Oct. 19, 1943. O. THEWS 2,331,873

ELECTRIC RAZOR

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Fig. 1

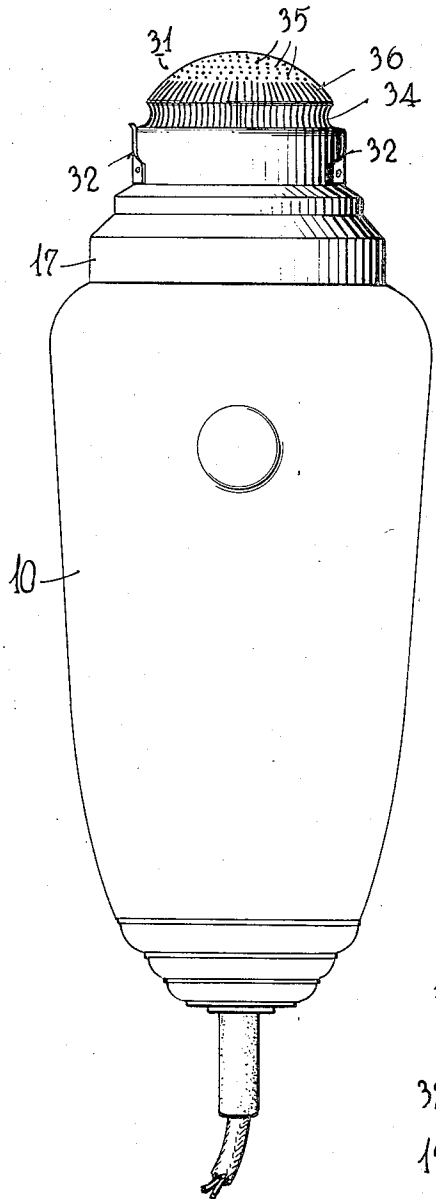


Fig. 3

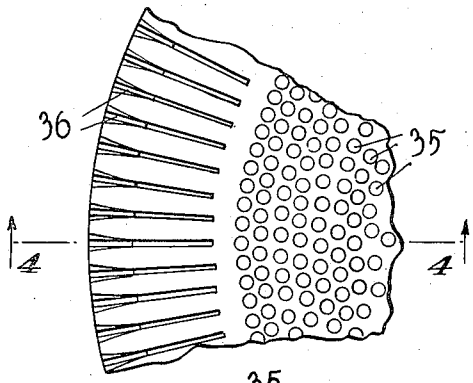


Fig. 4

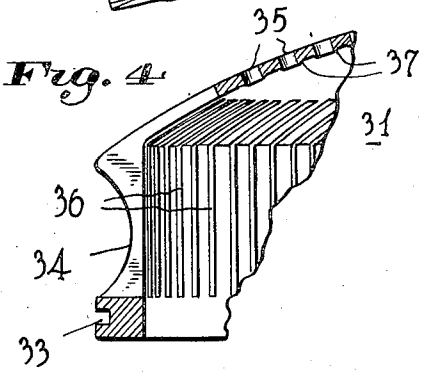
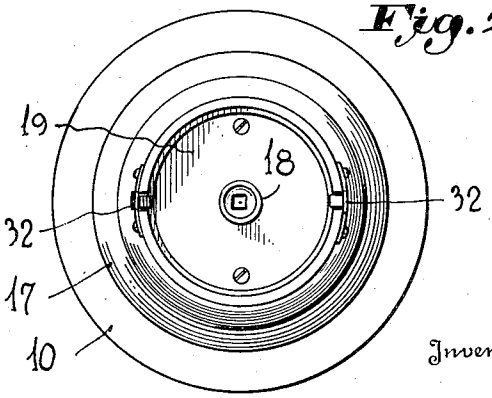


