May 4, 1937. T. S. CASNER 2,079,151

MOTOR FOR ELECTRIC RAZORS

Filed Sept. 17, 1936

Fig. 1

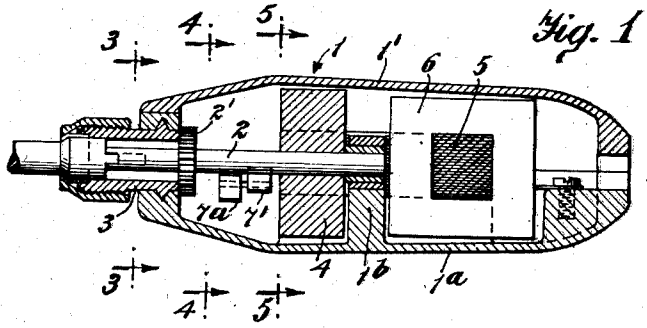


Fig. 2

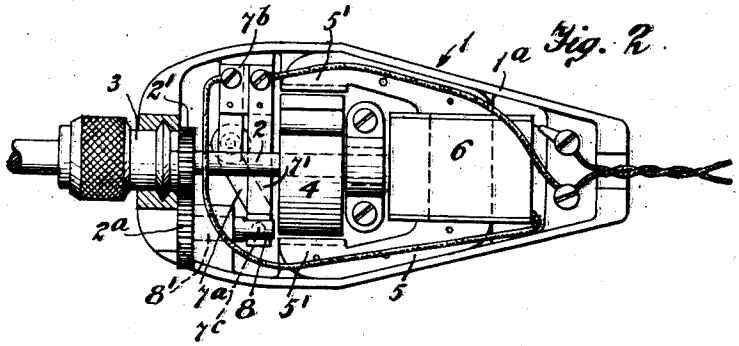


Fig. 3

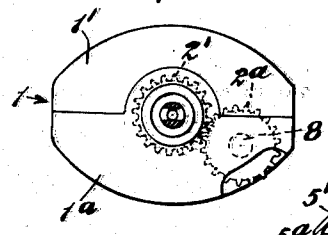
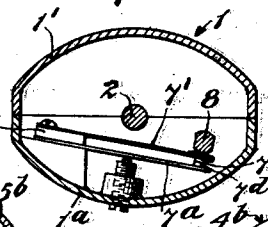


Fig. 4



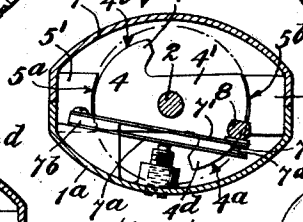


Fig. 7

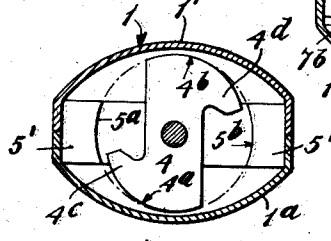


Fig. 5

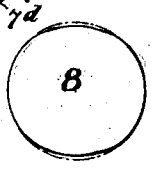


Fig. 6

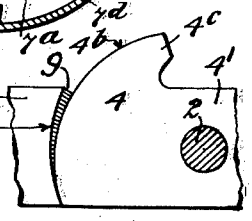


Fig. 8

Thaddeus S. Casner INVENTOR.

BY Joseph F. O'Brien

ATTORNEY.

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MOTOR FOR ELECTRIC RAZORS

Thaddeus S. Casner, Plainfield, N. J.

Application September 17, 1936, Serial No. 101,198

3 Claims. (Cl. 172—36)

This invention relates to improvements in motors for electric razors and the like.

One of the objects of this invention is to produce a motor for electric razors and the like, embodying an armature having arms provided with arcuate terminals having extension portions extending in the direction of rotation, thus enabling a longer surface for the application of power and the provision of a "pull" over or throughout an arc of increased extent or magnitude.

