

June 27, 1967

J. H. ANDREWS
ELECTRIC SHAVER HAVING COMBINED SWITCH
AND HEAD REMOVAL ACTUATOR

3,328,542

Filed Nov. 28, 1966

2 Sheets-Sheet 1

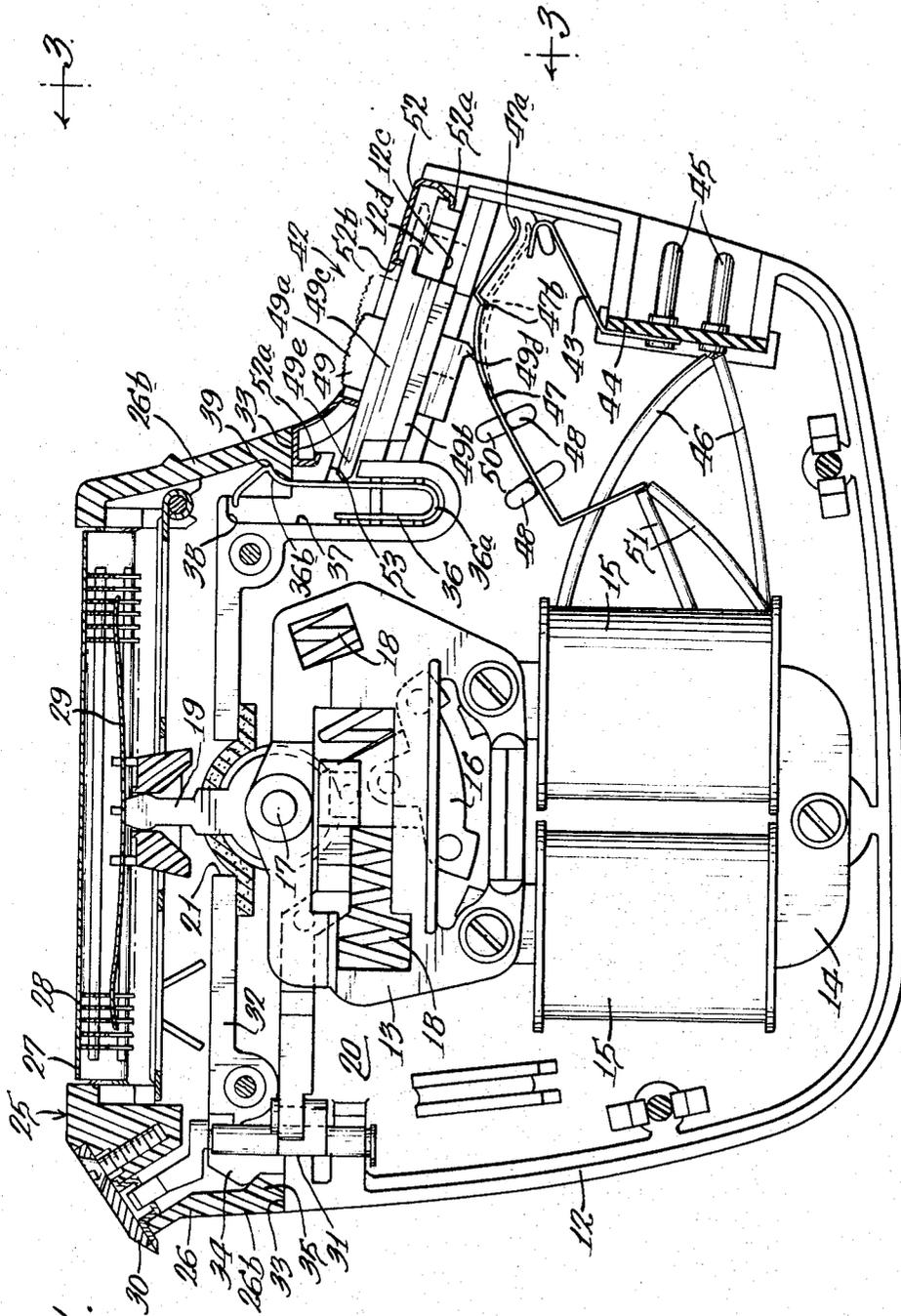


Fig. 1.

