Dec. 15, 1959 J. M. WITMER 2,916,821

ROTARY DRY SHAVER WITH WASTE COLLECTING MEANS

Filed Oct. 8, 1958

Fig. 1

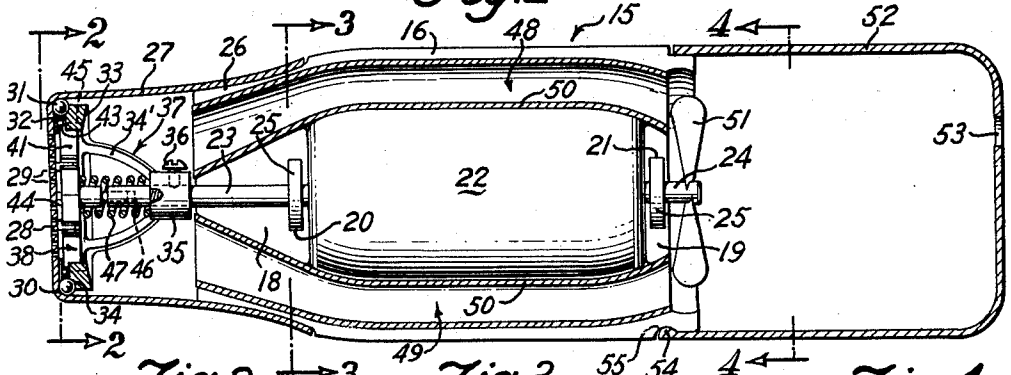


Fig. 2

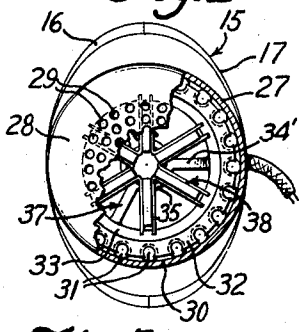


Fig. 3

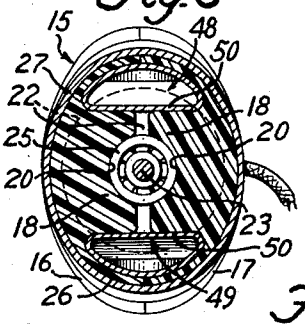


Fig. 4

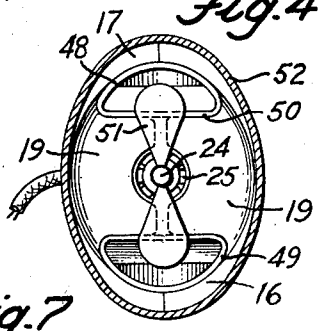


Fig. 5

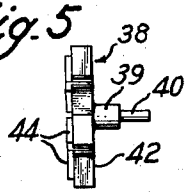


Fig. 6

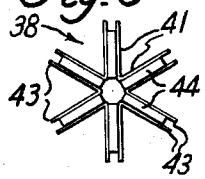


Fig. 7

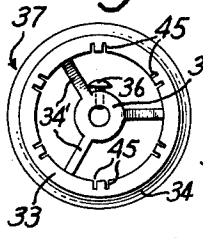


Fig. 8

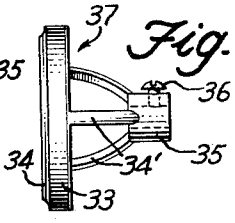


Fig. 9

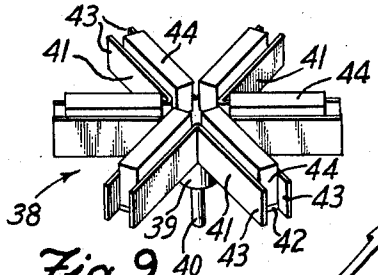
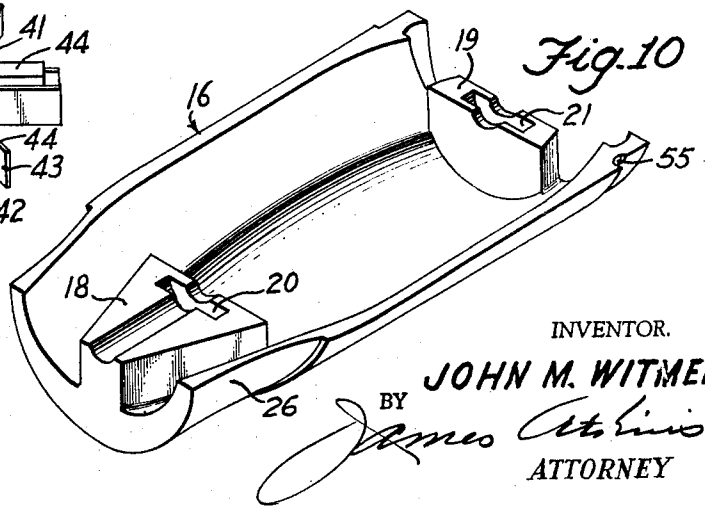


