

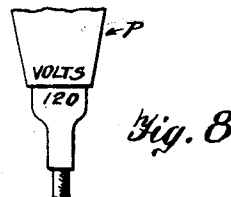
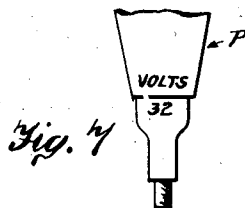
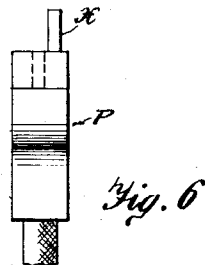
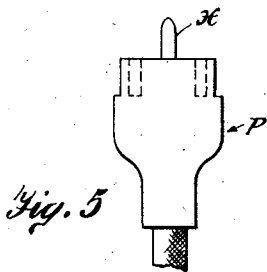
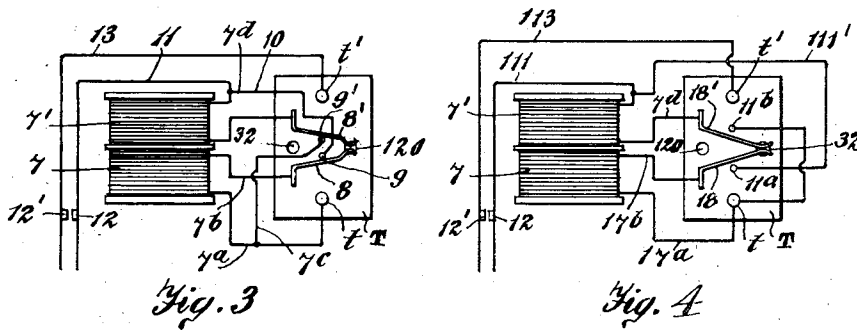
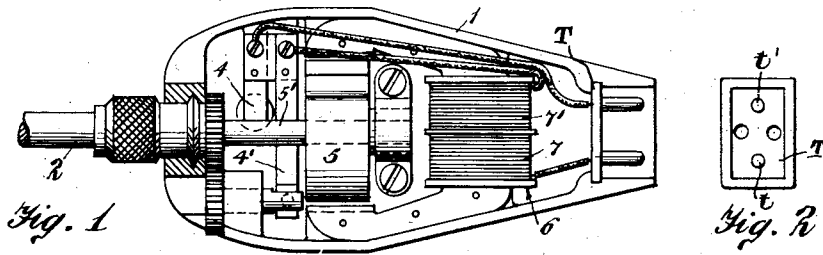
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2,174,652

DUAL VOLTAGE MAGNETIC MOTOR

Filed June 7, 1937



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UNITED STATES PATENT OFFICE

2,174,652

DUAL VOLTAGE MAGNETIC MOTOR

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3 Claims. (Cl. 172—36)

This invention relates to improvements in dual-voltage magnetic motors for electric razors and the like.

One of the objects of this invention is to provide a magnetic motor of the type specified which will be more universal and capable of operating with equal efficiency on either an alternating current of 120 volts, such as found in most apartment houses and offices or on a direct-current of 32 volts, such as frequently encountered during travel on Pullman cars and on ships.

Another object of my invention is to provide means in combination with a magnetic motor of the type specified which will enable ready, quick and convenient manipulation to change the motor from one type of current and voltage to the other, and which will necessitate a complete disconnection with the source of supply before each change of voltage and thus prevent arcing during any such change.

In general terms, my invention comprises the employment of a winding capable of satisfactory operation with an alternating current of 120 volts, the dividing of this winding into two equal parts or coils, the connecting of said coils with wiring or a hook-up for operation in series or parallel, and the utilizing of means in the form of a plug connector which will be capable of insertion into the motor body in two positions, insertion in one position being adapted to cause said coils or parts to be connected in series, thereby enabling satisfactory operation with the higher of the two currents and voltages specified, and insertion in a position opposite to the position first mentioned being adapted to cause said parts or coils to be connected in parallel, thus providing for satisfactory operation of the motor with direct-current of the lower voltage specified.

More particularly, I have provided, in a motor of the type specified, a field winding which is suitable and satisfactory for operation of the motor at a given number of revolutions per minute with 120 volts of alternating current and which when divided up into separate coils and connected in parallel is capable of also operating the motor with direct current of 32 volts at a substantially similar number of revolutions per minute. I find that by dividing such field winding into two equal coils, both wound in the same direction, I am enabled, by the use of a suitable hook-up, to operate on either current specified at a substantially similar number of revolutions per minute, and to so permit the motor to be operated alternately, I preferably use a plug connector arranged between terminals of the motor

and the source of supply and having connection means so disposed as to enable insertion into a suitable socket in two positions, the plug in one of such positions being adapted to connect the winding with the source of supply only without changing or disturbing the primary or normal position of the motor connections, while when inserted in the alternate positions said plug is adapted simultaneously to connect the motor with the source of supply and to change the primary position of the motor connections from the normal or initial position to an alternate position.

