Dec. 8, 1942. M. ANDIS 2,304,525

HAIR CLIPPER

Filed Aug. 11, 1941 2 Sheets-Sheet 1

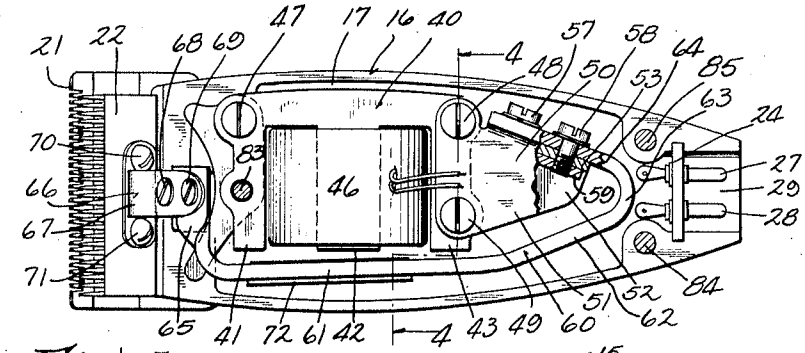


Fig. 1.

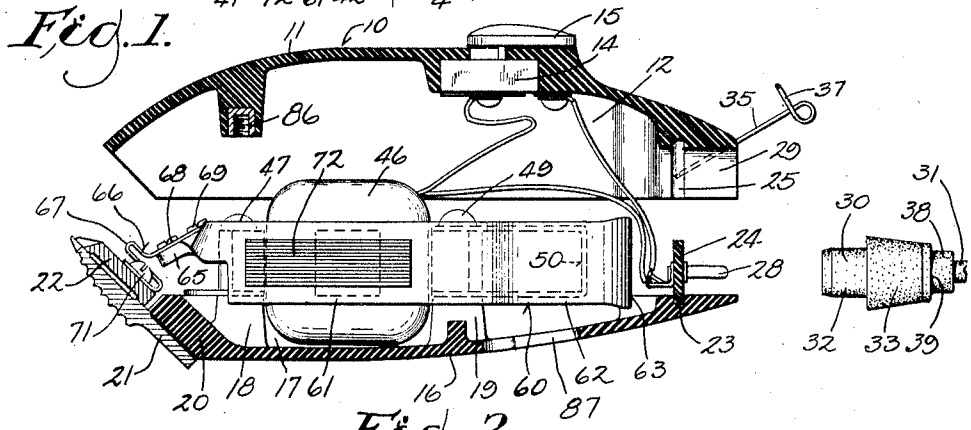


Fig. 2.

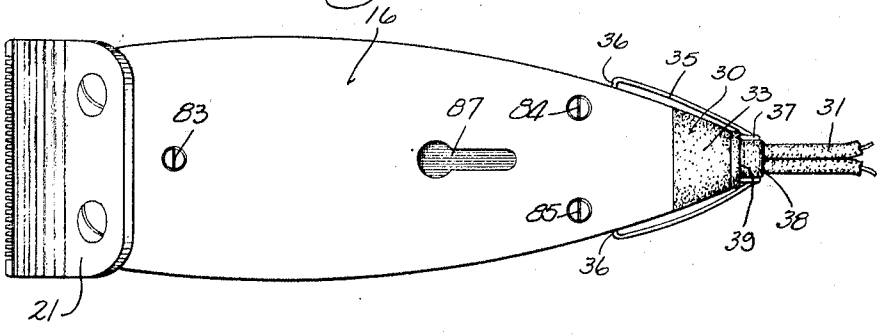


Fig. 3.

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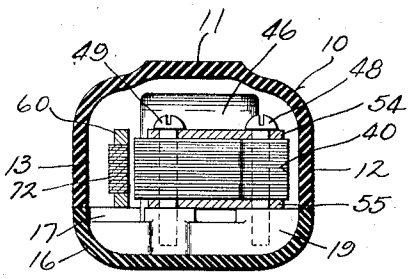


Fig. 4.

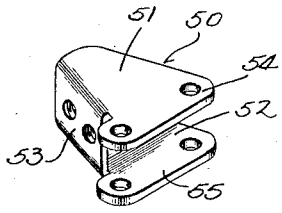


Fig. 5.

