

[54] ELECTRIC DRY SHAVER

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[58] Field of Search.....30/42, 43, 43.4, 43.5, 43.6, 30/43.9, 86, 85, 90; 200/16, 60, 172; 240/10-67

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[57]

ABSTRACT

An electric dry shaver comprising a casing member including a cylindrical section closed at the bottom thereof and a tubular part extending peripherally therefrom, said cylindrical section containing therein a motor mechanism and a switch mechanism and said tubular part containing therein dry batteries and being encased with a covering member for gripping, and a shaver blade section mounted in the upper, open end of the cylindrical section. The motor and switch mechanisms are compactly packed in the cylindrical section and separated from the shaver blade section by means of a separator wall mounted in the open end of the cylindrical section. The separator wall including a peripheral wall provided on the inside with alternate smooth sections and threaded sections and a stationary comb element having a skirt thereabout provided with external threads for attaching the comb to the threaded peripheral wall.

1 Claim, 10 Drawing Figures

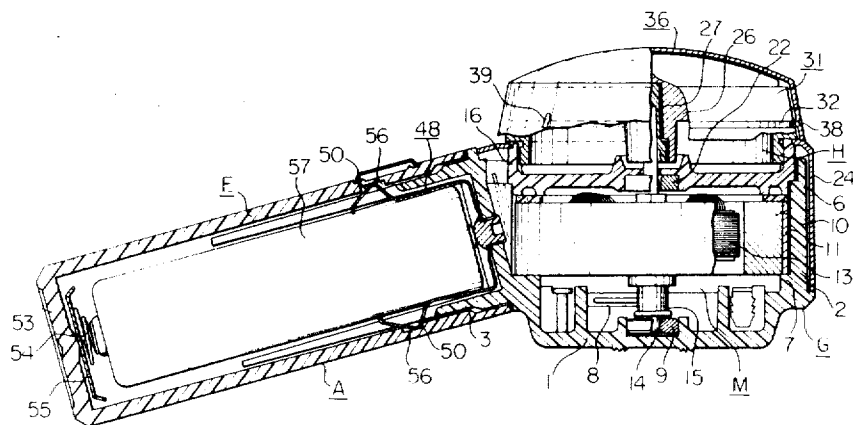


Fig. 1

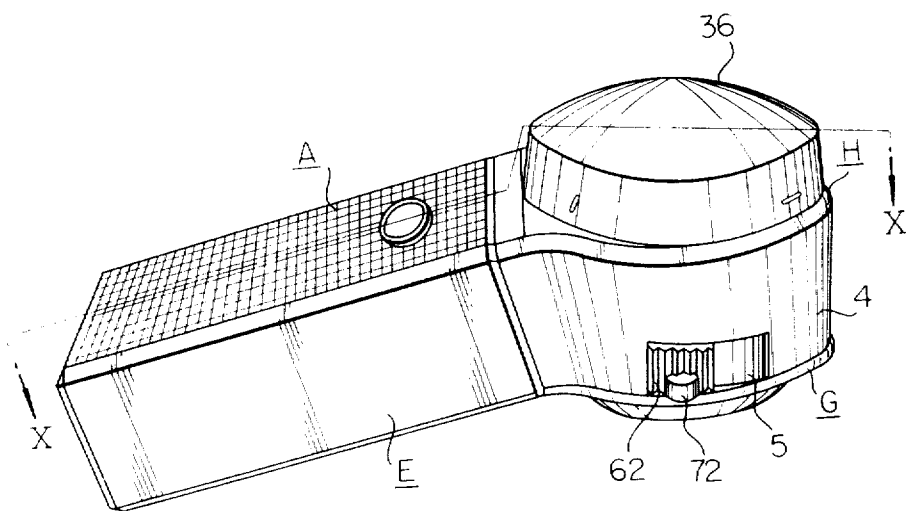


Fig. 2

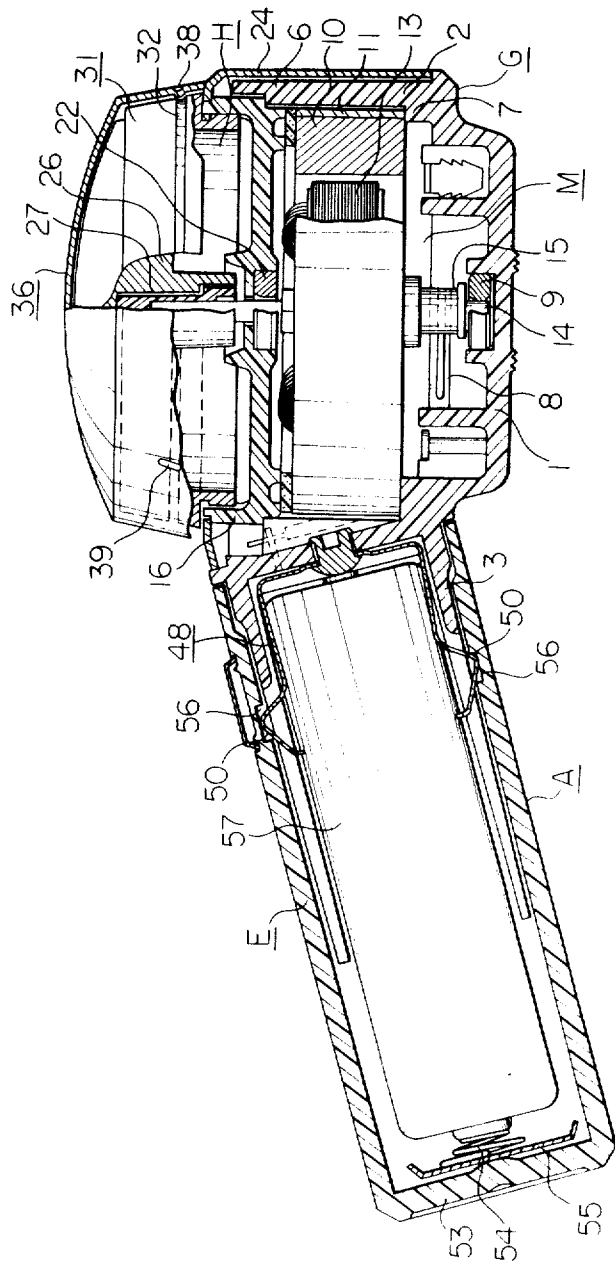


Fig. 3

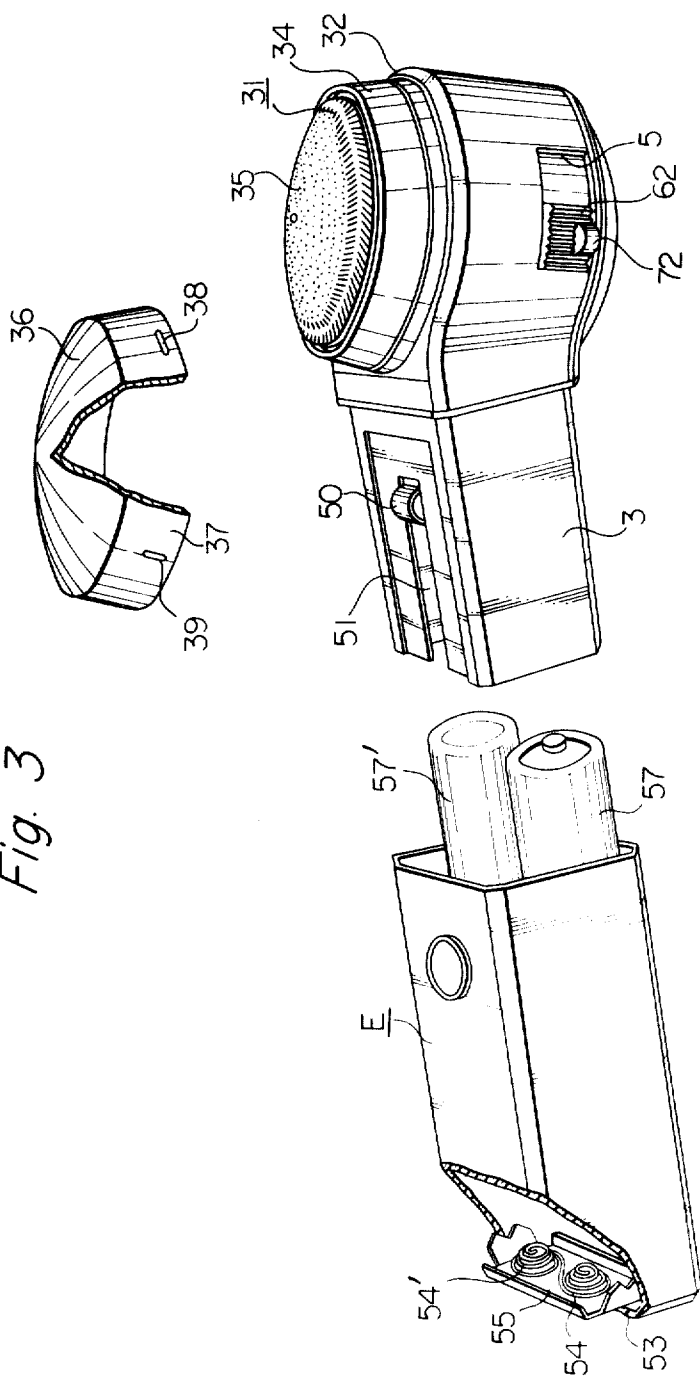


Fig. 4

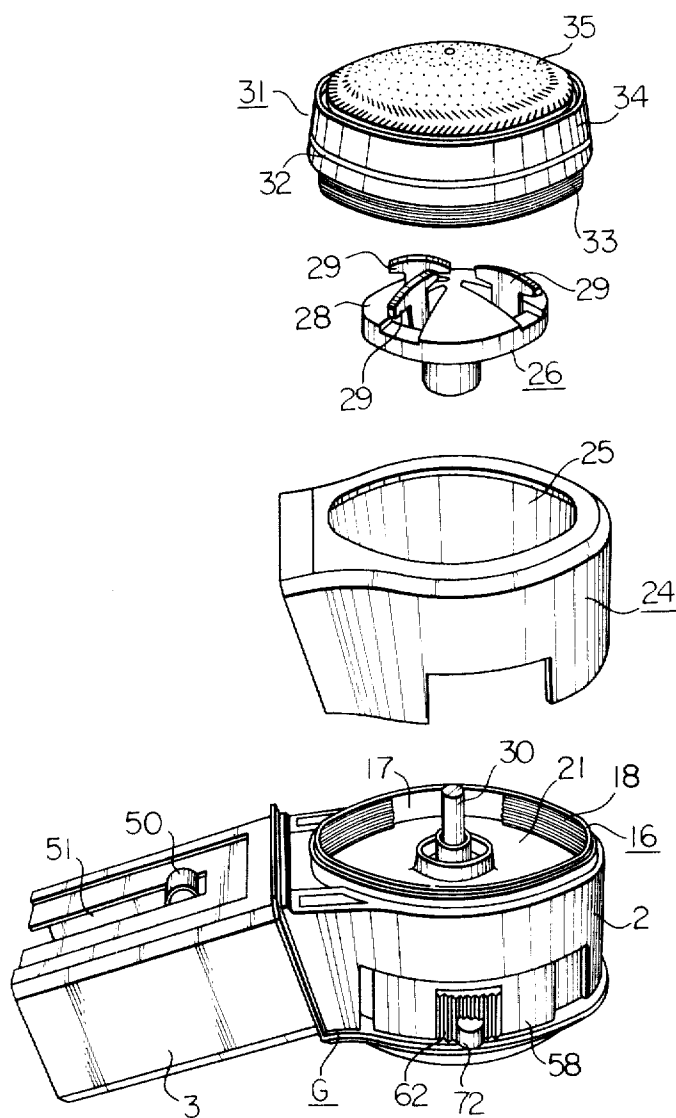


Fig. 5

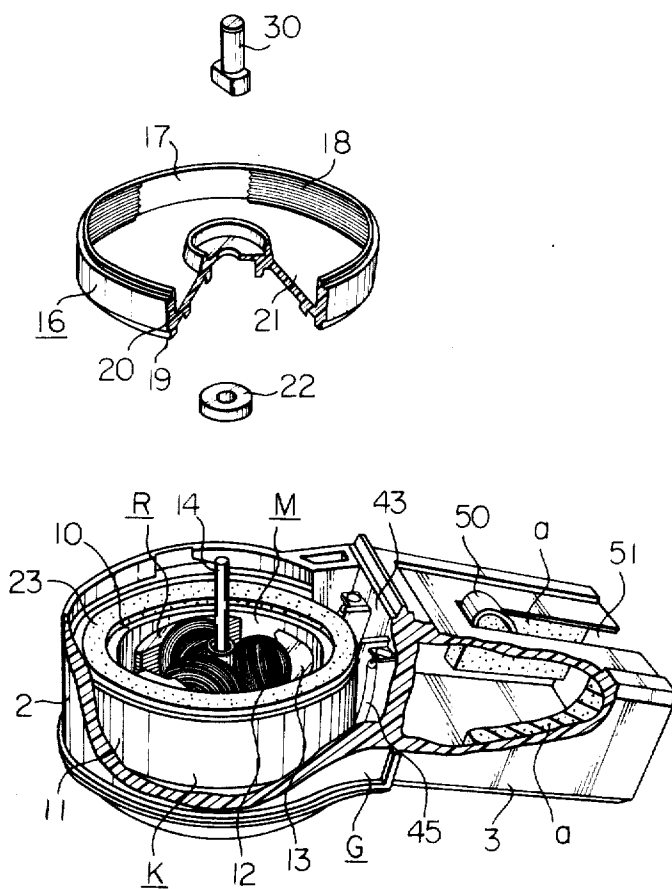


Fig. 6

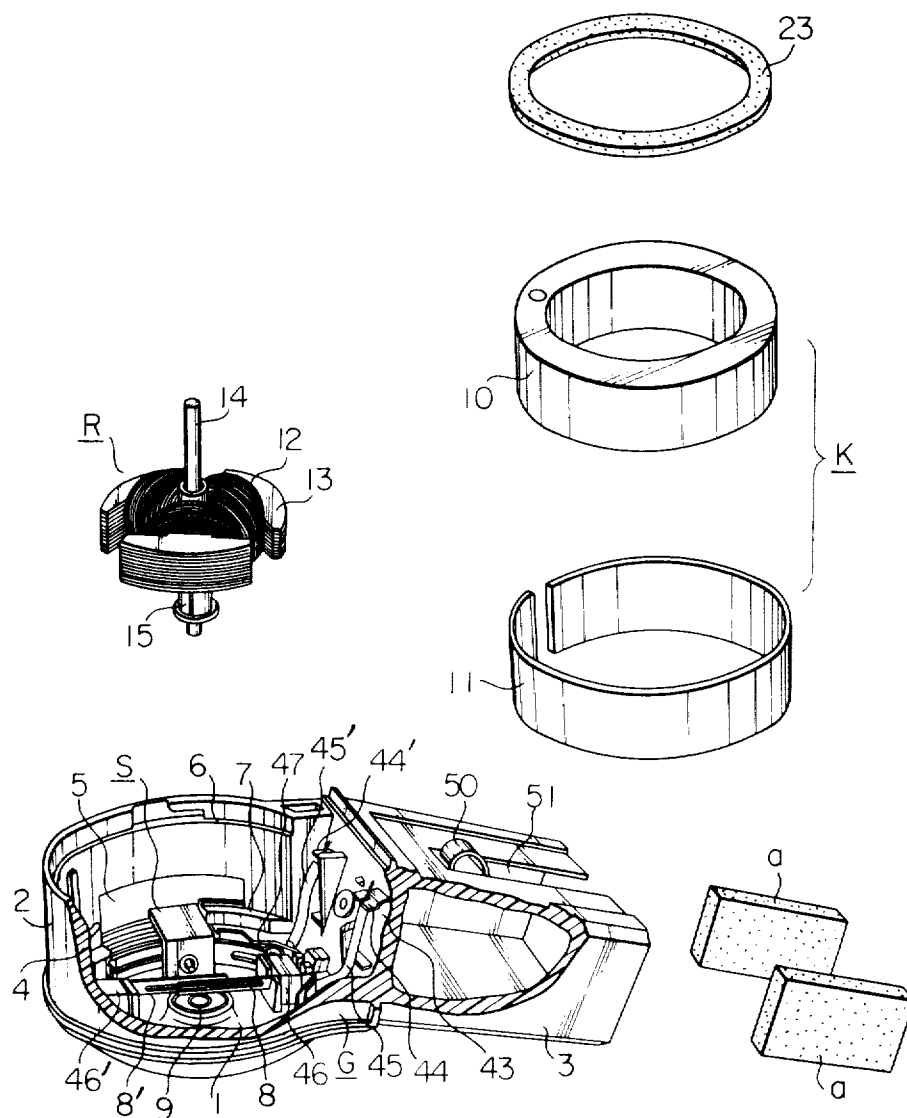


Fig. 7

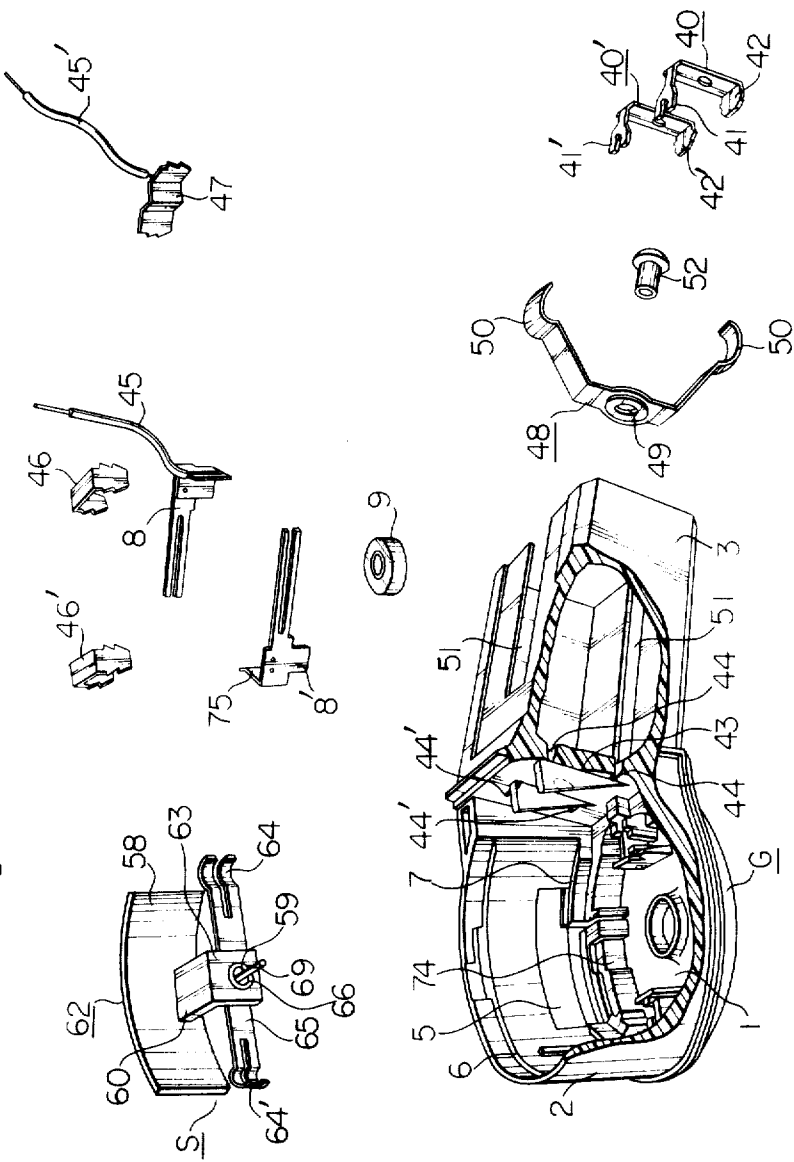


Fig. 8

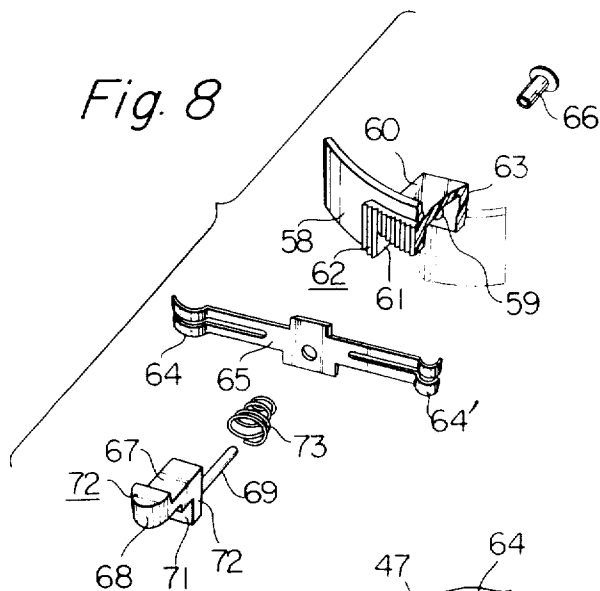


Fig. 9

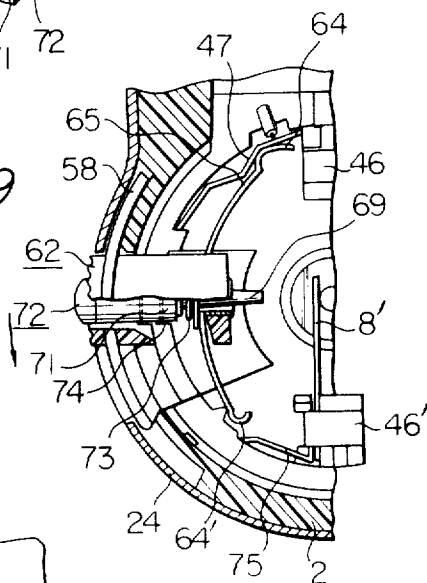
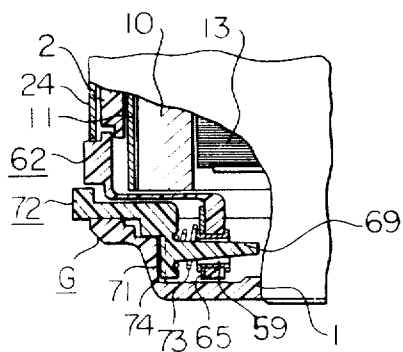


Fig. 10



ELECTRIC DRY SHAVER

This invention relates to improvements in electric dry shavers.

The electric dry shavers of conventional types have been large in size and, therefore, have been inconvenient for carrying and using. Many of such shavers have been of the type in which a motor block has been mounted on the shaver body and there has been provided unnecessary space inside the motor and between the motor and the shaver body so that the whole body of the shaver has had to be large.

Even though certain shavers of small size have been suggested, they have involved the use of small blades and, have been less powerful thus requiring a longer time for shaving. Thus, while these shavers of small size have been handy and convenient for carrying and using, their shaving efficiency has had to be sacrificed to a certain extent in order to make the size of motor itself smaller.

Further, the conventional dry shavers have been all of the vertical type having a shaving surface perpendicular to the longitudinal axis of the shaver body. Therefore, the user's arm when holding and using such a shaver has had to be kept at an angle where the arm has not been in a natural position.

