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ELECTRIC SAFETY RAZOR WITH RECIPROCATING BLADE

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2 Sheets-Sheet 2

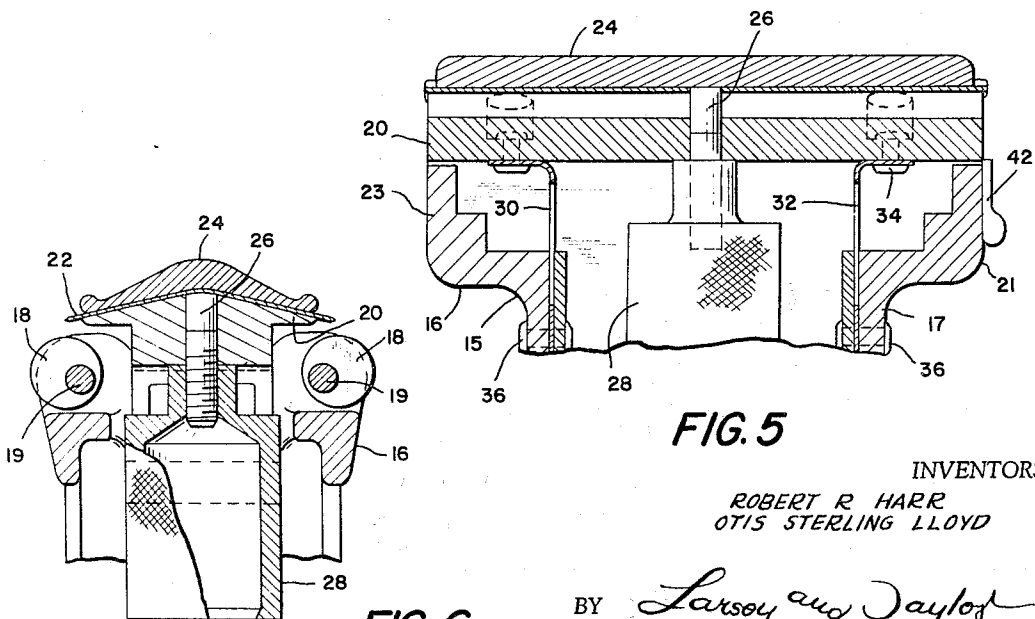
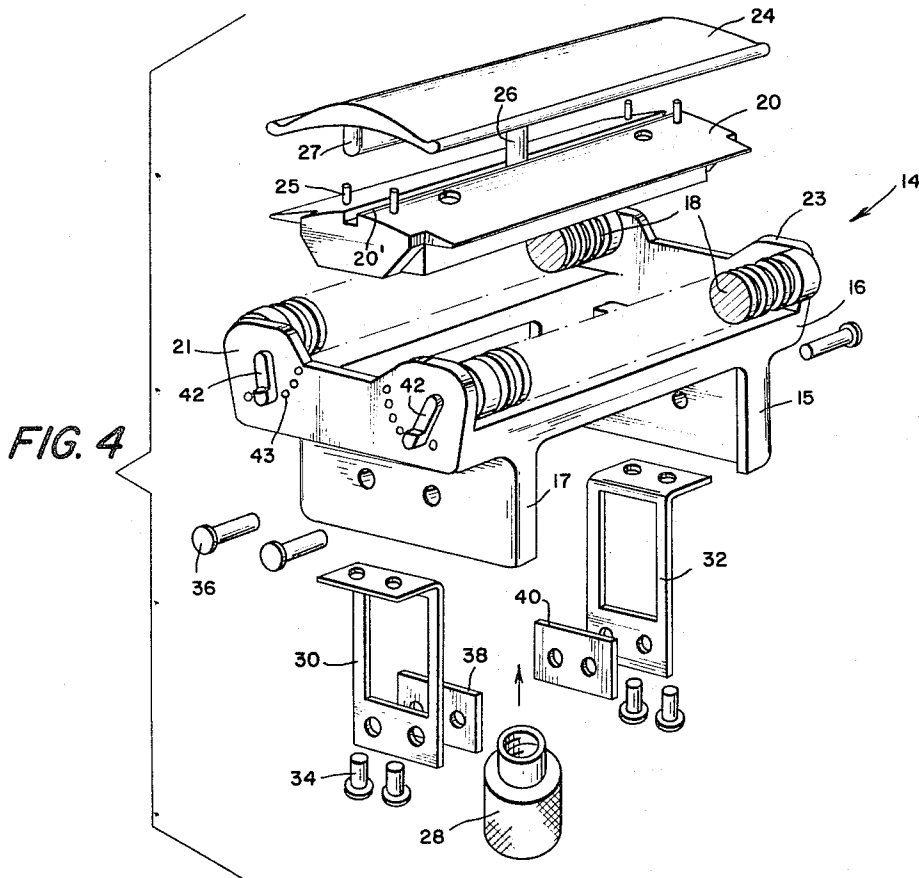


