said supporting structure, said turned-oved edges of the face plate forming exposed opposite longitudinal edges for contact with the surface being operated upon.

3. In a cutter head for a shaving device of the type described, an apertured face plate adapted to contact with the surface being operated upon and having a plurality of hair receiving openings with a portion at least of the margins of such openings defining cutting edges at the underside of the face plate, said hair receiving openings comprising two series of slots which terminate along a line intermediate the width of said face plate, said face plate being formed from a relatively thin piece of sheet metal with turned-over portions at its opposite longitudinal edges for stiffening and reinforcing the same, a supporting structure, and a rod extending through each of the turned-over portions of said face plate and traversing said supporting structure for attaching the face plate to the same, said turned-over edges of the face plate forming exposed opposite longitudinal edges for contact with the surface to be operated upon.

4. A cutter head for a shaving device comprising, a guard member with an apertured, skin-contacting, sheet metal face plate attached thereto, and a movably mounted member with cutter elements adapted for contact with the underside of said face plate, the thickness of said face plate being substantially reduced where it is contacted by said cutter elements, the portion of said face plate to one side of said reduced section being in the form of a series of relatively thick, closely spaced guard bars.

5. A cutter head for a shaving device comprising, a guard member with an apertured, skin-contacting, sheet metal face plate attached thereto, and a movably mounted member with cutter elements adapted for contact with the underside of said face plate, the thickness of the central area of said face plate being substantially reduced where it is contacted by said cutter elements, the portion of said face plate at each side of said reduced section being formed by a series of relatively thick, spaced guard bars, said bars extending into the reduced section of said face plate where their width is increased and their thickness is decreased.

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