June 13, 1950 J. VAN H. WHIPPLE 2,511,188

ELECTRIC SHAVER WITH BLADE SHARPENER

Filed Oct. 25, 1947 4 Sheets-Sheet 1

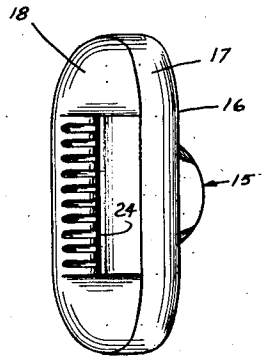


FIG. 3

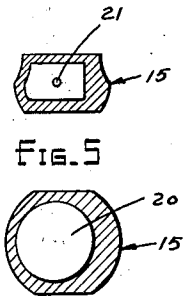


FIG. 5

FIG. 6

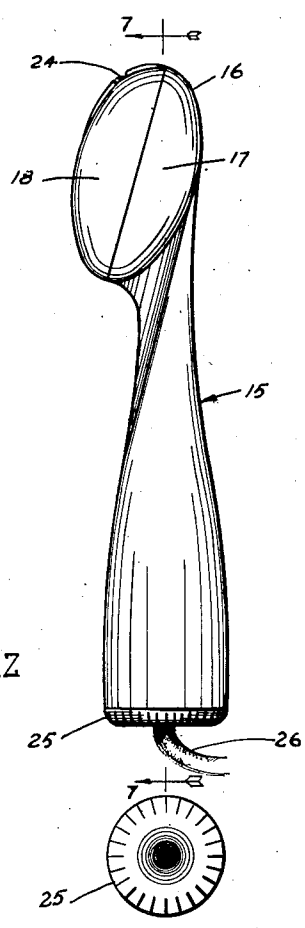


FIG. 2

FIG. 4

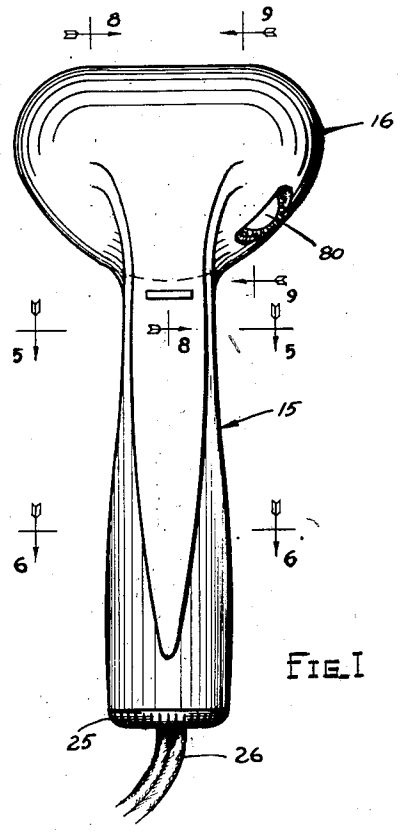


FIG. 1

INVENTOR
JACK VAN H. WHIPPLE
BY
Blair, Curtis & Hayward.
ATTORNEYS

June 13, 1950 J. VAN H. WHIPPLE 2,511,188

