Dec. 28, 1943. A. ROMAO 2,337,623

ELECTRIC DRY SHAVER

Filed May 19, 1941

Fig. 1.

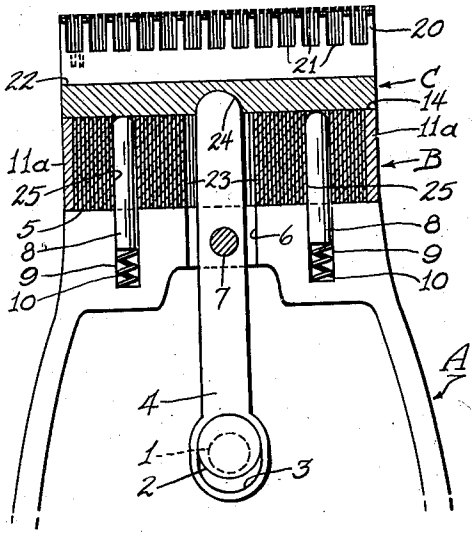
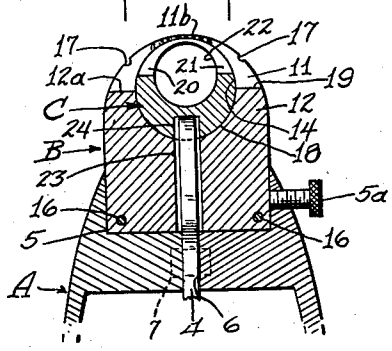


Fig. 2.



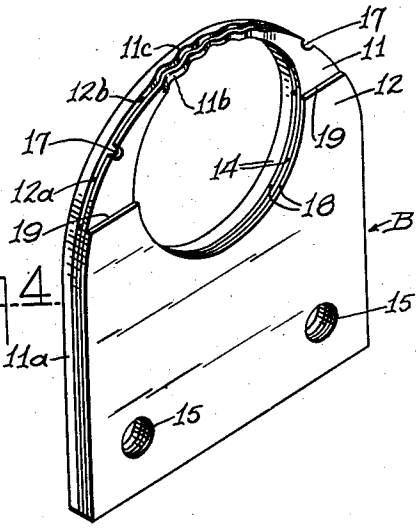
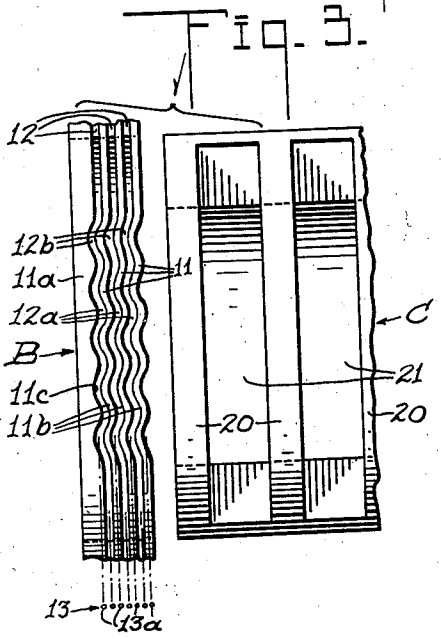


Fig. 4.

Fig. 3.



INVENTOR

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ELECTRIC DRY SHAVER

August Romao, San Francisco, Calif.

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8 Claims. (Cl. 30—43)

My invention relates to improvements in an electric dry shaver and it consists of the combinations, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide an electric dry shaver that has transversely extending bars and slots in the guard, each bar being transversely corrugated, the depth of the corrugations representing an offset in the direction of the length of the guard at least equal to the width of the slots separating the bars. The result of this is that as the guard is moved over the face or other body portions from which hair is to be removed, all of the hair lying in the path of the moving guard will find its way into the curved or corrugated guard slots during the single movement of the guard over the surface in one direction since the hair that initially lies in the path of one of the segments will be received in the loop of the adjacent slot and be severed by the cutter before the guard completes its single movement over the surface. It will therefore not be necessary to make repeated movements of the guard over the same skin area in order that all of the hairs be cut.

