United States Patent [19]

Artin et al.

[11] **3,800,172**

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[54] **HAIR CLIPPER HAVING BLADE ILLUMINATION AND FIELD WIRE STRAIN RELIEF**

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[73] Assignee: **John Oster Manufacturing Co.,** Milwaukee, Wis.

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Related U.S. Application Data

[62] Division of Ser. No. 138,719, April 29, 1971.

[52] **U.S. Cl.**..... **310/50,** 310/71, 336/192, 339/217 S,

[51] **Int. Cl.**..... **H02k 11/00,** H01f 15/10, H01r 9/08

[58] **Field of Search**..... 310/50, 71, 29, 42, 43, 310/47; 336/192; 30/210; 339/217 S

[56] **References Cited**

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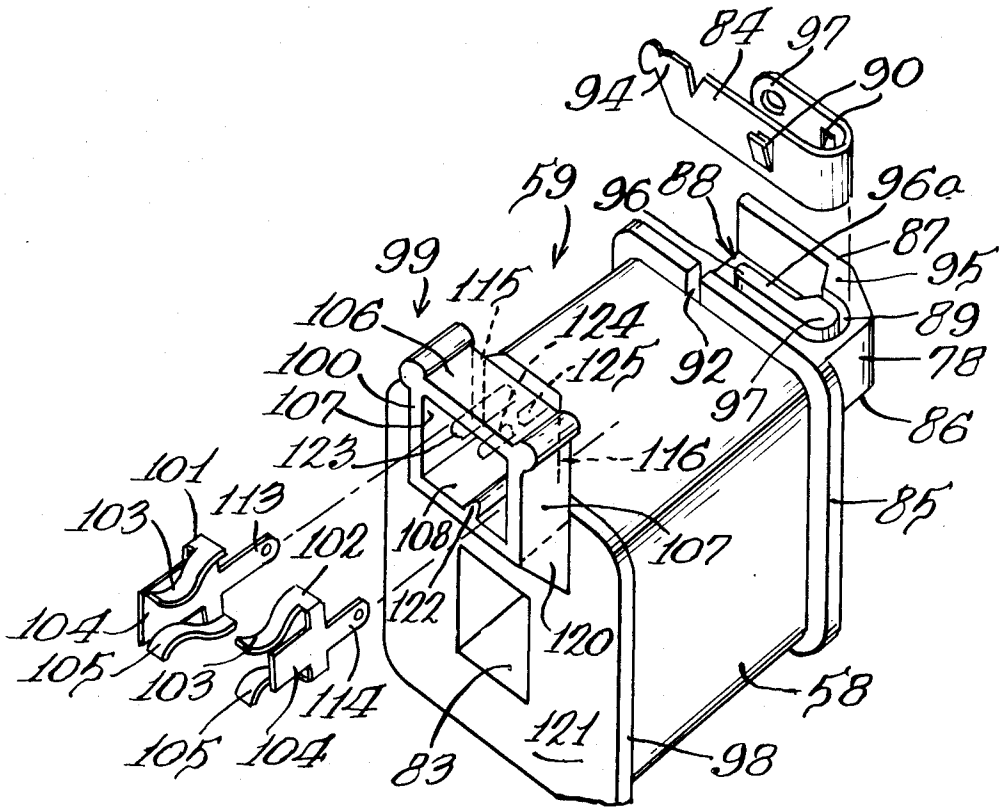
3,189,772	6/1965	Wingler et al.	310/71 X
2,959,762	11/1960	Schlee	339/217 S X
3,585,450	6/1971	Lane	336/192 X

Primary Examiner—J. D. Miller
Assistant Examiner—Robert J. Hickey
Attorney, Agent, or Firm—George R. Clark; Neil M. Rose; John S. Pacocha

[57] **ABSTRACT**

A hair clipper having a vibratory motor with a laminated field core is formed on a plastic bobbin which has a snap-in lamp socket projecting therefrom. The vibratory motor is enclosed in a plastic housing which has a transparent panel that is positioned so that the lightbulb which is inserted in the light socket will be positioned to illuminate the cutting blades. The laminated field core is positioned with its longitudinal axis running parallel to the longitudinal axis of the housing of the clipper so that a housing with an elongated shape is provided.