FIG. 5

FIG. 6

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## ELECTRIC SAFETY RAZOR WITH RECIPROCATING BLADE

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The present invention relates to an electric razor having a reciprocating razor blade, and more particularly, to a razor having an adjustable guard means which cooperates with the reciprocating blade to insure a better shave.

Razors of this general type are disclosed in Patent No. 2,530,759, issued Nov. 21, 1950, and embody power-driven means for imparting a reciprocatory end to end movement to a cutting blade. Razors of this type have been provided with stationary guard members which have not been capable of making the necessary adjustment to enable the razor to be sufficiently versatile and flexible to allow for individual differences in beard structure.

Furthermore, in razors of this type, it is imperative that only endwise reciprocatory movement be transmitted to the razor blade, since any side-to-side reciprocatory motion, even though slight, could conceivably cause the razor to cut the skin of the user.

To overcome the deficiencies of the prior art, the present invention provides a razor having guard rollers rotatably mounted in a fixed member, so that the guard rollers are held stationary in various discrete positions relative to the cutting edge of the blade. The guard rollers are provided with eccentrically mounted shafts and handles formed with said shafts to permit rotation of the guard rollers to allow either a greater or lesser exposure of cutting blade. The guard rollers are further provided with closely spaced parallel grooves, which circumscribe the guard rollers and provide a stationary surface for cooperation with the reciprocating blade. The rollers perform a combing function and enable the user to obtain a closer shave.

Furthermore, the blade carrying member is provided with four upwardly projecting prongs which are so positioned as to prevent side-to-side and end-to-end blade motion relative to a reciprocatory blade carrying member.

It is, therefore, a prime object of my invention to provide incrementally adjustable guard rollers for an electric razor which will enable the user to get a rapid, close, and satisfactory shave.

It is a further object of my invention to provide a blade carrying member with means to prevent side-to-side blade motion and allow only reciprocatory end-to-end motion parallel to the blade edge.

A still further object of my invention is to provide incrementally adjustable guard rollers for an electric razor which rollers have closely spaced parallel grooves. The grooves perform combing and aligning functions which prepare the beard to be closely cut by the reciprocating razor blade.

Other objects and novel features of the invention will appear more fully hereinafter from the following detailed description of the invention when taken in connection with the accompanying drawings wherein:

FIGURE 1 is a perspective view of the electric razor constructed in accordance with the principles of the present invention;

FIGURE 2 is a fragmentary side elevational view of the top structure of the razor;

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FIGURE 3 is a partial end view showing the guard rollers adjustment means of the invention;

FIGURE 4 is an exploded perspective view of the head structure of the razor;

FIGURE 5 is a section view taken along line 5—5 of FIGURE 3; and

FIGURE 6 is a section view taken through line 6—6 of FIGURE 2.

Referring now to FIGURES 1—4 of the drawings wherein similar reference characters refer to similar parts throughout the several views, an electric shaver indicated generally by 10, comprises a casing 12 formed as a handle, which casing houses a portion of the electric drive and is provided with a removable head 14. The head 14 frictionally grips the casing 12 and is readily removable as a unit and has no other mechanical connection with the housing.

The head 14 comprises a support member 16 which is of unitary construction and has downwardly extending flange elements 15 and 17 (FIGURE 2) which are utilized to provide the frictional gripping means for the removable head 14 within the casing 10. Member 16 is further provided with upwardly extending shoulder elements 21 and 23 which provide support means for a pair of guard rollers 18. The guard rollers 18 have shafts 19 outwardly extending from both ends thereof, said shafts being integral with the guard rollers and being eccentrically mounted with respect to the centers thereof as clearly seen in FIGURE 6. Openings 21' are provided in the shoulders 21 and 23 of support member 16, which openings are adapted to receive the shafts 19, so that the rollers 18 are then rotatably mounted in support member 16 with the center of rotation offset with respect to the centers of the guard rollers. Handles 42 are attached to the shafts 19 extending through shoulder 21. The handles 42 have projection 42' which cooperate with spaced non-flat surface deformations such as indentations 43 on the shoulder 21 to provide for various discrete incremental positions of the rollers 18.