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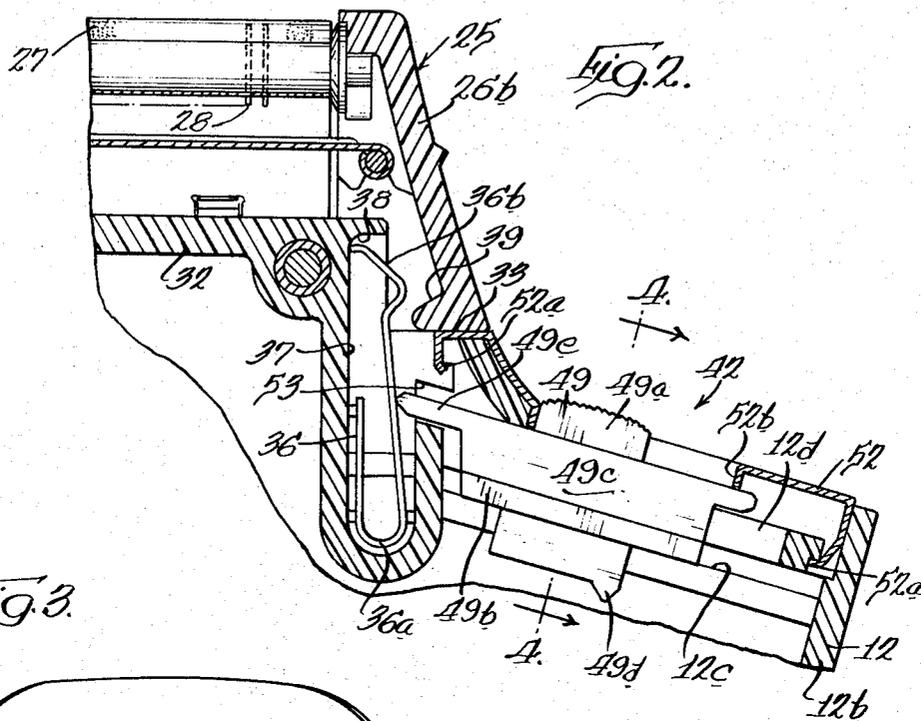
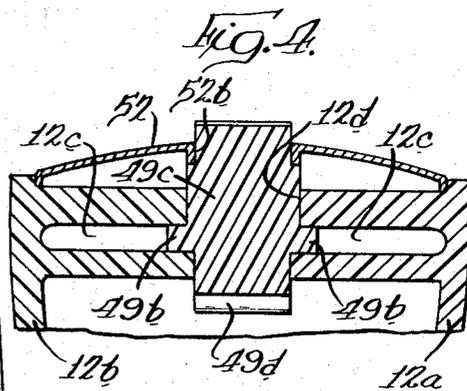
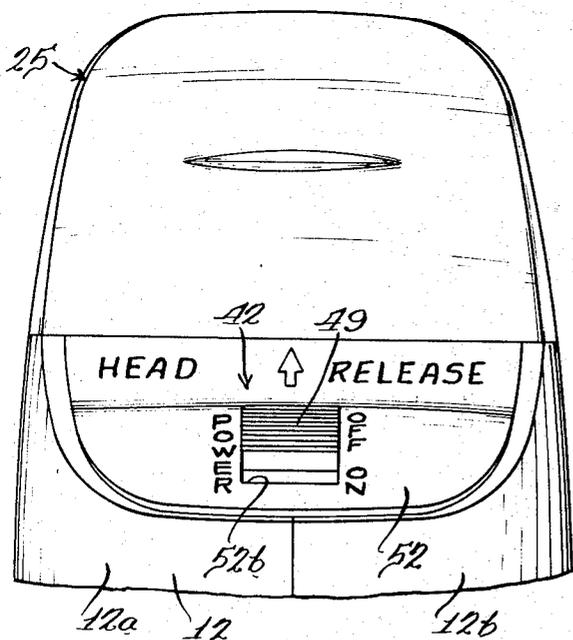


FIG. 3.



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ELECTRIC SHAVER HAVING COMBINED SWITCH AND HEAD REMOVAL ACTUATOR

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 Filed Nov. 28, 1966, Ser. No. 597,444
 15 Claims. (Cl. 200—52)

ABSTRACT OF THE DISCLOSURE

An electric shaver having a motor control switch which is equipped with an actuator engageable against a latch to detach the shearing head from the housing of the shaver.

