Aug. 11, 1942. A. ALEXAY 2,292,858

SHAVING DEVICE AND METHOD OF MAKING

Filed Jan. 28, 1938

Fig. 1.

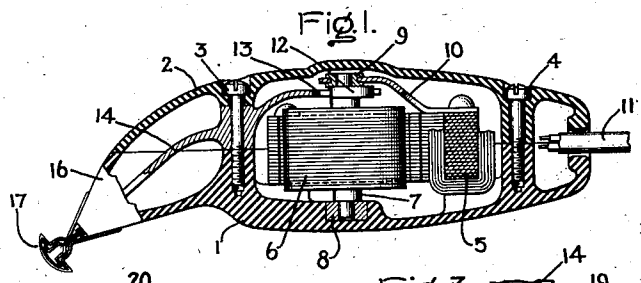


Fig. 2.

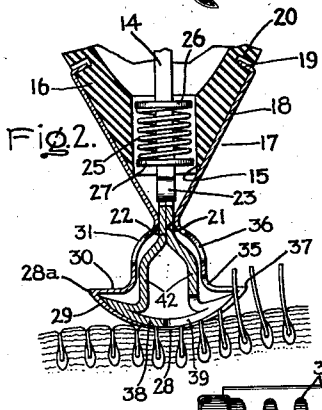


Fig. 3.

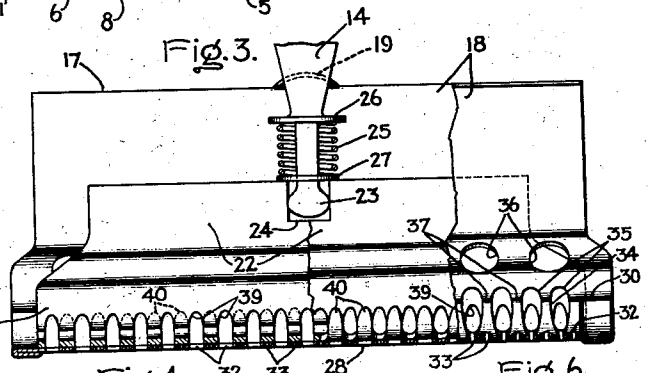


Fig. 4.

Fig. 6.

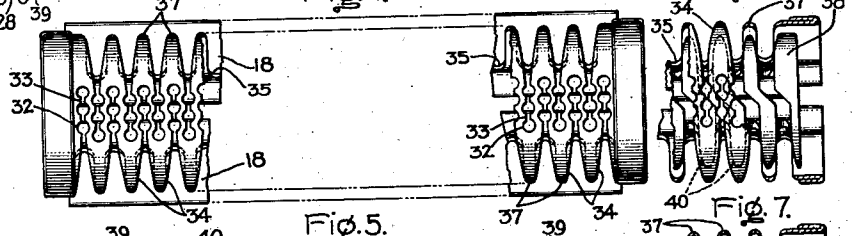


Fig. 5a.

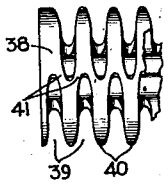


Fig. 5.

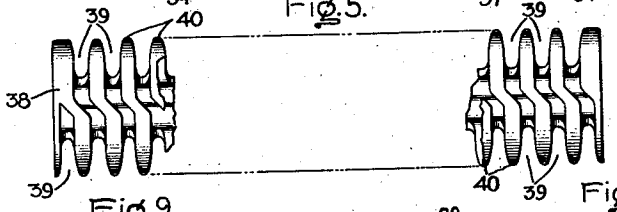


Fig. 7.

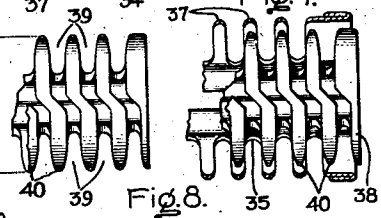


Fig. 9.

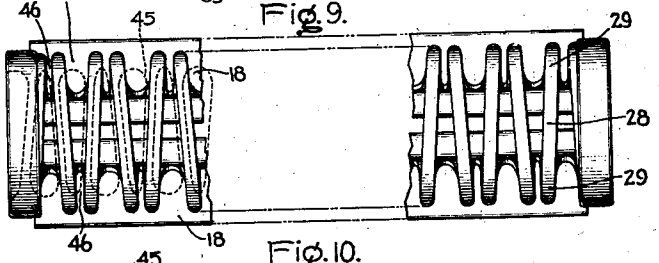


Fig. 8.

