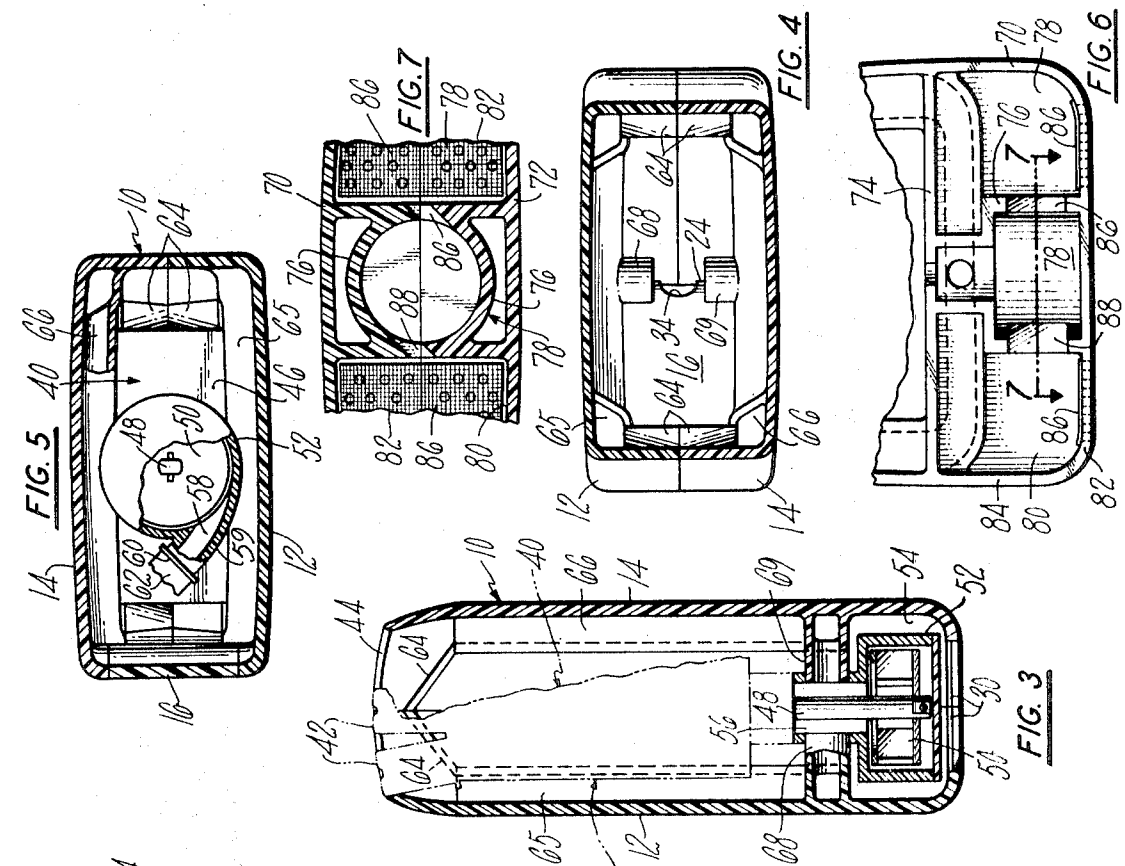
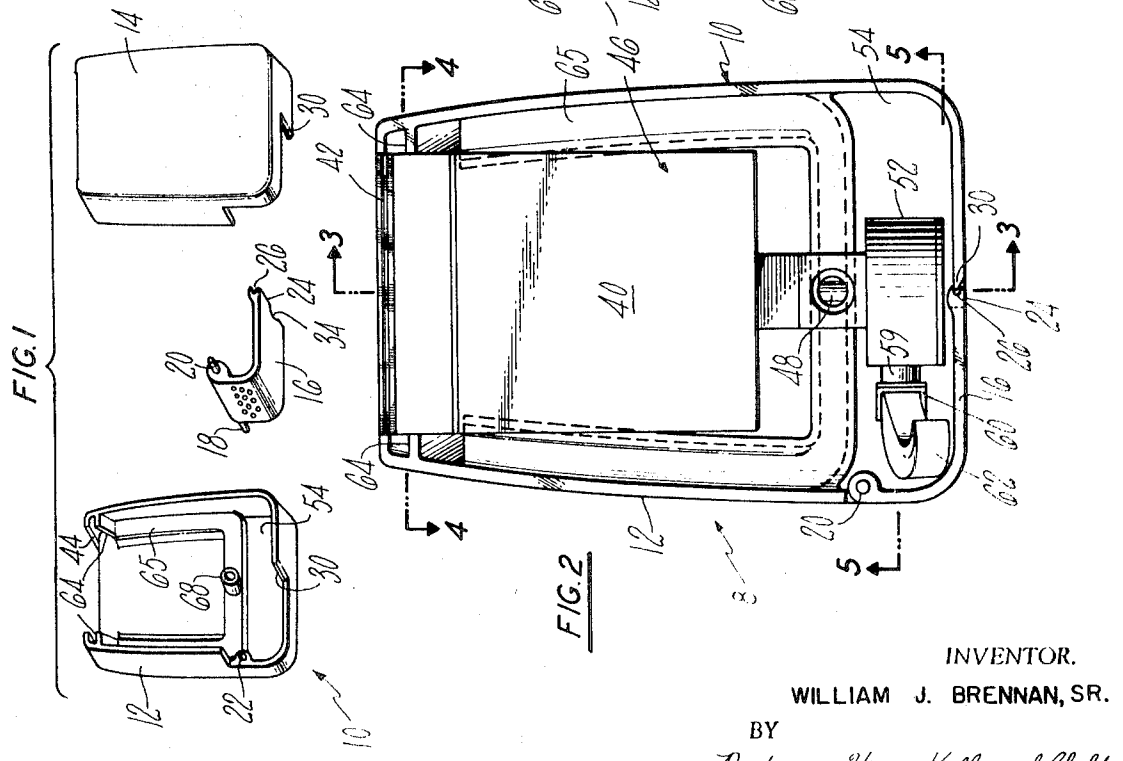
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ELECTRIC SHAVER WITH VACUUM COLLECTOR

