Nov. 17, 1953 G. W. DAVISON 2,659,139

ELECTRICAL DRY SHAVER

Filed May 17, 1951

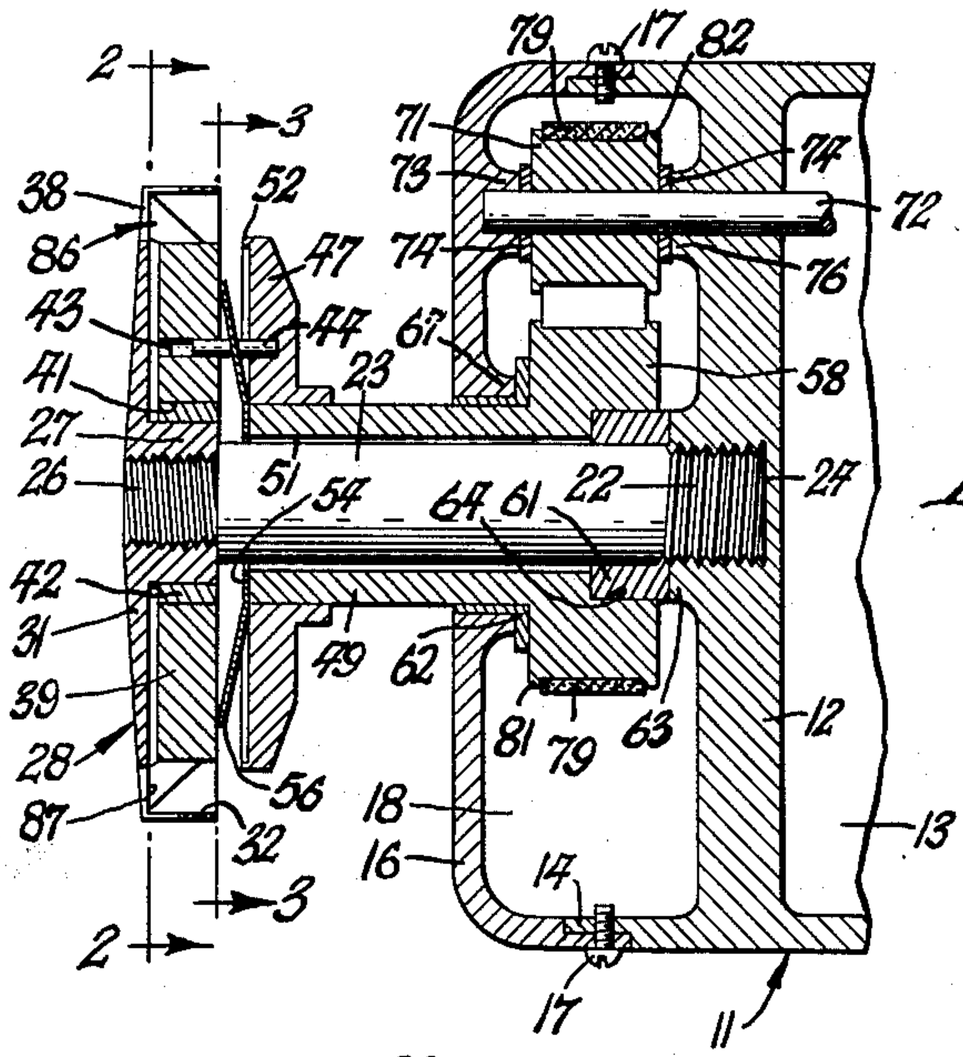

Fig. 1.

