Feb. 9, 1971 B. PALM 3,561,115

ELECTRIC HAIR CLIPPER

Filed March 29, 1968 2 Sheets-Sheet 1

Fig. 1.

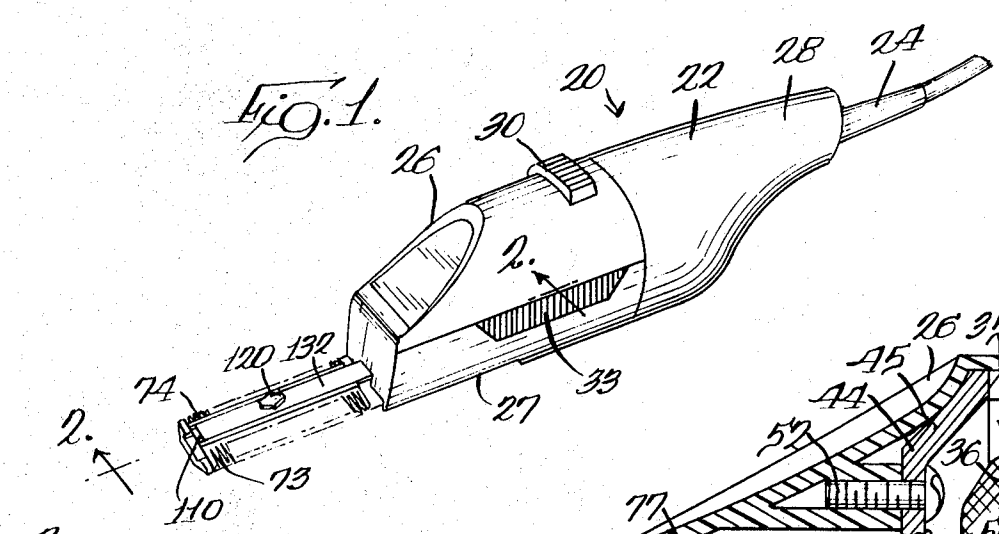


Fig. 2.

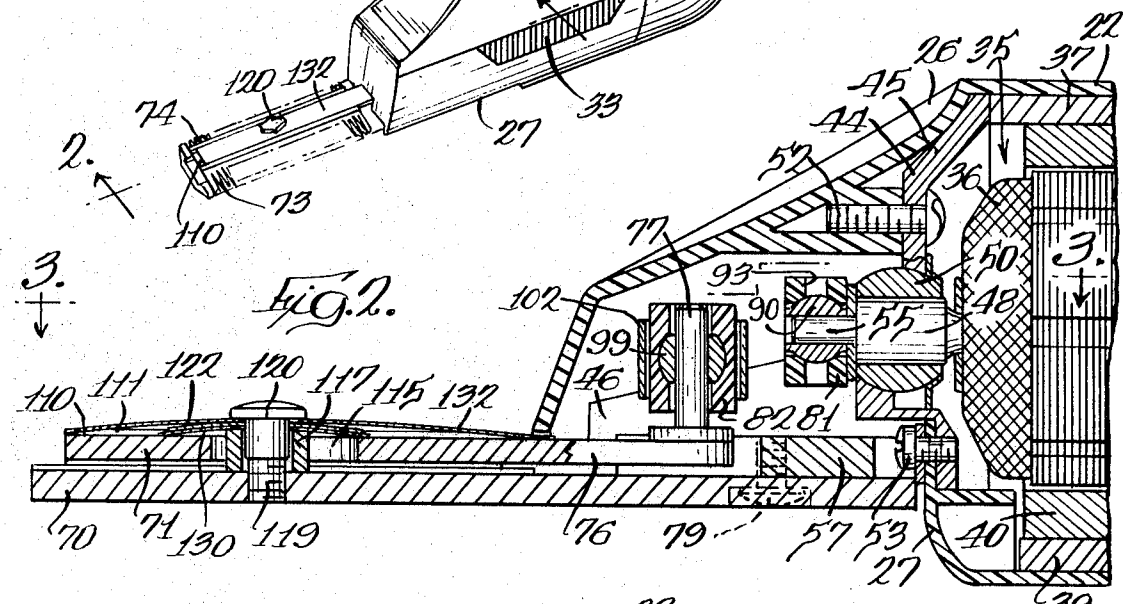
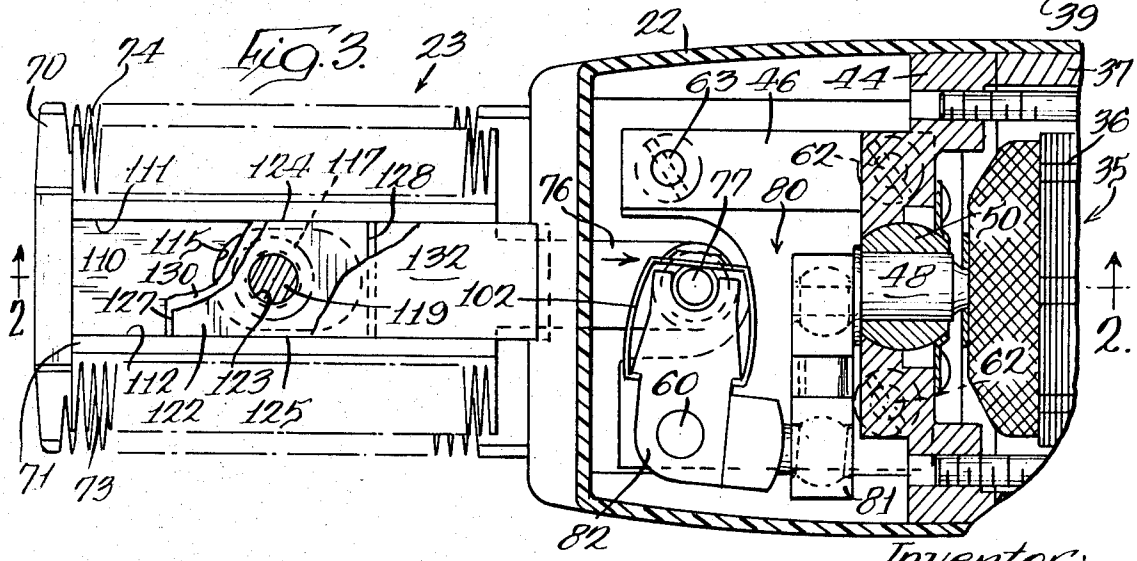