Upon rotation of handles 42 (FIGURE 3) into different incremental positions, the guard rollers 18 receive a resultant movement which is either downward and outward or downward and inward motion relative to the edge of the razor blade, due to the eccentric mounting of the shafts 19 relative to the centers of the guard rollers 18. The effect of the movement of the guard rollers 18 is that there can be a greater or lesser degree of razor blade 22 exposed according to the position in which the guard rollers are set (see FIGURE 3). When the guard rollers are in their outermost position there is very slight exposure of razor blade 22 and therefore the outermost position would be used when less blade exposure is desired. Accordingly the inward position of guard rollers 18 leave a wider gap between the roller surface and the razor blade whereby a greater degree of blade exposure occurs. The various incremental positions of the handles 42 are determined by the indentations 43 and movement of the handles 42 results in movement of the guard rollers 18 due to shafts 19 being formed with the guard rollers 18 and operatively attached to the handles 42.

The rollers 18 are provided with closely spaced circumferential grooves 18' so that when the roller is pressed against the skin the slight rises due to the grooves better prepare the face for shaving, thus performing a combing function and enabling the user to obtain a closer shave.

A blade carrier 20, a blade 22, and a cap 24 are resiliently mounted by means of double arm leaf springs

30 and 32 for reciprocatory end-to-end movement in a direction parallel to the edge of the razor blade as clearly seen in both FIGURES 4 and 5. The top ends of the springs 30 and 32 are connected to the blade carrier 20 by means of rivets 34, while the lower ends of the springs are secured to support member 16. The lower ends of the springs are retained between the flange elements 15 and 17 of support member 16, and blocks 38 and 40 by means of rivets 36. The spring elements 30 and 32 are preferably made of tough resilient metal, so that while endwise reciprocatory motion is enabled by the springs they also cooperate to substantially prevent any side-to-side motion.

The blade carrying member 20 is positioned above support member 16 but does not rest thereon. Member 20 is mounted for reciprocatory end-to-end movement free from frictional interference with member 16 solely by means of springs 30 and 32 which extend above shoulders 21 and 23 of support member 16. Member 20 has four upwardly extending prongs 25 thereon. The prongs 25 are so positioned on member 20 that when blade 22 is set on said member, side-to-side and end-to-end movement of the blade 22 with respect to member 20 will be substantially prevented.

Cap 24 has a threaded shaft member 26 extending downwardly therefrom and a downwardly extending flange 27 both of which are utilized to align the cap in the correct relationship with respect to the blade 22 and the blade carrier 20. The flange 27 extends downwardly through blade 22 and rests in a slot 20' provided in blade carrier 20 for alignment purposes. The threaded shaft 26 extends downwardly through the blade and blade carrier and is secured to a threaded ferrule 28. The threaded ferrule is positioned between but is free from engagement with the flanges 15 and 17 and the shoulders 21 and 23 of support member 16. The ferrule 28, upon tightening, is adapted, to hold the cap 24 against the blade 22 and the blade carrier 20 with the desired pressure so that the cap, blade, and blade carrier all reciprocate as a unit. The exterior of the ferrule 28 is made of non-magnetic material which surrounds a permanent magnet positioned inside the ferrule. The magnet within the ferrule cooperates with electrically operated means in the casing 12 to impart the reciprocating motion to the ferrule which causes the cap, blade, and blade carrier to reciprocate therewith, due to the mechanical connection between the ferrule 28 and the cap 24. The support member 16 remains stationary during operation of the electric razor and therefore the cap, blade, blade carrier, ferrule, and springs receive endwise reciprocatory movement with respect to guard rollers 18 which are mounted in shoulders 21 and 23 of stationary member 16. The specific means utilized to impart the end-to-end reciprocatory motion is more fully set forth in Patent No. 2,530,759, referred to hereinbefore.