Background of the invention

This invention relates to switches of the type conventionally used on electric shavers to control the energization of the electric motor positioned within the housing of the shaver. It is well known in the art to provide an electric shaver with a two-positioned switch which permits the user of the shaver to turn the shaver on or off while it is connected to a source of power.

Electric shavers normally include a shaving head which is detachably connected to the body or housing of the shaver. This detachability of the shaving head is provided both for cleaning purposes and to facilitate replacement of the parts of the head or of the entire head. Since the head is frequently removed daily for cleaning purposes, it is important that the detachment from the housing may be accomplished with a minimum amount of effort. In addition, in the operative position on the housing, the head must be relatively secure and must provide means whereby the driving mechanism within the housing is coupled to the head so that the movable cutter may be reciprocated or oscillated with respect to the fixed comb or cutter. There are many examples in the prior art of shavers having various types of easily operated latches to detachably secure the shaving head to the housing of the shaver.

Summary of the invention

The invention involves a combined switch and head latch in which actuator for the on-off switch also serves as a mechanism for unlatching or detaching the shaving head from the housing of the shaver. This combining of the switch actuator and the latch actuator results in a much more simple structure for accomplishing the switching and latching function than has heretofore been known in the art. In addition, by combining this structure there are additional advantages which result. The combined mechanism takes the form of a switch having three positions, two of which are the on-off switch positions for the motor circuit and the third is a position in which the switch actuator actuates the head latch causing the head to be detached from the shaver housing. The off position of the switch is immediately adjacent the head release position while the on position of the switch is more remote. With this arrangement, the head may be released or ejected only after the motor has been shut off. Thus, there is no possibility of damage to the head by detaching or removing the head while the motor is running.

Accordingly, it is an object of the present invention to

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provide an electric dry shaver having an improved switch which actuates the head retaining means.

It is a further object of the present invention to provide an improved dry shaver having a combined on-off switch and actuator for the latch which retains the shaving head assembled to the shaver housing.

It is still a further object of the present invention to provide a shaver having an improved switching means in which the switch actuator is slidable from a circuit energized position to an open circuit position to a position in which the shaving head is automatically released from assembled relation with respect to the shaver housing.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Brief description of the drawings

FIGURE 1 is a sectional view of an electric dry shaver embodying my invention;

FIG. 2 is a greatly enlarged sectional view of a portion of FIG. 1 showing the switch and the head latch in the position in which the head is released for detachment from the shaver housing;

FIG. 3 is a fragmentary end view of the shaver taken substantially on line 3—3 of FIG. 1 assuming that FIG. 1 shows the complete shaver; and,

FIG. 4 is a fragmentary section view of the switch taken substantially on line 4—4 of FIG. 2.

Referring to the drawings, there is shown an electric dry shaver designated generally by reference numeral 11. The shaver includes a housing 12 which encloses an electric motor 13. While the specific details of the motor are of no consequence with respect to the invention, the motor includes a U-shaped field 14 having a pair of energizing coils 15 mounted thereon. An armature 16 is pivotally mounted adjacent the field pole faces so that as the coils 15 are energized by alternating current, the armature is oscillated about a mounting pin 17. Suitable spring means 18 bias the armature 16 to the rest position shown.

Extending outwardly from the armature 16 is a bifurcated drive arm 19 which may be made of suitable nylon or other plastic material. The motor 13 is positioned within an enclosure 20 formed by the housing 12. To permit the bifurcated drive arm 19 to extend outside of the enclosure 20, there is provided an opening 21 as shown in FIG. 1.

Received on the top of the housing 12 is a shaving head 25. The head 25 includes a plastic head frame 26 on which is mounted a fixed shearing comb 27. Positioned beneath the shearing comb are a pair of reciprocating cutters 28. The cutters 28 are drivingly engaged by the drive arm 19 and are biased into shearing engagement with the comb 27 by means of elongated spring 29. Thus, as the motor operates, the drive arm 19 oscillates causing the cutters 28 to reciprocate back and forth in engagement with the perforated comb 27. As is well known in the art, the shaving action takes place as whiskers extend through perforations in the comb 27 and are sheared off by the individual blades on the cutters 28. The shaving head 25 also includes a long hair clipper 30 driven by a suitable linkage 31 from the motor 13.

