Feb. 15, 1944. C. L. VOLZ 2,341,833

SHAVING DEVICE

Filed Sept. 29, 1941

FIG.1.

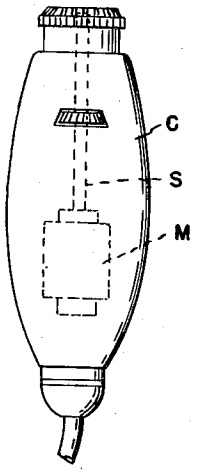


FIG.4.

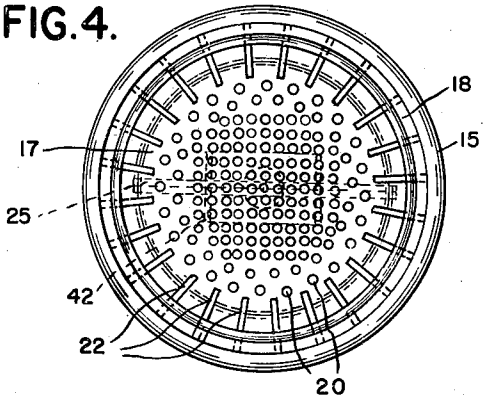


FIG.2.

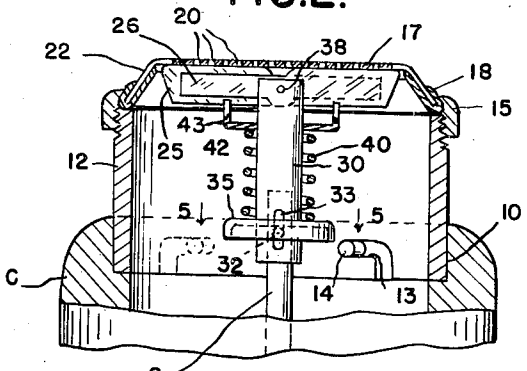


FIG.6.

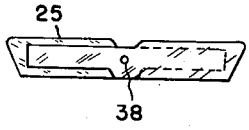


FIG.5.

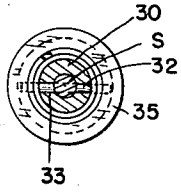
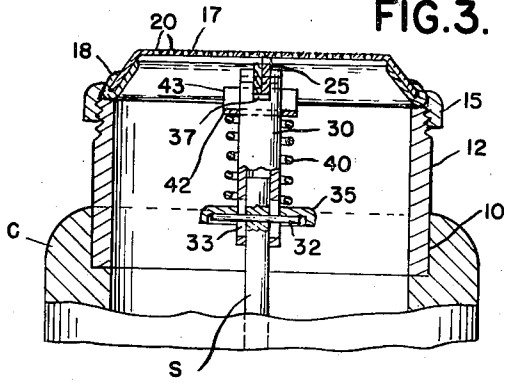


FIG.3.



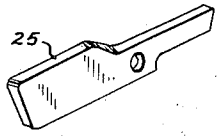


FIG.7.

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SHAVING DEVICE

Chris L. Volz, Birmingham, Mich.

Application September 29, 1941, Serial No. 412,721

5 Claims. (Cl. 30—43)

This invention relates to shaving and hair clipping devices, and is particularly directed to improvements in motor-driven shavers, constituting a further development of the invention disclosed in my Patent No. 2,245,420, granted June 10, 1941.

Shaving devices of the class here involved are provided with radially arranged cutter blades, rotating behind and coacting with a thin, perforated, skin-engaging shear plate, through which the hairs project to be sheared by the cutter blades. Such designs, as heretofore proposed and constructed, have not proved commercially successful or practicable. The principal source of difficulty in connection with the design of rotary shaving devices of this class has been the generation of heat. If the engagement pressure and rotational speeds are sufficient for effective operation, with most such designs, the resultant friction generates too much heat to enable the device to be comfortably held against the face of the user. If, on the other hand, the attempt is made to design the device with rigidly mounted, accurately guided parts, of such accuracy that low engagement pressure may be employed, the perforated plate must be stiff and self-supporting, and is accordingly too thick to permit a close shave, in addition to which it is virtually impossible to maintain permanently such accuracy as will insure proper shearing action and prevent pulling of hairs.