The above mentioned conventional shavers have also been inconvenient for operating the switch lock, since the switch lock must be operated twice at the time when the switch was shifted for unlocking and for switching the shaver on. Thus, the conventional shavers have been constructed as if two switches for on-off operation and safety operation have been provided therein.

The present invention eliminates such undesirable features.

The principal object of the present invention is therefore to provide an electric dry shaver of a small thin type having the motor block directly contained in the shaver case so that the motor block and shaver head are formed integrally.

Another object of the present invention is to provide an electric dry shaver which is easy to use, by forming a holder section which projects from the cylindrical head part at its periphery and is inclined with respect to the axis of the head part.

A further object of the invention is to provide an electric dry shaver, wherein a locking or unlocking operation by the switch can be simultaneously performed at the time of operating the switch for on-off operation, by providing a locking rod actuated by the switch in the switch handle itself.

Other objects and advantages of the present invention will become clear from the following detailed disclosure of the invention having reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of the electric dry shaver according to the present invention;

FIG. 2 is a section taken along X—X line in FIG. 1;

FIG. 3 is an exploded view of the shaver shown in FIG. 1 when separated into its driving section, power section with cover cap removed;

FIG. 4 is an exploded view of the driving section showing the blade head part disassembled from the section into its respective components;

FIG. 5 is an exploded view showing the motor block of the driving section partly cut away;

FIG. 6 is an exploded view of the motor block when disassembled;

FIG. 7 is an exploded view of the respective parts of the motor block when disassembled;

FIG. 8 is an exploded view of the switch block when disassembled;

FIG. 9 is a fragmentary sectional plan view showing the switch; and

FIG. 10 is a fragmentary sectional side view showing the switch.

While the present invention will be described with reference to a preferred embodiment shown in the drawings, it should be understood that the intention is not to limit the invention to the particular embodiment as illustrated, but it is rather in-

tended that all modifications, alterations and equivalent arrangements are to be included in the spirit and scope of the appended claims.

Referring now to FIGS. 1 to 3, G is a shaver casing made of a molded synthetic resin of such as polycarbonate or the like, and comprising a cylinder portion of part 2 open at its upper end and having a bottom wall 1 and a holder part or tubular portion 3 of an angular tube shape formed integrally with the part 2 so as to project at an inclination of about 15° from its outer periphery. In the peripheral wall of cylinder part 2, there is further provided a circumferential recess 5 for receiving a slidable switch handle, its inner periphery engaging stepped parts 6 and 7 respectively along its upper and lower edges. A switch block S and brushes 8 and 8' are arranged peripherally about a shaft bearing 9 fixed at the center of the bottom wall 1 (see FIG. 6).

In FIGS. 5 and 6, an electric motor means includes a stator K comprising a ring-shape magnet 10 magnetized so as to have respective magnetic poles alternating in polarity and a field plate 11 fitted around the outer periphery of the magnet 10. The stator K rests on the lower stepped part 7 (FIG. 2) in the cylinder part 2 so as to be enclosed therein and fixed to the same. R is a rotor which comprises a coil 12 wound on a core 13, a shaft 14 provided at the center of the core 13 so as to extend above and below the same, and a commutator 15 (FIG. 6) engaged on an extended part of the shaft 14. The commutator 15 is contacted by the brushes 8, 8' arranged on the bottom wall 1 and the shaft 14 is supported in the bearing 9, so that the rotor R is rotatably mounted inside the stator K. 16 is a circular blade mounting base, which is provided on the inner periphery of an upper cylindrical part thereof with a threaded part 18 interrupted by smooth cut-off sections 17 respectively spaced about part 18, and a flange 20 having a step 19 at the outer periphery of its lower end, and with a bearing 22 fixed at the center of a receiving or separating disc part 21. The shaft 14 of rotor R extends through the bearing 22 and the step 19 of flange 20 is engaged on the upper stepped part 6 in the cylinder part 2, so that the base 16 will cover the upper opening of the cylinder part 2. The stator K is fixed in a motor section M thus formed by the lower surface of the flange 20 and a ring-shaped resilient member 23.

Referring back to FIG. 4 and with reference to FIG. 5, 24 is a cover having a hole 25 which engages above the upper edge of the blade mounting base 16. The cover 24 engages over the outer periphery as well as upper edge of the cylinder part 2 of casing G. 26 is a cutter blade member, which comprises a cutter blade mounting base 28 in the form of an umbrella having a shaft engaging hole 27 (FIG. 2), and a plurality of cutter blades 29 provided radially on the upper surface of the base 28. The shaft engaging hole 27 (FIG. 2) of the member 26 is brought into engagement, by an engaging portion 30, at the upper end of the shaft 14 of rotor R extending above the flat part 21 in the blade mounting base 16 so that the cutter blade member 26 will be fixed to the rotatable shaft 14. 31 is an outer cutter blade or comb member, which comprises a comb frame 34 of a ring shape having a ring groove 32 substantially at the center of its outer periphery, a threaded stepped part or skirt 33 at its lower outer periphery and an outer cutter blade or comb 35 of a net type mounted on upper surface of the frame 34. The comb member 31 will be mounted on the blade mounting base 16 by engaging the threaded stepped part or skirt 33 with the threaded part 18 of the base 16 so that blade edges of the cutter blades 29 will slidably about the inner surface of the comb 35, whereby a shaver head section H will be thus formed.