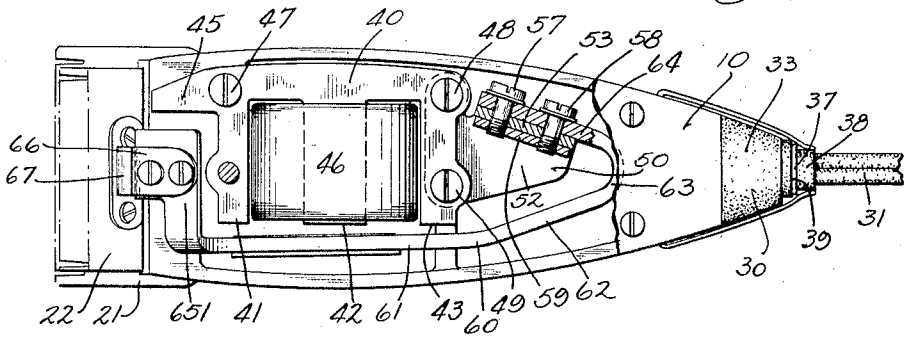


Fig. 6.

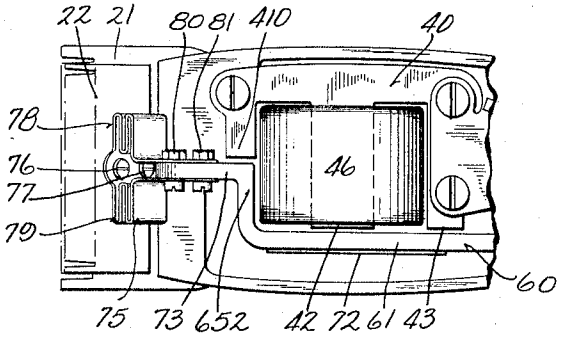


Fig. 7.

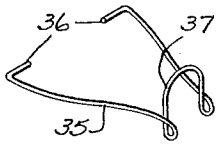


Fig. 9.

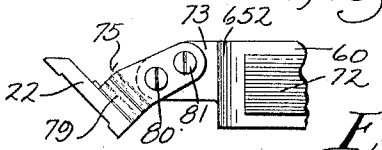


Fig. 8

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HAIR CLIPPER

Mathew Andis, Racine, Wis., assignor to Andis Clipper Company, Racine, Wis., a corporation of Wisconsin

Application August 11, 1941, Serial No. 406,317

20 Claims. (Cl. 30—210)

This invention relates to improvements in hair clippers.

One of the primary objects of the present invention is to eliminate set screw adjustments. The motor of the hair clipper hereinafter disclosed is of the vibratory type and requires not only proper design to develop the requisite power without overheating, but also requires proper tuning of its armature to the wattage input and frequency, proper alignment of its armature in the specific relation of the poles to the electromagnet, and proper alignment of the armature for application of proper tension to the shearing blade.

For tuning purposes and for determining the proper plane of vibration of the armature, and for determining its proper position in such plane, it has heretofore been the practice to provide adjusting screws which have required rather frequent adjustment and which, inexpertly adjusted, have resulted in the inadequate and improper functioning of the motor.

By means of the present invention I seek first of all to eliminate most of the wear which has heretofore required compensation by readjustment of the screws referred to. I propose to do this by providing a novel armature mounting and a novel shear blade driving connection from the armature substantially eliminating displacement resulting from the wear at these points in previously known devices.

In the second place, while provision is made for adjustment in the initial tuning and factory setting of the parts, and while these provisions for adjustment remain available for resetting in the factory, it is not my purpose to enable them to be tampered with by inexperienced users of the device. Since the adjustments are not effected by set screws, I have eliminated wear on the adjusting points of these set screws, such wear being a fertile source of trouble in previous constructions.

To further eliminate one source of failure, it is an object of the invention to provide a one piece armature and spring which will not settle under continued use as does an armature to which the spring is bolted or riveted. To eliminate a closely allied source of trouble it is one of the objects of the invention to provide a novel and improved armature spring mounting which is fixed directly to the motor core or frame instead of being fixed to any part of the case. To further eliminate difficulty experienced in prior art devices, it is proposed to provide a novel and improved connection between the armature and the blade for the blade actuation.