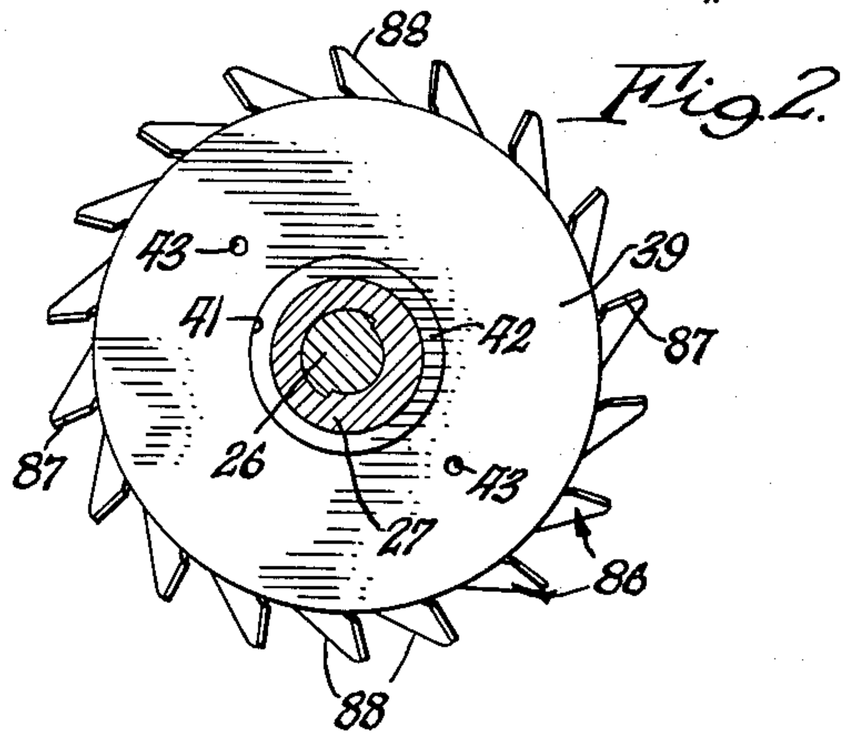

Fig. 2.

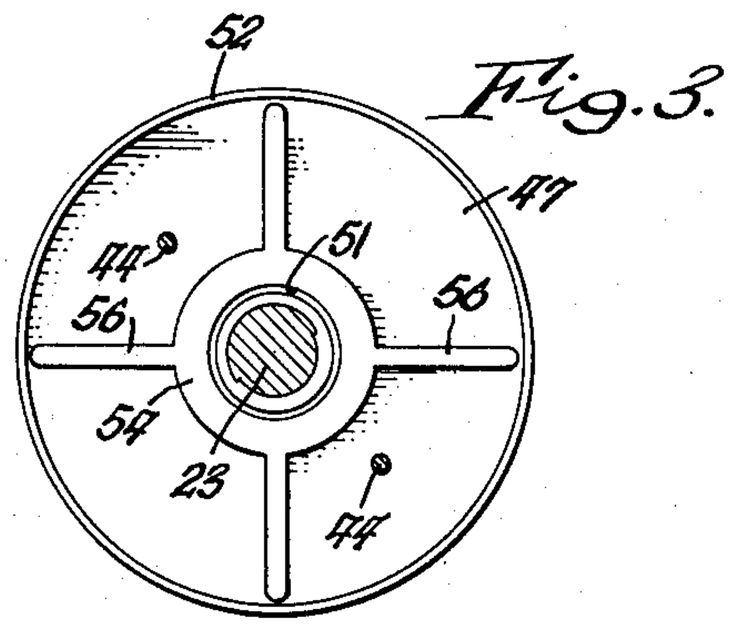

Fig. 3.

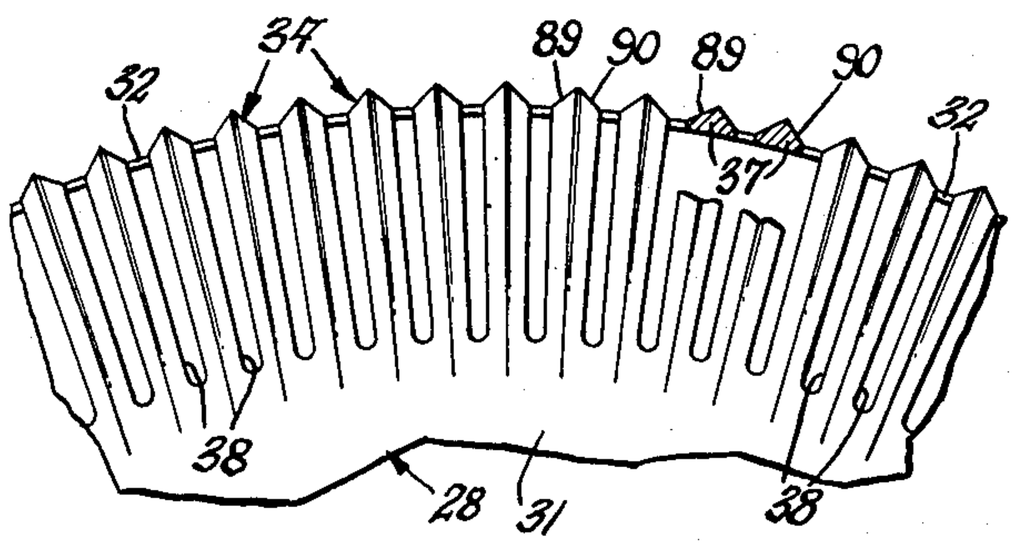

Fig. 4.

