

April 14, 1964

J. E. HUBBARTT ETAL

3,128,549

ROTARY TYPE SHAVER WITH SUCTION DISPOSAL MEANS

Filed March 19, 1962

2 Sheets-Sheet 1

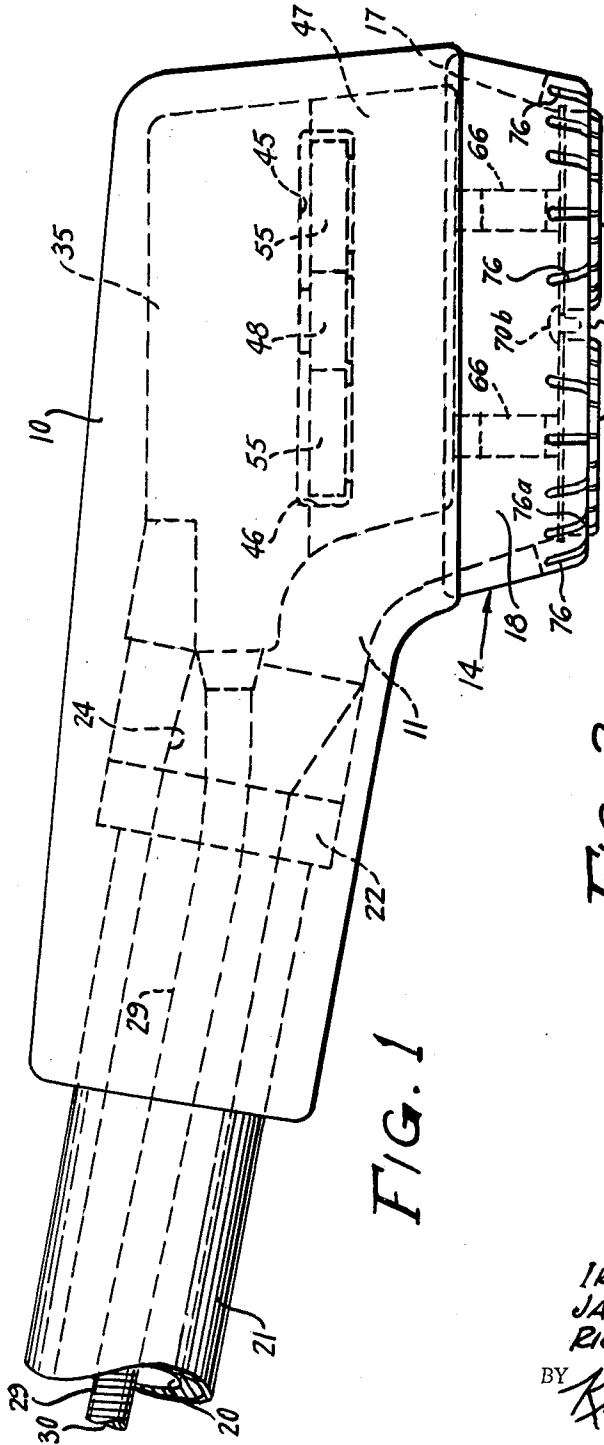


FIG. 1

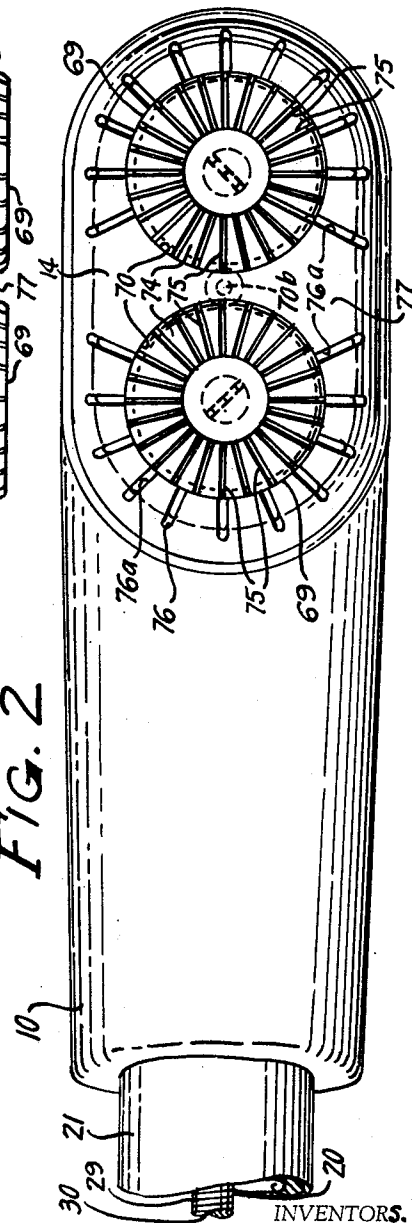


FIG. 2

IRVING SILVER
JAMES E. HUBBARTT
RICHARD B. INMAN

INVENTORS.

BY *Kimmel & Crowell*
ATTORNEYS.