Fig. 3.



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Fig. 4.

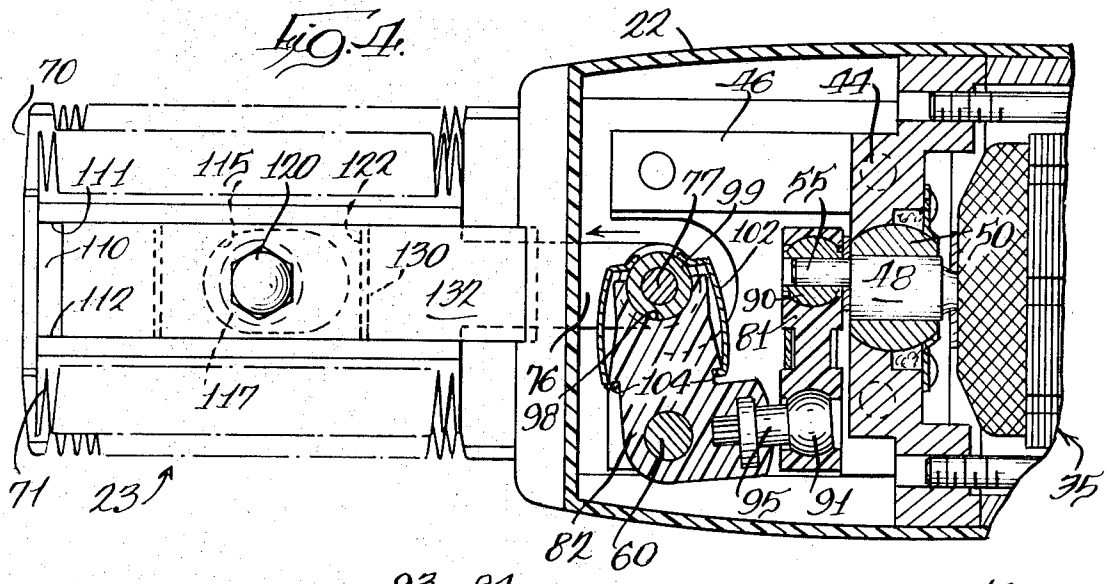


Fig. 5.