With the foregoing considerations in mind, my present invention aims to provide a rotary shaver of the indicated class in which the engagement area and pressure, rate of rotation and dimensions are interrelated in a novel manner which achieves rapid and effective shaving without generation of undue heat.

Another object is to provide such a shaver having a generally flat, perforated, flexible shearing plate, which is of substantial area yet extremely thin, backed by resiliently mounted rotary cutters, the arrangement being such that the plate may be made of very thin material, affording a very close shave, and the plate being flexible in character, the cutter blades bearing against the under side of the plate with considerable pressure.

It is also an aim of the present invention to provide novel means whereby the shear plate may flex under the pressure of the blades, and whereby the blades are maintained in engagement with the perforated shear plate with uniform pressure despite the flexing of the plate. A related object is to provide means whereby such engagement, and very effective cutting action, are maintained without the generation of undue heat.

Still another object is to provide such a shaver having a shearing plate of the indicated character supported and arranged in a novel manner, permitting relatively free flexing thereof and enabling quick and easy changing of plates when worn. A related object is to incorporate such a novel, resiliently mounted and very thin shearing plate designed to decrease in thickness gradually during use, whereby closer shaves are afforded as the plate wears, the plates being of very simple and inexpensive construction and adapted to be replaced at intervals.

Other objects and advantages will be apparent from the following description, wherein reference is made to the accompanying drawing illustrating a preferred embodiment of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawing:

Figure 1 is a side elevational view of an electrically operable shaver having a cutter head assembly constructed in accordance with the present invention.

Figure 2 is an enlarged substantially diametric longitudinal sectional view of the head portion.

Figure 3 is a view similar to Figure 2 but taken at right angles thereto.

Figure 4 is a plan view of the head assembly, also upon an enlarged scale.

Figure 5 is a cross section taken substantially on the line 5—5 of Figure 2 and looking in the direction of the arrows, and

Figure 6 is a side elevational view of the cutter blades, removed from their mounting.

Fig. 7 is a perspective view of a single cutter blade removed from its mounting and shown on a somewhat larger scale.

Referring now to the drawing, reference character C designates the casing of the shaving device, which is diagrammatically illustrated as provided with an electric motor M arranged to turn the cutter shaft S. The details of construction of the casing and motor form no part of my present invention.

The upper end of the casing is socketed, as at 10, to receive the cutter head assembly, the cylindrical body 12 of which is adapted to be locked to the casing by means of bayonet-type slots 13 formed in the lower periphery of the cylindrical body and engageable with pins 14 appropriately spaced and projecting inwardly from the socketed portion of the casing. Removably affixed to the upper end of the tubular body 12, as by means

of a threaded bezel 15, is a shear plate assembly 17 formed of thin sheet metal, peripherally dished, as best shown in Figures 2 and 3, and retained in a rigid rim 18 clamped or otherwise applied thereto. The portion of the rim 18 which projects upwardly upon the outside of the frusto-conic periphery of the dished clamping plate is relatively short, as shown, to permit free access of hairs to the radial slots 22 which intersect the corner formed by the dishing of the plate. The interior of the rim 18 extends upwardly into the corner or circular line of meeting between the frusto-conic area and the top. The rim thus provides firm support, from inside the plate, for the substantially flat top section.

The top area of the plate is provided with a plurality of relatively fine, closely spaced apertures 20, through which the hairs to be sheared are adapted to project. The radial slots 22 extend inwardly from the periphery of the flat section, and downwardly in the frusto-conic area, as shown in the drawing, and are open at the edge of the plate which is enclosed by the rim 18. The slotting will be seen to assist in forming the plate to the dished shape. The slots also extend inwardly far enough to partly overlie the area swept by the rotating cutter blades 25. As the shaver is moved over the face, hairs may enter the slots 22, which, by virtue of their arrangement will easily receive hairs too long to enter the apertures 20.

The cutter blades are carried by an extension sleeve portion 30, carried and driven by the upper end of the shaft S, but longitudinally movable with relation thereto, by virtue of a pin and slot connection, the pin 32 being fast in the shaft and projecting outwardly through opposed slots 33 in the extension sleeve 30. A washer 35, encircling the sleeve, is cupped to overlie and entrap the pin 32, preventing displacement of the latter, the washer serving as an abutment for a spring 40 which urges the sleeve, together with the cutter blades 25 carried thereby, outwardly and against the under surface of the shear plate.