A further object of my invention is to provide a strong shaver head even though the transversely extending and corrugated bars forming the slots are so arranged that all of the hair lying in the path of the moving guard will find its way into the curved or corrugated guard slots during a single movement of the guard over the surface in one direction. The bars defining the slots are made extremely narrow, being about seven-thousands of an inch in width, and the slots are of the same width. It would be difficult to stamp slots and form bars of these narrow widths in a single piece of sheet metal and if it could be done, the corrugating of the slots would weaken the metal forming the bars to such an extent as to likely make it incapable of withstanding the pressure exerted upon it when it is manually forced against the skin during the act of shaving.

In order to make the shaver head strong and yet be provided with hair receiving and transversely extending corrugated slots seven-thousandths of an inch in width and separated by bars of the same width and configuration, I construct the guard from plates and spacing members, each having a width between seven- to ten-thousandths of an inch. The spacing members alternate with the plates throughout the entire length of the guard and have their faces abutting the faces of the plates. The spacing members are of a less height than the plates and have their tops stop short of the tops of the plates and thus form the slots between the plates only at the top of the guard. The portions of the plates extending beyond the spacing members are corrugated for a certain length to provide corrugations in the slots for the purpose mentioned. The guard carries a reciprocating cutter that has slots cooperating with the corrugated guard slots for cutting all of the hair received in the guard slots, the cutter bars cooperating with the shearing tops of the plates for this purpose.

The guard and cutter are relatively simple in construction and are durable and efficient for the purpose intended. The shaver will cut the hair close to the skin for the top of the guard is only spaced substantially five-thousandths of an inch from the top of the cutter. The extreme thinness of the guard plates at the top of the guard is made possible by the rapidly thickening plate portions which provide sufficient support to the thin portion. The smaller radius of the opening for the cutter in the plate and the larger radius for the curved outer portion of the same plate result in the plate having rapidly thickening portions on each side of and integral with the thin plate portion.

Other objects and advantages will appear in the following specification and the novel features will be set forth in the appended claims.

My invention is illustrated in the accompanying drawing forming a part of the application, in which:

Figure 1 is a longitudinal section through the shaver illustrating the parts at about four times their normal size for the purpose of clarity;

Figure 2 is a transverse section through the shaver showing it about twice its normal size;

Figure 3 is a plan view of a portion of the guard and cutter on a greatly enlarged scale (about eight times actual size) to illustrate more clearly the plates, spacers and cutter; and

Figure 4 is an isometric view on a large scale, further illustrating how the plates and spacers are assembled to form the guard.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

In carrying out my invention, I provide a casing indicated generally at A in Figures 1 and 2. The casing houses an electric motor, not shown, whose shaft 1 has an eccentric disc 2 rotatably

received in a slot 3 formed in one end of a lever or rocker arm 4. Any form of power can be utilized with this type of electric shaver; preferably the impulse type of electric motor is used with my device.

The casing A has a recessed end 5 for removably receiving a shaving head or guard indicated generally at B, and the free end of the rocker arm 4 projects into the recess. A set screw 5a secures the guard B to the casing A. Figure 1 illustrates the arm 4 as extending through an opening 6 in the casing and as being pivotally supported at 7. Pressure pins 8 are also received in pockets 9 provided in the casing A, and coil springs 10 urge the pins outwardly for a purpose presently to be described. A rotation of the motor shaft 1 will cause the free end of the arm 4 to reciprocate in a plane paralleling the length of the recess 5.