The plastic head frame 26 is somewhat box-like in configuration having side walls 26a and end wall 26b. The

housing 13 is provided with an upwardly projecting portion 32 which extends upwardly into the head frame 26. Surrounding the upwardly projecting portion 32, is a shelf or ledge 33 on which the head frame 26 is seated when the shaving head 25 is assembled to the housing 12. At the end of the shaver adjacent the clipper, the housing is formed with a laterally extending abutment 34 which cooperates with a complementary abutment 35 on the head frame 26 which restrains the shaving head 25 against upward movement with respect to the housing 12.

In order to complete the restraint of the shaving head 25 with respect to the housing 12, there is provided a latch 36 at the end of the shaver remote from the abutments 34 and 35. The latch 36 consists of a J-shaped spring having a lower U-shaped mounting portion 36a and an upwardly extending latch portion 36b. The latch 36 is received in pocket or recess 37 in the wall of the housing 12. To permit the latch 36 to extend outside of the housing 12, there is provided an opening 38 at the mouth of the pocket 37. The latch portion 36b of the latch 36 extends outwardly through opening 38 into engagement with an abutment 39 formed on the inner edge of the head frame 26. With the abutment 34 and the latch portion 36b extending outwardly and overlying the abutments 35 and 39 on the head frame 26, it should be appreciated that the head frame is restrained against vertical displacement with respect to the housing 12. It should also be appreciated that the side walls 26a of the head frame are received in closely spaced relation to the upwardly projecting portion 32 thereby preventing lateral displacement of the shaving head with respect to the housing 12.

For the purpose of controlling the energization of the motor 13 as well as the operation of the latch 36, there is provided a switch 42. The switch 42 includes a fixed electrical contact 43 which is mounted within the enclosure 20 and secured to terminal board 44. Also carried by the terminal board 44 are a pair of terminal pins 45 which are adapted to receive a conventional power cord connector. Suitable leads 46 connect one of the terminal pins 45 to one side of each of the coils 15. A movable contact member 47 is supported within the enclosure 20 by means of two vertical posts 48 and switch actuator 49. One of the posts 48 and the actuator 49 engage one side of the contact member 47 while the other post 48 engages the other side thereby holding the contact member 47 immobile therebetween. The contact member 47 is made of a flat, flexible material and has a notched out portion engaging the wall 50 to prevent lengthwise displacement with respect to the posts 48. At the inner end of the contact member 47, leads 51 interconnect the contact member 47 with the coils 15.

The outer end of the contact member 47 is formed with a curved contacting portion 47a which is movable into engagement with a fixed contact 43. Spaced inwardly from the connecting portion 47 is a V-shaped bend in contact member 47 which serves as a detent portion 47b.

The switch actuator 49 is provided with a manually actuable portion or button 49a which extends outwardly through a slot formed in an escutcheon or plate 52. To support the switch actuator with respect to the housing 12, two mating housing halves 12a and 12b are formed with opposed slots 12c as shown best in FIG. 4. The slots 12c receive projections 49b which support the switch actuator 49 for sliding movement with respect to the housing 12. The body portion 49c is snugly received in opening 12d in the housing 12. With the projections 49b received in the slots 12 and the body portion 49c snugly received in the opening 12d, the switch actuator 49 is securely guided for its rectilinear movement lengthwise of the slots 12c.

In order to actuate the movable switch contact member 47c, the switch actuator 49 is provided with a downwardly projecting extension 49d which engages the contact member 47 as shown in FIG. 1. In the solid line position shown in FIG. 1, the contact member 47 is in the open position. When the switch actuator 49 is moved

to the dotted line position shown in FIG. 1, the contact member 47 is moved to the closed position as shown in dotted lines in FIG. 1.

So that the switch actuator 49 may also serve to actuate the latch 36, there is provided an integrally formed actuator or extension 49e which extends from the body portion toward the latch 36. The actuator 49e projects through an opening 53 into the pocket 37 whereby it may engage the latch 36 as is best shown in FIG. 2 wherein the switch actuator 49 has been urged toward the latch 36 thereby deflecting the latch portion 36b out of engagement with the abutment 39 on the head frame 26. With the switch actuator 49 and the latch 36 in the position shown in FIG. 2, the shaving head 25 may be readily removed from the housing 12 for cleaning purposes and the like.