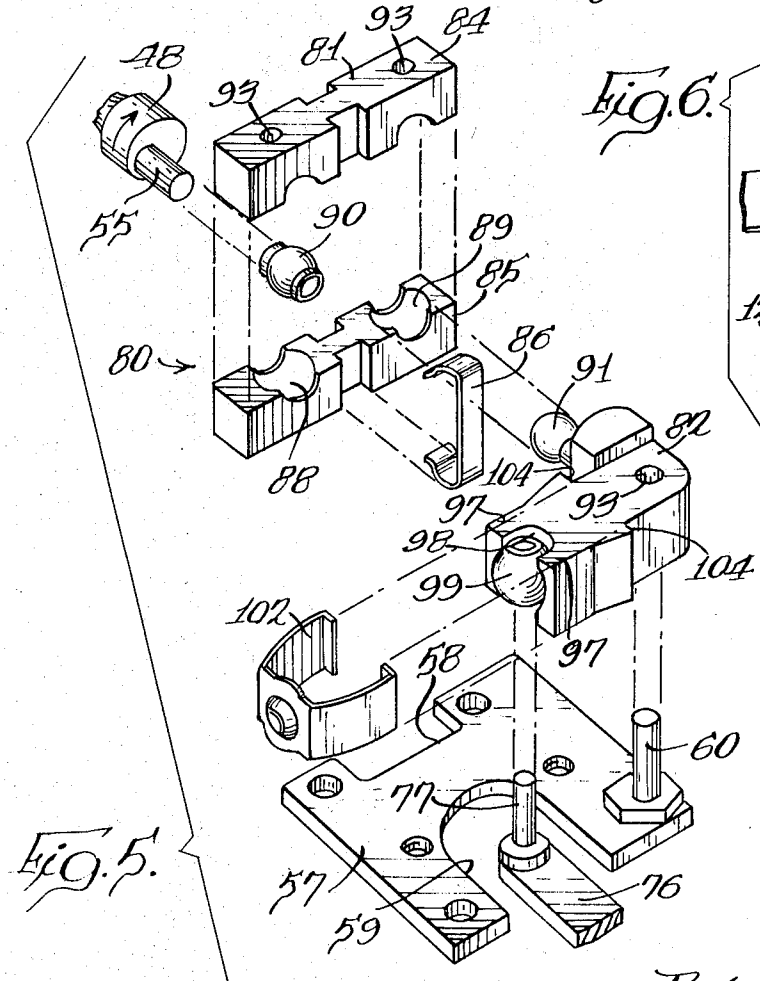
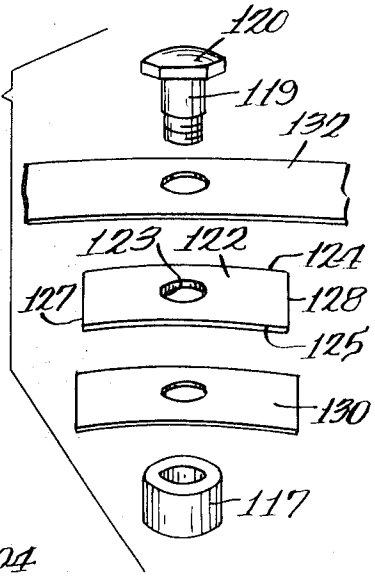


Fig. 6.



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3,561,115

ELECTRIC HAIR CLIPPER

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Filed Mar. 29, 1968, Ser. No. 717,347
Int. Cl. B26b 19/02
U.S. Cl. 30—218 22 Claims

ABSTRACT OF THE DISCLOSURE

Hair cutting device having the cutter assembly extending forwardly from the housing and the cutter assembly including two spaced rows of cutting teeth parallel to the housing. A linkage arrangement transmits the rotary power from a permanent magnet motor to reciprocate the cutter assembly comprising a reciprocal cutter and a stationary comb. The cutter is biased against the stationary comb by means of a leaf spring which is clamped in a manner to maintain a uniform tension therebetween.

BACKGROUND OF THE INVENTION

The present invention relates to electrically operated hair cutting devices and, more particularly, to hair clippers primarily adapted for use by professional barbers wherein the cutter assembly has two spaced parallel cutting edges which extend outwardly from the clipper housing.

In giving a professional haircut, the barber normally begins by using an electric hair clipper having an easily detachable cutter assembly at the forward end of its generally cylindrical housing, and the cutter assembly is traditionally angled forwardly and upwardly with the row of cutting teeth extending transversely to the axis of the housing. Inasmuch as it is necessary to cut the hair at varying lengths, the barber frequently changes the cutter assembly since the shape of the clipper comb influences the length of the remaining hair. Due to the overall configuration of the standard hair clipper, the barber is generally using an up and down stroke which requires his whole arm to move up and down with each stroke. After using the hair clipper, the barber does the final cutting with hand operated scissors in combination with a comb. It would be desirable to have a hair clipper which is used with a pivotal motion requiring only the turning of the barber's wrist. Fatigue of the barber would be further reduced if the center of gravity of the hair clipper is positioned at approximately the center of the pivotal movement which should coincide with the point at which the barber grasps the clipper housing. Furthermore, it would be most helpful if the same clipper could be used effectively in place of the scissors to relieve the barber of this fatiguing and slow operation. A monetary saving would be realized as well as time saved if the clipper does not need different cutter assemblies in order to cut hair at different lengths.

Nearly all electrical barber equipment is provided with an on-off switch so that the barber does not have to unplug the cord whenever he wishes to stop the device. Since the present invention hair clipper can be used with one hand while the other hand is using a comb or performing some other function, it is advantageous to have the electrical switch operated by the hand holding the clipper and without requiring the barber to change his grip on the clipper housing. Additionally, the actuation of the switch should not tend to move the cutting device forwardly or rearwardly.

By virtue of the nature of a hair clipper, it must be operated close to the customer's head and, at times, adjacent to his ears. Therefore, the hair clipper should be quiet in operation in order not to be annoying to the customer. Since gears are generally noisy, it would be advantageous if the linkage between the motor and the cutter assembly were to utilize no gearing and were very quiet in use.

The most important test for a good hair clipper is for hair to be cut cleanly without any pulling thereon. To accomplish this, it is necessary for the clipper comb and cutter to be biased together in order to maintain the correct cutting or shearing relationship therebetween. Consequently, it is mandatory that a simple means be employed for insuring that the cutter is uniformly and accurately biased against the comb.