The shaving head or guard B forms the principal novelty of the present invention, and it is illustrated in detail in Figures 3 and 4. The guard B is constructed out of individual plates 11 and spacers 12 which are preferably stamped out of a thin sheet of a tough material such as stainless steel. The plates and spacers are placed face to face in abutting relation and alternate with each other throughout the length of the guard head. Both the plates and spacers preferably have the same thickness and width, but the plates have arcuate tops while the spacers do not, and thus are shorter in height so as to provide the guard with a plurality of narrow hair-receiving slots formed by the extremely narrow spacers and the adjacent plates, and also to provide the guard with a plurality of extremely narrow hair-shaving members or bars.

The edges of the arcuate tops of the plates constitute the hair-shearing edges; and since the plates and spacers are stamped out of a thin sheet of tough material, it is evident that the shearing members can be made extremely more narrow than if the slots were cut out of a solid or hollow piece of material. And yet even with this extreme narrowness of hair shearing members in the head, it still maintains sufficient rigidity to withstand the reciprocation of a cutter C, hereinafter described, and also to withstand such pressure on the skin as is created during the act of shaving. In order to avoid unnecessary discomfort to the skin, the end plates 11a on the assembled guard have a greater thickness than the intermediate plates, and the outer arcuate edges of the end plates are rounded. If the plates and spacers are extremely narrow, such as seven-thousandths of an inch in thickness, the hair will more readily enter the hair-receiving spaces or slots 12a formed between adjacent plate tops, since the resistance of the plates or bars to the hair is reduced to a minimum.

It is obvious, however, that in order to cause the slots 12a to receive all of the hair on the skin area traversed by the guard during one movement of the guard over this area, the slots must be corrugated, and this is accomplished by corrugating or crimping a certain portion of the arcuate plate ends that extend beyond the tops of the spacers. This crimping or corrugating of the arcuate plate portions is clearly illustrated in Figures 3 and 4 at 11b and forms corrugations in the slots 12a at 12b. Any hair initially contacting with the arcuate portion of a plate, will be received in a corrugated portion of the adjacent slot before the guard completes its movement in one direction over the skin area. This is an important point and is diagrammatically illustrated in Figure 3.

In the greatly enlarged showing of Figure 3, three of the plates 11 and one end segment 11a are shown separated from each other by the spacers 12. The arcuate portions of the plates that project above the spacers are shown with corrugated portions. The resulting corrugated slot portions 12b will receive all of the hairs 13 indicated in the row even though initially the hairs 13a will be contacted by the arcuate plate ends before being cut. The result is that all of the hairs 13 and 13a will be received in the slots and be severed by the cutter C before the guard completes its single stroke over the hairs. The loops of the corrugations have a height at least equal to the width of the bars or plates and this in effect provides the guard with a hair receiving opening substantially coextensive with the length of the guard. Another way of stating the same thing would be to say that the shearing members or plates have crimped portions with alternate crests and troughs which are laterally disposed in relation to the plane of the shearing members. It is evident that the crimped portions of the shearing members will have the action of zigzagging over the skin as the guard is moved thereover, thus exposing all of the hair that lies in the path of the guard to the rapid reciprocal action of the cutter C. The end members 11a have corrugated portions 11c on their inner surfaces that conform to the corrugations of the adjacent plates.

In assembling the plates to form the completed guard, the crests of the crimps in one plate or shearing member are placed opposite the troughs in the adjoining plate. The individual plates are of substantially rectangular shape, convex on their upper edges and with a hole 14 placed slightly below the convex top. The depth of the metal at the top center of the arcuate curve is approximately five-thousandths of an inch or less to provide a close shave. It will be seen that the radius of the opening 14 is less than the radius of the arcuate plate top and therefore the depth of the plate portions disposed on each side of the crimped portion will rapidly increase for providing wedge-like portions, thus insuring that the shearing portion of the plate have the proper amount of rigidity. This permits the guard top to withstand shaving pressures even though the depth of the guard top is five-thousandths of an inch or less.