Fig. 10



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United States Patent Office 2,916,821 Patented Dec. 15, 1959

2,916,821

ROTARY DRY SHAVER WITH WASTE COLLECTING MEANS

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Application October 8, 1958, Serial No. 766,028

4 Claims. (Cl. 30—41.5)

The present invention relates to a rotary hair clipper.

A primary object of the invention is to provide an improved power-operated hair clipper, primarily for use by barbers to reduce the time necessary for producing a good haircut.

A further important object of the invention is to provide a hair clipper which is safe to use and cannot cut or damage the skin, and having suction means incorporated therein to draw off and collect the hair clippings, and thereby eliminate itching and annoyance to the person getting a haircut.

Another object of the invention is to provide a hair clipper which is highly sanitary, insomuch as the hair clippings are all collected within a removable receptacle carried by the hair clipper, thus eliminating the scattering of hair clippings about the barber shop.

A further object of the invention is to provide a hair clipper having a novel, compact and highly efficient rotary cutter mechanism, which, in conjunction with the suction means, renders the device capable of clipping hair in a highly uniform manner, close to the skin or close to the comb which may be utilized to guide the ends of the hair into the suction stream of the clipper.

A further object is to provide a hair clipper of the above-mentioned character which is easy to assemble and disassemble for cleaning or other maintenance.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a central vertical longitudinal section through the hair clipper embodying the present invention.

Figure 2 is an end elevation of the clipper, partly in section, taken on line 2—2 of Figure 1.

Figure 3 is a transverse vertical section taken on line 3—3 of Figure 1.

Figure 4 is a similar section taken on line 4—4 of Figure 1.

Figure 5 is a side elevation of a rotary blade assembly removed.

Figure 6 is an end elevational view of the same, taken from the left-hand side of Figure 5.

Figure 7 is an end elevation of a combined cutter blade driving spider and bearing retainer.

Figure 8 is a side elevational view of the same.

Figure 9 is a perspective view on an enlarged scale of the cutter blade assembly shown in Figures 5 and 6.

Figure 10 is an enlarged perspective view of one-half of a split casing for the hair clipper.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 15 designates a casing comprising a companion pair of opposed casing sections 16 and 17. In assembly, as shown in Figure 2, the opposed casing sections 16 and 17 which are secured together by any conventional means constitute a casing which is elliptical in cross section and generally tubular, as shown. The casing 15 may be formed of plastic material, metal or any other suitable material.

As best shown in Figure 10, the opposite ends of each casing section are open, except for bearing mounting blocks 18 and 19, preferably formed integral with each casing section adjacent to its opposite ends, as shown. The blocks 18 and 19 have recess means 20 and 21 formed therein for motor shaft bearings, to be described.

Mounted centrally within the casing 15 formed by the assembled casing sections 16 and 17 is a small electric motor 22 having armature shaft extensions 23 and 24 extending axially forwardly and rearwardly thereof as shown in Figure 1. The motor armature shaft extensions are journaled for rotation within a pair of ball bearings 25, adjacent to the forward and rear ends of the motor, and held within the recess means 20 and 21 of casing sections 16 and 17, as best shown in Figure 3. The motor including the armature shaft and bearings are thus clamped between the assembled casing sections 16 and 17, so that when the latter are separated the entire motor and associated elements are readily removable bodily from the casing.

The forward portion of the casing 15 is tapered, as indicated at 26, Figure 1. A hollow thin-walled one piece nosecap 27 engages removably over the tapered extension 26 of casing 15 and is detachably secured thereto by screws or other suitable means, not shown. The nosecap 27 is elliptical in cross section adjacent to the tapered portion 26 of casing 15, but the forward portion of the nosecap remote from the casing 15 is substantially cylindrical.