April 14, 1964

J. E. HUBBARTT ETAL

3,128,549

ROTARY TYPE SHAVER WITH SUCTION DISPOSAL MEANS

Filed March 19, 1962

2 Sheets-Sheet 2

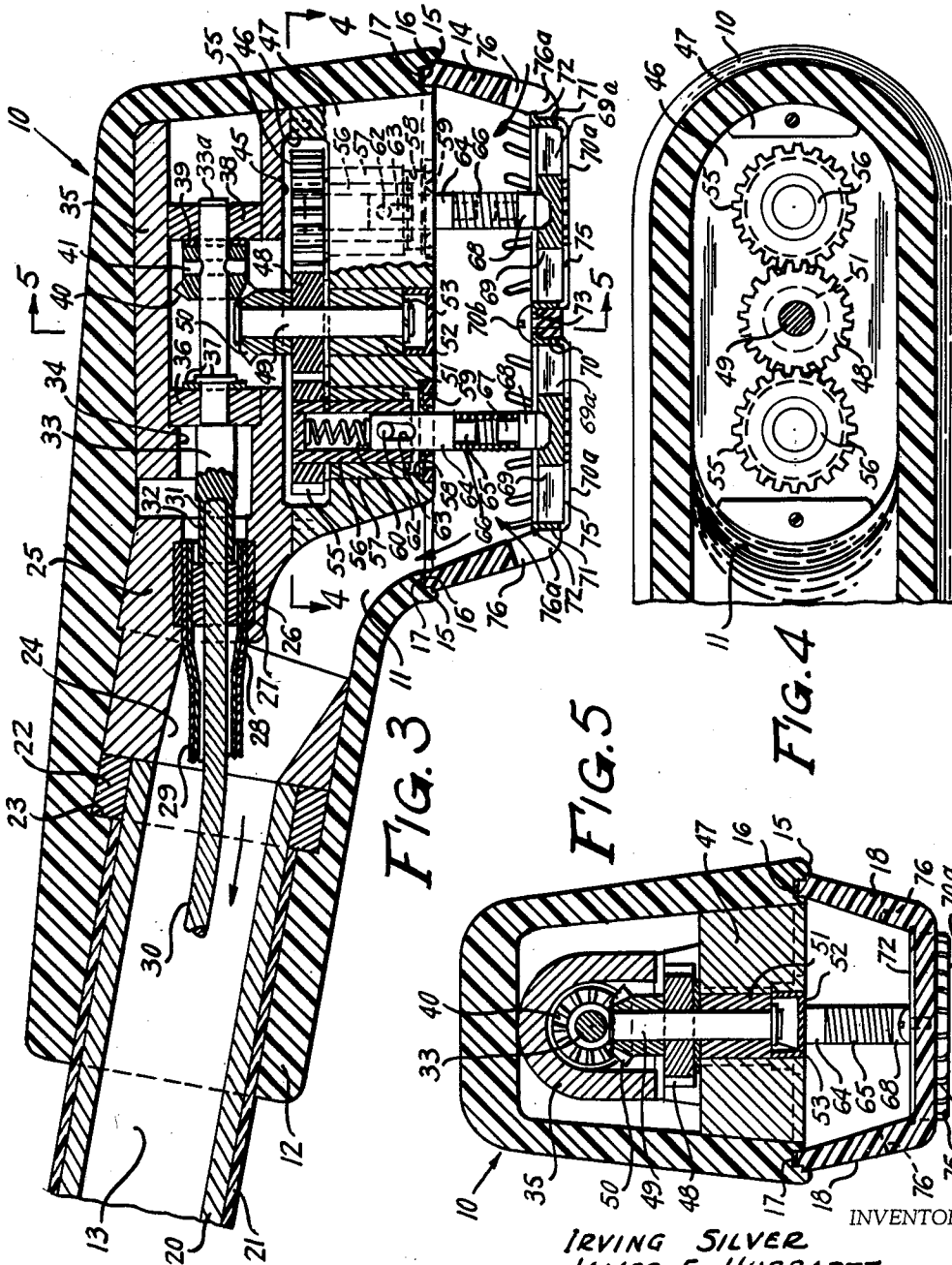


FIG. 3

FIG. 5

FIG. 4

IRVING SILVER
JAMES E. HUBBARTT
RICHARD B. INMAN

INVENTORS.

BY *Kimmel & Crowell*
ATTORNEYS.

1

2

3,128,549
**ROTARY TYPE SHAVER WITH SUCTION
 DISPOSAL MEANS**

James E. Hubbart, Irving Silver, and Richard B. Inman,
 Atlanta, Ga., assignors to Shavair of America, Inc.,
 Atlanta, Ga.

Filed Mar. 19, 1962, Ser. No. 180,550

4 Claims. (Cl. 30—41.5)

This invention relates to a power driven shaving device, and has particular applicability to a shaver which is powered from a remote source.

A primary object of the invention is the provision of a shaver characterized by a suction apparatus which, in addition to removing the shaved hair from the shaver head, additionally serves to draw the skin toward intimate contact with the cutting blades to insure a close and uniform shave.

An additional object of the invention is the provision of a shaver head which is connected by a continuous duct to a small air compressor or vacuum pump whereby air from the atmosphere flows successively through air inlet apertures into the shaver head cavity, through the cavity, the ducting system and the pump, and is finally discharged to the atmosphere.

Still another object of the invention is the provision of a shaver of this character wherein the apertures are located at positions within the glide plate so that the openings into the shaver head cavity are exposed to the atmosphere under normal shaving conditions at all times during the shave.

Still another object of the invention is the provision of a shaver head having openings therein in close proximity to the body surface being shaved, whereby maximum effectiveness is obtained during normal operation by allowing air flowing into and through the opening to be drawn over.

A further and more specific object of the invention is the provision of such a shaver head wherein a continuous flow of air from the region around the guide plate and through the shaver head cavity is provided, and wherein the shaver head cavity is maintained at a pressure significantly below that of the ambient atmosphere.