A further object of the invention is to provide a novel and improved relation between the motor, the blades, and the case. In the past, the motor has been mounted in a recess or compartment formed in the bottom of the case and exposed only partially by the removal of a closure constituting a top or lid. In accordance with the present invention it is my object to provide a unitary organization in which all of the essential operating parts are mounted on a bottom closure in such a position as to be fully exposed when such closure is separated from the case which comprises the top and sides of the handle. Substantially the entire motor-receiving cavity of the case or handle is in the upper rather than the lower separable part thereof, the plane of joinder between the parts of the case being substantially at the bottom level of the magnet frame so that the entire motor and all of the operating and mounting parts and connections may be fully exposed in one operation.

It is a further object of the invention to increase the power of the motor, this being preferably accomplished by the addition of a fourth pole to the field magnet operating on the extreme end of the armature and immediately adjacent the clipper blade.

Another object of the invention has to do with a novel arrangement for mounting and connecting the electrical supply cord and plug. Other objects will be apparent to those skilled in the art upon study of the following disclosure of the invention.

In the drawings:

Fig. 1 is a plan view of the operating unit comprising the bottom closure plate and the shear blades, magnet and armature, all unitarily assembled thereon.

Fig. 2 is a view showing the motor and blades in side elevation, the component parts of the case being illustrated in longitudinal section and partially separated.

Fig. 3 is a bottom plan view of the case.

Fig. 4 is a detail view of the assembly in cross section on the line 4—4 of Fig. 1.

Fig. 5 is a detail view in perspective of the armature mounting element.

Fig. 6 is a view showing a modified embodiment of the invention partially in plan and partially in horizontal section through the case to expose the operating unit in plane.

Fig. 7 is a fragmentary detail view of the

operating unit in plan showing a further modified embodiment of the invention.

Fig. 8 is a fragmentary detail view in side elevation of the armature and clipper blade connections shown in Fig. 7.

Fig. 9 is a detail view in perspective of the spring clip used to anchor the electrical connections.

Like parts are identified by the same reference characters throughout the several views.

In accordance with the usual practice in such devices, the motor case comprises a handle by means of which the clipper is manipulated. As indicated in my statement of objects, however, I have a new type of handle in which the principal cavity in which the motor is received is formed within the top rather than the bottom of the handle. Thus the top section 10 is a hollow part preferably molded of plastic in the form best shown in Figs. 2 and 4 to provide a top wall 11 and side walls 12 and 13. The top wall provides a recess for switch mechanism designated by reference character 14 and operated by a push button 15 as described in a companion application.

A bottom closure for the case is provided by the member 16 which has a shallow cavity at 17 (Fig. 2) just sufficient to receive the motor winding hereinafter to be described. Transverse partitions at 18 and 19 provide a bed upon which the motor is supported, such partitions extending substantially to the plane upon which the bottom closure 16 is joined to the hollow handle member 10, the arrangement being such that when the hollow handle member 10 and the bottom closure 16 are separated as shown in Fig. 2, substantially the entire motor structure and all of its connections are exposed.

At its forward end the bottom mounting plate and closure 16 are provided with a beveled surface at 20 to which the fixed clipper blade 21 is applied to project at the proper angle. Laterally reciprocable upon the fixed clipper blade 21 in the usual manner is the movable clipper blade 22.

At its rear end the bottom closure and mounting plate 16 is provided with a transverse slot at 23 in which an upright dielectric terminal plate 24 is disposed. The side walls 12 and 13 of the handle member 10 have similar slots, one of which is shown at 25 in Fig. 2, such slots being continuous about the remaining three sides of the upright terminal plate 24 so that when the handle member 10 and closure and mounting plate 16 are assembled, the dielectric terminal plate 24 is engaged at all four sides in the slots above described and is thereby rigidly positioned. Terminal plate 24 carries electrical terminal posts 27 and 28 disposed within a recess 29 at the rear of the handle and receivable into the connector 30 provided at the end of the electric supply cord 31. The connector 30 is not illustrated in detail inasmuch as its specific internal construction is immaterial to the present invention. In essence it constitutes a portable receptacle like that commonly used for the operation of toasters, flat irons, and other electrical appliances except that it is relatively miniature in size. Its portion 32 is made to fit within the cavity 29 at the rear of the handle case of the clipper and its enlarged portion 33 is shouldered to abut the end of the clipper case as a virtual continuation thereof in the manner indicated in Fig. 6.