With these and other objects in view, the invention comprises the combination of members and arrangement of parts so combined as to co-act and co-operate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawing, in which:—

Fig. 1 is a longitudinal section substantially along the middle line of a motor embodying my invention;

Fig. 2 is a view in plan of the bottom end of the motor showing the pins and holes in the socket plate;

Fig. 3 is a diagrammatic view of my preferred form of wiring or hook-up showing the coils normally in parallel and changeable to a series arrangement by plug;

Fig. 4 is a diagrammatic view of a modified form of wiring or hook-up showing the coils normally in series and changeable to parallel by plug;

Figs. 5 and 6 are side and edge elevations of the plug preferably employed; and

Figs. 7 and 8 are alternate positions of the plug, shown in Figs. 5 and 6, inserted in the motor socket.

Referring now to Fig. 1 of the drawing, 1 indicates a casing having a centrally-disposed operating shaft 2, an armature 3, circuit-breaker blades 4, 4', an actuating cam and cam-shaft 5, 5' and other mechanical parts similar to and more particularly shown and described in my Patent No. 2,079,151, dated May 4, 1937.

My present invention relates to an improvement in the type of motor described in said patent by providing a novel form of winding of the field member 6, utilizing a new hook-up or wiring and connections therefor and combining the same with a plug member usable in dual positions for different types of current.

With the objects hereinabove specified in view, the field winding 7, of said member 6 is, in accordance with this invention, formed of a sufficient number of turns so that when alternating current at 120 volts is employed suitable and satisfactory operation of the motor shaft at a given number of revolutions per minute is provided.

An idling speed of approximately 5000 R. P. M. with a loaded speed of approximately 3600 R. P. M. is highly satisfactory in a motor of the character under consideration, and in accordance with my invention, I am enabled to maintain approximately these idling and loaded speeds when utilizing either alternating current of 120 volts or direct current of 32 volts.

It is desirable to accomplish the result indicated with two coils which may be utilized either in series or in parallel, and in accordance with my invention, I find that when such field winding 7 is so divided into two separate coils 7', 7" and a wiring or hook-up is provided to enable said coils to be utilized in parallel with a direct current of 32 volts, an idling speed of approximately 5200 R. P. M. and a loaded speed of approximately 3600 R. P. M. may be maintained, thus enabling substantially equal efficiency to be obtained with either 120 volts of alternating current or 32 volts of direct current.

The division of the field winding into two parts, as specified, enables, with suitable wiring, the facile changing of the motor winding from one capable of operating with said alternating current to one capable of operating on said direct current, and this may be accomplished by a mere turning into alternate positions of a single connector member.

In Figs. 3 and 4 I have shown two forms of wiring or hook-ups suitable for use with a plug connector for changing over from one type of current specified to the other.

In the wiring or hook-up shown in Fig. 3, the coils are normally connected in parallel for operation with direct current of 32 volts. In said position of the wiring, current enters from one pole of the source of supply at *t*, passes by wire 7^a to and through coil 7; thence by wire 7^b to switch blade 8, terminal 9, wires 10 and 11 to contacts 12, 12', thence by wire 13 to terminal *t'* and opposite pole of source of supply. At the same time, current passes through terminal *t*, wire 7^a and wire 7^c to terminal 9', switch blade 8', wire 7^d to and through coil 7'; thence by wire 11 to contacts 12, 12' and by wire 13 to opposite terminal *t'* and opposite pole of source of supply. In this parallel position current passing through *t* has two paths and flows through the two coils 7 and 7' simultaneously. To change over to 120 volts A. C., the plug P is inserted in position to cause a conducting wedge *x* carried by said plug to enter the hole 120 and force the switch blades outwardly away from the terminals 9 and 9' and to connect the ends of the switch blades 8, 8' by said wedge of conducting material. In this position of the parts, current flowing through *t* passes by wire 7^a to and through coil 7; thence by wire 7^b, switch blade 8' and wire 7^d to and through coil 7' and thence by wire 11 to contacts 12, 12' and wire 13 to opposite terminal *t'*.

When the plug is removed and turned into alternate position, the wedge *x* enters the hole 32 and does not engage the switch blades, but leaves the same in their normal positions for parallel operation as above described.