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ELECTRIC SHAVER WITH VACUUM COLLECTOR

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ABSTRACT OF THE DISCLOSURE

An electric shaver comprising a molded plastic casing and a shaver mechanism subassembly mounted within the casing having shearing heads received within a forward opening in the casing, a rearward motor shaft extension and an impeller fixed onto the shaft extension. The impeller provides for drawing hair particles from the shearing heads through conduits integrally formed with the casing and into a receptacle within the rear end of the casing. In one embodiment a bag is employed as a receptacle for collecting the hair particles and in a second embodiment a pair of rear compartments integrally formed with the casing provide for collecting the hair particles.

BRIEF SUMMARY OF THE INVENTION

The present invention relates to electric shavers incorporating a vacuum collector for the sheared hair particles.

It is an aim of the present invention to provide a new and improved shaver vacuum collector system which operates with improved efficiency.

It is another aim of the present invention to provide a new and improved electric shaver of the type described having a compact assembly.

It is a further aim of the present invention to provide a new and improved electric shaver of the type described useful by astronauts in zero gravity conditions to avoid contaminating their living quarters with hair particles.

It is another aim of the present invention to provide a new and improved shaver vacuum collector system useful with commercial shaver mechanisms with minimum modification of the shaver mechanism. In accordance with the present invention a shaver vacuum collector system can be provided by modifying a standard shaver mechanism to extend the usual motor drive shaft, by securing an impeller onto the drive shaft extension and by using a casing designed for receiving the modified shaver mechanism and to enable the impeller to draw hair particles from the shearing head of the shaver mechanism for storage in a suitable receptacle.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

A better understanding of the invention will be obtained from the following detailed description and the accompanying drawing of illustrative applications of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is an exploded isometric view of a three part outer casing of a first embodiment of an electric shaver constructed in accordance with the present invention;