A more specific object of the invention is the provision of a device of this character wherein the continuous flow of air over the face or body surface provides a pleasant cooling and drying situation enabling one to comfortably shave a moist body surface, the forced evaporation essentially eliminating the shaver sliding resistance commonly experienced during shaving a moist body surface with the standard type electric shaver.

Still another object of the invention is the provision of apertures which are specifically designed to provide a direct contact between the flowing air and the body, the shaver cavity vacuum being maintained at the desired value by properly sizing the apertures in accordance with the pump and duct characteristics.

Still another object of the invention is the provision of a shaver head of this character which provides for the continuous removal of the cut hairs or foreign particles during shaving.

As conducive to a clearer understanding of this invention, it may here be pointed out that combining internal vacuum and air flow in a shaver head requires a carefully controlled air flow design to assure proper cleaning and vacuum action. For example, if the glide plate apertures are not present, the vacuum cannot be maintained at a desired level when the shaver is in contact with the face and when the contact is broken. By selection of the proper pumping system, a desired pressure could be maintained, in the absence of the plate apertures as long as the shaver is in contact with the face, but would immediately

drop upon removal of the shaver from contact with the face. This effect resulting from the air flow through the comb openings when the openings are exposed, is reflected in low air flow velocity and thus poor cleaning action. Conversely, if the vacuum is selected for good cleaning action without the glide plate apertures, the vacuum will be undesirably high when the shaver is in contact with the body surface, resulting in skin burn.