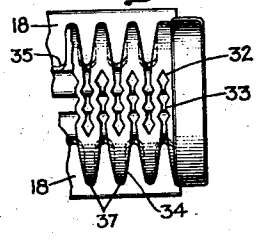
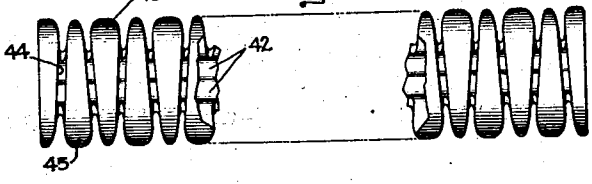


Fig. 10.



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SHAVING DEVICE AND METHOD OF MAKING

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Application July 28, 1938, Serial No. 221,784

13 Claims. (Cl. 30—43)

The present invention relates to shaving devices of the type having a cutting or shearing head and a cooperating cutter which is moved relative to the cutting head to shear hair projecting through openings in the cutting head.

The object of my invention is to provide an improved construction and arrangement in shaving devices of this type as well as a novel method of constructing the cutter element therefor, and for a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a sectional side elevation of a shaving device embodying my invention; Fig. 2 is a sectional end elevation of the cutting or shearing head; Fig. 3 is a front elevation of the cutting head broken away to show the construction of the cutter and the driving connection thereto; Fig. 4 is a bottom plan view of the cutting head; Fig. 5 is a bottom plan view of the cutter; Fig. 5*a* is a bottom plan view of a modified form of a cutter used with the cutting head of Fig. 4; Fig. 6 is a bottom plan view of the cutting head with the cutter assembled therein and at one extreme position in its movement, the cutting head being broken away to show the cutter; Fig. 7 is a view similar to Fig. 6, the cutter being shown at its other extreme position; Fig. 8 is a bottom plan view of one end of a modification of the cutting head; Fig. 9 is a bottom plan view of another modification of the cutting head; and Fig. 10 is a bottom plan view of the cutter used with the cutting head of Fig. 9.

Referring to Fig. 1 of the drawing, there is shown a shaving device having a split casing comprising parts 1 and 2 of molded insulating material fastened together by screws 3 and 4. Within the casing is an electric motor comprising a stationary member 5 fixed on casing part 1 and a rotating member 6 carried on a shaft 7 journaled at one end in a bearing 8 fixed in a recess in the casing part 1 and journaled at the other end in a bearing 9 carried on an arm 10 fixed to the stationary member 5. Current to the electric motor is supplied by a conductor cord 11 which extends through one end of the casing. Fixed on the shaft 7 is an eccentric 12 which cooperates with the forked end 13 of a lever 14 pivoted intermediate its ends on the screw 3. Upon rotation of the eccentric, the lever 14 is oscillated through an angle depending on the eccentricity of the eccentric. The other end of the lever 14 extends through a slot 15 (Fig. 2) in the tapered front end 16 of the casing part 1. On the front end 16 is a cutting or shearing head 17 having walls 18 extending along the outer surface of the casing and fixed thereto by tabs 19 and fitting in recesses 20. The walls 18 are sufficiently resilient so that the cutting head may be snapped in place on the casing. The walls 18 converge to provide guide bearing surfaces 21 for the shank 22 of a reciprocating cutter within the cutting head. The cutter is reciprocated by the rounded end 23 of the lever 14 which fits in a recess 24 in the cutter shank. The cutter is pressed into engagement with the inner surface of the cutting head by a coil spring 25 arranged around the lever 14 and between a collar 26 on the lever 14 and a washer 27 bearing against the upper edge of the cutter shank.

The cutting head 17, which is preferably made of a sheet metal, has a hollow mushroom shaped head having walls 28ª providing a generally rectangular active or cutting surface comprising an arcuate face contacting or shaving portion 28 at the center and upwardly or outwardly flaring clipping portions 29 at each side thereof. Above and extending inward from the edges of the walls 28ª are walls 30 connected by arched walls 31 to the walls 18 providing the shank of the cutting head. The walls 30 and 31 are in effect folded over the active or cutting portion of the cutting head. The cutting head is shaped so that it may be formed from a flat strip of sheet metal. After forming, the active portion of the cutting head is ground so that the wall thickness varies from a minimum in the face contacting or shaving portion 28, to a maximum, the full thickness of the sheet metal at the outer ends of the outwardly flaring portions 29. Satisfactory cutting heads have been made by using sheet metal of 0.015" thickness and grinding the shaving portion to a thickness of 0.004".