Engaged in suitable holes in the sides of the clipper case is the spring wire retaining device 35, the ends of which at 36 are directed toward each other to enter the holes in the case as indicated in Fig. 3 and Fig. 6. Intermediate its ends the spring wire retaining clip 35 is provided with a resilient loop at 37 engageable with the portion 38 of receptacle 30 adjacent the shoulder 39 of the receptacle. When the spring clip is so engaged it is impossible to pull the receptacle and cord out of the recess 29 in the case, but when the spring clip is swung aside to the position shown in Fig. 2, as is readily possible, the receptacle 30 is released and the cord may be withdrawn from connection with posts 27 and 28.

The motor is mounted with great rigidity upon the transverse bed partitions 18 and 19 of the bottom closure and mounting plate 16. The motor preferably comprises a laminated field frame 40 providing poles at 41, 42 and 43. Where desired, an additional pole may be provided at 45 projecting toward the blades from the inner end of pole 41. In the specific organization shown in Fig. 6 it is found that the power may be materially increased through the use of the supplemental pole at 45 coacting with the free end of the armature adjacent the connection between the armature and the movable blade 22.

The winding 46 is preferably mounted on the center pole 42 of the field frame in the conventional manner and connected with the terminal posts 27 and 28 through the switch 14. Suitable screws 47, 48 and 49 pass through the frame of the electromagnet into the underlying and heavily formed supporting bed partitions 18 and 19 as a means of rigidly anchoring the frame to the mounting plate 16.

The armature mounting fitting 50 is an important feature of the present invention. It comprises upper and lower plates 51 and 52 (Fig. 5) connected by a web at 53. The top and bottom plates 51 and 52 are extended beyond one end of the web 53 to provide the elongated ears 54 and 55 with registering holes through which the screws 48 and 49 extend, as best shown in Fig. 4. Thus the ear 54 overlies the laminated magnet frame 40 while the ear 52 underlies such frame between the magnet frame and the supporting bed member 19. Instead of being mounted solely upon the handle in accordance with conventional practice, the armature carrying fitting is rigidly connected both to the handle and directly to the frame 40 of the magnet in the construction just described. While the bolts or screws 48 and 49 are closely fitted, it will nevertheless be found possible to make minor adjustments of the armature carrying fitting 50 with respect to the magnet frame 40 before the screws or bolts 48, 49 are tightened. When they have been tightened the bearing surface provided is such as to admit of no relative displacement between the parts.

With the fitting 50 mounted as described, the web 53 will be supported at an oblique angle, as best shown in Figs. 1 and 6. The web has openings through which extend the armature mounting screws 57, 58 (Fig. 1, Fig. 6). These screws are threaded into a common nut at 59 lying within the web 53 of the mounting fitting.

The armature bar 60 has a portion 61 extending across the end of poles 41, 42, 43. Behind portion 61 of the armature bar, the bar is inclined at 62 toward the center line of the clipper. It crosses the center line in an arc 63 wherein it is swaged to reduce its thickness and somewhat increase its height as will appear from comparison of Figs. 1 and 2.

At the other side of its center line the bar continues in another obliquely disposed portion 64 which preferably has approximately the same angle to the center line as does portion 62 of the bar. It is portion 64 of the bar which is mounted upon web 53 of the mounting fitting 50, lying flat against such web and corresponding thereto in angle. The armature mounting screws 57, 58 pass directly through the portion 64 of the armature bar and the broad contacting surfaces of the bar and the web 53 of the mounting plate ensure against any relative displacement between these parts after the screws 57, 58 have been tightened. At the same time notwithstanding the close fit of the screws 57, 58 to the openings in the bar, it will be found possible to make the requisite minor factory predetermined adjustments of the bar respecting the mounting fitting before the screws 57, 58 are tightened.

The main pivoting flexing movement of the bar occurs resiliently upon the swaged curvilinear portion 63 thereof, although the bar may flex elsewhere to a lesser degree. In effect, the swaged curvilinear portion 63 constitutes the spring which determines the operation of the bar, the metal used being resilient. The exact thickness of the spring portion of the bar will depend upon its resilience but in general the swaging operation, by displacing metal, without removing it, gives resilient flexibility without decrease of strength.