In operation, the razor blade receives end-to-end-reciprocation with respect to the guard rollers. Therefore, upon drawing the electric razor across a surface to be cut, the blade is utilized more effectively both in a reciprocating shearing operation and in the conventional manner. Side-to-side motion of the blade with respect to the blade carrier is prevented by providing pronged holding members on the blade carrier so positioned that substantially no relative motion between the blade and the blade carrier can occur. The tough leaf springs allow the blade carrier, and the parts connected therewith to reciprocate endwise but substantially prevent any side-to-side motion. Handles 42 may be turned to rotate the eccentrically mounted guard rollers so that the degree of exposure of the razor blade may be varied. The provision of eccentrically mounted guard rollers enables the electric razor to be sufficiently adjustable to be of use to all regardless of the structure of the skin and hair. The guard rollers are provided with grooves which act as

comb members and serve the function of both aligning and combing the hair to provide for a closer shave.

From the foregoing, it will be readily apparent that a highly efficient and much more satisfactory shave can be obtained by utilizing the adjustable means which have been provided by the present invention.

While one embodiment of the invention has been shown and described, it will be understood by those skilled in the art, that many modifications may be made without departing from the spirit of the invention. It is to be expressly understood, however, that the drawings are utilized for purposes of illustration only, and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

We claim:

1. An electric razor comprising a main body portion, a top structure comprising a support member having an upwardly extending shoulder at each end and downwardly extending flanges, said flanges engaging said body portion for non-moveably holding the top portion thereon, a blade carrier mounted on said support member connected thereto by at least one leaf spring which allows the said blade carrier to reciprocate in the longitudinal direction with an end to end motion relative to said support member, a cap mounted above and non-moveably connected to said blade carrier, at least one guard roller eccentrically mounted about a shaft for rotational movement, said shaft being rotatably mounted in said support member between the said shoulders at a position below and proximate to that at which an edge of a blade would be positioned in the razor, at least one end of said shaft protruding through an opening in one of said shoulders, a handle attached to the protruding end of said guard roller, said one shoulder having formed on the exterior thereof a plurality of non-flat surface deformations, said handle having a means being selectively engageable with each of said surface deformations for locking the guard roller against rotative movement at a plurality of separate rotative positions of said guard roller.

2. An electric razor comprising a main body portion, a top structure comprising a support member having an upwardly extending shoulder at each end and downwardly extending flanges, said flanges engaging said body portion for non-moveably holding the top portion thereon, a blade carrier mounted on said support member connected thereto by at least one leaf spring which allows the said blade carrier to reciprocate in the longitudinal direction with an end to end motion relative to said support member, a cap mounted above and non-moveably connected to said blade carrier, said blade carrier having formed thereon a plurality of upwardly projecting prongs for preventing substantially all relative movement between a blade mounted on said blade carrier and said blade carrier, and means for preventing relative movement between said cap and said blade carrier in a direction transverse to said longitudinal direction, last said means including a longitudinally extending flange on said cap member engageable in a groove in said carrier groove.

3. An electric razor as claimed in claim 2 including at least one guard roller eccentrically mounted about a shaft for rotational movement, said shaft being rotatably mounted in said support member between the said shoulders at a position below and proximate to that at which an edge of a blade would be positioned in the razor, at least one end of said shaft protruding through an opening in one of said shoulders, a handle attached to the protruding end of said guard roller, said one shoulder having formed on the exterior thereof a plurality of non-flat surface deformations, said handle having a means being selectively engageable with each of said surface deformations for locking the guard roller against rotative movement at a plurality of separate rotative positions of said guard roller.

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4. An electric razor comprising a main body portion, a top structure comprising a support member having an upwardly extending shoulder at each end and downwardly extending flanges, said flanges engaging said body portion for non-moveably holding the top portion thereon, a bladed carrier mounted on said support member connected thereto by at least one leaf spring which allows the said blade carrier to reciprocate in the longitudinal direction with an end to end motion relative to said support member, a cap mounted above and non-moveably connected to said blade carrier, at least one guard roller eccentrically mounted about a shaft for rotational movement, said shaft being rotatably mounted in said support member between the said shoulders at a position below and proximate to that at which an edge of a blade would be positioned in the razor, means for locking said roller against rotative movement in a plurality of separate rotative positions and wherein said roller has a plurality of closely spaced parallel grooves which circumscribe at least a portion of the circumference thereof.

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