Fig. 2



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Fig. 5

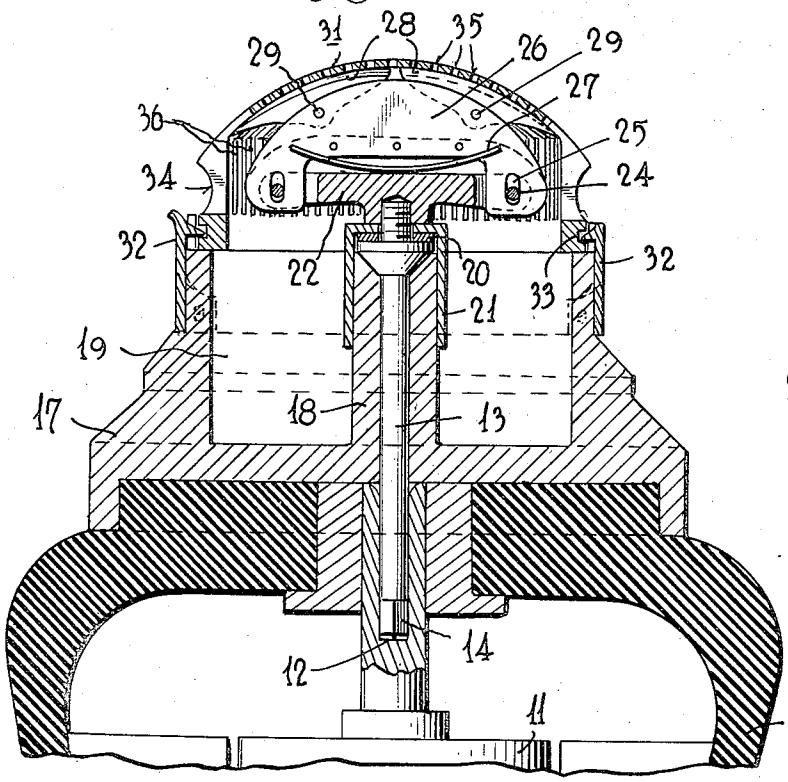


Fig. 6

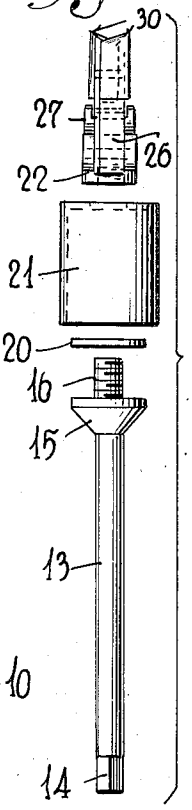


Fig. 7

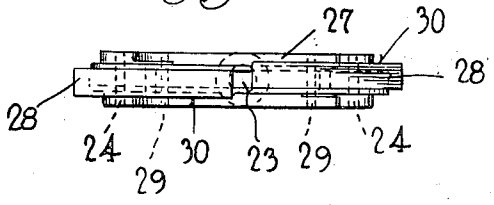
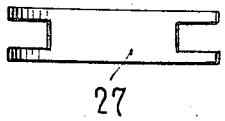


Fig. 8



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ELECTRIC RAZOR

Otto Thews, Weyauwega, Wis.

Application March 24, 1941, Serial No. 384,967

17 Claims. (Cl. 30—43)

This invention relates to electric razors, and more particularly to those in which the cutting operation is accomplished by a revolving knife edge operating in conjunction with a perforated plate.

In electric razors of this type there are numerous features which are objectionable to a greater or less degree depending on the quality of the materials and workmanship used in manufacture of the article. One of these is the fact that wearing of the knife edges causes a space to form between the under side of the perforated plate and the knife which prevents a clean-cut shearing action and causes "pulling." When this happens great discomfort is caused to the user of the razor and the device must be dismantled and the knives adjusted before it can be used effectively. Another disadvantage is that, when a flat or almost flat perforated plate is used, the device must be always held normal to the face in order that the hairs will penetrate the perforations. I am aware that various attempts have been made to avoid this objection by the use of plates of various shapes such as cylindrical, or dome-shaped, but quite often other objections are thereby raised, such as a lessening in the area which can be shaved at one time.

I am also cognizant of the fact that certain adjustable knives have been developed to prevent formation of a space between the knife and the plate but, so far as I am aware, no one has produced an electric razor which solves both of the above-mentioned and other problems in a compact, easily assembled, long lasting and efficient device similar to that embodied in my invention.

An object of my invention is to increase the efficiency of electric razors.

Another object is to facilitate the use of an electric razor by widening the range of angles at which it may be operated.

Another object is to enable such a razor to operate on hairs of varying lengths.

Another object is to increase the cutting effectiveness of such a razor.

Another object is to increase the length of time which such a device may be operated without changing or sharpening the knives.

Still another object is convenience in assembling and dismantling an electric razor.

These and other objects may be accomplished by my invention which embodies among its features a cutting plate having a central dome-shaped top portion which merges into a cylindrical side wall or skirt, the central portion of said plate being perforated, each perforation having a beveled cutting ridge around its edge on the under side of the plate, an annular groove around the outside of the cylindrical wall portion, radial slots in the outer part of the dome which extends over said groove, the slots extending through the said groove, and a cutter mechanism operating in the dome and cooperating therewith to cut hairs which enter either the perforations or slots, which latter function as a comb to guide the hairs as the plate is pressed into and moved across the face. Said cutter mechanism includes an electrically driven spindle operating in a conically-shaped bearing and carrying on its upper end a cross-head with a knife-carrying member attached thereto by pin-and-slot connections for limited upward movement, a knife pivoted on each side of the member, the upper edge of each knife curved to correspond to the under side of the dome and having a cutting flange in the direction of rotation, and a leaf spring between the crosshead and member operating to press the latter upward with the knives into cutting engagement with the dome.

