Aug. 8, 1950 W. C. RENNE 2,518,181

SAFETY RAZOR

Filed Oct. 7, 1946 2 Sheets-Sheet 1

Fig. 1

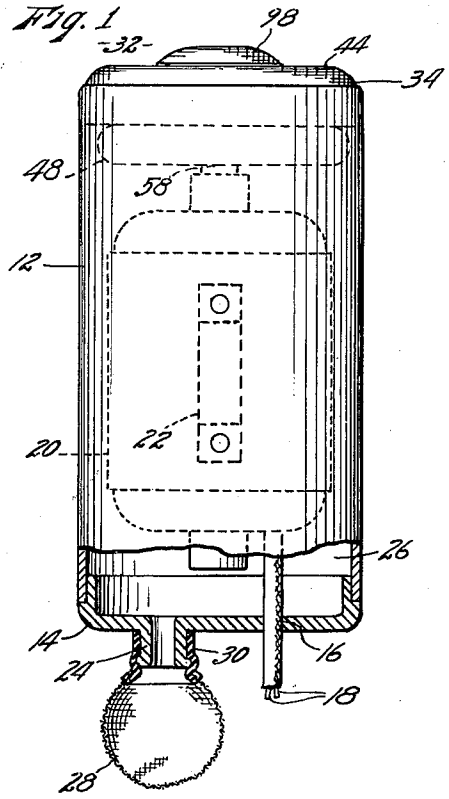


Fig. 6

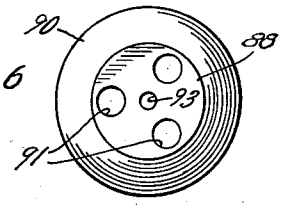


Fig. 7

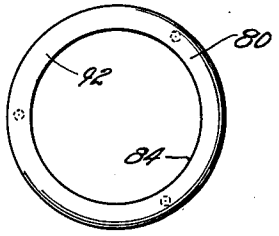


Fig. 8

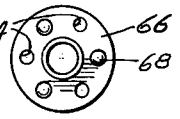
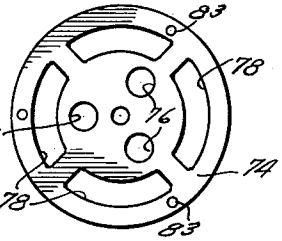


Fig. 9



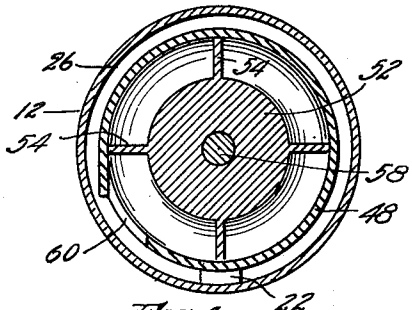
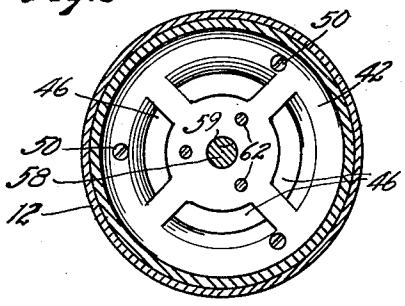


Fig. 4

Fig. 5



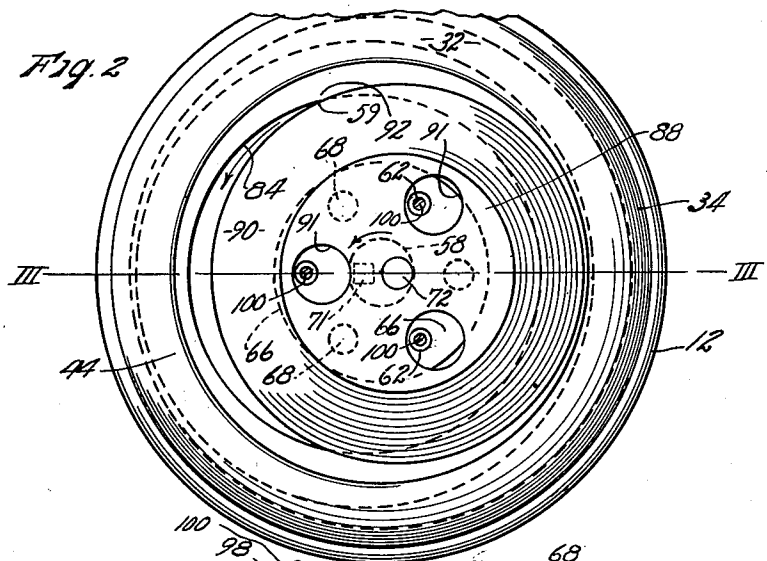
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SAFETY RAZOR