By virtue of the instant invention the air flow and vacuum principles in conjunction with the proper incorporation of air inlet apertures which are always exposed obviates the above disadvantages. Thus, with the design of the instant invention, the size of the apertures is such that the change in vacuum during normal operation, that is, intermittently exposing the cutter comb openings, is small, assuring good cleaning characteristics at all times without the possibility of excessive vacuum or skin burn.

Additionally, it is believed that skin burn or irritation is experienced with a conventional powered shaver by direct penetration of the skin through the comb and into the cutter path as a result of normal manual pressure forces on the shaver head. Thus, skin burn is probable if the skin folds beneath the shaver allowing a forced concentration. It is known that such skin burn occurs only in areas where the skin is not taut, and thus permits skin folds.

A further important object of the instant invention is the substantial elimination of such skin burns since uniform pressure is always exerted and tends to retain uniform contact between the skin and the shaver head resisting the formation of such folds.

Still other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter, and disclosed in the accompanying drawing wherein:

FIGURE 1 is a side elevational view of one form of shaving device constructed in accordance with the instant invention, the position of certain concealed elements therein being indicated by dotted lines.

FIGURE 2 is a bottom plan view of the structure of FIG. 1.

FIGURE 3 is a sectional view taken substantially along the vertical center line of the shaver head of FIG. 1.

FIGURE 4 is a sectional view taken substantially along the line 4—4 of FIG. 3 as viewed in the direction indicated by the arrows.

FIGURE 5 is a sectional view taken substantially along the line 5—5 of FIG. 3 as viewed in the direction indicated by the arrows.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawings in detail, and more particularly to the form of the invention disclosed in FIGS. 1 to 5, inclusive, there is generally indicated at 10 a shaving head piece which includes a body cavity 11, a handle portion 12 having an open central air or suction duct or passage 13 therethrough and a glide plate section 14. The glide plate section 14 serves to close the bottom opening of the head piece 10 and includes an annular rib 15 extending about the perimeter thereof which fits in a corresponding groove 16 extending around the lower opening of the shaver head 10, a neoprene seal 17 extending perimetrically about the rib 15 insuring a substantially airtight seal.

Preferably, the head piece 10 and glide plate 14 are comprised of plastic, metal, or other similar material wherein the resiliency of the side walls 18 of the glide plate 14 is sufficient to insure a tight seal to the head piece 10.

Positioned interiorly of the open end air passage 13 is a flexible stainless hose 20 surrounded by a plastic tube

21. Secured to the end of the tube and the hose is an annular retainer ring 22 which seats against the shoulder 23 in the shaver head.

A venturi throat piece 24 is provided at the opening of the air passage 13 interiorly of the hose 20, and includes at its larger end a depending frame member 25 which is provided with a recess 26 interiorly thereof, which contains a sealing member 27 for the retention of the expanded end 28 of a flexible casing 29 which in turn surrounds a flexible drive shaft 30 which extends through the air opening 13 to any desired source of power.

The end 31 of flexible shaft 30 is swedged into a recessed end portion 32 of a drive shaft 33 which extends through a passage 34 interiorly of a bearing housing 35, the bearing housing 35 containing a first ball bearing assembly 36 through which the shaft extends, the shaft being secured in position by multiple thrust washers 37. A second ball bearing assembly 38 is provided for the support of the far end 33a of drive shaft 33, the end being also secured in position by means of thrust washers 39.

A miter gear 40 is suitably keyed or otherwise secured as by means of keys 41 to the shaft between the bearings 35 and 38.

The lower portion of bearing housing 35 is recessed as at 45, the recess registering with a corresponding recess 46 in a gear mounting plate 47. The recess 45 accommodates a central drive gear 48 which is mounted on a shaft 49, the upper extremity of which has keyed thereto a miter gear 50 meshing with the miter gear 40. The shaft 49 extends through a bushing 51 into a recess closed by a plate 52, and is secured in position by a thrust washer assembly 53.