As shown in FIG. 3, 36 is a protecting cap, which includes a peripheral wall 37 having, on its peripheral wall, at least one projection 38 for engaging the ring groove 32 of the above mentioned comb member 31 and at least one bridging projection 39 of a length sufficient to bridge across the width of said ring groove 32, projections 38 and 39 being spaced a proper distance from each other. When the cap 36 is mounted on the comb member 31, therefore, the bridging projection 39 when

bridged across the ring groove 32 will bring the projections 38 into engagement in the groove 32 so as to be locked therein, so that the cap 36 will be prevented from falling off of the member 31 and, at the same time, when the cap 36 is manually removed from the member 31, the bridging projection 39 will be slipped upwardly so as to have the cap tilted, whereby the cap may be easily removed.

Referring next to FIG. 7, 40 and 40' are respectively U-shaped terminal plates having terminals 41 and 41', and fixed arms 42 and 42' respectively. The terminal plates 40 and 40' are each fitted in inserting holes 44 and 44' formed in a screening wall 43 between the cylinder part 2 and holder part 3 of the casing G, in such manner that the terminals 41 and 41' are inserted in one of the holes 44 and 44' from the side of the holder part 3 so as to project into the side of the cylinder part 2 and to be fixed therein. As shown in FIG. 6 the terminal 41 will be connected through a lead wire 45 to the brush 8 fixed to the bottom wall 1 by means of a U-shaped member 46, and the other terminal 41' will be connected through a lead wire 45' to a terminal 47 fixed to the peripheral wall about the bottom wall 1. 46' is a member for securing the other brush 8'. In FIG. 7 48 is a holding member having a hole 49 at the center and curved holding parts 50 at each end. The holding member 48 is fixed to the screening wall 43 by means of a rivet 52 inserted through the hole 49 so that the curved holding parts 50 will extend out of the holder part 3 through respective cut grooves 51, formed on each side of the holder part 3 of the casing G.

As shown best in FIGS. 2 and 3, E is a holder tube of a flat rectangular type, provided with a bottom wall 53 having on its inner surface electroconductive holding springs 54 and 54'; secured to a holding member 55 fixed in turn to the bottom wall 53, and with recesses 56 formed in the upper and lower walls respectively near the opposite open end of the tube E. Batteries 57 and 57' may be inserted in the holder part 3 of casing G respectively in opposite directions so as to be held between resilient members a (FIG. 6) of a plastic material and, then, the holder tube E will be loosely fitted around outer periphery of the holder part 3. At this time, the curved end parts 50 of holding member 48 will be engaged respectively in each of the recesses 56 of tube E so that the holder part 3 will be fixed therein and, at the same time, the springs 54 and 54' will resiliently urge the batteries 57, 57' into contact with the respective terminal plates 40, 40'. That is, the electric connection and mounting of the batteries into the electric circuit of the shaver will be simultaneously established and, at the same time, the grip A of the shaver on a flat wall of the rectangular holder tube E is formed so as to be inclined at about 15° with respect to the plane of the comb 35.

Referring again to FIG. 7 and in conjunction with FIG. 8, a switch block S is formed as described hereinafter. A switch knob member 58 curved with the same radius as that of outer peripheral wall of cylinder part 2 of the casing G is provided at its lower edge with a guide piece 60 substantially at the center of the member 58. The guide piece 60 has a reverse L-shape with a hole 59 formed as shown therein. A sliding groove 61, (FIG. 8) is formed along the center line of the underside of the guide piece 60 so as to be in alignment with the hole 59. Thus knob member 58 and L-shaped guide piece 60 constitute as a whole a switch handle 62. The hole 59 is provided in the vertical portion 63 of the guide piece 60. A contactor plate 65 having curved ends 64 and 64' is fixed to the vertical portion 63 by means of an eyelet rivet 66 fitted through the hole 59. 72 is a locking lever, which comprises a lateral part 67 having a curved head 68 at outer forward end thereof, a guide pin 69, a vertical part 70 from which the guide pin 69 extends laterally inwardly, and a step 71 integrally formed adjacent the junction of the lateral part 67 and vertical part 70. The lever 72 is fitted to the switch handle 62 in such manner that the guide pin will be engaged by means of spring 73 into the hole 59 and the lateral part 67 will be slidably fitted in the sliding groove 61 while the curved head 68 extends out from the surface of knob member 58, so that the handle 62 and lever 72 will be one switch block.