Filed Oct. 7, 1946 2 Sheets-Sheet 2

Fig. 2



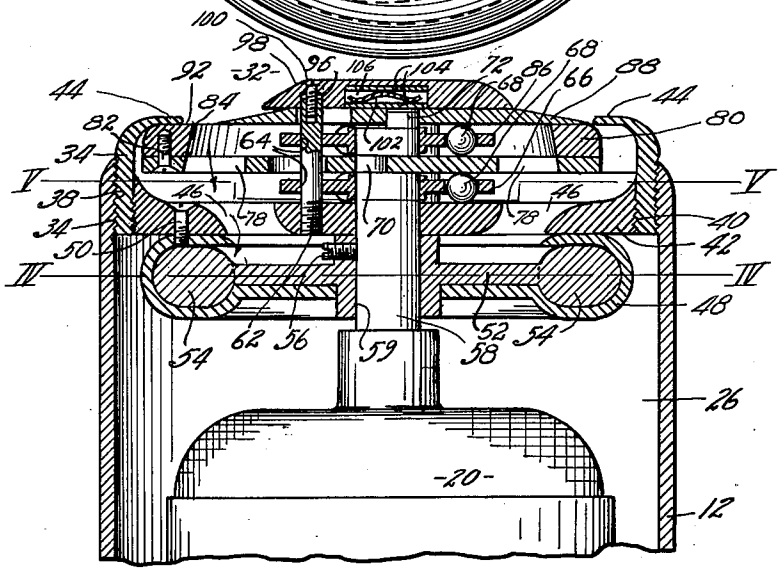
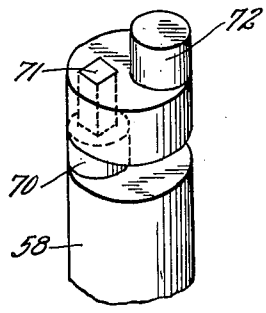


Fig. 3

Fig. 10



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SAFETY RAZOR

William C. Renne, Kansas City, Mo.

Application October 7, 1946, Serial No. 701,751

8 Claims. (Cl. 30—43)

1

This invention relates to improvements in razors of the electric class including means for moving cooperating shearing blades.

The principal object of the present invention is the provision of a power driven razor having a pair of cooperating circular shearing members eccentrically mounted for continuous shearing movement.

Another object is the provision of a powered razor having a ring member provided with an annular internal cutting edge mounted for circular oscillation on an eccentrically driven shaft and a cooperating cutting disc of less diameter than said internal cutting edge mounted on an eccentrically driven shaft disposed diametrically opposite to the axis of said ring member whereby as said cutting members are moved by said eccentric shafts they will present a continuous shearing action.

Other objects are rigidity and compactness of construction, ease and efficiency of operation, and adaptability to collect and retain the cuttings.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will be had to the drawing wherein:

Figure 1 is an elevational view with parts broken away of a razor having blade moving means, embodying this invention.

Fig. 2 is an enlarged plan view of the cutting face of the razor with parts broken away.

Fig. 3 is a fragmentary sectional view of the razor taken on line III—III of Figure 2.

Fig. 4 is a reduced cross sectional view taken on line IV—IV of Figure 3.

Fig. 5 is a reduced cross sectional view taken on line V—V of Figure 3.

Fig. 6 is a plan view of the cutter disc detached.

Fig. 7 is a plan view of the ring cutting member.

Fig. 8 is a plan view of one of the ball cages.

Fig. 9 is a plan view of the bearing plate.

Fig. 10 is an enlarged perspective view of the eccentric end of the driving shaft.

Throughout the several views like reference characters refer to similar parts and the numeral 12 designates a body housing of substantially cylindrical form having an end cap 14 which is tightly fitted therein. This cap is perforated at 16 to permit the insertion of electric wires 18 for energizing the electric motor 20 which is mounted adjacent the central portion in housing 12 by bracket 22.

Cap 14 also has a tubular boss 24 which communicates with the housing chamber 26 and is provided with a slip-on strainer 28 for receiving hair, etc., resulting from the shaving operation. This strainer after each shave may be slipped from boss 24, washed and then replaced for the next shave. The neck 30 of strainer 28 is made of an elastic material, such as rubber, so that the strainer may be quickly removed and replaced without the operating of any holding parts.

2

The opposite end of the housing 12 carries the cutting or shearing head 32 of the razor. An annular ring 34 threaded at its outer periphery at 36 operatively engages the internal threads 38 at the end portion of housing 12. The inner extremity of ring 34 is internally threaded at 40 to receive the threaded periphery of base plate 42 as shown in Figure 3. The outer portion of ring 34 is flanged inwardly at 44 to present a thin bearing guard for the shear as hereinafter set forth.