SUMMARY OF THE INVENTION

The present invention relates to an electrically operated hair clipper having an elongated housing enclosing an electric motor which includes an armature or rotor disposed for rotation about a given axis and a stator encircling the rotor. Extending forwardly from the housing is a cutter assembly having a stationary comb secured to the housing and a reciprocable cutter, both of which have complementary cutting edges parallel to the armature axis. Connecting the armature with the cutter is a power transmitting linkage arrangement. The cutter assembly lies in a plane parallel to the armature axis and between the armature axis and the outermost portion of the stator.

The motor stator is made with a permanent magnet and is relatively heavy. Since the stator is disposed at the middle of the housing, the center of gravity of the clipper is also approximately at the same point. In use, the housing is held at its middle, and normally, the housing is pivoted during the cutting strokes. To facilitate the ease of controlling the motor, an on-off switch is located on the housing adjacent to the stator so that the barber can govern the operation of the motor with the same hand that is holding the device and without releasing or changing his grip thereon.

To provide the proper tension between the cutter assembly cutter and comb, a downwardly bowed leaf spring is rigidly clamped between a spacer disposed in an opening defined by the cutter and a fastening member anchored to the comb. The spring is clamped at its midpoint and the ends thereof bias the cutter against the comb. Due to the manner in which the spring is clamped, the spring ends can act independently of each other.

Accordingly, it is an object of the present invention to provide a hair clipper which is easily used with a pivotal motion and which is balanced to facilitate the pivotal movement.

Another object of the present invention is to provide an electrically operated hair clipper which is quiet in operation.

Still another object of the present invention is to provide an electrically operated hair clipper having means to maintain the proper cutting tension between the comb and cutter.

Further objects and advantages of the present invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWING

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

FIG. 1 is a perspective view of an electric hair clipper embodying the present invention and which is illustrated with a portion of the electric power cord removed;

FIG. 2 is an enlarged fragmentary sectional view taken substantially on line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken substantially on line 3—3 of FIG. 2 assuming that FIG. 2 depicts a complete structure and showing the drive linkage between the motor and the cutter assembly in a position wherein the cutter is at its innermost position of the cutting stroke;

FIG. 4 is similar to FIG. 3 except the unit is disclosed with the cutter at its outermost position of the cutting stroke, and the linkage is shown in section;

FIG. 5 is an exploded assembly view illustrating the linkage between the eccentric at the end of the armature shaft and the driven end of the cutter; and

FIG. 6 is a fragmentary exploded assembly view of the spring and its associated parts for maintaining the proper cutting tension between the comb and cutter.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing wherein like reference characters designate corresponding parts throughout the several views, there is shown an electrically operated hair clipper generally designated by the reference numeral **20**. As illustrated in FIG. 1, the hair clipper **20** includes an elongated housing **22**, a cutter assembly **23** extending lengthwise from the front end of the housing and an electric power cord **24** emerging from the rear of the housing. Preferably, the housing **22** is molded from a suitable electrically insulating plastic material and has a somewhat cylindrical configuration with the forward end having a reduced cross section due to a front chamfered portion **26** and a lower forwardly disposed recessed portion **27**. At the rear of the housing **22** is a reduced cross sectional area portion **28**. For controlling the operation of the electric hair clipper **20**, there is provided an on-off slide switch **30** which is positioned near the midpoint of housing **22** and disposed behind front chamfer portion **26**. The slide switch **30** is oriented so that it is actuated by a transverse movement whereby the switch does not move toward or away from the cutter assembly **23**. In this manner when the user has the hair clipper in his grasp, he can actuate the slide switch without fear that the movement of the switch will tend to move the cutter assembly **23** either toward or away from the hair being cut. To facilitate the holding of housing **22** by the user, the elongated housing has a small girth and an area of surface serrations **33** is situated on each side of the housing approximately below the slide switch **30** whereby the user can grasp the housing at these areas without the fear of having the unit slip accidentally from his grasp. While any suitable slide switch **30** can be employed in the subject hair clipper, it is preferred that the switch be the same as disclosed in copending patent application Ser. No. 566,150 by the same applicant and assigned to the same assignee.

Enclosed within housing **22** at approximately its midpoint is permanent magnet motor **35** including an armature **36** disposed for rotation about an axis running lengthwise with respect to the housing **22** and a stator **37** encompassing armature **36**. Preferably, the permanent magnet motor **35** is the same that is disclosed in the heretofore mentioned patent application Ser. No. 566,150. As can be seen in FIG. 2, the stator **37** has a tubular steel ring **39** and a permanent magnet **40** which is affixed to the bore of the ring **39**. In the present embodiment, a barium sulphite permanent magnet is used, and with respect to the overall weight of the hair clipper **20**, the stator **37** is relatively heavy. Since the electric motor **35** constitutes an appreciable portion of the overall weight of the hair clipper **20**, the center of gravity of the hair clipper is located approximately at the motor or the midpoint of the housing **22**. Having the center of gravity so located is helpful for reducing the fatigue in using the present hair clipper since the hair clipper is adapted for use with a pivotal motion. Normally, the hair clipper **20** is used in combination with a comb whereby the comb lifts up the hair to be cut, and the hairs are severed by the cutter