The nosecap 27 includes a flat forward wall 28, or shear plate, having a multiplicity of small apertures 29 formed therethrough for the reception of hair to be clipped. The apertured area of the shear plate 28 extends over a mjaor portion of the entire diameter of the nosecap, as shown.

The nosecap 27 which is preferably formed of stainless steel, or the like, has its forward corner accurately rounded at 30 to provide an annular race for a plurality of ball bearings 31, arranged upon the inner side of the shear plate 28 and maintained spaced apart by a thin annular ball bearing cage 32.

In conjunction with the annular race 30 of the nosecap 27, the ball bearings 31 are retained in proper engagement within the nosecap 27 by an annular ring or retainer 33, provided in its forward side with a spherically curved groove 34, forming a complementary race for the ball bearings 31. The annular ball bearing retainer 33 is disposed within the nosecap 27, near and rearwardly of the shearing plate 28, and formed integral with the retainer 33 are a plurality of circumferentially equidistantly spaced rearwardly extending curved arms 34', rigidly secured at their rear ends and preferably formed integral with a sleeve 35.

The sleeve 35 engages over the forward armature shaft extension 23, which shaft extension projects a substantial distance forwardly of the casing 15 and into the nosecap 27, centrally thereof. The sleeve 35 is adjustably rigidly secured to the armature shaft extension 23 by means of a set screw 36 or the like. By adjusting the sleeve 35 upon the armature shaft extension 23 and locking the same in the selected adjusted position, the annular retainer 33 may be caused to bear evenly upon the ball bearings 31 so that the latter will have a smooth running fit about the annular race 30 and the complementary race 34. The sleeve 35, arms 34' and annular retainer 33 make up a unitary ball bearing retainer and cutter blade driving device 37, which device is illustrated alone in Figures 7 and 8 of the drawings for the sake of clarity.

With continued reference to the drawings, there is provided adjacent to the device 37 and inwardly of the ball bearings 31 a cutter blade assembly 38, shown in its entirety in Figures 5, 6 and 9. The assembly 38 embodies an axial hub 39 projecting rearwardly of the body portion thereof, which hub has an integral reduced extension 40, as shown. Forwardly of the hub 39 and integral therewith are a plurality of circumferentially equidistantly spaced cutter blade holders or channels 41, preferably six in number as shown, and being rectangular in cross section and forwardly open. The inner and outer ends of each channel 41 are likewise open, as best shown in Figure 9. The side walls of each channel 41 project radially outwardly of the bottom wall 42 of the channel, to form upon each channel a pair of outer radial parallel extensions 43, for a purpose to be described. Snugly and preferably fixedly mounted within each channel 41, inward y of the radial extensions 43, is an elongated rectangular cutter blade 44, preferably formed of molded spun glass reinforced with nylon, molded nylon, or some like non-metallic tough material. The forward flat cutting faces of the blades 44 project forwardly of the open sides of the channels 41, as shown clearly in Figure 9. The b.ades 44 extend throughout the major portion of the lengths of the channels 41, as shown.

In assembly, the cutter blade unit 38 is disposed rearwardly of the flat shearing plate 28, and the forward flat cutting faces of the blades 41 slidably engage the apertured portion of the plate 28, as shown in Figure 1. The channels 41 are disposed inwardly of the bearing retainer ring 33, which ring is provided in its bore with a plurality of circumferentially equidistantly spaced pairs of spaced parallel notches 45, adapted to slidably receive therein the radial extensions 43 of the channels 41. The hub 39 and extension 40 extend rearwardly of the retainer ring 33, Figure 1, and the reduced extension 40 engaged slidably within an opening 46 formed in the forward end of the armature shaft extension 23. A compressible coil spring 47 surrounds the hub 39 and armature shaft extension 23, and has its rear end bearing against the sleeve 35 and its forward end bearing against the rear sides of the channels 41.

By means of this arrangement, the cutter blade holding unit 38 is locked to the annular ring 33 for rotation therewith, and the unit 38 is urged forwardly by the spring 47 so that the flat forward faces of the blades 44 will remain in firm sliding contact with the inner face of the shear plate 28. The entire unit 38 is, however, axially self-adjusting within the ring 33, due to the sliding engagement of the extensions 43 within the notches 45 of the ring. The unit 38 cannot however move circumferentially with respect to the ring 33, but is locked or keyed thereto for rotation therewith.