Base plate 42 is provided with arcuate holes 46 which communicate with a fan housing 48 secured by screws 50 to the underside of base plate 42 wherein is mounted rotor 52 having fan blades 54 and which is rigidly secured by set screw 56 to the motor shaft 58 which extends through an opening 59 formed axially through said rotor. Housing 48 has a peripheral opening 60 through which air and cuttings are delivered to the chamber 26, thence into the strainer 28.

Posts 62 anchored in base plate 42 are disposed in parallel relation to the axis of drive shaft 58 and extend outwardly beyond the bearing guard 44. Mounted on shaft 58 and having spaced apart holes 64 through which posts 62 pass is a ball cage 66 which equally spaces balls 68 which in turn rest on the outer face of base plate 42. The outer end of the drive shaft 58 is provided with diametrically opposed crank pins 70 and 72 which are disposed at like distances from the axis of the drive shaft 58. Pin 70 is shown as integral with shaft 58 and pin 72 is removably carried thereby by press fitting it on squared stem 71. A circular plate 74 axially mounted on the inner crank pin 70 is provided with enlarged openings 76 through which posts 62 extend for limited movement. Also, it has a series of arcuate holes 78 outside the area of holes 76.

A ring shaped cutting or shearing blade 80 is concentrically mounted on plate 74 and is rigidly secured thereto by screws 82, which pass through holes 83 in plate 74. This ring blade 80 has an internal annular cutting edge 84 and is of sufficient mass to present a rigid cutting member. Another ball cage 86 carrying balls 68 is identi-

cal in structure as ball cage 66 and the three equally spaced balls carried by this cage rest on top of plate 74. Axially mounted on crank pin 72 is a disc blade 88 having tapered peripheral edge portion 90 with a hollow ground upper surface whereby the cutting edge rests securely against the upper planar surface 92 of shearing ring 80 and the body thereof rests on the three point ball support.

This blade has relative large holes 91 to receive posts 62 therethrough for limited movement, and a center hole 93 to operatively receive eccentric pin 72. The upper end of posts 62 extend beyond the outer surface of disc blade 94 and into holes 96 formed in the center guard plate 98. Screws 100 threaded into posts 62 serve to adjust plate 98 downwardly against blade 94. A spring member 102 mounted between two friction discs 104 positioned in a recess 106 formed in the under side of plate 98 serve to constantly urge cutting disc 88 against shearing ring 80.

The minimum diameter of shearing edge 84 of ring 80, measured from the axis of shaft 58 on a line passing through the axes of said shearing members, is slightly greater than the corresponding maximum diameter of cutting disc 88 so that as the shearing members are circumferentially oscillated on the diametrically opposed center, there will be a constant separation of the cutting members on a line passing through the axes of the two cutting members. The cutting members 80 and 88 are secured for limited relative rotation by posts 62, however, the oscillating movement of these cutting members in diametrically opposite directions causes separation of the cutting edges of the shearing member at one side of the razor, and this separation advances about the circular path as the oscillation continues. The rotary speed of advance of the separation of the shearing members is regulated by the speed of the motor.

Referring to Figures 2 and 3 it will be noted that the shearing edge 84 and the cutting edge of disc 88 are spaced apart at the left side and overlapped at the right side. This relation of the cutting member changes constantly as the shaft 58 rotates, so that there is a continuous shearing at a constant radial circular distance from the axis of shaft 58. Considering that the motor 20 is driving the shearing members in the direction, as indicated by the arrow in Figure 2, the cutting point will be at 59.

Due to the fact that the cutting disc 88 is thin at its edge portion and the bearing guards 44 and 98 are disposed in spaced relation slightly above the shearing edges, the skin to be shaved is adapted to be bulged toward the cutting edges so that the hair will protrude between the blades adjacent the cutting point of the blades.

The degree of pressure of the razor against the surface being shaved will determine to some degree the closeness of the shave. The action of the shearing members at their shearing point will tend to cause a constant sharpening of the cutting edges.

The space between the shearing members is crescent shaped and is of such a width that the face portion being shaved may be properly positioned to present the whiskers to the shearing action without in any manner cutting the skin adjacent the whiskers. It is apparent that any part of the annular portion of the cutting surface between the guards may be pressed against the face for shaving and when it is so positioned a continuous succession of shearing

actions of the cutting members will be obtained to produce the proper shearing action. The constant action of the fan blades 54 in the housing 48 will cause a flow of air through the opening between the cutting members so that the clipped whiskers will be forced into strainer 28 and lodged therein as the air is passed therethrough.