Other objects and features will become evident from the following description taken in conjunction with the drawings, wherein like numerals refer to like parts throughout the several figures, and wherein:

Figure 1 is a side elevation of the complete device;

Fig. 2 is a top plan view with the cutting plate and cutter assembly removed;

Fig. 3 is an enlarged fragmentary top view of a portion of the cutting plate;

Fig. 4 is a section taken along line 4—4 of Fig. 3;

Fig. 5 is a cross-section taken along the vertical axis of the device;

Fig. 6 is an exploded view of the spindle and cutter assembly;

Fig. 7 is a plan view of the cutter assembly, and

Fig. 8 is a plan view of the revolving cross-head.

Referring to the drawings in detail, the preferred form of my invention described herein includes a casing 10 which is constructed to form a convenient handle for the razor and houses a conventional electric motor 11. The armature shaft of the motor has a socket as shown at 12 to receive a spindle or drive shaft 13 for the cutting mechanism.

Said drive shaft 13, shown in detail in Fig. 6, has a conventional non-circular portion 14 at its bottom end to provide a driving fit with the motor armature and its upper portion is formed with a conical-shaped bearing 15, above which extends

a threaded portion 16. A base member 17, preferably metallic, is shrunk onto the top of casing 10 and carries a journal 18 for said shaft with its upper end flared to fit the conical bearing 15. This conical bearing structure effectively eliminates vibration of the shaft due to wearing, etc. The base 17 is also formed with an annular reservoir 19 which accommodates severed hairs when the device is in use.

Fitted on the threaded portions 16 of the shaft are one or more washers 20 and a dust cap 21 for protection of the bearing, and a revolving cross-head 22 which carries the cutter structure. It will be noted that the position of the cross-head is adjustable by washers 20. Said cross-head is bifurcated at its ends as at 23 and carries therein, by means of pins 24 and elongated slots 25, a carrier member 26 for the cutters, held in its upper position by means of a leaf spring 27 which bears on the cross-head 22. The member 26 is shaped as shown, with a rounded top, and its upper portion consists of two spaced plates accommodating cutters 28 pivotally held therein by means of pivot pins 29.

These cutters are formed with rounded blades as shown and their upper or cutting edges are formed with protruding cutting flanges 30, as may be seen more clearly in Fig. 6. These face in the direction of rotation and are of overground or self-sharpening construction, thereby forming durable cutting means.

Positioned on the top of the base 17 and cooperating with the cutters 28 is a cutting plate 31, secured by means of catches 32 on the base which releasably engage an annular groove 33 around the lower edge of the plate. The central top portion of the plate 31 is dome-shaped, preferably with approximately a 40% slope, terminating in a cylindrical side wall having in its outside a peripheral crimp or groove 34 as shown. The central top portion of the plate 31 is perforated throughout as shown at 35, and its radially outer portion is slotted by radially disposed slots 36, which extend or continue down through the crimped portion 34. It should be noted that the upper crimp of the crimped portion, or annular groove, 34 forms a slotted lip around the dome-shaped portion of the cutting plate, which lip functions as a comb, guiding the longer hairs up under the dome-shaped portion of the cutting plate as the device is pressed into the skin and moved across it during the shaving operation. On the under side of plate 31 each of the holes 35 is preferably formed with a depending flange 37 to coact with cutter blades 30 and produce an efficient cutting operation.

It is to be noted that both the holes 35 and slots 36 are of such a size as to admit the hairs on the skin of the user and at the same time are not large enough to permit the hairs to bend and avoid the action of the cutters. It is also to be noted that the action of spring 27 causes the cutters 28 to be pressed up close against the plate due to the action of pivots 29. Thus any wearing of the cutters or plate is compensated and no cutting action is lost.

Further, the cutters 28 operate not only on the holes 35 but on the upper portion of slots 36, so that cutting may be obtained on hairs that enter through either. By this means I am able to shave relatively long hairs which can only be introduced through the slots. Also, since both the holes and the slots produce a shaving action, the device may be held at a variety of angles to the face and still be operative.

To clean the device, and empty the reservoir 19, the catches 32 are released and the dome-shaped plate removed. It is then a simple matter to remove the cutter carrier, shaft, or any of the operative parts.

Although a preferred embodiment of my invention is disclosed herein, I do not wish to be limited thereto but only by the scope of the appended claims.

What I claim is:

1. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head, a plurality of knives pivoted to the member, and means for forcing the knives into engagement with the plate.

2. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives carried by the member, and means for forcing the knives into engagement with the plate.

3. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives carried by the member, and means for causing separation of the member and cross-head to force the knives into engagement with the plate.

4. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives carried by the member, and a leaf spring to cause separation of the member and cross-head to force the knives into engagement with the plate.

5. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives pivoted on the member, and means for forcing the knives into engagement with the plate.

6. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives pivoted to the member, and means causing separation of the member and cross-head to force the knives into engagement with the plate.

7. In a device of the class described, a base, an apertured cutting plate positioned above said base, a rotary cutting element on said base positioned to coact with the plate, said element including a motor-driven revolving cross-head, a

knife-carrying member secured to the cross-head for limited movement along the axis of rotation, knives pivoted on the member, and a leaf spring to cause separation of the member and cross-head to force the knives into engagement with the plate.

8. In a device of the class described, a base, an apertured cutting plate on the base, a motor in the base, a shafting journal disposed within the base and having a conical bearing at its outer extremity, a motor-driven shaft rotatably positioned in said journal, said shaft having a conical bearing cooperating with the bearing of said journal and including a threaded portion extending beyond the bearing, an apertured dust cap positioned over said threaded portion and supported by the base of the conical shaft bearing, said cap including a skirt extending along the outer wall of said journal, and a blade-carrying cross-head threaded on the extending portion of the shaft into abutting relation with the dust cap.

9. In a device of the class described, a base, a cutting plate on said base, said cutting plate including a central dome-shaped apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the dome-shaped portion of the plate, radial slots in said plate extending from within the margin of the dome-shaped portion through the lip and substantially along the length of the skirt, and a motor-driven cutting means supported by the base, said cutting means having an arcuate cutting edge conformable with the under surface of the dome-shaped portion of the cutting plate and cooperating therewith.

10. In a device of the class described, a base, a cutting plate on said base, said cutting plate including a central dome-shaped apertured top portion and a skirt depending from the margin thereof, said skirt having a substantially cylindrical inner surface and an inwardly crimped outer surface to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the dome-shaped portion of the plate, radial slots in said plate extending from within the margin of the dome-shaped portion through the lip and substantially along the length of the skirt, and a motor-driven cutting means supported by the base, said cutting means having an arcuate cutting edge conformable with the under surface of the dome-shaped portion of the cutting plate and cooperating therewith.

11. As an article of manufacture, a cutting plate for a rotary electric dry shaving mechanism, said plate including a central dome-shaped apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the dome-shaped portion of the plate, and radial slots in said plate extending from within the margin of the dome-shaped portion through the lip and substantially along the length of the skirt.

12. As an article of manufacture, a cutting plate for a rotary electric dry shaving mechanism, said plate including a central dome-shaped apertured top portion and a skirt depending from the margin thereof, said skirt having a substantially cylindrical inner surface and an inwardly crimped outer surface to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the dome-shaped portion of the plate, and radial slots in said plate extending from within the margin of the dome-shaped portion through the lip and substantially along the length of the skirt.

13. In a device of the class described, a base, a cutting plate on said base, said cutting plate including a central dome-shaped apertured top portion and a skirit depending from the margin thereof, said skirt having a substantially cylindrical inner surface and an inwardly crimped outer surface to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the dome-shaped portion of the plate, radial slots in said plate extending from within the margin of the dome-shaped portion through the lip and substantially along the length of the skirt, and a motor-driven cutting means supported by the base, said cutting means having an arcuate cutting edge conformable with the under surface of the dome-shaped portion of the cutting plate and cooperating therewith, said cutting means extending radially outwardly beyond the slots in the dome-shaped portion of the cutting plate.

14. In a device of the class described, a base, a cutting plate on said base, said cutting plate including a central apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the top portion of the plate, radial slots in said plate extending from within the margin of the top portion through the lip and substantially along the length of the skirt, and a motor-driven cutting means supported by the base, said cutting means having an arcuate cutting edge conformable with the under surface of the top portion of the cutting plate and cooperating therewith.

15. As an article of manufacture, a cutting plate for a rotary electric dry shaving mechanism, said plate including a central apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the top portion of the plate, and radial slots in said plate extending from within the margin of the top portion through the lip and substantially along the length of the skirt.

16. In a device of the class described, a base, a cutting plate on said base, said cutting plate including a central apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the top portion of the plate, radial slots in said plate extending from within the margin of the top portion through the lip and substantially along the length of the skirt, a motor-driven cutting means supported by the base, said cutting means having an arcuate cutting edge conformable with the under surface of the top portion of the cutting plate and cooperating therewith, an annular groove extending around said skirt adjacent the free end thereof, and spring means secured to said base cooperable with said groove for retaining the cutting plate on the base.

17. As an article of manufacture, a cutting plate for a rotary electric dry shaving mechanism, said plate including a central apertured top portion and a skirt depending from the margin thereof, said skirt being crimped inwardly to provide a groove extending radially inwardly from the margin of the top portion and form a peripheral lip extending around the top portion of the plate; radial slots in said plate extending from within the margin of the top portion through the lip and substantially along the length of the skirt, and an annular groove extending around said skirt adjacent the free end thereof.

OTTO THEWS.