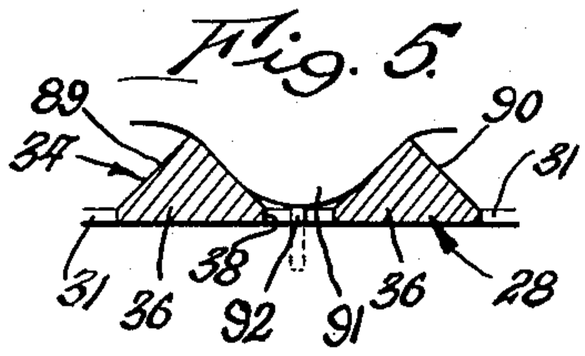

Fig. 5.

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Patented Nov. 17, 1953

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UNITED STATES PATENT OFFICE

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ELECTRICAL DRY SHAVER

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Application May 17, 1951, Serial No. 226,833

2 Claims. (Cl. 30—41.5)

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This invention relates to dry shavers and particularly to dry shavers of the rotary type in which a rotating cutter cooperates with a stationary head to shear off hairs which are caused to projects through openings in the head.

It is an object of the present invention to provide a dry shaver of the character described which will cut hairs close to the surface of the face of the user, but will neither pull the hairs nor irritate the skin.

Another object of the invention is to provide a dry shaver of the character described in which the stationary head is so designed as to guide hairs into position to be cut by rotating cutter blades.

A further object of the invention is to provide a dry shaver of the character described in which the stationary head is easily removable and in which the cutter is rotatably supported on a bearing in the head.

Still other objects of the invention are to provide a dry shaver of the character described which is self-cleaning, is of strong and durable construction, and is easily and conveniently operated.

Additional objects of the invention will be apparent from the following description of the invention taken in conjunction with the accompanying drawings of one embodiment thereof in which:

Figure 1 is a fragmentary, longitudinal sectional view of a dry shaver constructed in accordance with the present invention;

Figure 2 is a sectional view taken on line 2—2 of Figure 1 with the stationary head removed and showing the rotatable cutter disc and blades in plan;

Figure 3 is a transverse, sectional view taken on the line 3—3 of Figure 1 and showing the driving disc, and spring disc in plan;

Figure 4 is an enlarged, fragmentary view of the outer end of the stationary shaver head showing the construction and arrangement of the slots in the periphery thereof and with a portion broken away to show a cross section of a pair of the unitary teeth forming said slots; and

Figure 5 is a further enlarged, fragmentary view showing the way in which the teeth of the stationary head cooperate with the skin to permit the shearing of hairs close to the skin.

As illustrated in the drawings just described, a rotary dry shaver constructed in accordance with the present invention comprises a housing designated by the numeral 11 which is preferably of generally cylindrical shape. Within the

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housing 11 there is provided, one one side of a transverse partition 12, a chamber 13. On the other side of the partition 12 the cylindrical wall of the housing 11 is provided with an integral, axially extending, reduced portion 14 which is adapted to fit into a cover or cap 16 to which it may be secured by suitable means such as a plurality of screws 17. When cap 16 is in place, there is thus provided in the housing 11 a second chamber 18 on the side of the partition 12 opposite the chamber 13.

One end 22 of a stud 23 is threadedly secured in a recess 24 centrally located in the partition 12. The stud extends axially outwardly through chamber 18 and has its outer end 26 threaded for removable engagement in the threaded axial hub 27 of a stationary thin-walled cuplike head 28 providing an open, substantially cylindrical pocket opening toward and spaced from said housing. The thin-walled circular base 31 of the stationary head 28 decreases in thickness from the hub 27 toward its periphery where it is provided with an integral, thin-walled skirt-like guard 32 which extends toward the housing 11. At the periphery of the base 31 of the stationary head 28 a plurality of peripherally spaced teeth 34 are provided in the edge of the base 31 and the adjoining portion of the annular flange 32. The spaces between the teeth 34 constitute slots 38 which permit the entry of hairs into the interior of the head 28 when the head is passed over a hairy surface.

A cutter disc 39 having an axial bore 41 is rotatably mounted within the stationary head 28 on a cylindrical bearing bushing 42 which surrounds and is concentric with the hub 27 of the head 28. The cutter disc 39 is provided with a plurality of holes or orifices 43 which are spaced radially from the bore 41 and each of which is adapted to receive a driving pin 44 carried by a driving disc 47. The driving disc 47 is secured by suitable means, such as by welding, soldering, or by set screws (not shown) to the outer end of a driving sleeve 49, the latter being provided with an axial bore 51 through which the stud 23 may pass and extending through cap 16 into the chamber 18 of the housing 11. Driving pins 44 are mounted diametrically in the outer face of the driving disc 47 at equal distances from the center.