assembly **23** as the housing **22** is pivoted. Therefore, it is advantageous for the user to grasp the housing **22** at the surface serration areas **33** which are approximately at the center of gravity for the unit. As a result, very little effort is required on the part of the user in manipulating the hair clipper, and the motion is imparted to the hair clipper by basically a wrist movement as opposed to the up-and-down arm motion required with conventional hair clippers. It should also be appreciated that the on-off switch **30** is positioned close to the center of gravity of the hair clipper **20** so that the user can easily actuate the switch with the same hand that is holding the unit. Additionally, the switch **30** is disposed so that it can be manipulated by the user's thumb.

For supporting and positioning the electric motor **35** within the housing **22** there is provided a member **44** having a plate portion **45** extending vertically or normal to the axis of rotation of rotor **36** and a horizontal leg portion **46** extending forwardly and parallel to the rotor axis of rotation. As may be seen in FIGS. 2, 3 and 4, the stator **37** abuts against and is located by the plate portion **45**, and armature **36** having a shaft **48** is rotatably supported in bearing **50** which is attached to the center of plate portion **45**. With this construction, the member **44** is instrumental in supporting and locating both the rotor **36** and the stator **37**. The member **44** is anchored to the housing **22** by screws **52** and **53**. The mounting of the rear portion of the motor **35** (not shown in the drawing) may be in any suitable manner or as shown in detail in the heretofore mentioned patent application. Extending forwardly from armature shaft **48** is eccentric **55** which is offset from the axis of rotation of the armature **36**.

For attaching the cutter assembly **23** to the housing **22**, a mounting plate **57** is secured to the member **44**. As can be easily seen in FIG. 5, the mounting plate **57** is formed with a rear notch **58** providing clearance for assembly screw **53** and a front notch **59** which provides clearance for the reciprocating motion of cutter assembly **23**. Rigidly locked to mounting plate **57** is an upwardly extending pin **60** which is normal to the rotor axis. Inasmuch as the mounting plate **57** is used not only for mounting the cutter assembly **23** to the housing **22** but also supports a mechanism which requires that the pin **60** be positioned accurately with respect to the armature eccentric **55**, the plate **57** is held to the member **44** by two spaced flat-headed screws **62** which determine accurately the spacial relationship between the pin **60** and the member **44**. Additionally holding the plate **57** to the member **44** is a round-headed screw **63** anchored in leg portion **46**. However, while the round-headed screw **63** is useful in locking the plate **57** to the member leg portion **46**, it is not relied upon for locating these two components.

The cutter assembly **23** includes a relatively long stationary comb **70** and a much shorter reciprocable cutter **71**. Formed along the sides of comb **70** and cutter **71** are complementary cutting teeth which define two straight spaced cutting edges **73** and **74**. These parallel cutting edges **73** and **74** lie on each side of and in a plane parallel to the axis of rotation of armature **36**. The cutter **71** is formed with a rear tongue portion **76** which extends into housing **22** and has a shaft **77** rigidly affixed near its end. The comb **70** is secured to the housing **22** at the recessed portion **27** by attaching the comb to the mounting plate **57** by means of a plurality of screws **79**. Once the stationary comb is anchored to the mounting plate **57**, the cutter shaft **77** is disposed parallel to mounting plate pin **60** and closely spaced to eccentric **55**. Furthermore, the cutting assembly **23** is disposed between the bottom of the stator **37**, or its outermost portion, and the axis of rotation of rotor **36** to form a compact relationship and thereby provide an easily manipulated and easily viewed cutter assembly. It should be appreciated that the cutter assembly **23**, mounting plate **57** and member **44** constitutes an L-shaped assembly which supports and locates the motor **35** and which also extends forwardly from the housing **22**.

For transmitting power between electric motor **35** and the cutter assembly **23** and converting the rotary motion of the motor to the necessary reciprocating movement for the cutter **71**, there is provided a linkage assembly **80** disposed above the comb **70** and within the housing **22** below the housing front chamfered portion **26**. The purpose of the compact linkage assembly **80** is to transmit power from the eccentrics **55** to the cutter shaft **77**. As can easily be seen in FIG. 5, the linkage assembly **80** comprises a connecting link **81** and a bell crank **82**. The connecting link **81** has a split construction including an upper half **84** and a lower half **85** which are held together by a C-shaped spring clamp **86**. Each link half **84** and **85** is preferably formed from a suitable plastic material which has bearing and vibration absorbing characteristics, and together define spherical cavities **88** and **89** which receive bearings **90** and **91**, respectively. Bearing **90** receives eccentric **55** and has a spherical periphery which permits limited pivotal movement with respect to the connecting link **81**. However, since bearing **90** is of the so-called piped type having tubular end portions, its pivotal movement with respect to the connecting link is necessarily limited. Self-aligning bearing **91** has a spherical periphery which permits considerable pivotal movement between the bearing and its connecting link cavity **89**. When the connecting link **81** is assembled together, the upper and lower halves **84** and **85** sandwich the bearings **90** and **91** therebetween, and the halves do not meet so that there is defined a gap therebetween. With this construction, any wear between the bearings **90** and **91** and the link halves **84** and **85** is automatically compensated for by the halves moving closer together under the influence of the spring clamp **86** which biases and holds the two halves together. In an effort to maintain good surface contact between the bearings **90** and **91** with their respective cavities **88** and **89**, a centrally disposed opening **93** extends into each of the cavities since it is appreciated that very little wear will take place at the top of the bearing and cavity. If no opening **93** were provided, more wear would occur at the side of the bearing than at the top thereof causing undesirable side play. As can be seen in FIG. 4, the connecting link **81** in its assembled position extends contiguous with member **44** and is normal to the axis of rotation of rotor **36**.