ELECTRIC SHAVER WITH BLADE SHARPENER

Filed Oct. 25, 1947 4 Sheets-Sheet 2

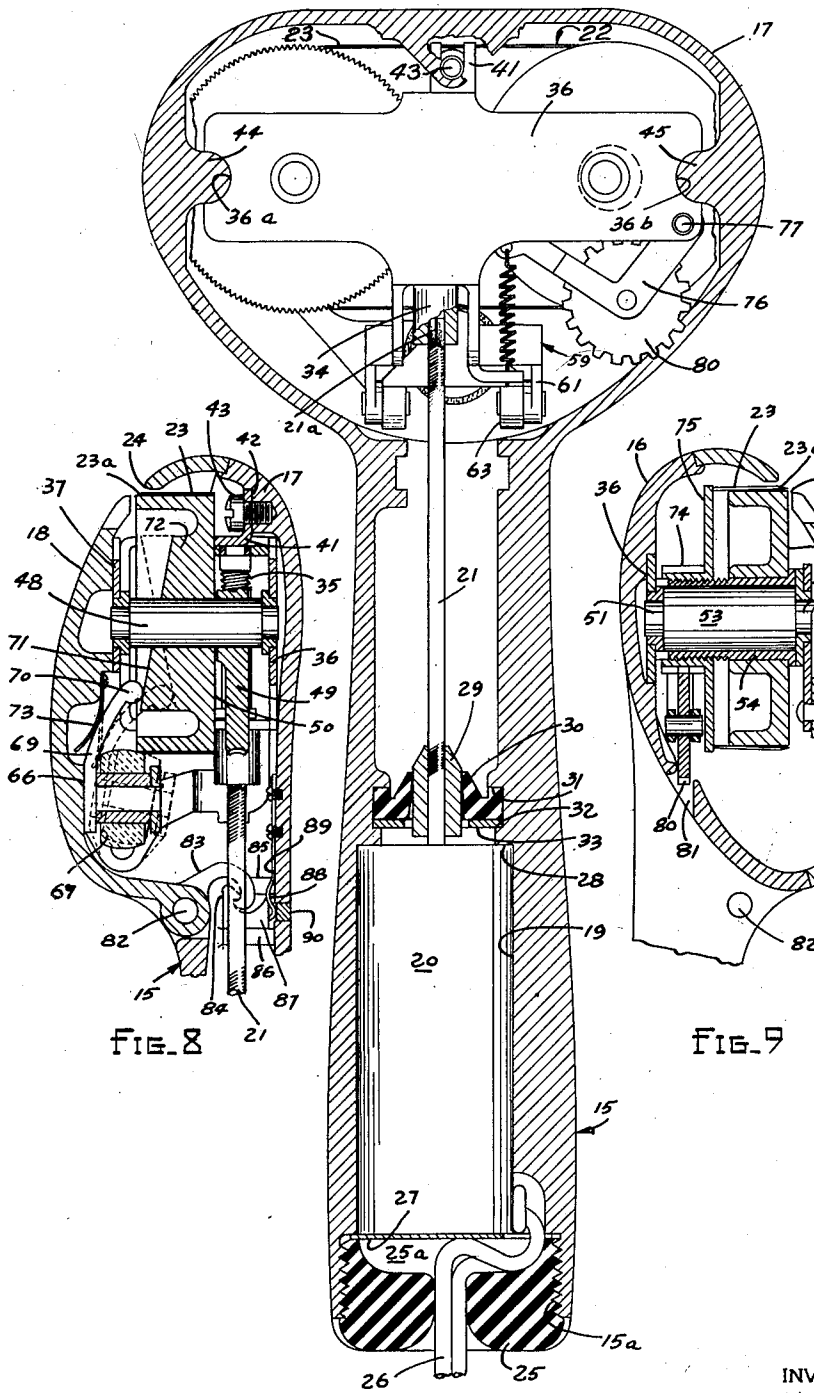


FIG. 7

FIG. 8

FIG. 9

INVENTOR
JACK VAN H. WHIPPLE
BY
Blair, Curtis & Hayward.
ATTORNEYS

June 13, 1950 J. VAN H. WHIPPLE 2,511,188

ELECTRIC SHAVER WITH BLADE SHARPENER

Filed Oct. 25, 1947 4 Sheets-Sheet 3

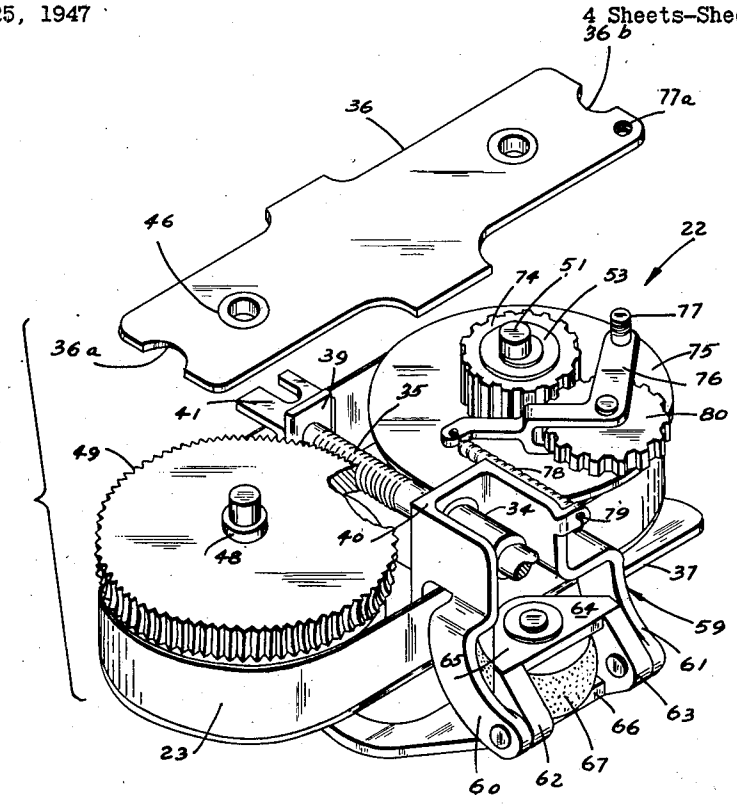


FIG. 10

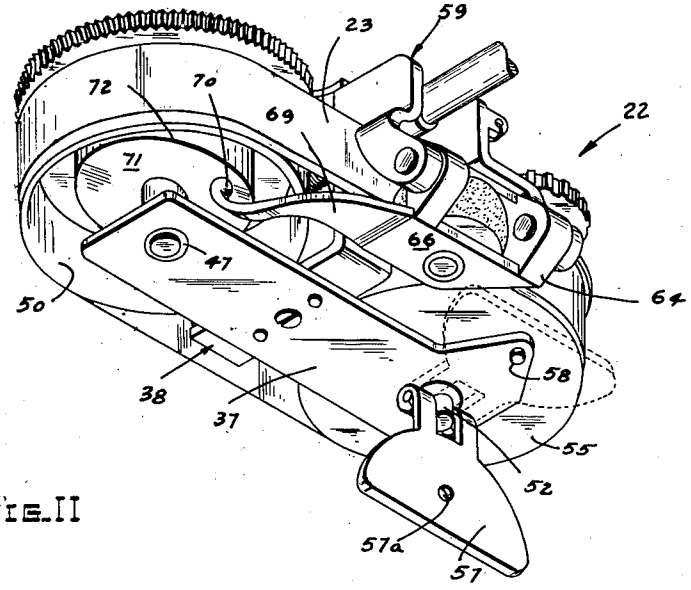


FIG. 11

INVENTOR
JACK VAN H. WHIPPLE
BY