Essentially, the switch actuator 49 has three alternative positions. The position furthestmost to the right as shown in FIG. 1 as a dotted line position, may be considered the first position in which the circuit to the motor 13 is closed or in the energized position. In this position, the detent portion 47b on the contact member 47 engages the projection 49b on the switch actuator and retains the switch actuator in the on position. When the button 49a is moved to the left from the dotted line position to the solid line position shown in FIG. 1, the switch 42 is in the open contact or de-energized position. In this position, the resilient contact member 47 urges the switch actuator 49 further to the left into contact with the latch 36. The latch 36 is much stiffer than the contact member 47, and as a consequence, is not deflected until additional pressure is applied against the switch actuator 49. This arrangement of the contact member 47 and the latch 36 results in the switch actuator being resiliently retained in a fixed off position as shown in FIG. 1.

If it is now desired to release and remove the shaving head 25, the switch actuator 49 is moved further to the left to the position shown in FIG. 2 at which time the latch portion 36b is disengaged from the abutment 39 permitting the head 25 to be removed from the housing 12. Upon release of manual pressure from the button 49a when it is in the position shown in FIG. 2, the latch 36 will return the switch actuator 49 to the solid line position shown in FIG. 1. Thus, when it is desired to reassemble the head to the shaver, the head 25 is merely forced downwardly toward the shelf or ledge 33. The projection forming the abutment 39 on the head frame 26 causes the latch portion 36b to be deflected inwardly by virtue of the slope on the upper end of the latch 36. The latch portion 36b is thus deflected inwardly until the shaving head is seated against the shelf 33 at which time the latch portion 36b moves back into retaining engagement with the abutment 39. It may be readily understood that the switch 42 has two stable positions for the actuator 49, a first position in which the switch contacts are closed and a second position in which the switch contacts are open. The third position for the switch actuator 49 is the unlatching position from which it is immediately biased back to the second position upon release of the manual biasing force from the button 49a.

The switch actuator 49 is substantially covered by the escutcheon plate 52. The plate 52 is provided with retaining tabs 52a at the top and bottom thereof which are formed around suitable portions of the housing 12 to retain it in position thereon. An elongated slot 52b in the escutcheon permits the button 49a to extend upwardly for manual actuation. The slot 52b is sufficiently long to permit the switch actuator 49 to be moved between its first and third positions. Suitable indicia are imprinted on the escutcheon 52 to indicate the electrical positions of the switch 42 as well as the head release condition of the latch in the third position as is clearly shown in FIG. 3.

It should be readily understood that there is a significant advantage in having the switch 42 related to the latch 36 in the manner disclosed in connection with the

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present invention. There is a much more simple structure provided by having the switch and the latch actuating mechanism integrated together rather than having them structurally independent of each other. In addition, the disclosed arrangement provides an interlock whereby the head release may not be actuated unless or until the switch is moved to the off position in which the motor will be de-energized. This assures that the motor will not be driving the drive arm 19 as the shaving head 25 is detached from the housing 12.

While there has been shown and described several embodiments of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and that it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In an electric shaver of the type having a motor positioned within a housing and a detachable head secured to said housing with said motor drivingly connected to said head, the improvement comprising a three position switch on said housing, means connecting said switch in series with said motor and a pair of power terminals carried on said housing, an actuator for said switch, said switch actuator having a first position in which said terminals are electrically connected to said motor, said switch actuator having a second position in which the circuit between said terminals and said motor is open, latch means retaining said head in assembled relation to said housing, means interconnecting said switch actuator and said latch, said switch actuator having a third position in which said latch is operated to release said head from said shaver housing.

2. The combination of claim 1 wherein said switch actuator is mounted for sliding movement on said housing and is arranged with said second position between said first and third positions whereby said motor is de-energized prior to said head being released from said housing.

3. The combination of claim 1 wherein said latch comprises a spring supported by said housing at one end and having a free end extending into retaining engagement with a head supporting frame, means on said housing supporting said actuator for sliding movement toward and away from said spring, said actuator having an extension which engages said spring and deflects it out of latching engagement with said head frame when said actuator moves to said third position.