Adjacent to the two lower plate corners, small holes 15 are provided to receive binding rods 16 for holding all of the plates and spacers together. On each side of the crimped portion, each plate, excepting the end plates 11a, is provided with an indentation 17 having a radius about three thirty-seconds of an inch to form a comb in the completed guard that will guide long hairs into the spaces or slots 12a. Such hairs as may incline to one side or the other of the path of the shearing members 11, will be lifted into the slots 12a and be sheared.

The spacers 12 are of substantially the same shape as the plates except that the top portions are cut off on a line that extends through the axis of the opening 14. Each spacer has a half-opening 18 aligned with the opening 14, and the top edge 19 of the spacer defines the lower limits of the slot 12a. The plates and spacers may be secured together by the binding rods 16 riveted at the ends, or they may be soldered by hard solder at the sides and base, or otherwise secured together to form a single unit guard.

The cutter C is of the cylindrical type and is received in the bore formed by the aligned openings 14 and half-openings 18. The cutter has shearing bars 20, see Figures 1 and 3, which are spaced from each other to provide hair receiving spaces 21 on the top side of the cutter. The hair receiving spaces are preferably wider than the bars in order to provide a substantial hair receiving interval for the cutter during its reciprocation. I have found from practice that spaces of one-sixteenth of an inch in width and bars of one thirty-second of an inch in width form an ideal hair-cutting portion for the cutter with the present day impulse motor of limited power. The cutter has a channel or hair receiving bore 22 that extends from end to end thereof and is disposed about one thirty-second of an inch below the top of the cutter. The severed hairs drop into this channel where they are collected. The cut hairs will gravitate to either end of the channel bore when the shaver is tilted and thus can be removed.

A slot 23 is provided at the center of the guard base for receiving the arm 4 and is large enough to permit the arm to reciprocate freely therein. The cutter base has a recess 24 therein for receiving the free end of the arm and the construction is such that a reciprocation of the arm will reciprocate the cutter in the guard. The guard B also has two bores 25 therein for slidably receiving the pins 8, and the springs 10 yieldingly hold the pins against the bottom of the cutter for causing the top of the cutter to make shearing contact at all times with the top of the guard bore formed by the opening 14. All of the spacers 12 that are severed into two parts by the openings 23 and 25 are secured in place in the guard by the hard solder and pins 16. The cutter receiving bore 14 should be enlarged at the bottom in order to provide a sufficient clearance between the cutter and guard for avoiding unnecessary friction. The interior of the cutter receiving bore 14 and the outer surface of the cutter should be ground to precision preferably on a hydraulic cylindrical grinder. If the guard is made of stainless steel and the cutter made from hardened tool steel, the combination offers an ideal condition from a standpoint of wear on both the guard and cutter. The spring pins 8 cause the cutter automatically to take up wear between the cutter and guard. Any other type of means for yieldingly holding the cutter against the top of the bore 14 may be used.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. The parts, consisting of the guard and cutter, are assembled in the manner illustrated and are removably held in place by the set screw 5a. The arm 4 may be reciprocated by any means, such as by the motor shaft 1, and will reciprocate the cutter in the bore 14. The guard is placed on the skin from which hair is to be removed and is pressed against the skin as the guard is moved thereover. The plates 11 depress the skin and cause the skin received in the slots 12a to bulge. This causes the cutter to sever the hair below the skin level and a close shave results. The thinness of the plates or shearing members and the narrowness of the slots cause the guard to offer no obstruction to the entrance of the hair into the slots. Any hair that initially is contacted by the curved top of the shearing member will be received in a corrugated portion of the same or adjacent slot before the guard completes a single stroke and the cutter will sever the hair as soon as it is received in the slot. This produces a clean shaving cut substantially from end to end of the guard, with only a single movement of the shaver over the face or other body portion being required. It is evident that since all hair will be cut by the shaver during one movement over the skin, less irritation results and a quicker shave is effected.