5 Claims, 6 Drawing Figures



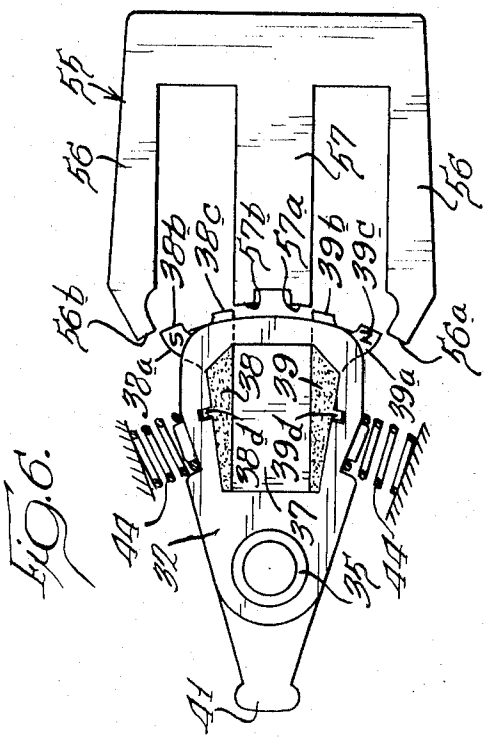


FIG. 6.

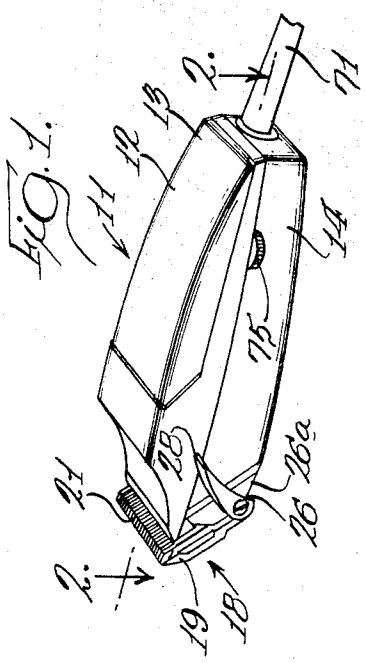


FIG. 1.

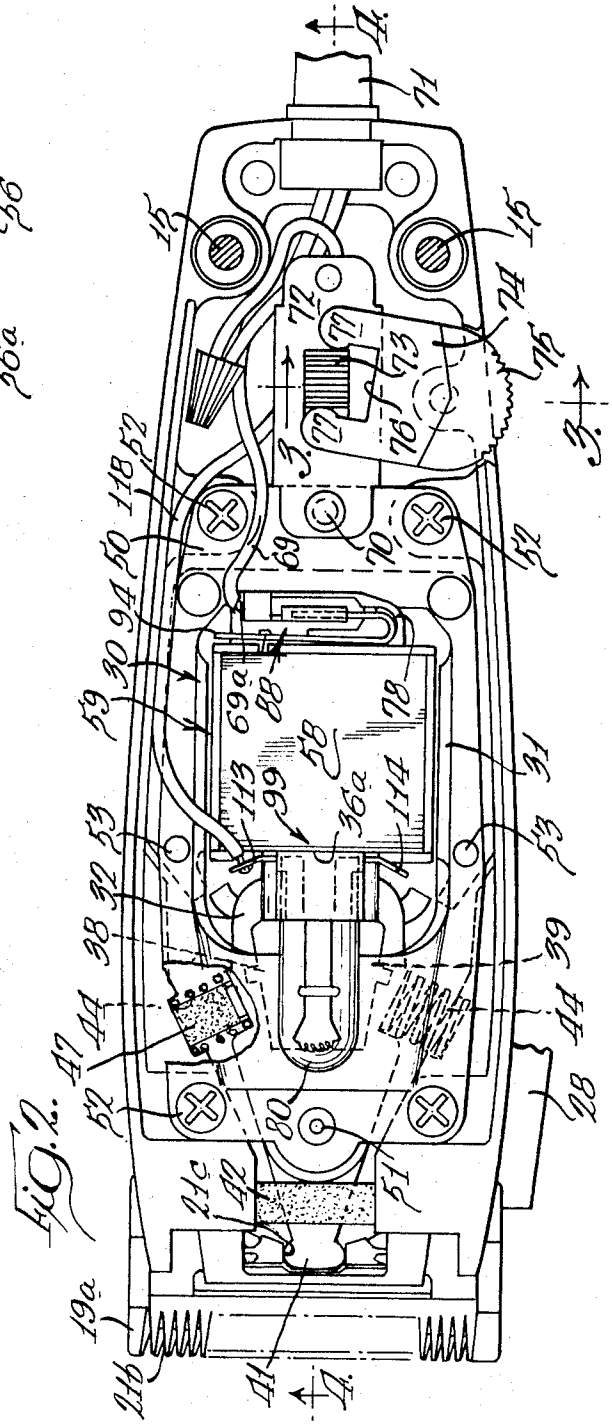


FIG. 2.