The oscillatable cutting members are so balanced that the high speed will not cause any objectionable vibrating movement of the razor and the action will be smooth at all times.

What I claim as new and desire to be covered by Letters Patent is:

1. An electric razor comprising a housing; a motor driven shaft operatively carried in said housing; a crank shaft having two diametrically offset pins formed on the outer end thereof; a ring shearing member having an internal, circular cutting edge axially mounted on one of said crank pins; and a disc shearing member axially mounted on the other of said crank pins and in operative relation to said ring member whereby when said crank shaft is rotated said shearing members will be reciprocated to produce a continuous shearing action between the two shearing members.

2. An electric razor comprising a housing; a motor driven shaft rotatably mounted in said housing; a crank shaft having two diametrically offset crank pins formed on the outer end thereof; a ring shearing member having an internal, circular shearing edge and being concentrically mounted on one of said crank pins; and a disc shearing member centrally mounted on the other of said crank pins and disposed in shearing relation with ring shearing member whereby when said crank shaft is rotated said shearing members will be relatively moved to cause a continuous shearing action of said shearing edges.

3. An electric razor comprising a housing; a motor driven shaft rotatably mounted in said housing; a crank shaft having two diametrically offset crank pins formed on the outer end of said drive shaft; a ring shearing member having an internal, circular cutting edge and being concentrically mounted on one of said crank pins; a disc shearing member centrally mounted on the other of said crank pins and disposed in shearing relation with ring shearing members whereby when said crank shaft is rotated said shearing members will be relatively moved to cause a continuous shearing action of said shearing edges; and guard members carried by said housing and spaced apart to form a circular path including the circle of travel of the shearing line of said shearing members.

4. An electric razor comprising a housing; a motor driven shaft rotatably mounted in said housing; a crank shaft having two diametrically offset crank pins formed on the outer end thereof; a ring shearing member having an internal, circular shearing edge and being concentrically mounted on one of said crank pins; a disc shearing member centrally mounted on the other of said crank pins and disposed in shearing relation with ring shearing member whereby when said crank shaft is rotated said shearing members will be relatively moved to cause a continuous shearing action of said shearing edges; and resilient means positioned to constantly urge said shearing disc against the outer surface of said ring member.

5. An electric razor comprising a housing; a motor driven shaft operatively carried in said

housing; a crank shaft having two diametrically offset pins formed on the outer end thereof; a ring shearing member having an internal, circular cutting edge axially mounted on one of said crank pins; a disc shearing member axially mounted on the other of said crank pins and adapted to rest on more than one hundred and eighty degrees of the upper surface of said ring member and in shearing relation with the shearing edge thereof whereby when said crank shaft is rotated said shearing members will be reciprocated to produce a continual shearing action between the two shearing members at a circular rate of speed double that of the rate of rotation of said crank shaft.

6. An electric razor comprising a housing; a motor driven shaft operatively carried in said housing; a crank shaft having two diametrically offset pins formed on the outer end thereof; a ring shearing member having an internal, circular cutting edge axially mounted on one of said crank pins; a disc shearing member axially mounted on the other of said crank pins and adapted to rest on more than one hundred and eighty degrees of the upper surface of said ring member and in shearing relation with the shearing edge thereof whereby when said crank shaft is rotated said shearing members will be reciprocated to produce a continuous shearing action between the two shearing members at a circular rate of speed double that of the rate of rotation of said crank shaft; and stationary guards carried in spaced apart relation by said housing to present the full cutting path of said shearing members to a surface to be sheared.

7. An electric shaver comprising a housing, a motor driven shaft operatively carried in said housing, an eccentrically disposed crank pin carried at the outer end of said shaft, a ring shearing member having an internal circular cutting edge carried in said housing about said shaft, a disc cutting member mounted axially for rotation on said crank pin eccentrically and in operative relation to said ring member, and means for securing said disc cutting member against rotation relative to said housing, whereby when said shaft is rotated said disc shearing member will be moved orbitally to cause a continuous shearing action between said disc shearing member and said ring shearing member.

8. An electric razor comprising a housing, a motor driven shaft carried in said housing, two diametrically offset crank pins carried at the outer end of said shaft, a ring shearing member having an internal circular cutting edge carried rotatably on one of said crank pins, a disc shearing member rotatably mounted on the other of said crank pins in operative relationship to said ring member, and means for securing said shearing members against rotation relative to said housing, whereby when said shaft is rotated said shearing members will be moved orbitally to produce a continuous shearing action between the two shearing members.

WILLIAM C. RENNE.

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