Blair, Curtis & Hayward
ATTORNEYS

June 13, 1950 J. VAN H. WHIPPLE 2,511,188

ELECTRIC SHAVER WITH BLADE SHARPENER

Filed Oct. 25, 1947 4 Sheets-Sheet 4

FIG. 13

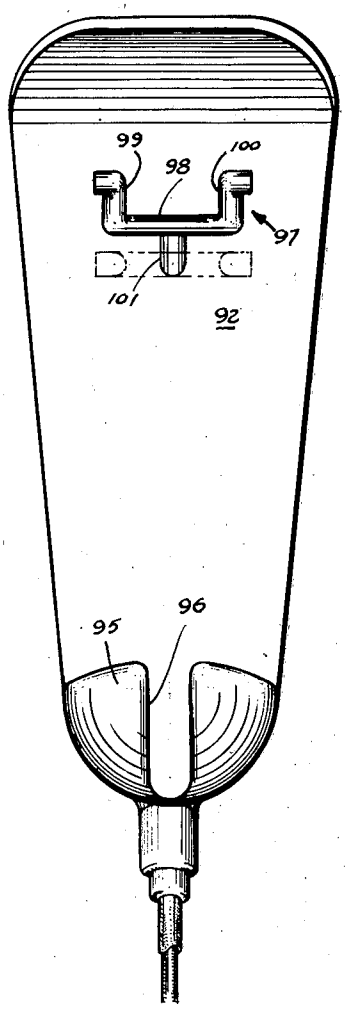
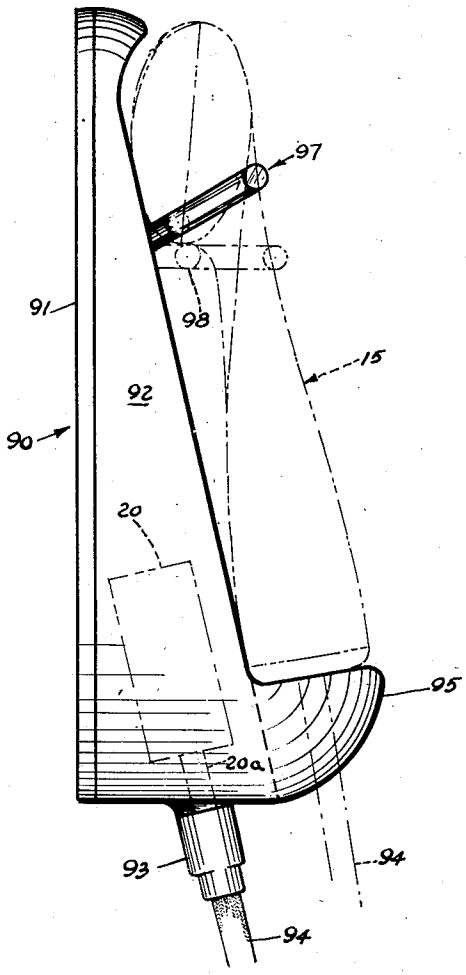


FIG. 12



INVENTOR
JACK VAN H. WHIPPLE
BY
Blair, Curtis & Hayward.
ATTORNEYS

Patented June 13, 1950 2,511,188

UNITED STATES PATENT OFFICE

2,511,188

ELECTRIC SHAVER WITH BLADE SHARPENER

Jack Van H. Whipple, New York, N. Y.