The shaving portion 28 of the cutting head, which comprises substantially one-third of the width, has a series of transverse narrow slots 33 having longitudinally spaced enlarged portions 32. The enlarged portions in adjacent slots are staggered. From one aspect the openings can be considered as perforations connected by slots. The slots and perforations also can be considered as a series of transverse slots. The slots 33 are of such width to easily receive hair. Widths of from 0.008" to 0.012" have proved satisfactory. The perforations 32, which may be of any suitable shape, for example, circular as in Fig. 4, or diamond shaped as in Fig. 8, are somewhat wider. The size of the perforations is such that

the skin may project within the perforations closer to the inner surface of the cutting head. This permits the hair to be cut closer to the surface of the skin. The slots **33** and the perforations **32** extend across substantially all of the shaving portion **28** of the cutting head. The perforations **32** increase the hair receiving area of the cutting head without permitting the skin to project far enough into the openings to become pinched between the edges of the openings and the cooperating cutter. The effective hair receiving area of the shaving portion is further increased by the staggered relation of the perforations.

Extending toward the edges of the working face of the cutting head are tapered or V-shaped slots **34**, the inner ends of which are respectively connected to opposite ends of the series of perforations **32**. The slots are narrowest at the point of connection to the perforations and the width of the slots gradually increases toward the outer or marginal edges of the cutting head. The increase in width does not permit pinching of the skin due in part to the increase in thickness of the cutting head and in part to the outward flaring of the surface of the cutting head. The V-shaped slots continue around the outer edges of the cutting head and terminate in slits **35** in the walls **30**. The slots **35** provide openings through which the clipped hair may be shaken from the inside of the cutting head. The removal of hair from the inside of the cutting head is further facilitated by openings **36** in the walls **31** of the hollow cutter shank.

From one aspect the slots and perforations **32**, **33**, **34** and **35** can be considered as interfitting tapered slots which are narrowest in the shaving portion of the cutting head and which gradually increase in width in the clipping portion as the cutting head flares outwardly out of contact with the skin. From another aspect the cutting head openings can be considered as a series of transverse slots, adjacent slots increasing in width and extending toward opposite edges of the cutting head. Since the slots extend around the outer edges of the cutting head, blunt ended teeth **37** are provided between which the longer hair is adapted to enter, as shown in Fig. 2. The longer hair is therefore clipped to a shorter length before it is acted upon by the shaving portion of the cutting head. This prevents clogging of the slots in the shaving portion by the longer hair. The inclined edges of the slots **34** also help guiding the hair into the perforations **32**. The guiding action is made more effective by the fact that the slots **34** extend in the general direction of the normal travel of the shaving head.

The rigidity and strength of the teeth is increased by the walls **30** and by the arched walls **31** forming the hollow shank of the cutting head. The configuration of the walls **30** and **31** is such that no additional external support is needed for the active surface of the cutting head. By having the walls **30** folded over the lower tooth walls, blunt ends are provided for the teeth.

The construction of the cutting head is such that it may be made from a sheet metal stamping. The various openings are first stamped in the sheet of metal and the sheet is then formed to the final shape. Since the openings are formed by stamping, the cost is materially decreased.

Pressed against the inner surface of the cutting head is a generally rectangular reciprocating cutter **38** having staggered or offset transverse slots **39** extending from the outer or marginal edges toward the center and providing teeth **40**. The inner ends of the slots **39** may overlap, as shown in Fig. 5*a* and be separated by relatively narrow connecting portions **41**. Alternate connecting portions may be eliminated by slots inclined with respect to the offset slots, as shown in Fig. 5, in which case the slots in the cutter extend completely across the width of the cutter. The cutter is reciprocated a distance equal to the spacing of the cutter teeth **40**. In respective extreme portions, shown in Figs. 6 and 7, the cutter teeth therefore rest wholly within the portions of the cutting head between the slots **34**. During the reciprocation of the cutter the edges of the teeth **40** cooperate within the edges of the openings in the cutting head to shear hair in the cutter head openings.

The cutter is also of such construction that it may be made of sheet metal. During the manufacture of the cutter a sheet of metal is folded at spaced parallel lines over the rear side of the working surface of the cutter providing double thickness of material at the outer or marginal edges of the cutter and the remote portions of the sheet are formed into spaced arched walls **42** which are pressed together at the upper edges to provide a shank for the cutter. The outer edges of the cutter are then swaged to cause the opposed surfaces of the walls adjacent the folds to be integrally united or intimately bonded together. During the swaging the material flows toward the outer ends to provide a decreasing thickness at the ends of the cutter teeth. The slots **39** in the edge and cutting portions are cut after the forming of the cutter. The hollow shank provided by the arched walls **42** provides a rigid support for the active or cutting face of the cutter and also provides a space for receiving the cut hair which may be readily removed through the ends of the shank. The construction of the cutter is such that it may be easily and cheaply manufactured.