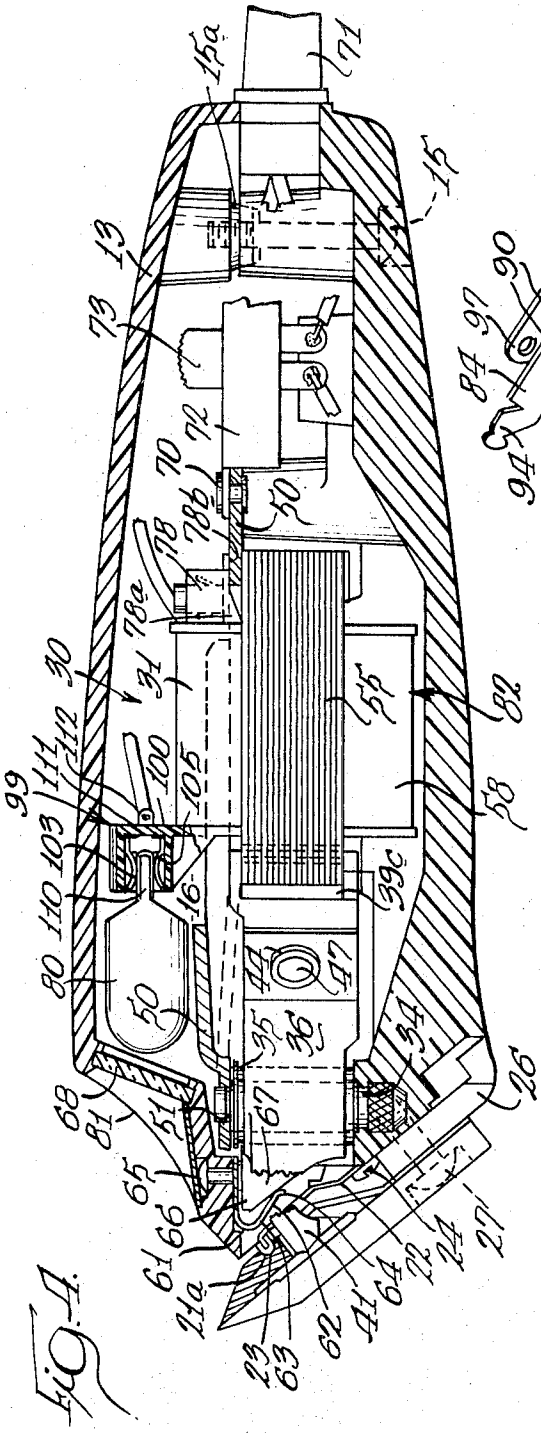


FIG. 4.

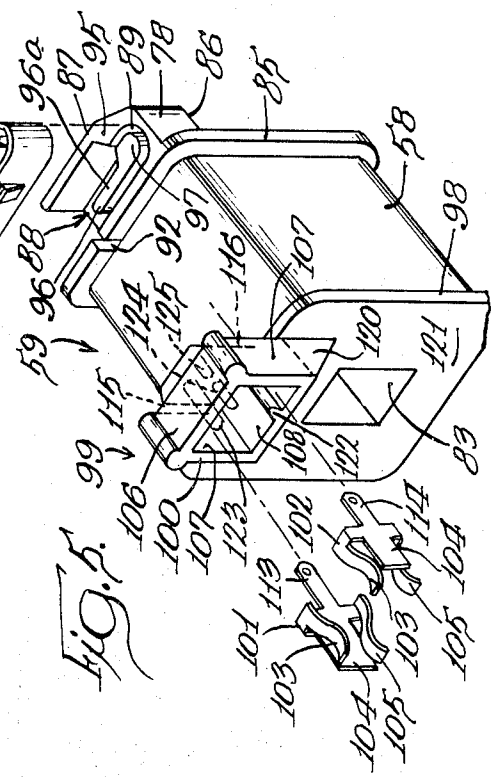


FIG. 5.

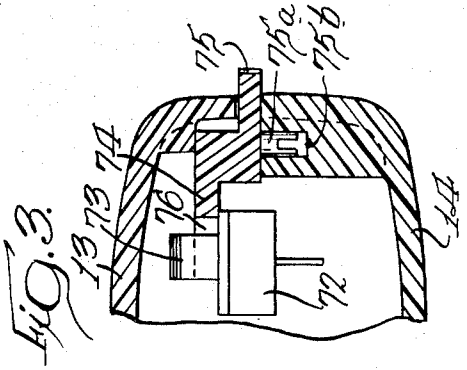


FIG. 3.