Application October 25, 1947, Serial No. 782,101

14 Claims. (Cl. 30—42)

1

This invention relates to a safety razor, and more particularly to a razor wherein the blade is driven by a motor.

While electric safety razors of the conventional vibrating type are being widely used, their structural characteristics give rise to certain inherent objectionable features which the user must countenance. In the first place, such electric shavers are incapable of giving other than a slow shave, i. e. it is necessary for the user to pass the razor over his beard repeatedly. In effect, he scrubs off his beard, or at least part of it. It is well known that these conventional electric shavers do not shave clean unless the user spends an entirely disproportionate amount of time removing his beard. The reason for this is, of course, that the cutting heads in such razors operate back of a guard, and the guard must, of course, have a certain finite thickness which naturally limits the proximity of the cutting head to the base of the individual whiskers.

It is, of course, often convenient to be able to shave without the use of hot water and soap, but the fact of the matter remains that a lathered beard is more readily removable than a dry one. Conventional electric shavers cannot be used with lather. Then too, these shavers have structural characteristics that necessarily render them heavy and clumsy, and their head constructions are such as make it difficult to shave certain portions of the face.

Probably the most objectionable feature of these shavers is their noisiness. While efforts have been made to reduce such noise, it can never be completely done away with as long as a vibrating cutter head is used. Another inherent disadvantage of the conventional electric shaver is its deterioration through use, i. e. its cutting edges become duller and duller as the razor is used, until finally it must be returned to the factory or service station for sharpening or for new cutting heads. In this connection, it should be noted that certain types of these shavers use as many as five cutting heads in an effort to provide a quicker and cleaner shave. This, of course, greatly complicates the razor structure and lends materially to its cost.

It is accordingly among the objects of this invention to provide a power-operated razor which obviates the aforementioned disadvantages in a thoroughly simple and efficient manner.

In accordance with one form of my invention, the razor comprises an elongated hollow handle with an enlarged hollow head on one end thereof, and in this head are rotatably mounted a pair of

2

drums or blade carrying members. An endless blade is carried by these drums, means being provided for adjusting the sharp edge of the blade relative to a slot in the head, so that the blade can be set at its most efficient operating position. In the handle of the razor is disposed a small electric, or, if desired, a spring driven motor, which is connected to the blade carrying drums by any suitable driving mechanism, so that when the motor is energized, the drums are rotated at a relatively high R. P. M., thus drawing the endless blade across the slot. It follows that when the blade is drawn downwardly against the whiskers, it moves transversely thereof, thus shearing them off close to the skin, very much in the manner of a straight razor wielded by a barber. Means are also provided for constantly sharpening the blade while it is driven, so that regardless of the extent of use of the blade, it is always sharp. Under certain circumstances, I have found it desirable to locate the driving motor remote from the razor, and under such circumstances, the motor is disposed in a housing that may be hung on the wall, for example, the motor being connected to the razor by an elongated flexible driving cable. Where the motor, however, is disposed in the razor handle, I provide a seal between the motor and the shaving head, so that the razor may be used with lather, without danger of water entering the motor compartment and damaging the motor.

In the drawing, wherein I have shown two forms of my razor,

Figure 1 is a rear view of the razor;

Figure 2 is a side view thereof;

Figure 3 is an end view showing the end of the cutting head;

Figure 4 is a view of the end of the razor handle;

Figure 5 is a section taken along line 5—5 of Figure 1;

Figure 6 is a section taken along the line 6—6 of Figure 1;

Figure 7 is an enlarged sectional view taken along the line 7—7 of Figure 2;

Figure 8 is a fragmentary sectional view taken along the line 8—8 of Figure 1;

Figure 9 is a fragmentary sectional view taken along the line 9—9 of Figure 1;

Figure 10 is an enlarged, exploded fragmentary sectional view of the blade driving mechanism in the razor head;

Figure 11 is a view somewhat similar to Figure 10, but showing the bottom of the blade and blade drum assembly;

Figure 12 is a side elevation of a modified form of the razor, wherein a wall fixture constitutes a support for the razor, with the driving motor therefor mounted in the wall fixture; and,

Figure 13 is a front elevation of the wall fixture.

Similar reference characters refer to similar parts throughout the views of the drawing.

Referring to Figure 1 of the drawing, the razor comprises a handle generally indicated at 15, on one end of which is an enlarged hollow head 16, comprising, as shown in Figure 2, an integral section 17 and a hinged section 18 which may be swung open to permit access to the interior of the head. As shown in Figure 7, handle 15 is provided with a motor compartment 19, within which is disposed a driving motor 20, as here shown, an electric motor, connected by a drive shaft 21 to a razor blade assembly, generally indicated at 22. This assembly is unitary, and includes an endless blade 23, the sharp edge 23a of which (Figure 8) runs along a slot 24 formed in hinged head section 18, this slot running transverse to the axis of handle 15.