It is now apparent that rotation of the armature shaft extension 23 will cause rotation of the device 37, together with the blade holding unit 38, and the several cutter blades 44 held against the shear plate 28 by the spring 47 will slide over the shear plate and produce a cutting action in cooperation with the apertures 29 of the shear plate, through which the hairs to be clipped are projected.

A pair of diametrically opposed elongated suction tubes 48 and 49 are removably mounted within the split casing 15 on opposite sides of the motor 22, as shown. The tubes 48 and 49 are locked in place by the assembling of the casing sections 16 and 17, and the bearing blocks 18 and 19 cooperate to secure the tubes 48 and 49 in place, as best shown in Figure 3. The inner walls 50 of the tubes are flat for engagement with the sides of the blocks 18 and 19 to prevent the tubes from turning, Figure 3. The opposite open ends of the tubes 48 and 49 terminate adjacent to the opposite ends of the casing 15, as shown in Figure 1. The forward ends of the tubes 48 and 49 communicate with the interior of the nosecap 27 to convey the clipped hairs rearwardly therefrom, as will be further described.

Adjacent to the rear open ends of the tubes 48 and 49, a rotary suction fan 51 is fixedly secured to the rear armature shaft extension 24 to turn therewith. When the armature shaft turns, the fan 51 creates suction through the tubes 48 and within the nosecap 27, and the hair to be clipped is drawn by the suction stream into the apertures 29 of the shear plate 28, and after clipping by the blades 44, the loose clippings are drawn rearwardly from the nosecap 27 and through the suction tubes 48 and 49 by the fan.

Removably mounted upon the rear end of the casing 15 is a one piece elliptical hair collection receptacle or cup 52, having a small vent opening 53 in its rear wall which may be covered by a screen, if desired. The receptacle 52 may be formed of plastics material, metal or the like, as found desirable, and the receptacle 52 is detachably secured to the rear end of the assembled casing 15 in any conventional manner. For example, one side wall portion of the receptacle 52 may be provided with an internal bead 54 at the forward open end of the receptacle, which bead may resiliently snap into a recess 55 formed in the adjacent side wall portion of the casing 15. Any other preferred type of connection between the casing 15 and hair collection receptacle 52 may be provided, if preferred.

During the operation of the hair clipper, the rotary cutter blade assembly 38 shears or clips the hair in cooperation with the apertures 29 of the shear plate 28. As soon as the hair clippings enter the nosecap 27, the suction stream afforded by the fan 51 will convey the hair clippings through the tubes 48 and 49, and beyond the rear open ends of the tubes to the hair collection receptacle 52. When sufficient hair clippings have accumulated within the receptacle 52, the same may be readily removed from the casing 15 and emptied.

The use of the clipper renders the hair cutting operation sanitary, due to the fact that the hair clippings are not scattered about the room and over the customer as usually occurs in the barber shop. Instead, substantially all of the hair clippings are conveyed into the receptacle 52, as explained.

The rotary cutter assembly and ball bearing arrangement is highly efficient in operation, greatly simplified, compact and sturdy and durable. With the use of the hair clipper, the time required to administer a hair cut is greatly reduced.

The entire device can be quickly disassembled by merely removing the receptacle 52 and nosecap 27 from the casing 15. When this is done, the two casing sections 16 and 17 may be separated and the motor 22 and all parts carried thereby are then exposed. It is therefore a very simple operation to clean or service the hair clipper and to reassemble the same for further use.

The cutter blades 44 formed of molded spun glass or the like rather than metal assure fast cutting and long-lasting edges. The blades 44 are substantially noiseless, and very little friction is developed between the blades and the shearing plate 28. If desired, however, the blades 44 may be formed of metal or any other suitable material.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, what I claim is:

