July 4, 1939. G. R. EWALD. 2,164,581

THERMOELECTRIC ROTARY RAZOR

Filed Dec. 31, 1937

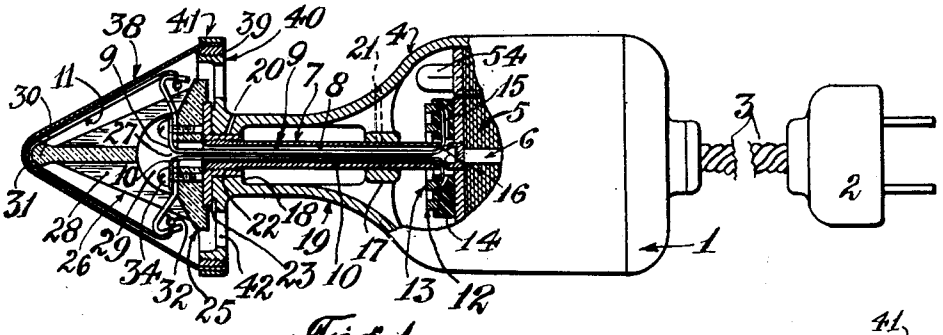


Fig. 1

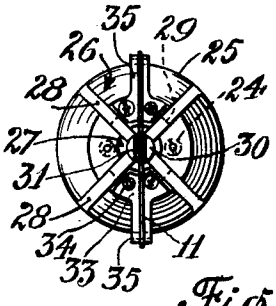


Fig. 3

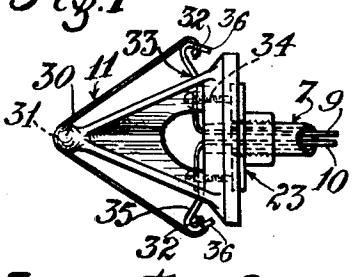


Fig. 2

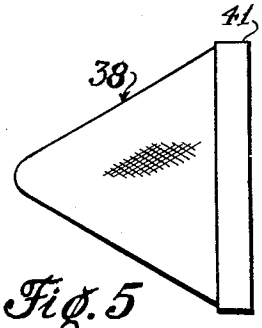


Fig. 5

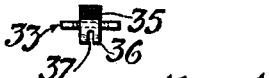


Fig. 4

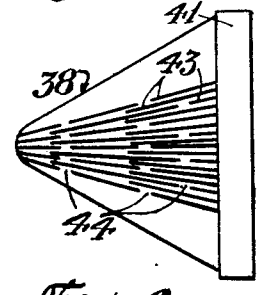


Fig. 6

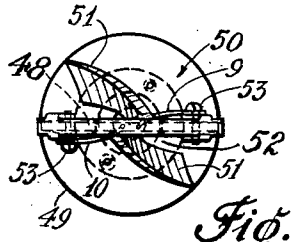


Fig. 8

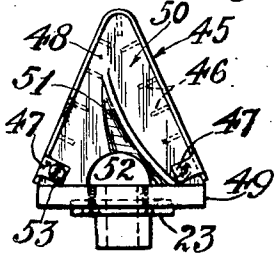


Fig. 7

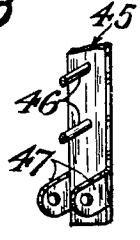


Fig. 9

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THERMOELECTRIC ROTARY RAZOR

George R. Ewald, Pittsburgh, Pa.

Application December 31, 1937, Serial No. 182,791

4 Claims. (Cl. 219—29)

This invention relates to razors, and more in particular to power actuated thermo-electric rotary razors.

One of the primary objects of this invention is to provide a razor in which the severing of human hair is performed by means of one or more electrically heated cutting elements, instead of using sharply ground cutting edges.

Another object of this invention is to provide such a razor having a guard to protect the skin of the user against burns and also having ventilating means whereby said skin may be cooled and the severed hairs blown away.

Yet another object of this invention is to provide a thermo-electric rotary razor in which the expansion of the heated cutting element is automatically taken care of, to thus hold said element always in taut operative condition.

Still a further object of this invention is the provision of a razor of this type in which the heated element may be replaced with speed and ease.

Additional features and advantages of this invention will appear in the following description considered in connection with the accompanying drawing forming part of this application.

In the drawing:

Fig. 1 is a side-view, partly in section, showing one embodiment of my invention.

Fig. 2 is a side elevation of the complete cutting unit used in Fig. 1.