Referring back to Figure 7, handle 15 may be formed of any suitable material, e. g. a plastic material, and has its bottom end threaded as at 15a to receive a threaded dielectric plug 25. This plug is hollowed out to provide a recess 25a for wires 26 and the edge of the plug bears against a supporting plate 27, which acts as a seat for motor 20. Thus, when plug 25 is screwed tightly into the socket, the motor is forced against an annular shoulder 28 within the handle 15, this shoulder defining the inner end of motor compartment 19. Drive shaft 21 is secured to the armature shaft of motor 20 in any suitable manner, and carries a sealing collar 29 adapted to rotate within a packing gland 30 disposed and held between shoulders 31 and 32 in handle 15 by an expandable locking ring 33.

The free end 21a of shaft 21 is squared and is detachably received in the end 34 of a worm 35 (see Figure 10) rotatably journaled in assembly 22 in a manner which will be described. Thus it may be seen that motor 20 (Figure 7) is removably disposed within razor handle 15, from which it may readily be withdrawn for replacement or repair, merely by unscrewing plug 25 and withdrawing motor 20 and its drive shaft 21 axially of the handle. It may also be seen that through the provision of packing gland 30 any moisture which may enter the upper end of handle 15 is trapped therein by the packing gland, and cannot leak through into the motor compartment where it otherwise might damage the motor. While motor 20, as shown, is an electric motor, it will, of course, be understood that a suitable spring driven motor may alternatively be provided if so desired.

Referring now to Figures 10 and 11, it may be seen that razor blade assembly 22 includes a chassis having side plates 36 (Figure 10) and 37 (Figure 11) to the former of which is securely fastened a generally U-shaped bracket generally indicated at 38. Plate 37 is removably but accurately mounted to the underside of bracket 38. Adjacent the ends of bracket legs 39 and 40 (Figure 10) are suitable bearings in which worm 35 is rotatably journaled. Secured to and extending outwardly from bracket leg 39 is a bifurcated lug 41 (see also Figure 8) which is adapted to seat on a shoulder 42 in head section 17, where it is detachably secured by a screw 43 extending through the lug into the head section.

Plate 36 (Figure 10) has its ends recessed or notched as at 36a and 36b, and these notches receive respectively bosses 44 and 45 (Figure 7) which are integral with head section 17 to locate plate 36 and accordingly the entire assembly 22 within the razor head section, wherein it is secured by screw 43, as mentioned above. Thus it may be seen that blade assembly 22 is readily installable or removable from the razor head section as a unit, and accordingly is easily accessible for replacement or repair. Such installation or removal of assembly 22 may be effected by reason of the fact that the coupling between shaft 21 and worm portion 34 is separable by virtue of the squared end 21a of the drive shaft which is slidably received in worm portion 34.

Plates 36 and 37 (Figures 10 and 11) carry bearings 46 and 47, respectively, in which are journaled the ends of a shaft 48 ((see also Figure 8). To this shaft is secured a worm wheel 49 which meshes with worm 35. A blade carrying member or drum 50 is mounted on and rotates with the shaft when the worm wheel is driven by worm 35.

The opposite ends of plates 36 and 37 (Figure 9) pivotally support respectively a pair of trunnions 51 and 52 formed on the end of a shaft 53, to which is fixedly secured a bushing 54. As shown in Figure 10, trunnions 51 and 52 are eccentric to shaft 53 for a purpose that will be described. Referring back to Figure 9, a second blade carrying member or drum 55 is rotatably mounted on bushing 54 and, together with drum 50 (Figure 11), constitute rotatable supports for the endless blade 23.

A key 57 is pivotally connected to the outer end of eccentric trunnion 52, and may be swung from its dotted to its full line position for operation. With the key swung to its full line position, it may readily be grasped and turned so as to rotate shaft 53 (Figure 9). When the shaft is so rotated, it moves bodily toward shaft 48 (Figure 8) thus lessening the distance between the two blade supporting drums 50 and 55 to permit removal or installation of a blade 23, as the case may be. Of course, when key 57 is turned in the opposite direction (to the position shown in Figure 9) drum 55 is moved away from drum 50 so that blade 23 is tightened about the peripheries of the two drums. With the key in its Figure 9 position, a hole 57a (Figure 11) therein may register with a pin 58 on plate 37 so that the key may fold flat against the plate, thus assuring that drum 55 is held in its fully spaced position relative to the other blade carrying drum.