HAIR CLIPPER HAVING BLADE ILLUMINATION AND FIELD WIRE STRAIN RELIEF

This application is a divisional application of Hair Clipper Having Blade Illumination And Field Wire Strain Relief by inventors, Robert Lee Artin and Robert Paul Petroske, Ser. No. 138,719, filed Apr. 29, 1971, which was assigned to the assignee of the present invention.

BACKGROUND OF THE INVENTION

The invention relates to electric hair clippers and, more specifically, to an electric hair clipper which is provided with a snap-in lamp for blade illumination. Since hair clippers will be used at various locations in which the illumination will vary substantially, it is desirable to provide a self-contained blade illumination lamp in the clipper. The blade illumination provisions must be of a low cost, and they must not interfere with the operation or the balance of the clipper.

A woman's dry shaver which employs a light that is supported within the shaver housing and a lens for diffusing the light from the bulb is described in Spohr U.S. Pat. No. 3,432,652. In this dry shaver, the longitudinal axis of the field core is parallel to the longitudinal dimension of the shaving head. The lightbulb in the shaver of the Spohr patent is mounted intermediate the ends of the laminated field core at a point approximately midway between the ends along the longitudinal axis of the core. A stamped bracket, which is secured to the frame by a pair of tabs which extend through openings in the bracket, is required to support the lightbulb. The plastic diffusing lens which is inserted in the side of the housing has a forward portion which allows light from the bulb to be directed towards the cutting edge of the shaver.

While the illumination provisions of the Spohr patent provide a relatively simple way of illuminating the cutting edge of a woman's dry shaver, the employment of these provisions in a hair clipper would not be desirable since the preferable shape for a woman's dry shaver is thin and relatively flat, as shown in the Spohr patent, while the preferable shape for a hair clipper is generally rectangular and elongated, as shown in the Niemela U.S. Pat. No. 3,493,793 which is assigned to the same assignee as the present invention. Mounting of a lamp on a hair clipper such as that shown in the Niemela patent in the manner described in the Spohr patent would be bulky and hard to hold. The shape and feel of a hair clipper is very important since it must be capable of use continuously by professional barbers without fatigue for many hours. In addition, the screw-in type of lamp bulb and socket and the stamped bracket are more costly and larger in size than is desirable in such shavers.

Another example of an electrically operated dry shaver that employs a bulb illumination means is shown in Jepson et al. U.S. Pat. No. 3,389,323. In the shaver of this patent, the longitudinal axis of the filed core is parallel to the longitudinal dimension of the shaving head. However, the bulb and socket are of a costly and relatively space-consuming screw-in design. Furthermore, a separate bracket must be secured to the pole pieces of the motor. It is desirable in a hair clipper to employ a lamp for illumination of the cutting edges of the clipper wherein the lamp is of the snap-in type and the lamp socket is formed integrally with the plastic bobbin that supports the field windings of the clipper motor.

An object of the present invention is to provide a motorized device having an elongated shape with a snap-in lightbulb for illuminating the operating portion of the motorized device.

A further object of the present invention is to provide an illumination means for a motorized device wherein a lamp socket for a snap-in lightbulb extends from an end plate of a bobbin which preferably is integrally formed with the lamp socket of an insulating material.

Another object of the present invention is to provide a strain relief for the field core wire of a motor by means of a pocket that extends from the bobbin on which the core wire is wound and a resilient metal connector that fits into the pocket and has the core wire secured thereto.

It is an additional object of the present invention to provide an improved strain relief for a motorized device wherein a resilient male connector is inserted into a pocket which extends from an end plate of a bobbin on which the field core wires of the motor are wound and which preferably is integrally formed with the pocket of an insulating material.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a hair clipper embodying the present invention;

FIG. 2 is a sectional view of the hair clipper taken along line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the hair clipper taken along line 3—3 of FIG. 2;

FIG. 4 is a sectional view of the hair clipper taken along line 4—4 of FIG. 2;

FIG. 5 is a perspective view of the bobbin structure of the hair clipper; and

FIG. 6 is a plan view of the armature and field core of the motor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, there is shown in FIG. 1 a hair clipper designated generally by reference numberal **11**. The hair clipper **11** includes a housing **12** which is made up of an upper housing member **13** and a lower housing member **14** which are secured together in abutting relation by screws **15**, as shown in FIG. **4**, which extend through openings in the bottom housing **14** into metal threaded inserts **15***a* in the upper housing **13** to form a motor enclosure **16**.