Still another object of my invention is, in a device of the character specified, to provide an armature having a surface or surfaces that will cause a change in the direction of the lines of magnetic force or "pull" in relation to said surface or surfaces of the armature whereby such lines will extend and pull in the direction of movement of the surface being acted upon and also will cause said force to be applied gradually or with a gradual increase in intensity that will avoid jerking movements of the armature, so as to result in a uniform, smooth movement and a cool-running, and to this end the arcuate terminal surfaces of the armature are slightly shaded or offset from a truly circular segment, and in the preferred embodiment of my invention each of the curved terminal surfaces of the armature will have differential radii gradually increasing in length from the outer extension portion at the leading edge toward the following edge.

Still another object of my invention is to produce a motor construction having a circuit breaker operating to provide positively closed intervals timed by positive-engagements of surfaces of a double cam positioned directly above the contact points of the circuit breaker combined with open intervals caused by an automatic opening movement of a spring contact-arm, whereby accurate positive timing of the application of power to and movement of the armature can be more closely and accurately accomplished.

With these and other objects in view, the invention comprises the combination of members and arrangements of parts so combined as to coact 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 my motor with one-half of the cover removed;

Fig. 3 is a section on the line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a section on the line 4—4 of Fig. 1, showing my circuit breaker and omitting the armature;

Fig. 5 is a section on the line 5—5 of Fig. 1, showing another position of the armature;

Fig. 6 is a view in end elevation of the cam member preferably employed by me;

Fig. 7 is a view on the line 4—4 of Fig. 1, showing another position of the armature;

Fig. 8 is an enlarged diagrammatic section of the field ends and armature.

Referring now to the drawing which illustrates a preferred embodiment of my invention, 1 indicates a casing, preferably composed of a suitable condensation product, formed in two halves 1', 1^a one of such halves being provided with an integral bearing 1^b for a centrally-disposed shaft 2 supported at one end in said bearing and extending through and supported at its upper end in an insert 3 at the upper end of the casing 1 and passing between the ends of a field member 5.

An armature 4 is fast on said shaft 2 so as to be rotatable between said field ends, and, as shown, the said armature 4 is rotatably mounted on the shaft 2 between ends 5', 5' of the U-shaped field member 5 having a suitable winding or coil as at 6 and said field ends are provided with segmental cylindrical surfaces 5^a, 5^b between which the armature 4 rotates with said shaft 2.

In accordance with this invention, the armature 4 is provided with a body portion 4' of a width substantially similar to the width of said field ends and has arcuate terminal portions 4^a, 4^b. Said terminal portions, as shown, are provided with forward extensions 4^c, 4^d extending a considerable distance beyond said body portion from the leading edges in the direction of rotation of the armature. These extensions cause the armature to assume an S-shaped configuration and also provide an unbalanced structure which, upon rotation, will store power and also will provide an additional body of metal at such leading edges and provide a pull through an arc of greater magnitude.

In the embodiment of my invention shown, the arcuate terminals 4^a, 4^b of my armature 4 are gradually shaded or offset from the cylindrical field surfaces, the shading extending from the following to the leading edges and in my preferred embodiment the curves or arcs of the

armature surfaces 4^a, 4^b are of differential radii, said radii increasing in length from the extensions at the leading edges to the following edge of said armature. This shading or offsetting cooperates with said extension portion in causing power to be applied gradually to said armature and avoids any jerking movement thereof and also causes the lines of force to incline in the direction of movement of the armature so as to cause a more direct pull in said direction of movement of the arcuate surfaces. This will be apparent from an examination of Fig. 8 in which the lines of force are indicated by the lines 9 extending between the surfaces 5^a of the ends 5', 5' of the field member and a shaded surface portion 4^b of the armature 4. This construction of armature, furthermore, will because the pull is applied gradually instead of in jerks, have a tendency to avoid heating and thus will provide for a cool-running of the motor. In fact, I find that my motor will run cool for a period of time much greater than is required for the operation of shaving hair from the skin of the user.