Blade 23 would, of course, rapidly deteriorate and become dull upon continued use of the razor, and to preclude the necessity of frequently replacing the blade with a new one, or removing it for sharpening, I have provided automatic sharpening means, as shown in Figures 10 and 11. Thus bracket leg 40 (Figure 10) includes an outwardly projecting yoke, generally indicated at 59, having arms 60 and 61, to which are respectively pivotally connected arms 62 and 63 of another yoke 64. Yoke 64 includes top and bottom plates 65 and 66, between which is rotatably mounted a blade sharpening member 67 preferably having, as is better shown in Figure 8, a spherical abrading surface. Bottom plate 66 (Figure 11) has secured thereto or integral therewith an extending arm 69 on the end of which is a follower 70. This follower 70 is adapted to engage the surface 71 of a cam 72 which, as shown in Figure 8, may comprise an integral portion of blade

carrying drum 50. Thus, as drum 50 rotates, cam surface 71 rocks arm 69 between its full and dotted line positions shown in Figure 8 to rock blade sharpener 67 between its full and dotted lines. This causes different portions of the surface of sharpener 67 to pass over the sharp edge of blade 23, as the blade passes rapidly thereby, thus reducing localized wear of the sharpener's surface. This, of course, restores the edge of the blade, thus assuring its continued sharpness regardless of its period of use. In order to maintain arm 69, or rather its follower 70 in engagement with surface 71 of cam 72, a leaf spring 73 is carried by head section 18 and bears against arm 69, thus holding follower 70 against cam surface 71.

The surfaces of blade carrying drums 50 and 55 are quite smooth and hard. By reason of the tight engagement of the blade with the drum surfaces, a rolled feather edge on the back side of the blade is prevented. In other words, the heavy pressure of the blade against the smooth, hard drum surfaces, and the rolling effect of the drums on the blade edge, result in bending back or breaking off any microscopic edge particles which may have been forced out of the plane of the cutting edge in a direction opposite to that of the sharpener.

Blade sharpener 67 is mounted between top and bottom plates 65 and 66 in such a manner as to have a slight cant along the axis of blade 23. Thus, while the blade sharpener 67 rotates upon contact with the moving blade 23, a very slight sliding component is introduced, which is sufficient to maintain a sharp edge on the blade 23 without causing undue wear to it.

In view of the fact that the sharpening action of sharpener 67 will in time wear away the blade edge, means are provided for adjusting the sharp edge of the blade relative to slot 24. Thus, as shown in Figure 9, the left-hand end of bushing 54 is threaded to threadably receive the toothed hub 74 of an adjusting plate or disc 75 adapted to underlie blade carrying drum 55 and support the dull edge of blade 23. As is better shown in Figure 10, an angular yoke 76 is pivotally mounted on a headed pin 77 which is threadably received in a threaded hole 77*a* in plate 36 (Figure 7). This yoke is biased counterclockwise, as viewed in Figure 10, by a spring 78, having one end fastened to the end of the yoke, and the other end fastened to a lug 79 which may form an integral portion of yoke 59. Yoke 76 rotatably carries a gear 80 having teeth of the same pitch as those on hub 74, so that when in mesh therewith, hub 74, as well as disc 75, may be rotated when gear 80 is rotated. When adjusting disc 75 (Figure 9) is so rotated, in a direction to move the disc toward drum 55, it forces blade 23 toward opening 24, and accordingly makes it possible to adjust the sharp edge of the blade relative to the opening. In order to maintain blade 23 in engagement with disc 75, drum 55 is slightly conical, with its inner edge of less diameter than its outer edge. Thus drum 55 tends to feed the blade inwardly of slot 24, and accordingly maintains its dull edge in engagement with adjusting disc 75.

As shown in Figure 9, head section 16 is slotted as at 81, and the edge of gear 80 projects through this slot (see Figure 1) where it is readily accessible to the user of the razor. Thus it may be seen that it is a very simple matter for the user to engage gear 80 with his finger and force it inwardly against the bias of spring 78 (Figure 10) until it meshes with the teeth on hub 74, whereupon he may rotate the gear and accordingly adjust the blade as hereinbefore described.

In order to provide ready access to the interior of the razor head, head section 18 is pivotally connected to the root of razor handle 15 by a pin 82. Adjacent pin 82, head section 18 includes an inwardly directed hook 83, the free end of which is adapted to engage under a latch 84 whose body portion is slidably mounted between guides 85 and 86 fastened to razor head section 17. Body portion 87 of latch 84 is slotted as at 88 to receive the free end of a spring 89 which is preloaded to bias latch 84 to the right, as viewed in Figure 8, thus to maintain it in latching engagement with the end of hook 83. A fingerpiece 90 is connected to the latch body and extends through the wall of head section 17 where it is accessible for depression by the user when he desires to unlatch hook 83. When the hook is unlatched, it is, of course, easy to swing head section 18 counterclockwise about its pivot, thus exposing the interior of the head section and rendering readily accessible the blade assembly disposed therein.