4. The combination of claim 1 wherein said housing includes two mating case halves which abut on a common plane to form an enclosure within which said motor is received, an opening in said housing formed by adjacent portions of said case halves, opposed grooves formed to said case halves to slidably support said actuator within said opening, an extension on said actuator within said housing positioned to actuate said latch means when said actuator is in said third position.

5. The combination of claim 1 wherein said housing is provided with a switch opening and a latch opening, means supporting said switch actuator within said switch opening with a manually operable button portion extending outside of said housing, said latch means including a latch spring mounted within said housing with a portion extending into said latch opening into latching engagement with said head, and an extension on said actuator adapted for engagement with said spring when said actuator is in said third position to deflect said spring out of latching engagement with said head.

6. The combination of claim 1 wherein said latch means comprises resilient means which is deflected to release said head from said casing, spring detent means retaining said actuator in one of said first and second positions, said actuator engaging directly against and deflecting said re-

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silient means in moving from said second to said third position, said resilient means biasing said actuator to said second position from said third position after release of manual pressure from said actuator.

7. In an electric dry shaver of the type having a head with a comb and movable cutter supported by a head frame detachably mounted on a housing within which an electric motor is mounted, said motor having driving means extending outwardly from said housing into driving engagement with said movable cutter, switch means for controlling the flow of electrical power to said motor, the improvement comprising a latch for retaining said head frame assembled to said housing, said switch having three positions to control the actuation of said motor and the operation of said latch, said switch including a switch actuator having a manually actuatable button portion extending outside of said housing for actuation by an operator, said switch including means for interconnecting said motor to a source of electrical power when said actuator is in a first position, said switch including means for interrupting the connection between said motor on a source of electrical power when said actuator is in a second position, said actuator being movable to a third position wherein said actuator operates said latch to detach said head frame from said housing.

8. The combination of claim 7 including means for retaining said actuator in one of said first and second positions, and means biasing said actuator from said third position to said second position whereby said switch will be in the open circuit position automatically following release of said actuator after unlatching said head frame.

9. The combination of claim 7 wherein said switch actuator is slidably mounted on said housing, said switch including a fixed and a movable contact mounted within said housing, said movable contact comprising an elongated cantilever spring member the outer end of which is movable into engagement with said fixed contact, means on said actuator engaging said spring member intermediate its ends to deflect it between a contact closed position and a contact open position as it moves from said first position to said second position.

10. The combination of claim 9 wherein said spring member is formed with a bend to provide a detent action retaining said actuator in said first position.

11. The combination of claim 7 wherein said switch includes resilient means to provide a detent action to retain said actuator in either one of said first and second positions.

12. The combination of claim 7 wherein said housing is formed with a switch opening and a latch opening, means on said housing mounting said actuator for sliding movement within said switch opening, said latch including a resilient latch member mounted in said housing with one end in said latch opening, an abutment on said head frame positioned to engage said latch, means on said actuator within said housing extending into engagement with said resilient latch member to deflect said latch member out of engagement with said abutment when said actuator is moved to said third position.

13. The combination of claim 7 wherein said actuator is mounted for sliding movement in opposed slots in an opening in said housing, an escutcheon plate overlying said actuator and having a slot through which said button portion extends, said plate having indicia indicating the functions performed by said switch in the various positions of said actuator.

14. In an electric shaver of the type having a housing enclosing an electric motor and a shaving head detachably secured to said housing, said head including a head frame supporting a fixed shearing comb, a movable shearing cutter driven by said motor in shearing engagement with said comb, the improvement comprising switch means supported on said housing connected to close and open the electrical power circuit to said motor, fixed and movable abutments on said housing to retain said head

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frame on said housing, said switch including means for moving said movable abutment to detach said head from said housing.

15. The combination of claim 14 wherein said movable abutment is a cantilever spring having its free end in latching engagement with an abutment on said head frame, said switch having an actuator movable between a motor energized and a motor off position, means on said actuator engaging said spring when said switch is in off position, said actuator being further movable in the off posi-

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tion to move said spring out of latching engagement with said head frame abutment.

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