The forward end of the elongated housing **12** receives a blade set **18** which consists of a comb **19** and a cutter **21** which is pressed into shearing engagement with the comb **19** by means of a biasing spring **22**. The biasing spring **22** is a frame member having a plastic bearing portion **23** secured on its outer end for sliding engagement with a groove **21***a* formed in the cutter **21**. At its inner edge, the biasing spring **22** is secured to the lower housing member **14** by means of screws **24**.

The comb **19** and the cutter **21** are provided with teeth **19***a* and **21***b*, respectively, along their abutting outer edges as is best shown in FIGS. **1** and **2**. The comb **19** is supported for movement relative to the lower housing member **14** by means of a blade support **26**. The blade support **26** extends across the bottom of the housing member **14** and has inwardly turned ends

26*a* which are received in slots in the side wall of housing member **14** permitting the support **26** to slide in the plane of the blade set **18.** The comb **19** is secured to the blade support **26** by means of screws **27.** The position of the blade support and the comb **19** is controlled by means of a lever **28** which has on its inner face eccentric means to move the blade support **26** as the lever **28** is rotated. This type of control is old and well known in the art and serves to change the relative position of the comb **19** with respect to the cutter **21** so that the barber may cut hair very short when the blade set is positioned, as shown in FIG. **4**, or cut hair longer when the comb is displaced further outwardly with respect to the cutter **21.**

Mounted within the enclosure **16** is a motor **30** which includes a field or stator **31** and an oscillating armature **32.** The armature **32** is supported of oscillating movement by means of a bearing pin **34** which is secured to the lower housing member **14** by having its lower end molded into the plastic housing member **14.** The armature itself includes an oil impregnated bearing bushing **35** which is secured to a nylon frame or carrier **36.** The carrier **36** is formed with an internal pocket **36***a* in which is received a permanent magnet **37** and a pair of pole pieces **38** and **39.** The pole pieces **38** and **39** are elongated members of magnetically permeable material such as soft iron and are formed at their outer ends with crescent shaped poles **38***a* and **39***a* which define a pair of salient pole faces **38***b* and **38***c* and **39***b* and **39***c*, respectively. Thus, each pole piece has a pair of salient pole faces formed by the crescent shaped poles on the outer ends thereof. The permanent magnet **37** is polarized so that the pole pieces **38** and **39** are magnetized to the opposite polarity. As a consequence, the salient pole faces **38***b* and **38***c* formed on the pole **38***a* will be polarized to the opposite polarity from the other armature pole **39***a* having salient pole faces **39***b* and **39***c*.

In order to assemble the pole pieces **38** and **39** to the nylon carrier **36**, the pole pieces are first inserted into the pocket **36***a*. They are then spread apart until suitable retaining ribs **38***d* and **39***d* engage corresponding notches in the nylon carrier **36.** The permanent magnet **37** is then inserted downwardly into the pocket **36***a* thereby locking the pole pieces **38** and **39** against removal or displacement. The frictional engagement between the permanent magnet **37** and the pole pieces **38** and **39** within the pocket **36***a* tends to prevent its removal from the pocket **36***a*. In addition, the strong magnetic force of the permanent magnet **37** tends to retain it within the pocket **36***a*.

The nylon carrier **36** of the armature **32** is formed with a driving lever **41** which extends radially from the bearing pin **34** in a direction opposite from the permanent magnet **37** and the pole pieces **38** and **39.** The cutter **21** is formed with a slot **21***c* which receives the end of the driving lever **41.** As the armature **32** oscillates about the axis of the bearing pin **34**, the cutter **21** is reciprocated in shearing engagement with the comb **19.** As is conventional in the hair clipper art, the area around the driving lever **41**, where it extends outwardly from the motor enclosure **16**, is surrounded by a plastic foam **42** which prevents the entrance of hair clippings into the motor **16.**

The armature **32** is biased to a central position by means of coil springs **44** which are compressed between the lower housing member **14** and the nylon carrier **36.** The housing member **14** is formed with a pair of U-shaped recesses or spring seats **45** which receive the outer ends of the springs **44.** The inner ends of the springs **44** are received on locating bosses **46** which are formed integrally with the nylon carrier **36.** To dampen vibration noises which otherwise might be associated with the springs **44**, they may be filled with foam plastic material **47.**

The motor field **31** is supported within the motor enclosure **16** by means of a sheet metal member **50** which is the field supporting frame. The member **50** serves not only to support the field **31** but also accurately locates the field **31** with respect to the armature **32.** This accurate location of the field is accomplished by locating the frame **50** from the bearing pin **34.** An opening **51** in the frame **50** receives the upper end of the bearing pin **34** as shown in FIG. **2.** The frame **50** is secured to the lower housing member **14** by means of four screws **52** which extend through openings in the corners of the frame **50.** The field **31** is riveted to the frame **50** by means of the rivets **53** which also retain the laminations in assembled relation.