In the preferred embodiment of my invention, I utilize a circuit-breaker 7 consisting of two spring blades 7', 7^a secured to opposite sides of a block of insulation 7^b. The free ends of the blades carry contact points 7^c, 7^d, preferably of tungsten, and normally spaced apart a given distance. One of the blades is actuated by a cam 8, the shape of which is shown in Fig. 6, and this cam is positioned directly above the contact points and is adapted upon each rotation of the cam to positively close the circuit twice, said circuit being opened by the resilience of the spring blade. By positioning a cam of this type directly over the contact points and providing an armature of the S-shape hereinabove specified, I am, as aforesaid, enabled to procure a definite co-relation of the timing period between the said cam and the armature. The shaft 2 is provided with a gear 2' which meshes with a gear 2^a on a cam shaft 8' so as to provide for a synchronization of the cam and armature, the shapes of which, as aforesaid, make accurate timing and synchronization possible.

In operation, when the tip end of an extension portion of the armature is positioned near the field ends, the circuit breaker will close the circuit through the field coil 6. The field thus being energized, exerts a strong magnetic pull on the armature causing it to revolve. Just before the armature, in its revolution, has shorted the magnetic field, the current through the field coil will be interrupted, and the armature will continue to revolve by its own momentum until it swings past the pole of the field whereupon the circuit will be again closed and another impulse given to the armature. This action will be repeated twice during each revolution of the armature and I thus provide for a strong, continuous and smooth rotation thereof.

Having described my invention, I claim:

1. A motor for electric razors and the like, embodying, in combination, a bi-polar field member provided with oppositely-disposed arcuate end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the said end surfaces of said field member, said armature comprising a relatively-narrow body portion and terminal portions having curved surfaces of substantially quadrant-extent, each of said curved-surface terminal portions projecting approximately half of its extent to one side of said body portion in the direction of rotation of said armature and being of a differential radii offset adjacent to its leading edge from the arcuate surfaces of the field member and at its following edge being closely adjacent thereto, a circuit breaker having contact points normally separated from each other by spring power and a rotatably-mounted operating cam for closing said circuit breaker having oppositely-disposed circuit closing portions of substantially quadrant extent to positively move said contact points into engagement against the action of said spring power and in timed co-relationship with the said terminals of said armature.

2. A motor for electric razors and the like embodying, in combination, a bi-polar field member provided with oppositely-disposed arcuate end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the said end surfaces of said field member, said armature comprising a relatively-narrow body portion and terminal portions having curved surfaces of substantially quadrant-extent each of said curved-surface terminal portions projecting approximately half of its extent to one side of said body portion in the direction of rotation of said armature and being of a differential radii offset adjacent to its leading edge from the arcuate surfaces of the field member and at its following edge being closely adjacent thereto, a circuit breaker having contact points mounted on flexible blades normally separated from each other by spring power and an operating cam for said circuit breaker rotatable to positively move said contacts into engagement against the action of said spring power and in timed relationship with said armature, said operating cam being positioned directly above said contact points.

3. A motor for electric razors and the like embodying, in combination, a bi-polar field member provided with oppositely-disposed arcuate end-surfaces, a shaft, an unwound bi-polar armature mounted on said shaft and rotatable between the said end surfaces of said field member, said armature comprising a relatively-narrow body portion and terminal portions having curved surfaces of substantially quadrant-extent each of said curved-surface terminal portions projecting approximately half of its extent to one side of said body portion in the direction of rotation of said armature and being of a differential radii offset adjacent to its leading edge from the arcuate surfaces of the field member and at its following edge being closely adjacent thereto, a circuit breaker having contact points positioned at the free ends of spaced parallel spring blades having their opposite ends clamped in fixed relationship to each other and an operating cam for said circuit breaker rotatable to positively move said contact points into engagement against the action of spring power in said spring blades and in timed relationship with said armature and also to provide a wiping contact during the closing movement of the contact points.

THADDEUS S. CASNER.