Furthermore, since this type of shaver head and cutter has no blunt edges that travel against the hair stubs, no rasping effect is experienced by the operator on his skin. It should be understood that this invention broadly covers the feature of bending the shearing members for forming slots that will receive all of the hair lying in the path of the guard during a single movement of the guard along the path. Different types of crimping may be used. I have shown a wavy-type of crimp although the crimping can be of herring bone fashion, etc. Any design that will cause the transverse slots to deviate from side to side of a median line will fall within the scope of this invention.

I claim:

1. An electric dry shaver comprising a head built up of alternate plates and spacers arranged face to face in abutting relation; said spacers being of less height than the plates, thus providing transversely extending hair receiving slots at the top of the head and between the plates; the tops of the segments constituting hair shearing members and having corrugated portions, the displacements forming the corrugations lying in the direction of the length of the head to form the slots with corrugated portions; whereby hair initially contacting with the shearing members when the shaver is pressed against the skin, will be received in the corrugated portions of the adjacent slots before the head is moved clear of the skin area being shaved; and a cutter cooperating with the shearing members for cutting the hair received in the slots.

2. An electric dry shaver comprising a head built up of alternate plates and spacers arranged face to face in abutting relation; said spacers being of less height than the plates, thus providing transversely extending hair receiving slots at the top of the head and between the plates; the tops of the segments constituting hair shearing members and having corrugated portions, the displacements forming the corrugations lying in the direction of the length of the head to form the slots with corrugated portions; whereby hair initially contacting with the shearing members when the shaver is pressed against the skin, will be received in the corrugated portions of the adjacent slots before the head is moved clear of the skin area being shaved; and a cutter cooperating with the shearing members for cutting the hair received in the slots, the corrugations representing an offset in the direction of the length of the head at least equal to the width of the slots separating the plates.

3. An article of manufacture comprising a member very thin in thickness and having a curved end; said member being provided with an opening having a portion lying near the curved end to form a thin bar-like portion that is very shallow in depth; this bar-like portion being corrugated on its two faces.

4. An article of manufacture comprising a member very thin in thickness and having a curved end; said member being provided with an opening having a portion lying near the curved

end to form a thin bar-like portion that is very shallow in depth; this bar-like portion being corrugated on its two faces, the crests and troughs of the corrugations being at least equal to the thickness of the member.

5. A shaving head for a dry shaver having a semi-cylindrical top with transversely extending slots therein; said head having a longitudinally-extending cutter-receiving bore therein placed near the curved top so that the bar-like portions in the head formed by the slots and bore will have a very thin depth at their midportions, these thin midportions being effectively supported by wedge-like ends of the bar that merge into the head, said bar-like portions having their sides transversely corrugated to form corrugations in the slots, the crests and troughs of the corrugations having rounded tops and bottoms to prevent the bars from digging into the skin.

6. A shaving head for an electric dry shaver formed from a plurality of members about seven-thousandths of an inch thick; spacers of the same thickness placed between adjacent members and stopping short of the top of the head for providing transversely-extending hair-receiving slots, means for securing the members and spacers together, to form the head, said head having a cutter-receiving bore; portions of the members defining the slots being corrugated to form corrugations in the slots.

7. An electric dry shaver comprising a head with spaced parallel and transversely extending bars forming parallel slots; the bars having portions thereof similarly corrugated, the displacements which form the corrugations extending in the direction of the length of the head and providing corrugations in the slots; whereby hair initially contacting with the bars when the shaver head is pressed against the skin, will be received in the crests or troughs of the adjacent slots before the head is moved clear of the skin area being shaved; and a cutter cooperating with the bars for severing all of the hair received in the slots.

8. An electric dry shaver comprising a head with spaced parallel and transversely extending bars forming parallel slots; each bar being similarly transversely corrugated, the depth of the corrugations representing an offset in the direction of the length of the guard at least equal to the width of the slots separating the bars; whereby hair initially contacting with the bars when the shaver head is pressed against the skin, will be received in the crests or troughs of the adjacent slots before the head is moved clear of the skin area being shaved; and a cutter cooperating with the bars for severing all of the hair received in the slots.

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