1. A hair clipper comprising a casing, a motor mounted within the casing and having forward and rear armature shaft extensions, a nosecap for the forward end of the casing including a forward shear plate which is apertured, said nosecap having a forward annular rounded corner wall adapted to serve as a ball bearing race, ball bear-

ings disposed within the nosecap and engaging said race, an annular ball bearing retainer disposed within the nosecap rearwardly of the ball bearings and said shear plate and having an annular recess adapted to receive said ball bearings, means interconnecting said retainer and the forward armature shaft extension so that said retainer rotates with said extension, a cutter blade unit including a plurality of circumferentially spaced radial cutter blades arranged within the nosecap, said cutter blades having their forward sides slidably engaging said apertured shear plate, said unit keyed to the ball bearing retainer for rotation therewith but being axially adjustable relative to said retainer, resilient means engaging the cutter blade unit and urging the same toward said shear plate, said casing having longitudinal passage means extending therethrough outwardly of said motor and communicating with the interior of the nosecap, a suction fan secured to the rear armature shaft extension and adapted to draw air through said apertured shear plate and through the nosecap and said passage means, and a hair collection receptacle carried by the rear end of said casing and communicating with said passage means and detachable from said casing.

2. A hair clipper comprising a casing, a motor mounted within said casing and having an armature shaft extension which projects forwardly of the casing, a nosecap for the forward end of said casing and having a flat forward wall provided with a multiplicity of apertures and constituting a shear plate, said nosecap rounded at the juncture of said forward wall and the side wall of the nosecap to form an annular ball bearing race internally of the nosecap, a plurality of ball bearings engaging said race of the nosecap, a cage for the ball bearings maintaining the same spaced apart circumferentially, a combined ball bearing retainer and cutter blade drive device mounted within the nosecap and engaging said ball bearings and secured to said armature shaft extension, a cutter blade unit arranged within the nosecap adjacent to said shear plate and ball bearing retainer, said unit comprising a plurality of circumferentially spaced connected radial channel elements having end extensions, said ball bearing retainer having a corresponding number of notches formed therein receiving said extensions and serving to interconnect the cutter blade unit and ball bearing retainer for rotation in unison when said armature shaft extension rotates, cutter blades mounted within said channel elements and having forward sides slidably engaging said apertured shear plate, the cutter blade unit having an axially rearwardly extending hub including a reduced extension, the forward end of said armature shaft extension having an opening receiving said hub extension, a compressible coil spring surrounding said hub and armature shaft extension within said nosecap and resiliently urging the cutter blade unit toward said shear plate, and suction means operated by said motor for conveying hair clippings from the interior of the nosecap rearwardly through said casing.

3. A hair clipper comprising a casing adapted to be held in the hand and having longitudinal air passage means, a motor mounted within said casing and having a forward armature shaft extension, a receptacle for collecting hair clippings detachably secured to the rear end of said casing and communicating with said air passage means, fan means driven by said motor for drawing hair clippings through said passage means of the casing and depositing the clippings in said receptacle, a nosecap mounted upon the forward end of said casing and having an apertured forward wall forming a shear plate, said nosecap formed to provide an annular ball bearing race near the periphery of the nosecap, ball bearings engaging said race of the nosecap, a sleeve fixedly secured to the forward armature shaft extension, an annular ball bearing retainer engaging said ball bearings to hold them in contact with said race, arms interconnecting the ball bearing retainer and said sleeve, a cutter blade unit including a plurality of radially arranged cutter blades having forward sides slidably engaging said shear plate, said cutter blade unit keyed to the ball bearing retainer for rotation therewith and being axially shiftable relative to the ball bearing retainer, and resilient means interconnecting the cutter blade unit and said sleeve and urging the cutter blade unit toward said shear plate.

4. A rotary hair clipper comprising casing means including a nose section having a foraminous forward wall which is substantially flat, said nose section formed to provide an annular ball bearing race integral therewith at the inner face of said forward wall and adjacent to the margin thereof, ball bearing means engaging said annular race within said nose section, an annular element disposed within the nose section rearwardly of the ball bearing means and engaging the latter to maintain the ball bearing means in contact with the annular race, a motor including a rotary armature shaft extension, said shaft extension projecting into said nose section, means interconnecting said shaft extension and annular element and causing the latter to rotate with said shaft extension when the motor is in operation, a cutter blade assembly including a plurality of radial cutter blades disposed rearwardly of said forward wall within the nose section and slidably contacting the forward wall, radial interlocking means between said annular element and cutter blade assembly causing the cutter blade assembly to turn with the annular element and permitting the cutter blade assembly to shift axially somewhat relative to the annular element, and resilient means connected with the cutter blade assembly to urge the cutter blades thereof into sliding contact with said foraminous forward wall.

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