A pair of oppositely disposed driven gears, which are substantially identical in construction and designated by the same reference character 55, are positioned on opposite sides of drive gear 48. Each of gears 55 is secured to a tubular shaft 56 which is rotatable in a bushing 57, the latter seating in a recess 58 which is closed by a sealing plate 59.

Interiorly of each tubular shaft 56 is positioned a resilient coil spring 60 which has at its lower end a stud or hub 61 which is provided with a pin 62 which engages in a slot 63 in a tubular driving member 64. Driving member 64 has at its lower extremity a stud or hub 65 which is surrounded by a coil spring 66, into the opposite end of which extends a stud or hub 67 of a centrally disposed hub member 68 forming part of a rotary cutting head 69 provided with the usual blades 69a.

In the illustrative form of the invention herein shown (FIGS. 1 to 5) glide plate 14 is provided with a pair of openings 70 which are substantially equal in diameter to cutter combs 70a, it being pointed out that each of the cutter combs 70a is cup-shaped and includes an annular wall 71 which is surmounted by an outwardly extending flange 72, the flanges seating on shoulders 73 formed on the inner side of the openings 70. Each comb 70a includes along its flat bottom 74 a plurality of radially extending severing slots 75, which serve when cutter heads 69 are rotated through the arrangement above described, closely to sever the hair on the body surface being shaved. The combs 70a are held in position in openings 70 in glide plate 14 by means of a screw 70b.

The springs maintain proper cutting pressure on the cutters for the specific r.p.m. used and additionally provide a self-sharpening feature.

A very important feature of the instant invention includes the provision of radial apertures or slots 76a which extend outwardly from the rim of openings 70 and upwardly as at 76 along the sides of the glide plate side walls 18. The dimensioning and positioning of the slots 76a so that they encompass substantially the entire oval periphery of the bottom 77 of the glide plate 14 is of material importance, as is the extent to which the portion 76 of the slots extend upwardly along the side and end walls of the substantially oval-shaped bottom. The apertures or

slots 76a—76 are of substantially uniform length, and height, although increasing slightly in length toward the inner sides of the openings 70, so that the ends in the adjacent slots about the openings 70 are relatively closely adjacent each other. The slots 76a—76 communicate with the central air passage 11, so that air drawn through the air space 13 and the venturi 24 affords a relatively strong suction at all times, regardless of the pressure exerted on the glide plate 14 and cutter combs 70a. In other words, there is always an air space, afforded by the upwardly extending portions 76 of the slots through which air may be drawn, as well as severed hairs. By virtue of this arrangement it is to be noted that the powered shaver of the instant invention may be used in conjunction with a lathered face, or with any shaving lotion, so that upon the moist or lathered surface the suction will remove the lather as well as dry the exposed body surface, resulting in a smooth, even shave, and obviating the possibility of skin burn resulting from the formation of skin folds.

The upwardly extending portions 76 of the slots 76a serve to permit free passage of air through and around the cutter combs 70a and heads 69 even though the skin of the face or other portion of the body serves as a closure for the radial portions of the slots both in the cutter comb and in the glide plate. The skin is held taut against the glide plate so that a cooling draft is created through the upwardly extending portions 76 of slots 76a, and a continuous suction equally applied to the surface being shaved results in a pleasant and cool shave.

It is to be pointed out that the basic inventive concept resides primarily in the design of the glider head with the apertures, openings or slots extending radially, or perimetrically, of the glide plate, and thence upwardly along the side walls thereof to insure an adequate passage of air through the interior suction tubes of the device regardless of the pressure exerted by the user against the face or other portion being shaved.