The field **31** includes an E-shaped core **55** made of laminations of magnetically permeable material which are retained together and secured to the frame **50** by means of the rivets **53** as explained above. The E-shaped core **55** has a pair of outer legs **56** and a central leg **57**, the central leg being substantially thicker than the outer legs and terminating in a pair of salient pole faces **57***a* and **57***b*. The outer legs of the core **55** terminate in salient poles **56***a* and **56***b*. Surrounding the central leg **57** of the core **55** is the coil **58** which includes a plastic bobbin **59** and conventional insulated windings. When the coil **58** is energized by current flowing in either direction, it will induce magnetic flux which will cause the salient pole faces on the center leg **57** to be magnetized to one polarity while the salient poles **56***a* and **56***b* on the outer legs will be magnetized to the opposite polarity. The field will then have two pairs of oppositely polarized pole faces, and oscillation of the motor will begin.

In analyzing the operation of the hair clipper **11**, it should be understood that the device is intended to be energized by an alternating current power source such as the conventional 60 cycle 110 volt power supply. The coil **58** receives current flowing first in one direction and then in the other direction in each half cycle. This causes the polarity of the field poles to be reversed each half cycle. It should be appreciated that the armature poles will, of course, always remain polarized in the same manner which has arbitrarily been shown in the figures as the pole piece **38** polarized south and the pole piece **39** polarized north. When the coil **58** receives current such that the central leg **57** is polarized north, the armature **32** tends to rotate clockwise by virtue of the attraction between the salient pole faces **39***c* and **56***a* and pole faces **38***c* and **57***b* and the repulsion between the salient pole faces **39***b* and **57***a* and pole faces **38***b* and **56***b*. The repelling and attracting forces contribute equally to the output torque when averaged over each entire cycle. There is some tendency from the armature **32** to override because of its inertia moving past the field poles. At this point, the attraction exerted by the poles retards the armature movement before the current flow changes and reverses the polarity. This action combined with the action of the springs **44** tends to provide a smooth reversal in the direction of

the motion of the armature **32** with a minimum amount of vibration being produced. An important design criteria is the dimensioning of each armature pole **38***a* and **39***a* with a width equal to approximately the distance between the outer pole face **56***a* and **56***b* and the adjacent center pole face **57***a* and **57***b*, respectively. This arrangement permits alignment of the field poles to exert maximum torque in either attracting or repelling the adjacent armature poles.

The forward end of the upper housing member **13** has a lower plane surface **61** with a recess **62** formed therein. A spring steel locking spring **63** having a pair of hooks **64** and a generally rectangular portion extending between the hooks **64** is secured to the upper housing **13** by means of rivets **65.** The spring steel hooks **64** snap over the ledge **66** and grip the flat housing surface **67** of the lower housing member **14** which forms an acute angle with the plane surface **61.** The only screws used to hold the upper housing member **13** and the lower housing member **14** together are the screws **15** which are located on the rear of the unit. The locking spring **63** enables the upper and lower housing members to be locked together to allow the illumination window **68** to be positioned very close to the blade set **18.** In addition, the use of screws would detract from the appearance of the clipper.

The hair clipper **11** is provided with a power cord **71** which is connected to the end of the hair clipper opposite from the end on which the blade set **18** is mounted. To control the supply of power to the motor **30,** there is provided and on/off switch **72.** The switch **72** is secured to one end of the field supporting frame **50** by means of a rivet **70.** Suitable leads are provided to interconnect the power cord **71,** the switch **72** and the field coil **58.** It should be noted that the assembly of the parts to the housing **12** is simplified considerably by having the switch **72** mounted integrally with the coil **31** and the supporting frame **50.** The switch **72** is a slide switch having an operating bottom **73** and is located within the enclosure **16.**