An axially extending annular flange 52 is provided on the outer face of the disc 47 and within the recess formed thereby there is mounted a thin spring disc 54. The disc 54 is provided with a central orifice for the passage of the stud 23 and

with a plurality of axially extending prongs 56, the outer portions of which are bent away from the driving disc 47 and, when the shaver is assembled, press against the outer face of the rotatable cutter disc 39 so as resiliently to hold the latter in cutting position within the stationary head 28.

At its other end the driving sleeve 49 is provided with a pulley 58 which may be formed integrally with the sleeve and is mounted for rotation between bearing bushings 61 and 62. The bushing 61, which is cylindrical and surrounds the stud 23, has one of its ends resting against a boss 63 formed on the partition 12 at the mouth of the screw threaded recess 24. The other end of bushing 61 extends into an annular recess 64 in the pulley 58. The bushing 62 is flanged and is mounted in an inwardly extending boss 67 that is formed around the axial opening for the stud 23 in the cap with the flange thereof interposed between the end of the boss and the adjacent face of the pulley 58.

There is also provided within the chamber 18 another pulley 71 which is firmly secured by any suitable means to a shaft 72 for rotation therewith. One end of the shaft 72 projects through partition 12 into chamber 13 where suitable driving means (not shown) may be provided therefor. The other end of the shaft 72 is received in a recess formed in an inwardly directed boss 73 on the cap 16. Alignment of the pulley 71 with the pulley 58 is ensured by antifriction washers 74, one of which is disposed between the end of the boss 73 and the adjacent pulley face and the other of which is disposed between the opposite pulley face and a boss 76 formed on the partition 12 around the shaft 72 and extending outwardly from the partition.

A belt 79 passes around and engages pulleys 58 and 71, thereby causing the latter to turn when the former rotates. Rotation of the pulley 59 produces rotation of the attached driving disc 47 and, through driving pins 44, rotation of the cutter disc 39. To prevent disengagement of the belt 79 from the pulleys 58 and 71, the pulleys are provided with spaced radially extending peripheral flanges 81 and 82, respectively.

The rotatable cutter disc 39 has equally spaced around its periphery a plurality of projecting blades 86. The blades 86, which may be formed integrally with the cutter 39 by machining or may be formed separately and rigidly attached thereto by suitable means, are thin, and as best shown in Figure 2, are uniformly inclined with respect to the axis of the cutter 39. As shown in Figure 1, the cutting edge 87 of each of the blades 86 projects slightly beyond the face of the cutter disc 39 so as to engage the under surfaces of the sections 36 of the unitary teeth 34 that are formed in the base 31 of the stationary head 28. The opposite edge 88 of each of the blades 86 is bevelled to provide clearance between the blades and the peripheral guard 32 which includes sections 37 of teeth 34. The teeth 34 in the base 31 and guard 32 are closely and evenly spaced between the slots 38 and are disposed radially with respect to the axis of the stationary head 28. Preferably the cutting edges 87 of the blades 86 are slightly inclined with respect to radii of the rotatable cutter disc 39. Thus the blades 86 and the portions of the slots 38 in the base 31 of the stationary head 28 have a shearing cutting relation in the plane of the undersides of the tooth sections 36 for any hairs which project through the slots 39.

As shown in Figures 4 and 5, the outer surfaces of the sections 36 and 37 of teeth 34, between the webs to which they are joined, have converging, inclined faces 89 and 90 so that the portions projecting above the webs are triangular in cross section. As a result, the teeth are strong and rigid while at the same time, as best shown in Figure 5, in moving over the skin 91 of a user hairs 92 will pass through the slots 38 without difficulty and may be cut by the rotating blades 86 as close to the skin as though the teeth were thin. While the angle between the sloping faces 89 and 90 of the teeth 34 may vary from about 50° to 120°, an angle of approximately 90° has been found very satisfactory where the width of the slots 38 is approximately half the width of the teeth 34.

The dry shaver of the present application is, in operation, extremely efficient. As described in the immediately preceding paragraph, the teeth 34 are so formed as to be rigid and stronger than the thin teeth ordinarily used in shavers of this type. At the same time the teeth are so designed as to permit the cutting of hairs almost flush with the skin surface and thus to achieve a close, satisfactory shave. Furthermore, the thicker teeth of the stationary head 28 are not subject to the vibration that is likely to occur with thin teeth and, as shown in Figure 5, the skin is pushed back from the hairs as they are projected through the slots 38 and hence does not engage the edges of the slots. Both of the points just mentioned contribute to the smoothness and pleasantness of a shave with dry shavers constructed according to the present invention.