The cutter blades are mounted in a transverse slot 37 formed in the upper end of the sleeve 30, being pivoted with respect to the sleeve upon a cross pin 38. I have found that if more than two such blades are used, sufficient pressure for effective shearing action can not be provided without the generation of undue heat, unless the head diameter is too small for convenience. With two blades, I am able to use a head diameter of approximately ¾", provided the motor speed is held relatively low for such devices (approximately 3600 revolutions per minute) and find that it is still possible to apply sufficient engagement pressure for effective cutting without undue heating. These factors are relatively critical, and if any one is exceeded, the heat generation or cutting characteristics become unsatisfactory. I have determined that from the standpoint of efficiency and the prevention of undue heating, the relationship between the total engagement pressure in pounds, the contacting surface area in square inches, and the average surface speed in feet per second, should be such that the product of all of these will equal approximately one-tenth. With dimensions, speed and number of blades as given, I am able to use an engagement spring pressure of approximately twelve ounces. The distribution of the spring pressure is also important, however.

It will be noted that the spring 40 bears against a pressure equalizing and thrust bracket 42 having outwardly directed and upturned arms 43, each of which engages and is notched to receive the lower edge of one of the pivoted cutter blades 25. The diametrical spacing between the upturned arms is approximately four-tenths of the diameter of the cutter blade assembly, and the upward thrust thus imparted maintains full length contact between the upper edge of the cutter blades and the under surface of the plate, while permitting the blades to follow the flexure of the plate. Each blade is provided with an integral rearwardly extending arm 26, which normally floats freely between the shear plate and the upper edge of the subjacent arm 43. When the shear plate is removed, however, the portions 26 prevent the cutter blades from being swung sharply upwardly, thus guarding the blades and the plate against injury.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What I claim is:

1. A shear plate assembly for a rotary shaver, comprising a substantially flat, flexible, perforated plate section, a slotted peripheral flange portion extending from the plane of the plate section, and a supporting and reinforcing rim element engaging the periphery of said flange portion and extending interiorly of the flange portion substantially to the juncture thereof with said plate section.

2. A shear plate assembly for a rotary shaver, comprising a substantially flat, flexible, perforated plate section, an integral peripheral flange portion extending from the plane of the plate section, said plate assembly having substantially radial slots extending through the same in the area of juncture of the flange portion and plate section, and a supporting and reinforcing rim element embracing the periphery of said flange portion and extending interiorly thereof substantially to the juncture of said flange portion with the plate section, said rim element also extending on the outside of said flange portion but for a lesser distance.

3. A shear plate assembly for a rotary shaver, comprising a substantially flat, flexible, perforated plate section, a substantially frusto-conic peripheral flange portion integral with the plate section, and means for supporting and reinforcing the assembly, comprising a rim element engaging the periphery of the flange portion and extending interiorly thereof substantially to the line of juncture of said flange portion and plate section.

4. A shear plate assembly for a rotary shaver, comprising a substantially flat, flexible, perforated plate section, a substantially frusto-conic peripheral flange portion integral with the plate section, said assembly being provided with substantially radial slots extending inwardly from the periphery of the flange portion to positions inside the line of juncture of the flange portion and plate section, and means for supporting the assembly, comprising a rim element embracing the periphery of the flange portion and extending interiorly thereof substantially to the line of juncture of the flange portion and plate section.

5. A rotary shaver construction comprising in combination with a shaft adapted to be motor-

driven, a perforated shear plate overlying an end of the shaft and formed of thin, flexible material, a cutter assembly including substantially radial blade means rotatable by the shaft and adapted yieldably to engage the under side of the shear plate, and means for supporting the blade means upon the shaft including a carrier keyed to the shaft for rotation therewith but slidable toward and from the plate, the blade means being separately pivoted to and adjacent the end of the carrier, the pivot means for said blade means having a transverse axis and the blade means being swingable thereabout toward and from the plate, spring means reacting against said shaft and against said blade means and urging the latter outwardly toward said plate, the carrier being movable longitudinally outwardly in the same direction to cause all portions of the blade means which abut the plate to be urged into uniform or desired engagement with the latter, and pressure distributing means arranged between the spring means and the blade means and engaging said blade means at a predetermined distance from the pivot means.

CHRIS L. VOLZ.