To permit operation of the switch **62** when the housing members **13** and **14** are assembled together, a switch control member **74** is provided. The switch control member **74** is formed with a knob **75** which is exposed for finger operation on the outer surfaces of the housing **12.** The knob **75** has a post **75***a* that extends in an opening **75***b* in the lower housing member **14.** The operating button **73** of switch **72** is located in a recess **76** between two inwardly extending grips **77** of the control member **74.** The control member **74** is clamped between the housing members **13** and **14** with sufficient clearance provided so that it may move between its various operating positions to control the on-off switch **72.** Thus, the control member **74** provides a simple and effective means of operating the switch **72.** This arrangement permits the use of a simple inexpensive slide switch which may be mounted directly to the motor **30** thereby simplifying the assembly of the components to the housing **12.** At the same time, the simple control member **74** provides an attractive and easily operated control for switch **72.** The bobbin **59** on which the coil **58** is wound includes a simplified means for making the lead connections to the very fine coil wire of the coil **58.** This means includes a plastic pocket **78** which is formed integrally with the end wall of the bobbin **59** and which will be subsequently described in more detail.

In accordance with the present invention, as shown in FIGS. **4** and **5,** the plastic bobbin **49,** on which the coil **58** is would, supports a removable snap-in lightbulb **80** which is used for illuminating the blade of the hair clipper through the transparent illumination window **68.** The illumination window **68** is mounted at an angle with respect to the upper housing member **13** between two side walls **81.** The plastic bobbin **59** consists of a central tube portion **83** on which the coil wire **58** is wound. One end of the wire of the coil **58** is electrically connected to a resilient U-shaped male connector **84** which is rigidly held in place in the overhanging U-shaped plastic pocket **78** that is formed integrally with the rear plate **85** of the bobbin **59.** The pocket **78** has a bottom wall **86** and a U-shaped side wall **87.** Positioned inwardly of the U-shaped wall **87** is a cavity **88** formed by the side wall **87** and an upstanding boss **96.** The boss **96** is positioned and shaped so that a U-shaped groove **89** is provided between the side wall **87** and the boss **96.** The metal connector **84** is wedged into the U-shaped groove **89** and is rigidly held in place by means of outwardly extending tabs **90** which grip the plastic as the connector **84** is pushed into place so as to resist removal of the connector **84.** The connector **84** is positioned in the pocket **78** so that its outer end **94** is spaced sufficiently far from the outer portion of the side wall **87** and from the boss **96** so that connection may be made with a female connector **69***a* through the connecting lead **69** to the switch **72.** Connection between the coil **58** and the male connector **84** is provided by an end of the coil **58** which runs through the notch **92** in the rear plate **85** of the bobbin **59** and the notch **93** in the connector **84** which is in alignment with the notch **92** when the connector **84** is in place in pocket **78.** The end of the coil **58** is then wrapped and soldered around the outer end **94.**

In the previously mentioned Niemela patent, an overhanging plastic pocket was provided in which the connecting lead was drawn into a loop and positioned in the pocket. This method of connecting the lead to the coil wire provided a measure of strain relief if the wire was properly positioned when the clipper was assembled. However, if the wire was not properly positioned, a slight variation in position of the connecting wire during assembly could result in a broken connection between the connecting lead and the coil wire. The improved U-shaped plastic pocket **78** of the present invention, in combination with the resilient connector **84,** provides an improved strain relief connection wherein the strain relief is obtained with a resilient metallic connector **84** which is secured in the plastic pocket **78.** Connection of the female connector on the lead **69** to the male connector **84** can, therefore, be accomplished without placing any strain on the end of the coil **58** in accordance with the present invention.

The pocket **78** is designed so that the outer portion of the side wall **87** has a generally triangular section **95** which abuts the male connector **84** to provide an abutment which maintains the end of the connector **84** positioned in parallel spaced relation to the edge of the side wall **87** to provide sufficient clearance so that the female connector **69***a* on the lead **69** may be received on the male end of the connector **84.** The boss **96** is provided with a generally elongated portion **96***a* which has a rounded end **97** that contacts the surface of the connector **84.** As best shown in FIG. **4,** triangular ribs **78***a* are provided which extend between the bottom wall **86**

of the plastic pocket 78 and the rear plate 85 of the bobbin 59 to help to support the pocket 78. The bottom wall 86 of the pocket 78 also rests on the sheet metal member 50 for support.