Fig. 3 is a top plan view of Fig. 2.

Fig. 4 is an end elevation of one of the anchoring and stretching connectors used in the above embodiment.

Fig. 5 is a side elevation of a razor guard constructed mainly of suitably fine wire-meshing.

Fig. 6 is a similar view showing a guard made of thin sheet metal suitably slotted to serve the purpose.

Fig. 7 is a side elevation showing a modified construction for the complete cutting unit.

Fig. 8 is a top plan view of Fig. 7.

Fig. 9 is a fragmentary perspective view, on an enlarged scale, of the electrically heated cutting element used in Figs. 7 and 8.

Referring to the drawing, the power for actuating my thermo-electric rotary razor is derived from an electric motor 1, preferably of the universal type capable of operation on alternating or on direct current, and which may be connected to an electric circuit by means of a contact plug 2 and the flexible cable or cord 3. This motor is, of course, especially built for its purpose and its stator-frame 4 is preferably so dimensioned and shaped to serve as the handle of the shaving device.

The rotor 5 of this motor has a shaft 6, the forward portion 7 of which is enlarged and bored out, as at 8, to accommodate the insulated electric lead-wires 9 and 10 which conduct the current to the substantially V-shaped rotary cutting element 11 which is electricaly heated. Current for said element is also obtained from said electric cord and is transmitted to the rotating leads 9 and 10 by means of two concentrically disposed collector-rings 12 and 13 mounted on a disc 14 of insulating material secured in any desired manner on the rotor. The inner ends of the leads are each connected to one of said collector-rings, and suitable grooves 15 in the disc 14 and holes 16, in the shaft portion 7, are provided for the passage of said leads. Brushes (not shown) are, of course, used to supply the electric current to the revolving collector-rings.

Bearings 17 and 18 are provided in the forward tubular extension 19 of the frame 4 of the stator and oiling ducts 20 and 21 are also provided for said bearings.

The outer end of the shaft portion 7 is outwardly threaded, as at 22, and on it is securely screwed the flanged hub 23 on which is secured, by means of screws 24, the base 25 of the spider 26, made of insulating and fireproof material, such as porcelain, for instance. This base is centrally apertured, as at 27, for the passage of the lead-wires and carries one or more radial and substantially triangular wings 28 disposed at right angles to the base and centrally apertured along their junction with the base, as at 29.

At the apex of the wings there is a bulbous extension 30 provided with a guide-groove 31 which holds the middle of the cutting element or wire 11 in place. Both ends of said wire have enlargements, such as the beads 32, by means of which said ends may be removably attached to the anchors 33, secured on the base 25 by screws 34.

These anchors are made of resilient metal, such as bronze, and serve as connectors for the lead-wires 9 and 10, each secured by one of the screws 34. The outer arm 35 of each anchor is made narrow to increase its resiliency, is hooked rearwardly, as at 36, and has a narrow slot 37 just wide enough to receive the end of the thread-like cutting element 11, which end is held in position by the bead 32, pressed thereon. Because of the springiness of said arms, the cutting element is always held taut, regardless of its ex-

pansion due to heating or the action of the centrifugal force acting on said element.

By suitably dimensioning the cross section of said cutting element, it may be brought to the required temperature of incandescence to sever hairs rapidly, with a relatively small electric current.

To protect the face of the person using the device, as well as the cutting element thereof, the latter is enclosed in a close fitting guard **38**, of conical shape in the present embodiment, which guard may be made of fine wire mesh, as suggested in Fig. 5 in particular. The large end of the guard is reinforced with an inner ring **39** suitably threaded for screwing onto the outwardly threaded flange **40** formed on the outer end of the frame extension **19**, and with an outer ring **41** soldered or otherwise fastened over the guard. If desired, apertures **42** may be provided in this flange for greater ventilation and to facilitate the exit of the severed hairs which may have collected at the rear of the spider-base **25**.

Instead of using wire-mesh, the guard may be made of very thin sheet metal provided with suitably staggered narrow slots, indicated in Fig. 6 by the heavy lines **43**. As shown therein, these slots are spaced as closely as the varying diameter of the guard will permit and they are interrupted, as at **44**, to impart the required rigidity to said guard.

As will be readily understood, the above described construction of the device makes the replacement of burnt out cutting elements a very simple and rapid operation.