The switch block is inserted, as shown in FIGS. 9 and 10, in the circumferential recess 5 formed in the peripheral wall 4 of cylindrical part 2, so that inner peripheral surface of the knob member 58 will abut against the outer periphery of the peripheral wall 4, the step 71 of the lever 72 will be resiliently engaged by means of the spring 73 in a recess 74 formed at peripheral wall between the lower stepped part 7 (FIG. 7) and bottom wall 1 of the cylindrical part 2 and, at the same time, one curved end 64 at one end of the contacting plate 65 will resiliently contact the terminal member 47 and the other curved end 64' will be slightly spaced from mounting base 75 of the brush 8'. As a result, the switch block S is slidably mounted in an OFF position beneath the motor section M in the cylindrical part 2 of casing G. It will be appreciated that the contacting plate 65 has a length sufficient to bridge across the terminal 47 and the mounting base 75 of brush 8' when the switch handle 58 is moved into its ON position, and that by this bridging closes the circuit to the motor M.

According to the present invention, as detailed in the foregoing, the shaver casing G is integrally formed with the cylindrical part 2 having bottom wall 1 and the holder part 3 is inclined at about 15° with respect to the cylindrical part 2. The stator K and rotor R are contained in part 2 and in its bottom section the switch block S is provided. The stator K is pressed downward so as to be fixed in the proper position by means of the blade mounting base 16 mounted on the open end of the above cylindrical part and at the same time the rotor R is born by the base 16 so that the motor section M will be formed, the cutter blade member 26 is fitted to the rotary shaft extending above the base 16 and the comb member 31 is mounted on the blade mounting base 16 with the threaded step 33 being screwed into the threaded wall 18 of the base 16 so that the shaver head H will be formed. The batteries 57 are mounted in the holder part 3 and then the holding tube E in flat rectangular shape is mounted over the holder part 3 so as to hold and fix the batteries therein and thereby the hand grip A will be formed. Therefore, the switch block S can be mounted in the shaver casing without requiring any additional space in the receptacle for the switch block. At the same time, the motor case can be utilized also as the shaver casing. Further, the comb member can be detachable mounted onto the blade mounting base with the lower outer periphery of the comb member being screwed into the base and, to the same cylindrical part containing the motor and both blade member 26 and comb 31, the flat rectangular holding tube can be inclined at about 15° with respect to the comb surface. Therefore, an electric dry shaver which is thin and small and, thus, is convenient in carrying can be obtained. Further because of its structure as specified in the above, the numbers of component parts and assembling steps can be remarkable reduced and thus the manufacturing cost may be reduced. Since the holder or grip part is inclined with respect to the blade surface, further, shaving can be done easily without the user's fingers holding the shaver touching the face. Since there is provided no threaded part in the inner peripheral wall of the comb member while the threaded inner peripheral wall of the blade mounting base is provided with flat cut-outs, desired cleaning of inside space of the both blade member and comb after shaving is very easy. Furthermore, the switch mechanism of the present invention has excellent advantages and effects since the locking lever for the switch is provided integrally with the switch handle, the locking or unlocking operation of the switch can be performed simultaneously with the operation of the switch handle, so that the switch is prevented from being accidentally thrown into its ON position while being carried and, thus prevent inadvertent consumption of the battery power.

What we claim is:

1. An electric dry shaver comprising a casing member having a cylindrical portion closed at the bottom end thereof and open at the top thereof, an electric motor means disposed in the cylindrical portion of the casing and having a rotatable shaft extending therefrom axially of the cylindrical portion, a shaving means disposed above said motor means and includ-

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ing a rotary cutting blade means removably mounted on the rotary shaft of said motor means for rotation therewith about the axis of the cylindrical portion of said casing member, said casing member having a tubular portion extending from the cylindrical portion and open at its outer end, a holder tube for a source of electric power removably attached to the open end of the tubular portion and coaxially therewith, said holder tube serving as a handle means, circuit means for supplying electric power from the source of electric power to said motor means when a source of electric power is mounted in said holder tube, and control switch means disposed in said circuit means for controlling the operation of said motor means, a separator wall disposed within the cylindrical portion of said

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casing member and above said motor means, said separator wall having a central opening therein for passage of the rotary shaft therethrough and adapted to bear against said motor means to maintain the position of said motor means within the cylindrical portion of said casing member and adapted to prevent cut hairs from entering said motor means, said separator wall including a peripheral wall provided on the inside with alternate smooth sections and threaded sections and said shaving means including a stationary comb element having a skirt thereabout provided with external threads for attaching said comb element to the threaded sections on the inside of the peripheral wall of said separator wall.

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