In the use of the shaver, the cutting head is rested on the skin in the position shown in Fig. 2 and is moved back and forth in the direction of the slots in the cutting head. The teeth at the edges of the cutting head and the cooperating teeth **40** in the cutter serve as a clipper which cuts the hair above the surface of the skin. The hair entering the perforations **32** and the slots **33** is cut close to the surface of the skin. Due to the staggered relation of the perforations **32** nearly all of the hair in the path of the cutting head is subjected to the cutting action of the shaving portion of the cutting head. The construction of the slots in the cutting head is such that hair entering any portion of the slots is guided along the slots. The inclined sides of the slots **34** tend to guide the hair into the perforations **32** and the slots **33** tend to guide the hair to a succeeding perforation. This increases the change of cutting the hair and therefore decreases the required number of back and forth movements of the cutting head. Due to the increase in wall thickness of the cutting head toward the edges there is no danger of pinching the skin entering the wider portions of the slots **34**.

In Figs. 9 and 10 is shown a modification of the cutter and cutting head. The shape of the cutter and cutting head is the same as in the previously described construction, the differences lying in the shape of the slots in the cutting or

working faces and in the movement of the cutter.

As in the previously described construction, the working face of the cutting head comprises a shaving portion 28 and clipping portions 29. In the working face of the cutting head are interfitting tapered or V-shaped slots 43 which extend completely across the cutting head in the general direction of travel of the cutting head. The slots, particularly in the shaving portion of the cutting head, are much wider than would be permissible if the slots were at any time fully opened. In the working face of the cutter are relatively narrow slots 44 which are parallel to the edges of the slots 43. Between the slots 44 are bars 45 which are of substantially the same size as the slots 43. The bars are shown as slightly wider than the slots 44 so that the cutter bars are at all times supported in the cutting head.

In the use of the shaver, shown in Figs. 9 and 10, the movement of the cutter is restricted so that relatively narrow openings 46 are successively opened between the edges of the bars 45 and the adjacent edges of the slots 43. A few of the slots 46 are shown in Fig. 9, the cooperating cutter bar being shown in dotted lines at one extreme position in its movement. At the other extreme position a similar slot is opened between the opposite edge of the cutting bar and the opposite edge of the slot 43. The relatively wide slots 43 are easy to punch. Due to the greater width of the slots 43 the skin enters these slots and the hair entering the openings 46 is accordingly cut or sheared closer to the surface of the skin. Due to the bending of the skin entering the slots 43 the hair may actually in some cases be cut below the normal surface of the skin. The sides of the slots 43 serve to guide the hair into the openings 46. It is obviously unnecessary that the slots 43 and the bars 45 be tapered as shown. It is merely necessary that the slots in the cutting head and the bars of the cutter be shaped so that portions of the cutter bars at all times block portions of the slots 43 and that the movement of the cutter be such that relatively narrow hair receiving openings are successively opened and closed between the adjacent edges of the cutter bars and cutting head slots.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a shaver, a cutting head having an outer face engaging surface and an inner shearing surface, said cutting head having a relatively thin walled shaving portion and a thicker walled clipping portion, shearing edges at said inner surface of the cutting head defining relatively small hair receiving openings in said shaving portion and relatively larger hair receiving openings in said clipping portion, and a cutter bearing against said shearing surface for shearing hair entering said openings.

2. In a shaver, a cutting head having an outer skin engaging surface and an inner shearing surface, said skin engaging surface comprising a thin walled shaving portion and a thicker walled clipping portion flaring outwardly therefrom out of normal contact with the skin, shearing edges at said inner surface of the cutting head defining hair receiving openings in said shearing portion and relatively larger hair receiving openings in said clipping portion, and a cutter cooperating with said inner surface of the head to shear hair in said openings.

3. In a shaver, a generally rectangular cutting head having an outer skin engaging surface and an inner shearing surface, said head having a relatively thin walled central portion increasing in wall thickness and flaring outwardly toward the edges of the head, a series of transverse slots in the central portion, adjacent slots extending and increasing in width toward the respective edges and providing comb-like teeth on said edges, said slots having shearing edges at said inner surface of the head defining hair receiving openings increasing in width with the wall thickness of the head, and a cutter cooperating with said inner surface of the head to shear hair entering said slots.