At its free end the extension arm 65 of the armature bar is bent inwardly and twisted as shown in Figs. 1 and 2 to provide for the mounting of the blade actuating spring 66. This spring is rigidly connected by screws 68, 69, with the arm 65 and is provided with a loop 67 affording sufficient flexibility so that the end of the spring may be rigidly connected by screws 70, 71 with the reciprocable clipper blade 22. The blade is obviously required to reciprocate in a plane determined by the fixed blade 21, while the armature 60 must obviously move in an arc about a series of pivots generally within the curved and swaged portion 63 of the bar. The loop at 67 in the blade spring accommodates the slight discrepancy in the paths of movement of the armature and the blade, while maintaining the blade under adaquate tension in a direction to bias the moving blade toward the fixed blade. The reaction of such tension is naturally communicated to the armature bar and must be resisted by the rigidity of the bar and the rigidity of its mounting on the web 53 of the mounting bracket 50.

Adjustment of the armature bar with respect to the mounting bracket determines the tension bias on the clipper blades, while adjustment of the mounting bracket as a whole with respect to the motor frame determines the spacing between the armature bar and the magnet poles. It will be noted from Fig. 1 that this latter adjustment is effected in a horizontal plane, whereas the adjustment of the bar respecting its bracket is effected in a generally vertical plane.

The magnetic action of the motor upon the armature bar may be increased, as above indicated, by the provision of the polar extension at 45 shown in Fig. 6 which interacts with the end of the arm 651 corresponding to arm 65 with which the armature bar is provided in Figs. 1 and 2. It is also found desirable to incorporate laminations in the armature bar opposite at least two of the poles 41 and 42 at 72, as best shown in Fig. 2 and Fig. 4.

In the construction shown in Fig. 7 the polar extension 410, instead of being equal in length to the poles 42 and 43, is materially shorter than pole 41 as shown in Figs. 1 and 6. The arm 652 of the armature bar, instead of being twisted to the oblique plane shown in Figs. 2 and 6, remains vertical and at right angles to the portion 61 of the bar, and ends in a longitudinally projecting finger at 73 substantially on the center line of the clipper and coacting with pole 410. This permits the use of a special spring at 75 which comprises a ribbon of spring metal centrally connected at 76, 77, to the movable blade 22 and thence extending in accordion folds or convolutions 78, 79 to opposite sides of the terminal finger 73 of the armature bar. Cross bolts 80 and 81 rigidly connect the two ends of the convoluted legs of the spring 75 to the armature providing a flexible connection capable of exerting substantially constant tension upon the clipper blades while permitting free flexibility in directions such as to accommodate for slight discrepancy in the relative paths of movement of the armature and the reciprocable blade.

The screws which connect the two parts of the case are preferably inserted from the bottom as indicated at 83, 84 and 85 in Figs. 3 and 1. Screw 83 passes upwardly through the pole 41 of the magnet into a nut provided at 86 in the handle member 10 of the case, as shown in Fig. 2.

It will be apparent that there is nothing projecting from the case of this clipper with which the inexperienced operator may tamper to destroy the factory set adjustment of the parts. Even if the case be opened, it is not apparent how any adjustments may be effected, there being no adjusting screws. The elimination of adjusting set screws is not merely for the protection of the factory adjustment against tampering, but further eliminates a fertile source of trouble due to the fact that the small areas provided at the ends of such screws are constantly being varied by impact during the operation of the clipper which, being dependent upon synchronism with the alternating current, generally occurs at 3,600 cycles per minute. No matter how hard the end of the adjusting screw is, it will, in a comparatively short time, be peened or flattened by these repeated impacts. This is avoided in the present construction where the positioning of the parts does not depend upon any such limited areas.

Inspection of Fig. 2 will disclose that upon removal of the recessed handle element 10, the entire motor including the magnet, the armature, the blades, and all connections between these parts, will be left exposed but in unitary and operative assembly upon the base plate 16. Only the electrical connections extend between the hollow handle member 10 and the base plate, and these do not preclude the full exposure of the operating unit inasmuch as the terminal plate 24 is positioned solely by the association of the two parts of the case, and upon removal of the hollow handle member 10 the terminal plate 24 is left completely free so that it does not impede the complete exposure of the motor. When factory readjustment is required, therefore, it is not necessary to lift the motor from its mounting, all of the points of connection and adjustment being fully exposed by merely opening the case.