In Fig. 4, the coils are connected in series for

120 volts. Current enters at *t*, passes by wire 17^a to and through coil 7 to switch blade 18 thence to switch blade 18' through coil 7' to contacts 12, 12' thence by wire 113 and out at *t'*. To change for 32 volts D. C., the plug P is inserted in a position to bring the wedge *x'* which, in this case, will be of dielectric material between switch blades 18 and 18' to force them apart and against posts 11^a and 11^b, making electrical contact therewith. In this position, current entering at *t* has two paths and flows through the two coils simultaneously. Entering at *t* current flows through wires 17^a, to coil 7, thence to blade 18, post 11^a and wires 111' and 111 to contacts 12, 12' and thence through wire 113 and out at terminal *t'*. At the same time, it flows from *t* to post 11^b, blade 18', coil 7', wire 111 to contacts 12, 12', wire 113 and out at *t'*. When plug is inserted in razor handle with wedge *x* in opening marked 32, it separates the blades 18 and 18' and puts coils 7, 7' in parallel for 32 volt current. When plug is inserted in razor handle with wedge *x* in opening marked 120, the wedge *x* does not engage blades 18, 18' and coils 7, 7' are maintained in series for the 120 volt current.

On one face of the motor casing, I mark with the word "volts" to indicate the face with which opposite sides of the plug is adapted to match in order to permit use of one current and voltage or the other. When the current available is direct current of 32 volts, the plug surface with the numeral "32" is matched with the word "volts" and when 120 volts A. C. is available, the plug is turned to cause the plug surface marked "120" to match with the word "volts". Obviously, this system may be utilized with either of the wiring arrangements shown in Figs. 3 and 4.

In Figs. 3 and 4 the switch mechanism and connections are mounted on the bottoms of tablets or plates T and either one of these mechanisms may be used in connection with the tablet or plate T shown in Figs. 1 and 2. Obviously, if the switch mechanism of Fig. 3 is used and if a conventional plug P having at one side of the center a single switch-separating wedge X of conducting material be passed up in relation to Fig. 3 through the hole 120 to force the switch blades outwardly away from the terminals 9 and 9' and into connection with the ends of the switch blades 8, 8', in this position of the parts current flowing through *t* will pass by wire 7^a to and through coil 7; thence by wire 7^b, switch blade 8' and wire 7^d to and through coil 7' and thence by wire 11 to contacts 12, 12' and wire 13 to opposite terminal *t'*. When, however, the plug is turned 180° the conducting wedge X will enter the empty hole 32 where it does not engage the switch blades, but leaves the same in their normal positions for parallel operation as above described.

If, however, the switch mechanism shown in Fig. 4 is mounted beneath the tablet or panel T, and if a wedge *x* of dielectric material is placed in the empty hole 120, the coils will remain in series for 120 volts. If now the dielectric wedge X is passed up in relation to Fig. 4 through the switch obstructed hole 32 the said wedge will change the hook-up to parallel as hereinabove described.

Having described my invention, I claim:

1. A magnetic motor for electric razors and the like embodying, in combination, a casing, a bi-polar field member provided with oppositely disposed end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the end-surfaces of said field

member all mounted within said casing, said field member having an energizing winding comprising a pair of coils operable in series circuit relationship on a 120 volt alternating-current circuit and operable in parallel relationship on a 32 volt direct-current circuit, switch mechanism mounted within said casing and in one position connecting said coils in series relationship and in another position of said switch mechanism connecting the same in parallel, and a releasable plug engaging said switch mechanism and having means for actuating said switch mechanism to change over said coils from one of said connected relationships to the other.

2. A magnetic motor for electric razors and the like embodying, in combination, a casing, a bi-polar field member provided with oppositely disposed end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the end-surfaces of said field member all mounted within said casing, said field member having an energizing winding comprising a pair of coils operable in series circuit relationship on a 120 volt alternating-current circuit and operable in parallel relationship on a 32 volt direct-current circuit, switch mechanism mounted within said casing and in one position connecting said coils in series relationship and in another position of said switch mechanism connecting the same in

parallel, and a switch-actuating plug engaging said switch mechanism by providing a wedge of conducting material insertable into engagement with said switch mechanism to connect the coils and change the relationship thereof from parallel to series.

3. A magnetic motor for electric razors and the like embodying, in combination, a casing, a bi-polar field member provided with oppositely disposed end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the end-surfaces of said field member all mounted within said casing, said field member having an energizing winding comprising a pair of coils operable in series circuit relationship on a 120 volt alternating-current circuit and operable in parallel relationship on a 32 volt direct-current circuit, switch mechanism mounted within said casing and in one position connecting said coils in series relationship and in another position of said switch mechanism connecting the same in parallel, means for actuating said switch mechanism to change over said coils from one of said connected relationships to the other, and means for guiding the same into contact with said switch mechanism to move the connections of said coils from parallel position into series circuit relationship to each other.

THADDEUS S. CASNER.