From the foregoing it will now be seen that there is herein provided an improved shaver head construction which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

We claim:

1. A power shaver comprising, in combination, a head piece having a cavity therein and a bottom opening, a handle portion having an open central air passage, a glide plate removably closing said bottom opening and forming an air space, a flexible suction hose connected to said open central air passage, a venturi throat piece in said air passage adjacent said air space and communicating therewith, a frame member having a recess therein, a flexible casing interiorly of said hose having one end secured in said recess, a flexible drive shaft extending through said flexible casing into said head piece, a bearing housing having a passage therethrough in said cavity, a rigid drive shaft connected to said flexible drive shaft extending through said passage, a miter gear carried by said rigid drive shaft, a gear mounting plate in said body cavity, a shaft perpendicular to said rigid drive shaft extending through an opening in said gear mounting plate, a central drive gear on said perpendicular shaft, a miter gear on said perpendicular shaft meshing with said first-mentioned miter gear, oppositely driven gears in mesh with said drive gear, a tubular shaft mounting each driven gear, each tubular shaft extending through a bushing seated in an opening in said gear mounting plate and extending parallel to said perpendicular shaft, a coil spring in each tubular shaft, a stud secured to the outer end of each spring, a rotary cutting head se-

5

cured to each stud, said guide plate having a pair of cutter comb supporting openings therein, each coaxial with one of said cutting heads, a cup-shaped cutter comb in each opening, each comb having a flat bottom having radial severing slots therein communicating with said air space, said cutting heads extending interiorly of said cup-shaped cutter combs and being rotatable therein, means for producing suction in said suction hose and hence in said air space, and means for driving said flexible shaft to rotate said rotary cutting heads.

2. The structure of claim 1, wherein said glide plate includes a relatively flat bottom surface in which said pair of cutter comb supporting openings are positioned, said flat surface being bounded by an angularly disposed wall, said elongated openings extending radially from said first-mentioned openings to the edge of said wall and a substantial distance through said wall, said slots communicating with said air space.

3. The structure of claim 1, wherein said elongated openings are of uniform depth and length about the ends of said flat surface and elongated toward the center thereof, with the space between said cutter comb supporting openings being free of said slots.

4. A power shaver comprising in combination, a head piece having a cavity defining an air space therein, a handle portion having an open central air passage, a flexible suction hose connected to one end of said open central air passage, a frame member having a recess therein, a flexible drive shaft extending through said hose and into said recess, a bearing housing in said cavity having a passage therein, a rigid drive shaft connected to said flexible drive shaft and extending through said passage, a miter gear carried by said rigid drive shaft, a gear mounting plate in said cavity, a shaft perpendicular to said rigid drive shaft extending through an opening in said gear mounting plate, a central drive gear on said perpendicular shaft, a miter gear on said perpendicular shaft meshing with said first-mentioned miter gear, oppositely driven gears in mesh with said

6

drive gear, a tubular shaft mounting each driven gear, each tubular shaft extending through an opening in said gear mounting plate and extending parallel to said perpendicular shaft, a coil spring in each tubular shaft, a stud secured to the outer end of each spring, a rotary cutting head secured to each stud, a pair of cutter combs mounted in openings formed in said head piece remote from said hose, said head piece defining a flat surface and said combs being cup-shaped and being coaxial relative to said driven gears respectively, each comb having radial severing slots therein communicating with said air space, said cutter heads extending interiorly of said cup-shaped cutter combs and being rotatable by said studs, said flat surface being bounded by an angularly disposed wall, elongated openings formed in said flat surface about each of said cutter combs and extending therefrom into said wall by a substantial distance and communicating with said cavity, means for producing suction in said suction hose and hence in said air space, means for driving said flexible shaft to rotate said rotary cutting heads.

References Cited in the file of this patent

UNITED STATES PATENTS

937,334	Shurtleff	Oct. 19, 1909
2,239,279	Tremolada	Apr. 22, 1941
2,240,958	Rand	May 6, 1941
2,292,453	Le Mere	Aug. 11, 1942
2,345,796	Conner	Apr. 4, 1944
2,373,370	Bahr	Apr. 10, 1945
2,912,753	Henry	Nov. 17, 1959
2,914,849	Watkins	Dec. 1, 1959
2,965,966	Jacobs	Dec. 27, 1960
3,001,282	Pinkas	Sept. 26, 1961

FOREIGN PATENTS

297,736	Great Britain	Sept. 21, 1928
---------	---------------	----------------