For convenience in supporting the clipper safely when not in use, I preferably provide a keyhole slot 87 in the base plate 16 upon which the motor and blades are unitarily assembled.

Thus this mounting means is available for use even when the case 10 is removed. The larger end of the slot is toward the shear-bearing end of the plate, where the greatest weight of the motor is found. Thus with the head of a nail or other similar headed bracket engaged in the keyhole slot, the device may safely be hung with its shear-bearing end downwardly.

While many of the features above described are of primary significance only in hair clippers, the motor as shown comprises a separate article of manufacture.

I claim:

1. In a device of the character described, the combination with shear blades and a handle comprising a two part case, of a motor in the handle having a driving member connected with one of the blades, and a terminal plate for mounting electrical connections to the motor, the parts of said case providing means releasable in the separation of said parts for holding said terminal plate in position when said parts are in assembly, said plate being freely removable when the casing parts are separated.

2. In a device of the character described, the combination with a motor enclosing case, of power supply means, such case and means having complementary portions interacting to position said power supply means respecting the case for engagement and disengagement by substantially rectilinear movement, and a spring clip having portions pivoted to the case and other portions providing a loop engageable with said power supply means to normally hold the same from longitudinal movement with reference to the case.

3. In a device of the character described, the combination with a magnet frame having poles and a winding operatively associated for the energization thereof, of an armature having a portion positioned for vibration with respect to the poles and a bracket directly connected with one of said poles in fixed factory predetermined adjustment relative thereto and to which a portion of said armature is directly connected.

4. In a device of the character described, the combination with a clipper having relatively reciprocable blades, of a magnet frame having poles disposed transversely of the center line of the clipper behind the blades, an armature extending along one side of the poles and connected with one of the blades for the reciprocation thereof, said armature having a resiliently flexible portion extending across the center line behind the magnet frame and a bracket with which said portion is fixedly connected at the other side of the center line from the vibratory portion of the armature, said bracket being rigidly mounted to the magnet frame.

5. In a device of the character described, the combination of a pair of relatively reciprocable blades and a handle approximately symmetrical with reference to a predetermined center line across which said blades are disposed, a magnet frame having a plurality of poles disposed transversely of said handle across said center line, a bracket rigidly connected with said frame and projecting rearwardly therefrom away from said blades, an armature having a mounting portion rigidly connected with said bracket at one side of the center line, said armature extending curvilinearly across said center line and thence reversely beside said bracket and frame in proximity to said poles, with a front end portion extending inwardly and forwardly in front of said frame and yieldingly connected to one of the blades, said armature being formed of resilient material, reduced in thickness and increased in width in the portion which crosses the center line in the rear of said bracket, whereby the armature may vibrate with major flexion in the portion most distant from the blades, said armature and its connection with one of the blades being adapted to predetermine the pressure of the connected blade upon the fixed blade.

6. In a device of the character described, the combination with an electromagnet having laterally extending pole pieces and a winding, of an armature having a portion spanning the pole pieces and vibratory to and from the poles, said armature also having integral portions mutually convergent in the rear of said magnet and joined by an integral portion of increased flexibility, said convergent armature portions lying at opposite sides of a predetermined center line through said portion of increased flexibility, one of said convergent portions being directly connected with the vibratory armature portion and the other being rigidly connected with the magnet frame in permanent factory predetermined adjustment relative thereto.

7. In a device of the character described, the combination with a reciprocable shear element and an electromagnet provided with a vibratory armature, of a connection between said shear element and armature comprising a resilient band having an intervening convolution.

8. The device of claim 7 in which the convolution extends transversely of the path of reciprocation of said shear element.

9. The device of claim 7 in which the convolution of said band extends in the direction of the path of reciprocation of the shear element.

10. In a device of the character described, the combination with a reciprocable shear element and an electromagnet provided with a vibratory armature, of a connection therebetween comprising a resiliently flexible strip provided at an intermediate point with a connection to said shear element and having convoluted legs respectively connected with said armature.

11. The device of claim 10 in which the convolutions of the respective legs are substantially symmetrical in corresponding planes and project in opposite directions from the connection of the spring band to the shear element and substantially parallel to the path of reciprocation of said element.