FIG. 2 is an enlarged longitudinal side view showing the electric shaver with one part of the outer casing removed;

FIG. 3 is a longitudinal section view, partly broken away and partly in section, of the electric shaver as taken generally along line 3—3 of the view of FIG. 2;

FIG. 4 is a transverse section view, partly in section, of the outer casing of the electric shaver as taken along line 4—4 of the view of FIG. 2;

FIG. 5 is a transverse section view, partly broken away and partly in section, of the shaver as taken generally along line 5—5 of the view of FIG. 2;

FIG. 6 is a view, partly broken away, of a casing part of another embodiment of an electric shaver constructed in accordance with the present invention; and

FIG. 7 is a transverse section view, partly broken away and partly in section, of the casing of the embodiment of FIG. 6 as taken generally along line 7—7 of FIG. 6.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in detail wherein like numerals represent like parts throughout the various figures, a first embodiment 8 of an electric shaver of the present invention is shown comprising a three part molded plastic casing 10 comprising a pair of side covers or shells 12, 14 and and L-shaped perforated door 16 having integral pivot pins 18, 20 adapted to be received in opposed openings 22 in the side covers 12, 14. The opposite enlarged end 24 of the door 16 is provided with a groove 26 which receives a tapered edge 30 of the covers 12, 14 to hold the door closed, and the door 16 is shown provided with a slot opening 34 for pivoting the door outwardly.

The casing is formed with a suitable pocket for receiving an electric shaver mechanism or subassembly 40 having three substantially identical shearing heads 42 received within a forward generally rectangular opening 44 in the outer casing. The shown shearing heads 42 have suitable transversely reciprocable blades (not shown) which are reciprocated by a motor 46 to provide the shearing action.

The otherwise conventional electric shaver subassembly 40 is modified to provide a rearward motor shaft extension 48, a suitable impeller 50 secured onto the shaft extension 48 and an impeller housing 52, the impeller 50 and impeller housing 52 being received within a rear compartment 54 in the outer casing 10.

The impeller housing 52 has an axial inlet 56 surrounding the motor shaft extension 48 and a tangential outlet 58 within a projecting boss 59 onto which an elastic neck 60 of a bag receptacle 62 is retained.

A pair of inverted V-shaped ramps 64 are provided at the opposite transverse ends of the forward casing opening 44 for receiving hair particles from the transversely extending shearing heads 42, and U-shaped conduits 65, 66 integrally formed with the casing shells 12, 14 are provided for conducting hair particles from the outer ends of the ramps 64 to transversely projecting connector conduits 68, 69 having outer ends received within conforming openings in the impeller housing. Accordingly, as best seen in FIG. 4, a first generally T-shaped conduit is provided by the lower end of each U-shaped conduit 65, 66 and its respective transversely projecting connector conduit 68, 69, and as best seen in FIG. 3, a second generally T-shaped conduit is formed by the pair of transversely projecting connector conduits 68, 69 and the axially extending impeller inlet conduit 56.

During operation of the shaver the impeller 50 provides for drawing hair particles from the shearing heads 42 transversely onto the ramps 64 and into the open ends of the U-shaped conduits 65, 66. The hair particles are thereupon conducted by the action of the impeller through the U-shaped conduits 65, 66, connector conduits 68, 69, and impeller chamber to the collector bag 62. Normally, during use a majority of the casing opening 44 is in effect covered by the face or other skin surface being shaved, whereupon the impeller 50 can establish sufficient partial vacuum for drawing hair particles from the shearing heads as the shaver is moved across the skin and portions of the outer surface of the shearing heads are momentarily uncovered.

In another embodiment of the present invention shown

in FIGS. 6 and 7 a pair of casing shells **70, 72** (which may be identical) are formed with transversely extending webs **74** to compartmentalize the rear end of the casing and are formed with integral impeller housing sections **76** which provide a split impeller housing **78** for the motor driven impeller, the housing section **76** also dividing the rear end of the casing into compartment sections **78, 80.** The rear portions **82** of the peripheral flanges **84** of the shells are perforated and a suitable fabric screen **86** is secured to the flange overlying the perforations so that the compartments **78, 80** may be used for collecting hair particles discharged from the impeller housing through the opposed outlets **86, 88.** Consequently, the compartment sections **78, 80** may be emptied merely by separating the two casing shells **70, 72** which normally are detachably held together by suitable means not shown.