A further advantage of the construction of the present invention is that the cutter blades 86 being inclined with respect to the axis of the rotatable cutter disc 39 function, when rotating, as a fan to draw air through the open pocket of the head 28 and thus to prevent the recutting of hair particles in the slots 38. Still another advantage of the shaver of the present invention is that the slots 38, being at the edge of the base 31 of the head 28 and the adjacent portion of the skirt 32, permit the engagement of long hairs in the slots. Nevertheless, since the cutter blades 86 engage only the portions of the teeth 34 which are in the base 31 of the head and are spaced from the inside of the skirt-like guard 32, such hairs will not be caught in the rotating blades and pulled, to the discomfort of the user.

The construction of the dry shaver of the present invention as described above is simple and efficient. The rotatable cutter disc 39 may be removed for cleaning, sharpening or replacement by merely unscrewing the stationary head 28 from the stud 23. Furthermore, the cap 16 may be readily removed to give access to the mechanism in the chamber 18 for replacement of the belt 79, or for any other reason. It will also be noted that although the driving sleeve 49 is held concentric with stud or stem 23 by bearing bushings 61 and 62 the driving pins 44 which engage the rotatable cutter disc 39 are not relied upon for alignment of the disc but the latter is also centered with respect to the stem 23 by the bushing 42. Vibration is thus reduced and unevenness of cutting is avoided. The shaft 72 may be driven by any suitable means, but is preferably connected to an electric motor (not shown) in the chamber 13 which is supplied with electric current from a suitable source. The housing 11 and cap 16 may be constructed of metal or other suitable material such as a molded plastic. The

bushings or bearings 42, 61 and 62 and the washers 74 are preferably made of an antifriction bearing material such as graphite or oil impregnated metal. The stationary head 28 and rotatable cutter 39 are preferably of steel and the other parts may be made of such materials as are suitable and convenient.

It will be understood that many of the details of construction shown in the drawings and described above may be modified if desired. As an example, the driving disc 47 may be formed integrally with the driving sleeve 49 and the pulley 58 may be made separable or both disc 47 and pulley 58 may be made in one piece with the sleeve 49 and the cap 16 may be split to permit the pulley 58 to be inserted in the chamber 18. Other possible modifications and changes of structure will be apparent and it is not therefore intended that the invention shall be limited to the precise embodiment shown and described, but that it shall be interpreted as broadly as is permitted by the appended claims.

I claim:

1. In a shaver of the character described, a housing, a stationary stem extending outwardly from said housing, a stationary head removably secured on the outer end of said stem, said head comprising a thin-walled circular disk-like base having an integral, thin-walled peripheral, skirt-like guard extending toward said housing to provide an open, substantially cylindrical pocket opening toward and spaced from said housing, said thin-walled base and guard being jointly provided with a plurality of closely spaced slots extending across the adjoining portions of said base and said guard, a driving sleeve concentric with said stem extending into said housing and being rotatably mounted therein, means within said housing for rotating said sleeve, a bearing within said head disposed concentrically with respect to said stem, a cutter adapted to rotate on said bearing within said pocket, means operatively connecting said sleeve and said cutter and adapted to rotate said cutter with said sleeve, a plurality of cutting blades on the periphery of said cutter, said blades being adapted to engage said head in cutting relation with the portions of said slots in said base, and means rotatable with said sleeve and said cutter resiliently holding said cutter in said head.

2. In a shaver of the character described, a housing, a stationary stem secured within said housing and extending outwardly therefrom, a stationary head removably secured on the outer end of said stem, said head comprising a thin-walled circular disk-like base having an integral, thin-walled peripheral, skirt-like guard extending toward said housing to provide an open, substantially cylindrical pocket opening toward and spaced from said housing, said thin-walled base and guard being jointly provided with a plurality of closely spaced slots extending across the adjoining portions of said base and said guard, a driving sleeve concentric with said stem extending into said housing and being rotatably mounted therein, means within said housing for rotating said sleeve, a bearing within said head disposed concentrically with respect to said stem, a cutter adapted to rotate on said bearing within said pocket, means operatively connecting said sleeve and said cutter and adapted to rotate said cutter with said sleeve, a plurality of blades on the periphery of said cutter, said blades being adapted to engage said head in cutting relation with the portions of said slots in said base and being aligned at an angle to the axis of said cutter whereby to cause movement of air through said pocket during rotation of said cutter, and means rotatable with said sleeve and said cutter resiliently holding said cutter in said head.

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