4. In a shaver, a cutting head having an outer skin engaging surface and an inner shearing surface, said cutting head having a variable wall thickness, shearing edges at said inner surface of the head defining hair receiving openings, and a cutter cooperating with the inner surface of the head to shear hair entering said openings, the size of the openings increasing with the wall thickness whereby cutting of the skin entering the openings is prevented.

5. In a shaver, a cutting head having an outer skin engaging surface and an inner shearing surface and interfitting relatively wide V-shaped slots defining V-shaped shearing edges at said inner surface of the head, the spacing of the shearing edges being such that the skin, unless otherwise prevented, would during the shaving operation project to a position in which it could be pinched against said shearing edges, a cutter having interfitting relatively wide V-shaped bars bearing against the inner surface of the head and spaced so as to be positionable to partially block said slots, and means moving the cutter to successively open and close relatively narrow openings between the edges of said bars and slots while maintaining said cutter bars in a position to partially block said slots and prevent the skin from projecting into the openings far enough to be pinched against said shearing edges.

6. In a shaver, a cutting head having an outer skin engaging surface and an inner shearing surface, spaced relatively large openings in the head defining shearing edges at said inner surface of the head, the spacing of the shearing edges being such that the skin, unless otherwise prevented, would during the shaving operation project to a position in which it could be pinched against said shearing edges, and a cutter bearing against the inner surface of the head having shearing edges for cooperation with the shearing edges of the cutting head and parts for engaging the skin and preventing it from projecting into the openings far enough to be pinched between said shearing edges.

7. In a shaver, a cutting head having an outer skin engaging surface and an inner shearing surface, spaced relatively large openings in the head defining shearing edges at said inner surface of the head, the spacing of the shearing edges being such that the skin, unless otherwise prevented, would during the shaving operation project to a position in which it could be pinched against said shearing edges, a cutter having parts substantially the size of said openings bearing against the inner surface of the head and spaced so as to be positionable to block portions of said openings, the edges of said parts providing shearing edges for cooperation with the shearing edges of the cutting head, and means for effecting relative movement of the cutter with respect to the head to open and close hair receiving openings between the respective shearing edges which are relatively small compared to the cutting head

openings while maintaining said cutter parts in a position to partially block said openings and prevent the skin from projecting into the openings far enough to be pinched between said shearing edges.

8. In a shaver, a cutting head having hollow edge portions including a face contacting portion having an outer skin engaging surface and an inner shearing surface and an upper portion folded back over the outer portion and spaced therefrom to produce lateral edge portions, relatively wide slots in said edge portions forming hollow comb-like teeth having shearing edges at said shearing surface, the spacing of the shearing edges being such that the skin, unless otherwise prevented, would during the shaving operation project to a position in which it could be pinched against said shearing edges, a cutter within said edge portions having parts substantially the size of said slots bearing against the inner surface of the head and spaced so as to be positionable to block portions of said slots, the edges of said parts providing shearing edges for cooperation with the shearing edges of the cutting head, and means for effecting relative movement of the cutter with respect to the head to open and close hair receiving openings between the respective shearing edges which are relatively small compared to said slots while maintaining said cutter parts in a position to partially block said slots and prevent the skin from projecting into said slots far enough to be pinched between said shearing edges.

9. In a shaver, a hollow cutter having a front wall providing a cutting portion bounded by marginal edge portions and rear walls providing an enclosure for the rear side of the cutting portion, opposed faces of said marginal edge portions of the front and rear walls being joined together to provide increased wall thickness at said edge portions, and slots in the edge portions providing teeth along the edges of said front wall.

10. In a shaver, a sheet metal cutter having a front wall providing a cutting portion bounded by marginal edge portions, walls connected to and folded inwardly over the rear side of the front wall at said edge portions, opposed faces of said walls being in intimate contact at the edge portions, and slots in said edge and cutting portions.

11. The method of forming from sheet metal a cutter of the type described having a cutting portion bounded by marginal edge portions which includes forming said cutting portion with a single wall thickness and said edge portions with a double wall thickness, and swaging the edge portions to gradually decrease the thickness thereof outwardly from said cutting portion.

12. The method of forming a cutter which comprises, folding a metal sheet upon itself at two spaced lines to define a medial cutting portion, integrally uniting opposed faces of the sheet adjacent the folds to form edge portions of double wall thickness, bringing the remote portions of the sheet together to form a shank portion, and slotting said edge portions and intermediate portions of said cutting portion.

13. In a shaver, a generally rectangular cutter having offset slots extending inwardly from opposite edges of the cutter to the medial portion of the cutter, and slots in said medial portion inclined with respect to and connecting said offset slots.

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