In the modified construction of the cutting unit shown in Figs. 7 to 9, the heating or cutting element **45** consists of a thin strip of non-corroding and heat resistant metal to which are secured, preferably by welding, anchor-pins **46** and, at both ends, the holding-lugs **47** by means of which the strip may be secured around the edges of the triangularly shaped wing **48** disposed normal to the base **49** of the spider **50**, also made of porcelain or other suitable heat resisting and electric insulating material. On both sides of this wing are provided integral fan-blades **51** suitably curved to force air forwardly to cool the part of the body where the shaving occurs.

The wing **48** as well as the fan-blades are centrally apertured adjacent the base, as shown at **52**, to facilitate the passage of the lead-wires **9** and **10** which are connected to the cutting-strip **45** by means of screws **53** which also serve as clamping means for the lugs **47** on the wing. The anchor-pins **46** are held solidly in the wing and serve the dual purpose of fastening the cutting-strip thereon against the action of the centrifugal force and also of subdividing the total expansion of the strip, due to its heating, into as many fractions as there are pins in the strip, thus reducing the bulge in the strip intermediate two anchoring pins to a practically negligible amount.

When a cutting element is used up, it will be found more advantageous and less troublesome to substitute therefor a new element together with its porcelain spider upon which it is solidly mounted.

From the above description, the operation of the device will be readily understood and may be described succinctly to be as follows: The plug **2** is inserted in an electric socket (not shown), thus enabling electric current to pass into the stator-winding **54**, the lead-wires **9** and **10**, and finally into the cutting element **11** or **45**, as the case may be, to heat same to incandescence. This element rotates, of course, with the rotor and when the guard is lightly pressed against the skin, the hairs will pass through the openings of the wire-mesh or the slots **43** of the sheet metal guard, coming thus within close reach of the cutting elements and being rapidly burnt off by them. The air currents produced by the rotating wings and fan-blades of the spider will force the severed hair particles out of the guard or through the apertures **42** in the flange **40**, while at the same time also cooling the skin where the shaving occurs, and the guard.

The angle of conicity of the guard determines the distance at which the handle, respectively the motor-frame, is to be held from the body of the user; this angle is so selected as to afford the greatest ease in shaving as well as to reduce dark shadows where shaving occurs. Places which are rather difficult to shave with the straight sides of the razor, may be easily reached with the apex thereof, as will be noted from the design shown in the drawing.

While, in the above described embodiments, but a single V-shaped cutting element has been used, two or more could easily be mounted on each cutting unit, connected either in series or parallel electric relation, if desired, in a manner that will readily be conceived by persons versed in the art.

As will be understood, as suggested herein, there may be changes made in the construction and arrangement of the details of this invention without departing from the field and scope of the same, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred forms only of my invention have been disclosed.

I claim:

1. In a thermo-electric rotary razor, an electric motor comprising a stator and a rotor; a partly hollow shaft for said rotor; a substantially V-shaped burning element; a supporting frame therefor made of heat resisting and dielectric material mounted on said shaft; an apertured conic guard surrounding said element; means to conduct electric current to said motor; lead-wires partly positioned in said hollow shaft to conduct electric current to said element and heat same, air circulating means formed integrally with said spider and adapted to force air toward the user, and means to absorb the expansion of the element due to heating.

2. In a thermo-electric rotary razor, an electric motor comprising a stator and a rotor; a shaft for said rotor; a substantially V-shaped burning element; a supporting spider therefor mounted on said shaft; a conic apertured guard surrounding said element; means to conduct simultaneously electric current to said motor and to said element to heat same; air circulating means formed integrally with said spider and adapted to force air through said guard, and means to resist the effect of the centrifugal force on said element.

3. In a thermo-electric rotary razor, an electric motor comprising a stator and a rotor; a shaft for said rotor; a substantially V-shaped burning element; a supporting spider therefor mounted on said shaft; a conic apertured guard surrounding said element; unitary means to supply simultaneously electric current to said motor and to said element to heat same; air circulating means formed integrally with said spider and adapted to force air through said guard, and unitary means to resist the effect of centrifugal force on said element and absorb the expansion thereof due to heating.

4. In a thermo-electric rotary razor, an electric motor comprising a stator and a rotor; a shaft therefor; a substantially V-shaped burning element; a supporting spider therefor mounted on said shaft; a conic apertured guard for said element; unitary means to supply simultaneously electric current to said motor and to the element to heat the latter; air circulating means positioned on said spider adapted to force air through said guard, and unitary resilient means to automatically absorb expansion of said element due to heating and resist the effect of centrifugal force thereon.

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