Preferably, the bell crank **82** is molded from a suitable plastic and is formed having a somewhat L-shaped configuration. The bell crank has an opening **93** which receives the mounting plate pin **60** so that the bell crank is pivotally mounted with respect to the plate **57**. At one end of the bell crank **82** is a horizontally extending shaft **95**, as seen in FIG. 4, which is received in connecting link bearing **91** and which has its center at the same elevation above the comb **70** as the center of armature **36**. The other end of bell crank **82** is molded with two spaced fingers **97** between which is a bight portion **98** having a spherical surface to receive a self-aligning bearing **99** having a complementary spherical surface so that the bearing **99** can pivot with respect to the bell crank **82**. As seen in FIG. 4, the fingers **97** are sufficiently long so that all forces between the bearing **99** and the spaced fingers **97** are transmitted entirely through their areas of mutual contact. Holding the bearing **99** in operating position is a C-shaped resilient clamp **102**. The bell crank **82** is molded with spaced shoulders **104** which are positioned to hold the ends of the clamp **102** in an assembled state. The bearing **99** is located to receive the cutter shaft **77** thereby completing the linkage between the eccentric **55** and the cutter **71**. As the eccentric **55** rotates, it forces the connecting link **81** to move transversely with respect to the axis of rotation of armature **36**. Since the bell crank shaft **95** is journaled in the connecting link bearing **91**, the transverse motion of the link causes the bell crank to pivot about mounting plate pin **60** thereby forcing the cutter **71** to reciprocate in a direction substantially parallel to the armature axis and to move to its outer position shown in FIG. 4 and to an inner position depicted in FIG. 3. The eccentric **55**, when viewed from the direction of cutter assembly **23**, rotates in a clockwise direction as indicated by an arrow in FIG. 5, and this direction of rotation tends to exert a force through connecting link **81** causing the bell crank **82** to move towards the mounting plate **57** because the eccentric in moving from nine o'clock through to the three o'clock position as seen in FIG. 5 places the link **81** in compression causing a resultant downwardly vertical component of force on shaft **95** and correspondingly as the eccentric moves from three o'clock to the nine o'clock position the link is placed in tension causing a resultant downwardly vertical component of force on shaft **95**. Therefore, with this direction of rotation, no fastening means is necessary in order to hold the bell crank **82** onto the mounting plate pin **60** even when the hair clipper is used in an inverted position so that the pin **60** extends downwardly. A single rotation of the eccentric **55** causes the linkage assembly **80** to reciprocate the cutter **71** through one cutting cycle. Since no gearing is utilized in the linkage assembly **80**, the operation thereof is relatively quiet. Furthermore, the use of self-aligning bearings **91** and **99** accommodates considerable misalignment of the linkage components without causing a large frictional power loss.

In order for the hair clipper to operate properly, the cutter **71** must be urged against the comb **70**. Additionally, to insure that the cutter reciprocates with respect to the comb **70**, it is necessary to have some guiding means limiting the motion to substantially a linear reciprocating movement. To accomplish these objectives, the cutter **71** is formed with a shallow longitudinally extending channel **110** defined by parallel side walls **111** and **112**, as seen in FIG. 4. Extending through the cutter **71** in the middle of channel **110** is an elongated clearance opening **115** in which is disposed a tubular spacer **117** that is positioned so that it will not come in contact with any portion of the cutter **71**. Extending through the tubular spacer **117** is a screw **119** having a flat head **120** at its upper end, and its lower end is in threaded engagement with the comb **70**. Firmly clamped between the screw head **120** and the spacer **117** is a downwardly bowed, rectangularly-shaped leaf spring **122**. This spring has a centrally disposed opening **123** through which the screw **119** extends, and parallel sides **124** and **125** of the spring are disposed adjacent to the cutter side wall **111** and **112**, respectively, thereby limiting the motion of the cutter **71** to relatively pure linear reciprocating movement. That is to say, the cutter **71** cannot move an appreciable distance transversely due to the engagement between the spring sides **124** and **125** with the cutter side walls **111** and **112**. Since the spring **122** is downwardly bowed, spring ends **127** and **128** bias the cutter **71** towards the comb **70**. It should be appreciated, due to the symmetry of the design, the spring ends **127** and **128** apply a substantially equal pressure along the cutting edges **73** and **74**. One of the significant advantages of the present spring arrangement is that the spring is held at its midpoint by a strong clamping force so that each half of the spring may act independently of the other to effect equalized pressure between the comb and cutter. Furthermore, it should be realized that the opening **123** in the spring **122** greatly reduces the cross sectional area at this point, and consequently, the spring is very weak at its center. However, due to the clamping force on the spring **122** at the area around the opening **123**, the spring is not permitted to distort or bend beyond its elastic limit at this point which distorting could, obviously, have a very detrimental effect on the manner in which the cutter **71** is biased against the comb **70**. To reduce the friction between leaf spring **122** and the cutter channel **110**, a pliable slick sheet **130**, which is slightly longer than the spring **122**, is disposed on screw **119** between the spring **122** and the cutter **71**. Thus, the sheet **130** is an effective bearing between the