It may now be seen that many of the objectionable features inherent in conventional motor driven razors are obviated by my razor as hereinabove described. The action of the endless blade closely simulates that of a barber's straight razor, in that it shears off the whiskers close to the skin, and accordingly is capable of providing a fast, close shave. It will further be seen that my razor may be used with lather as readily as dry, in view of the fact that the motor is sealed from the head, and the mechanism in the head is readily accessible for cleaning or drying. In view of the fact that the operating mechanism in my razor is simple in construction, it is not bulky nor heavy, and accordingly the size of my razor is considerably less than the conventional motor driven shaver. Of perhaps paramount importance is the fact that the blade in my razor does not become dull, but remains sharp throughout its use, and needs only to be replaced when it has been sharpened down to unusable width. By virtue of the fact that all of the blade driving parts rotate, rather than oscillate, the razor is vibrationless in use, and accordingly does not create any objectionable noise.

Referring now to Figures 12 and 13, wherein I have shown a modified form of my razor, the razor shown in dot and dash lines is supported by a wall fixture, generally indicated at 90. This fixture may be permanently or detachably secured to a wall and, of course, includes an electrical connection (not shown) for motor 20. Fixture 90 includes a back plate 91, from which extends a housing 92, within which motor 20 is mounted. The motor shaft 20*a* is connectable by means of a separable coupling 93 to a flexible driving shaft 94, the other end of which is connected to the razor drive shaft in any suitable manner. In this case, drive shaft 21 is coextensive with razor handle 15, and may be detachably connectable to flexible shaft 94 (Figure 12) or integral therewith as desired.

Projecting outwardly from the bottom of housing 92 is a support 95, slotted as at 96 (Figure 12) on which the end of razor handle 15 may be supported, slot 96 accommodating flexible drive shaft 94. A yoke, generally indicated at 97, comprises a cross-piece 98, from which extend legs 99 and 100, the cross-piece having extending therefrom a post 101, which may be piv-

otally secured to housing 92 in any suitable manner. Thus when it is desired to mount the razor on fixture 98 (Figure 12), the root of razor handle 15 is disposed within yoke legs 99 and 100 so that the razor head rests therebetween. The weight of the razor on the yoke swings the yoke from its solid to its dotted line position in Figure 12, so that the bottom end of the razor handle rests on support 95, the bottom portion of the razor head resting on yoke cross-piece 98.

Preferably, yoke 97 is under the constant bias of any suitable spring (not shown) which biases the yoke toward its solid line position in Figure 12. If desired, this movement of the yoke may control switch (not shown) so that when the razor is removed from the yoke, movement of the yoke from its dotted to its solid line position closes the switch and thus energizes motor 20. Replacement of the razor on the yoke, causing the yoke to swing to its dotted line position, would, of course, operate the switch to break the motor circuit.

Accordingly, it may be seen that I have provided a motor driven razor which attains the aforementioned objects in a thoroughly simple and practical manner.

As many possible embodiments may be made of the above invention, and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim

1. A safety razor comprising, in combination, an elongated hollow handle, a hollow head on one end of said handle, said head having a slot formed therein transverse to the axis of said handle, a pair of blade carrying members rotatably mounted in said head, an endless blade mounted on said carrying members and having its sharp edge arranged to run along said slot when said members are rotated, a driving motor, and driving means including a drive shaft in said handle connected to said motor and to one of said members and forming a driving connection therebetween, whereby said members are rotated to drive said blade when said motor operates.

2. A safety razor comprising, in combination, an elongated hollow handle, a hollow head on one end of said handle, said head having a slot formed therein transverse to the axis of said handle, an electric motor mounted in said handle, a pair of blade carrying members rotatably mounted in said head, an endless blade mounted on said carrying members and having its sharp edge arranged to run along said slot when said members are rotated, and driving means including a drive shaft in said handle connected to said motor and to one of said members and forming a driving connection therebetween, whereby said members are rotated to drive said blade when said motor operates.

3. A razor in accordance with claim 2, wherein a water-proof seal is disposed in said handle about said shaft and between the motor and the razor head to preclude passage of moisture through said handle to said motor.

4. A razor in accordance with claim 1, wherein the driving means includes a worm and worm wheel, said worm being connected to said drive shaft, and said worm wheel being connected to one of said blade carrying members.