It can be seen therefore that the electric shaver of the present invention provides for efficiently drawing hair particles from the shearing head and collecting them in a receptacle at the rear end of the shaver, and provides for emptying the collected hair particles—by opening the door **16** and emptying or replacing the receptacle bag **62** in the embodiment of FIGS. 1–5 and by separating the casing halves and emptying the compartments **78, 80** in the embodiments of FIGS. 6 and 7.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the teachings of the present invention.

I claim:

1. An electric shaver comprising an outer casing with a transversely extending opening at a forward longitudinal end thereof; a shaver subassembly mounted within the casing having a drive motor with a longitudinally extending drive shaft with a rearward extension, a shearing head received within said casing opening connected for being driven by the motor, and an impeller mounted on the rearward extension of the drive shaft to be driven thereby; an impeller housing within the outer casing having an inlet and outlet, conduit means within the outer casing connecting the forward end of the casing to the impeller housing inlet for conducting hair particles from the shearing head to the impeller housing; the conduit means including rearwardly inclined ramp means immediately rearwardly and transversely of opposite transverse ends of the casing opening for receiving hair particles transversely from the shearing head, and conduits connecting the rearward ends of the rearwardly inclined ramp means to the impeller housing inlet for conducting hair particles from the ramp means to the impeller housing; and receptable means within the rearward end of the outer casing for receiving hair particles from the impeller housing outlet.

2. An electric shaver comprising an outer casing with an opening at a forward longitudinal end thereof; a shaver subassembly mounted within the casing having a drive motor with a longitudinally extending drive shaft with a rearward extension, a shearing head received within said casing opening connected for being driven by the motor, and an impeller mounted on the rearward extension of the drive shaft to be driven thereby; an impeller housing within the outer casing having an inlet and outlet, conduit means within the outer casing connecting the forward end of the casing to the impeller housing inlet for conducting hair particles from the shearing head to the impeller housing, and receptacle means within the rearward end of the outer casing for receiving hair particles from the impeller housing outlet, the outer casing comprising a pair of opposed casing parts and the conduit means comprising a generally U-shaped conduit in each casing part integrally formed therewith and having a pair of leg portions with forward open ends adjacent the casing opening and an intermediate rearward base portion, and a pair of conduit portions projecting laterally from the base portions of the U-shaped conduits respectively for connecting the U-shaped conduits to the impeller housing inlet.

3. An electric shaver comprising an outer casing with an opening at a forward longitudinal end thereof; a shaver subassembly mounted within the casing having a drive motor with a longitudinally extending drive shaft with a rearward extension, a shearing head received within said casing opening connected for being driven by the motor, and an impeller mounted on the rearward extension of the drive shaft to be driven thereby; an impeller housing within the outer casing having an inlet and outlet, conduit means within the outer casing connecting the forward end of the casing to the impeller housing inlet for conducting hair particles from the shearing head to the impeller housing, and receptacle means within the rearward end of the outer casing for receiving hair particles from the impeller housing outlet, the outer casing comprising a pair of opposed casing parts and the conduit means comprising separate conduits in each casing part integrally formed therewith and a T-shaped conduit with an axially extending conduit portion connected to the impeller housing inlet and laterally extending conduit portions for connecting said separate conduits in each casing part with said axially extending conduit portion.

4. The electric shaver of claim **1** wherein the ramp means comprises inverted V-shaped ramps integrally formed with the outer casings.

5. The electric shaver of claim **1** wherein the outer casing provides an internal compartment adjacent the impeller housing outlet and comprises a pivotal door to the internal compartment.

6. The electric shaver of claim **5** wherein the receptacle means comprises a removable bag mounted within the internal compartment for receiving hair particles from the impeller housing outlet.

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