spring **122** and the cutter **71**. For the purpose of enhancing the visual appearance of the cutter assembly **23**, a downwardly bowed cover **132** is anchored in place by screw **119** and covers channel **110**, spring **122** and sheet **130**. Since the force applied by spring **122** is dependent upon the distance that the spacer **117** extends above the channel **110**, it is sometimes advantageous to place a spacing washer (not shown) between the spacer **117** and the comb **70** whereby the top of the spacer **117** is located the proper distance above the channel **110**.

The hair clipper **20** is adapted for use by a barber in giving a haircut and can be utilized in both clipping the hair and also to replace the need for manually operated scissors. The hair clipper **20** is normally used in combination with a standard comb wherein the comb is used to lift the hair away from the scalp of the person receiving the haircut, and the hair clipper cuts the portion of hair extending through the teeth of the comb. With this technique, the hair clipper can be used with a pivotal motion of the barber's wrist and, thus, eliminate the normal pumping motion required with conventional hair clippers. Since the present hair clipper is designed to be used in combination with a comb, it is not necessary to have various sized cutter assemblies to govern the length of the haircut. Employing this mode of operation, it is necessary that the barber be able to see the cutter assembly in operation, and for that purpose, the housing **22** has chamfered portion **26** increasing the visibility of the cutting assembly **23**. The cutter assembly **23**, which extends forwardly from the housing **22**, is offset from the center of the housing **22** to facilitate the pivotal motion used by the barber in bringing the cutter assembly **23** through its proper cutting stroke. Since the center of gravity of the hair clipper is substantially at a point where the barber grasps the hair clipper, the hair clipper may be pivoted with very little effort. The overall length of the hair clipper is minimized by having the power transmission means between the permanent magnet motor and the cutter assembly disposed above the cutter assembly.

While there has been illustrated and described a single, preferred embodiment of the invention, it will be readily understood by those skilled in the art that numerous changes and modifications can be made without departing from the present invention. It is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An electrically operate hair clipper comprising an elongated housing enclosing an electric motor having an armature disposed for rotation on an axis running lengthwise of said housing and a stator encircling said armature, elongated cutter means secured to said housing near the forward end thereof and extending forwardly parallel with the armature axis, said cutter means provided with a hair cutting edge parallel to the armature axis, power transmission means connecting said armature to said cutter means for reciprocating a portion of said cutter means, said power transmission means disposed within said housing and lying over said cutter means, said cutter means being in a plane between the outermost portion of said stator and the armature, a member having a plate portion which extends normal to said cutter means and in which is journalled said armature, said member being secured to said cutter means to form an L-shaped assembly, said power transmission means secured to said member near the junction between said cutter means and said plate portion.

2. The electrically operated hair clipper of claim **1** wherein said housing one end is recessed, said cutter means secured to said housing at said recess whereby said cutter means is spaced slightly above the bottom of said housing.

3. The electrically operated hair clipper of claim **2** wherein said housing one end has a reduced cross section enclosing said power transmission means for providing good visibility of said cutter means edge.

4. The electrically operated hair clipper of claim **1** wherein said cutter means comprising a reciprocable cutter and a stationary comb which are secured to said housing and over which said power transmission means is disposed, said comb and cutter defining two spaced cutting edges arranged so that one is positioned on each side of the armature axis.

5. The electrically operated hair clipper of claim **4** wherein said comb extending longitudinally with respect to said housing a greater distance than said cutter.

6. An electrically operated hair clipper comprising a housing enclosing an electric motor including an armature and stator, a shaft supporting said armature, cutter means secured to the front of said housing and extending forwardly therefrom parallel to the axis of rotation of said armature, a member secured to said cutter means and being provided with a plate portion normal to said cutter means, said plate portion positioning said stator and being provided with bearing means for rotatably supporting said armature, said member and cutter means defining an L-shaped assembly, linkage means connecting said armature to said cutter means for reciprocating a portion of said cutter means, said linkage means disposed above said cutter means and in front of said plate portion, and including an eccentric on said armature shaft connected by a crank arm to a bell crank which drives directly said portion of said cutter means.