5. A safety razor comprising, in combination, an elongated hollow handle, a hollow head on one end of said handle, said head having a slot formed therein transverse to the axis of said handle, a pair of blade carrying members rotatably mounted in said head, an endless blade mounted on said carrying members and having its sharp edge arranged to run along said slot when said members are rotated, a driving motor, driving means including a drive shaft in said handle connected to said motor and to one of said members and forming a driving connection therebetween, whereby said members are rotated to drive said blade when said motor operates, and a blade setting member adjustably mounted in said head in a position to engage the dull edge of the blade, whereby upon adjustment said blade may be moved relative to said slot to set the sharp edge of the blade relative thereto.

6. A razor in accordance with claim 5, wherein a blade setting member comprises a disc which is mounted coaxially with one of said blade carrying members, and is axially movable relative thereto, and manually operable means accessible exteriorly of said razor head for moving said blade setting member against the dull edge of said blade, thereby to adjust the sharp edge of said blade relative to said slot.

7. A razor in accordance with claim 1, wherein one of said blade carrying members is slightly conical in shape with its greater diameter adjacent said slot, and its lesser diameter remote therefrom, whereby one member tends to feed said blade away from said slot inwardly of said head, and a blade setting member adjustably mounted in said head in a position to engage the dull edge of the blade and resist its inward movement, whereby upon adjustment said blade may be moved relative to said slot to feed the sharp edge of the blade relative thereto.

8. A safety razor comprising, in combination, an elongated hollow handle, a hollow head on one end of said handle, said head having a slot formed therein transverse to the axis of said handle, a pair of blade carrying members rotatably mounted in said head, an endless blade mounted on said carrying members and having its sharp edge arranged to run along said slot when said members are rotated, a driving motor, driving means including a drive shaft in said handle connected to said motor and to one of said members and forming a driving connection therebetween, whereby said members are rotated to drive said blade when said motor operates, a blade sharpening member pivotally mounted in said head in a position to engage the sharp edge of said blade, and means connected to said blade sharpening member and operatively associated with one of said blade carrying members for pivoting said sharpening member relative to the shape edge of said blade to engage said blade and said blade sharpening member, thereby to sharpen said blade.

9. A razor in accordance with claim 8, wherein said blade sharpening member comprises a rotatable wheel having a spherical treating surface, different portions of which are engaged by the sharp edge of said blade as the sharpening member pivots.

10. A razor in accordance with claim 8, wherein the means for pivoting the sharpening member includes an arm connected to said sharpening member and engaging a cam on said blade carrying member, and spring means for holding said arm in engagement with said cam, whereby as said cam rotates with said blade carrying member it

rocks said arm back and forth, thereby pivoting said blade sharpening member.

11. A razor in accordance with claim 1, wherein one of said blade carrying members is rotatably mounted on a shaft, and said shaft having eccentric trunnions at its ends carried by bearings in said head, and manually operable means connected to said shaft for rotating the shaft, thereby to move said one blade carrying member toward the other of said blade carrying members thereby to effect removal or installation of said blade about said members.

12. A safety razor comprising, in combination, a handle, a hollow head on one end of said handle, said head having a slot formed therein transverse to the axis of said handle, a pair of spaced supporting plates, a pair of blade carrying members rotatably supported between said plates, an endless blade mounted on said carrying members and having its sharp edge arranged to run through said slot when said members are rotated, a pair of locating bosses integral with said head and extending inwardly thereof, one of said supporting plates having a pair of recesses adapted respectively to receive said bosses to locate said plates and said members in said head, means for detachably securing said plates and said members as an assembly in said head, and means for driving said blade carrying members.

13. In a safety razor having a slotted head within which a blade is mounted on supporting and actuating mechanism, that improvement which includes the provision of a blade sharpening member movably mounted in said head in a position to engage the sharp edge of said blade, and means connected to said blade sharpening member and operatively associated with said mechanism for moving said sharpening member relative to the sharp edge of said blade to effect engagement between said blade and said blade sharpening member thereby to sharpen said blade.

14. In a safety razor having a slotted head within which a blade is mounted on supporting and actuating mechanism, that improvement which includes the provision of a blade sharpening member movably mounted in said head in a position to engage the sharp edge of said blade, and means connected to said blade sharpening member and adapted upon actuation to move said sharpening member relative to the sharp edge of said blade to effect engagement between said blade and said blade sharpening member thereby to sharpen said blade.

JACK VAN H. WHIPPLE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
703,784	Grosheim	July 1, 1902
1,360,778	Neel	Nov. 30, 1920
1,759,981	Elzinga	May 27, 1930
1,788,614	Blackmore	Jan. 13, 1931
1,950,097	Brunner	Mar. 6, 1934
2,196,786	Wahl	Apr. 9, 1940

FOREIGN PATENTS

Number	Country	Date
527,341	France	July 22, 1921