12. In a device of the character described, the combination with an electromagnet having a core provided with a plurality of spaced and substantially parallel polar extensions, of a winding for energizing said core, an armature extending past said parallel polar extensions and inwardly turned across said winding, and an additional polar extension coacting with the inwardly turned portion of the armature.

13. In a device of the character described, the combination with an electromagnet core having a base portion and three substantially parallel polar extensions, of an energizing winding upon said core, an armature extending across all three of said polar extensions and inwardly turned toward said base, and an additional polar extension from said base with which the inwardly turned portion of said armature coacts.

14. A device of the character described, comprising the combination with a mounting plate, of hair clipping mechanism permanently secured to the mounting plate, relatively fixed and mov-

able shear members projecting from one end of the plate, and a housing for said mechanism, U-shaped in cross section, with side walls in registry with the margins of the mounting plate substantially at the bottom level of the mechanism, and means for securing the housing to the mounting plate, the parts of said mechanism being in permanent factory predetermined adjustment with reference to each other and the top, sides and ends of the mechanism being wholly exposed and accessible without removal from the mounting plate when the housing is detached.

15. A device of the character described, comprising a hollow handle composed of a mounting plate and a superposed switch carrying housing having side walls in registry with the side margins of the mounting plate, of electrically driven hair clipping mechanism permanently secured to the mounting plate and having extension wiring connected with the switch mechanism, relatively fixed and movable shear members projecting from one end of the mounting plate, and screws extending through the mounting plate and threaded into the housing, the parts of said mechanism being in permanent factory predetermined adjustment with reference to each other and inaccessible for changing such adjustment without removal of said screws.

16. Electromagnetic hair clipping mechanism, including the combination of relatively fixed and movable shear members, an electromagnet and a vibratory armature operatively connected with the movable shear member and resiliently connected with the magnet frame in factory predetermined adjustment with reference to the magnet and the movable shear member, and a switch carrying housing normally preventing access to said mechanism by barbers seeking to change said adjustments.

17. An electromagnetic vibrator for hair clippers and the like, comprising the combination with an electromagnet having a frame provided with laterally extending polar projections, of a unitary bar formed of resilient material and having an intermediate armature portion adapted for vibration to and from said polar projections, said bar being elbowed at one end of the armature portion and extended along a line substantially parallel to the armature portion to provide an actuating arm for a vibratory element, the other end portion of said bar being reversely curved across said line at the opposite end of the electromagnet frame and permanently secured to said frame, with the armature portion in factory predetermined spaced relationship to the magnet poles—the reversely curved portion of the bar being relatively thin and proportionately wide in the vicinity of said line and in a plane perpendicular to that of armature vibration, whereby the position of the bar and the degree of intensity of the vibratory stroke may be permanently predetermined at the factory where such parts are assembled.

18. In a device of the character described, the combination with a hollow handle having an electromagnet installed therein and including a frame provided along one side of the handle axis with a longitudinally extending row of polar projections, of a unitary bar having an armature portion in working proximity to said polar projections, a working end portion substantially at the axis of the handle beyond one end of the magnet frame, and a supporting end portion secured to the opposite end of the magnet frame at the other side of the handle axis from that occupied by the armature portion of the bar, said bar being reversely bent along curved lines crossing the axis of the handle between the secured end and the armature portion, said reversely bent portion being relatively thin and correspondingly wide in a plane perpendicular to that of armature vibration.

19. In a device of the character described, the combination with an electrically operable motor, of a motor supporting base having its rear end portion provided with a transverse channel in its upper surface, a terminal head plate having its lower margin removably socketed in said channel, a casing member having correspondingly channeled side walls in which the ends of the terminal plate may engage when the parts are assembled, terminal posts carried by said plate, and means for detachably connecting the casing member and base, said casing member and base providing a hollow handle, open at its rear end to receive a terminal plug engageable with said posts.

20. The combination with an electromagnet, of an armature bar of resilient material having an elbowed vibratory working end portion, convergent rear portions integrally connected by a relatively thin, wide and resiliently flexible portion curving transversely of a plane across which the working end portion may vibrate during flexion of the relatively thin and wide portion, the extremity of said rear portion being permanently connected with a fixed support associated with the electromagnet at the side opposite that occupied by the vibratory working portion.

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