7. The electrically operated hair clipper of claim **6** wherein said cutter means comprising a stationary comb secured to said member and a reciprocable cutter which is driven by said bell crank by means of an upstanding pin secured to said cutter positioned within said housing, said linkage means disposed over said comb.

8. The electrically operated hair clipper of claim **7** including a mounting plate positioned between said comb and said member, said plate being provided with an upstanding pin on which said bell crank is mounted, the rotation of said armature being in a direction that it forces said linkage means toward said plate.

9. In an electrically operated hair clipper comprising an electric motor armature adapted to rotate on a given axis, cutter means including a portion adapted to reciprocate in a plane parallel to said axis, said armature provided with an eccentric facing towards said cutter means, said clipper having means supporting a stationary pin which is normal to said reciprocating plane, a bell crank pivotally mounted on said pin one end of said crank being in driving engagement with said portion of said cutter means and the other end defining a stud extending away from said cutter means, and a connecting link between said eccentric and said stud whereby the single rotation of said armature causes said portion of said cutter means to reciprocate through one cycle.

10. In the electrically operated hair clipper of claim **9** wherein said bell crank one end being formed with bifurcated fingers in the bight portion of which is disposed a self-aligning bearing adapted for engagement with said portion of said cutter means, means biasing said bearing into said bight portion, said fingers being sufficiently long so that all the driving force between said bearing and said fingers is transmitted solely through the engagement therebetween.

11. In the electrically operated hair clipper of claim **10** wherein said crank is formed with spaced shoulders, said biasing means comprising a U-shaped clamp whose ends are adapted to lock with said crank shoulders so that the bight portion of said clamp biases inwardly said bearing between said fingers.

12. In the electrically operated hair clipper of claim **10** wherein said portion of said cutter means including

a reciprocable cutter having at its end nearer said crank an upwardly extending pin which is pivotally received within said self-aligning bearing whereby the pivotal movement of said crank causes said cutter to reciprocate.

13. In the electrically operated hair clipper of claim **9** wherein said connecting link is provided with a first self-aligning bearing at one end thereof in engagement with said bell crank stud and is provided with a second bearing at the other end which is attached to said eccentric.

14. In the electrically operated hair clipper of claim **13** wherein said connecting link having a split construction formed by two halves with said bearings sandwiched therebetween so that a slight gap is established between said split halves, spring means biasing said link halves together for holding said halves in assembled relationship and compensating for wear between said halves and said bearings.

15. In the electrically operated hair clipper of claim **9** including a self-aligning bearing between said connecting link and bell crank stud and between said bell crank one end and said portion of said cutter means whereby said connecting link and bell crank can move with a minimum of binding friction therebetween.

16. In the electrically operated hair clipper of claim **9** wherein said portion of said cutter means including a cutter having an upstanding shaft which is parallel to said stationary pin and which is in engagement with said bell crank one end, said shaft being closely spaced to said eccentric whereby the space occupied by said crank and connecting link between said electric motor armature and cutter means is relatively small.

17. In an electrically operated hair clipper of claim **9** wherein said pin and said bell crank are positioned with respect to said armature axis so that the rotation of said eccentric by said motor maintains said bell crank from coming off said pin.

18. In an electrically operated hair clipper of claim **9** wherein said connecting link is movable in a plane substantially normal to said reciprocating plane and said bell crank is pivoting in a plane parallel to said reciprocating plane.

19. In an electrically operated hair clipper comprising a housing enclosing an electric motor including a rotor adapted for rotation about its central axis, a cutter assembly secured to said housing and extending forwardly therefrom parallel to said axis, said assembly including a stationary comb and a reciprocable cutter in overlying relationship both of which are provided with complementary side cutting edges, linkage means between said rotor and said cutter whereby the rotary motion of said rotor causes said cutter edges to reciprocate in a direction parallel to said axis, said cutter defining a clearance opening between its side cutting edges, a spacer and fastening means being disposed within said cutter opening, a downwardly bowed elongated leaf spring rigidly clamped near its midpoint between said spacer and fastening means whereby the ends of said spring bias said cutter into good cutting engagement with said comb and said spring ends can act independently of each other, said cutter is formed with a channel extending in the direction of cutter reciprocation, said spring having parallel sides which coact with said cutter channel to guide said cutter, said cutter clearance opening being sufficiently large so that no contact is made with said cutter by said fastening means and spacer.

20. In the electrically operated hair clipper of claim **19** including a thin, smooth pliable member between said spring and said spacer and extending under both ends of said spring thereby reducing the friction between spring and said cutter while said cutter is reciprocating.

21. In the electrically operated hair clipper of claim **20** including a cover being held in a stationary position by said fastening means and covering said spring and said member so that they are not outwardly visible.

22. In the electrically operated hair clipper of claim **19** wherein said spring defining an aperture through which said fastening means extends, said aperture being sufficiently large so that said spring has a relatively small transverse cross sectional area at said aperture, the area of clamping between said fastening means and said spacer on said spring being sufficiently large to prevent the bending of said spring beyond its elastic limit at said small cross sectional area.

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