At the opposite end from plate 85, the bobbin 59 is formed with a front plate 98 which has an integrally formed snap-in lamp holder 99 thereon. The lamp holder 99 consists of a rectangular plastic holder 100 into which a pair of resilient metal connectors 101 and 102 for receiving the terminals of the snap-in lightbulb 80 are wedged. It is preferred that the connectors 101, 102 are designed so that they have three resilient arms 103, 104 and 105 which engage the top wall 106, the side walls 107 and the bottom wall 108 of the plastic holder 100, respectively. The resilient arms 103 and 105 are bent so as to provide a resilient electrical connection to the leads 110 which extend from the lightbulb 80. The plastic holder 100 is also provided with an aperture 111 through which the glass base 112 formed on the lightbulb 80 is inserted. Electrical connection to the connectors 101 and 102 is provided by extending ears 113 and 114 which are formed to extend through slots 115 and 116, respectively, in the side walls 107. The extending ear 114 of the snap connector 102 is connected to one end of the coil wire 58, and the extending ear 113 of the snap connector 101 is connected to the third wire of coil 58 and to the lead 118, the other end of which is connected to the line voltage through the switch 72. The lightbulb 80 is thus connected across a portion of the field winding in order to provide energization of the bulb when the switch 72 is closed and the motor 30 is energized.

Triangular ribs 120, the edges of which engage the front surface 121 of the front plate 98 and the bottom wall 108 of the holder 100, are provided to support the plastic holder 100. The protuberances 122, 123, 124 and 125 on the upper and lower walls of the plastic holder 100 are provided to hold the connectors 101, 102 in place in the holder 100. The protuberance 122 extends along the width of the bottom wall 108 and abuts the arm 105 of the connector 102, and it ends along the entire width of the wall 108. The protuberance 123 extends along the width of the upper wall 106 and abuts the arm 103 of the connector 101. The short protuberance 124 at the rear of the upper wall 106 abuts the rear section of the arm 103 of the connector 102, and the short protuberance 125 at the rear of the lower wall 108 similarly abuts the rear portion of the arm 105 of the connector 101.

In the light of the description presented above, it is evident that there is provided a simple, compact and inexpensive means of supporting an illuminating means for a hair clipper within the motor enclosing housing. By a snap-in bulb socket integrally formed with the coil bobbin, a minimum amount of space is required for the socket and its mounting. In addition, the use of simple snap-in connectors 101 and 102 provides an inexpensive means for mounting the bulb 80 with respect to the motor 30 and for electrically interconnecting the bulb to a source of power. Since the plastic holder 100 which forms the lamp holder 99 is formed integrally with the coil bobbin 59, it adds little or nothing to the overall cost of the hair clipper. Thus, the illuminating feature is obtained for a very minimal cost involving only the cost of the bulb 80, the lens 68 and the connectors 101 and 102.

While there has been illustrated and described a particular embodiment of the present invention, it will be understood that changes and modifications within the scope of the present invention may occur to those skilled in the art, and it is, therefore, contemplated by 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 electric device comprising operating means, a motor for driving said operating means, having a moving armature and a stationary field and field coil, a bobbin having a strain relief support plate, a housing which encloses said motor and said bobbin, said field coil being wound on said bobbin, a generally U-shaped pocket extending from said strain relief support plate of said bobbin and being formed by a botton wall and a generally U-shaped side wall, an upstanding boss extending upwardly from said bottom wall and having a rounded end, said boss and a portion of said U-shaped side wall furthest from said strain relief support plate defining a cavity, said side wall and said rounded end of said boss being constructed to form a curved groove, an electrical connector having a first elongated segment with a male terminal on the end thereof, a curved segment and a second elongated segment connected to said field coil, said curved segment of said connector being positioned in said groove and said first elongated segment of said connector being positioned to extend into said cavity so that a female terminal may be connected thereto.

2. An electric device as set forth in claim 1 wherein said strain relief support plate of said bobbin and said pocket are integrally formed of electrically insulated material.

3. An electric device as set forth in claim 2 wherein said strain relief support plate of said bobbin has a first notch therein for receiving said field coil wire therein, said second elongated segment of said connector has a second notch in alignment with said first notch for receiving said field coil wire therein, and said elongated segment of said connector has a terminal portion which extends outwardly from said bobbin for connection thereto of the end of said field coil wire which is received in said first and second notches.

4. An electric device as set forth in claim 2 wherein said pocket comprises support ribs which extend between said strain relief support plate of said bobbin and said bottom wall of said pocket.

5. An electric device as set forth in claim 1 wherein said connector has resilient tabs that extend outwardly towards said side wall of said U-shaped pocket, said tabs being constructed such that they allow for relatively easy insertion of said connector into said pocket, but such that they grip into said side wall when removal of said connector from said pocket is attempted.

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