

Nov. 25, 1941.

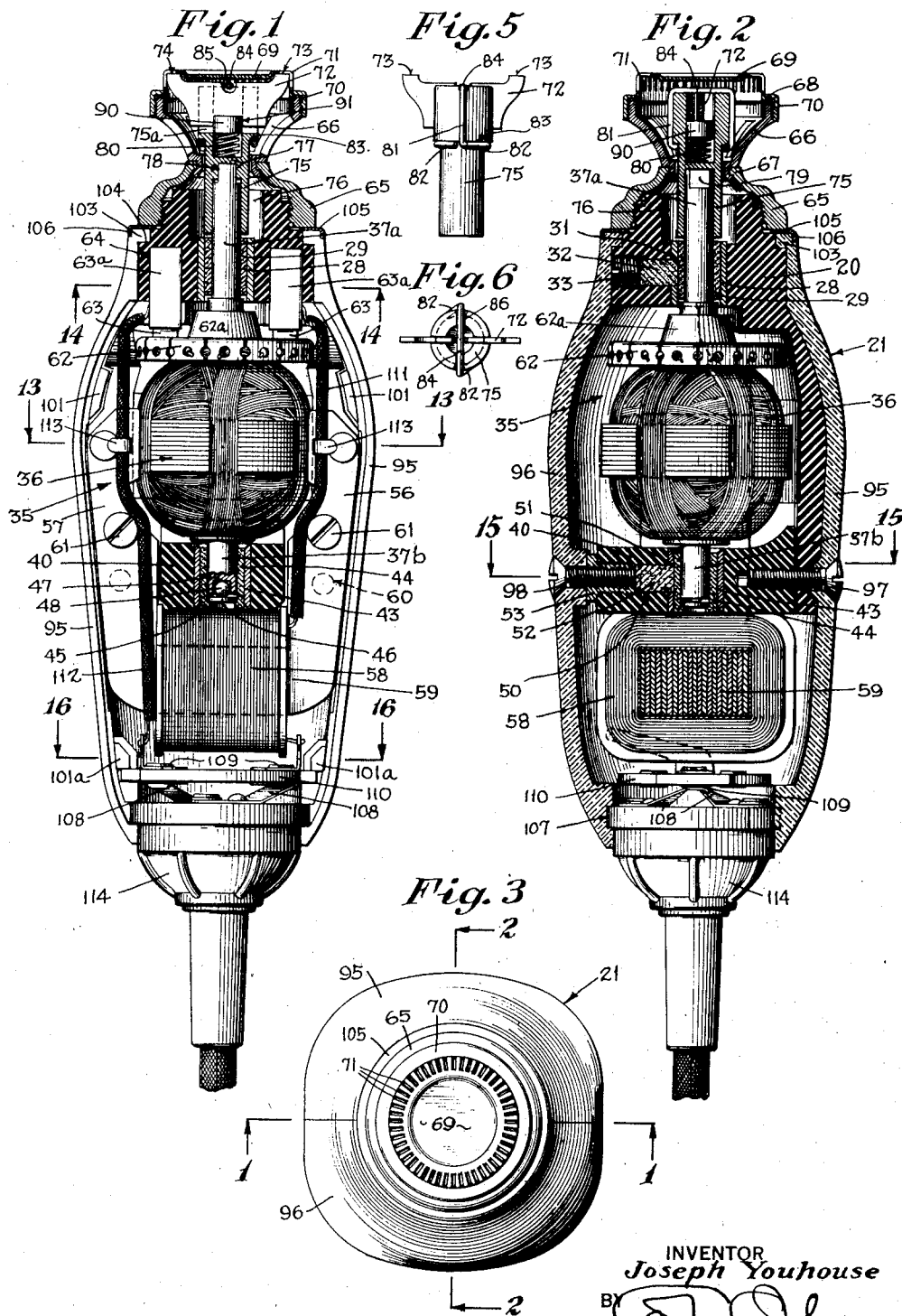
J. YOUHOUSE

2,264,033

MOTOR

Filed July 30, 1938

4 Sheets-Sheet 1



INVENTOR
Joseph Youhouse
BY *Samuel A. Johnson*
ATTORNEY

Nov. 25, 1941.

J. YOUHOUSE

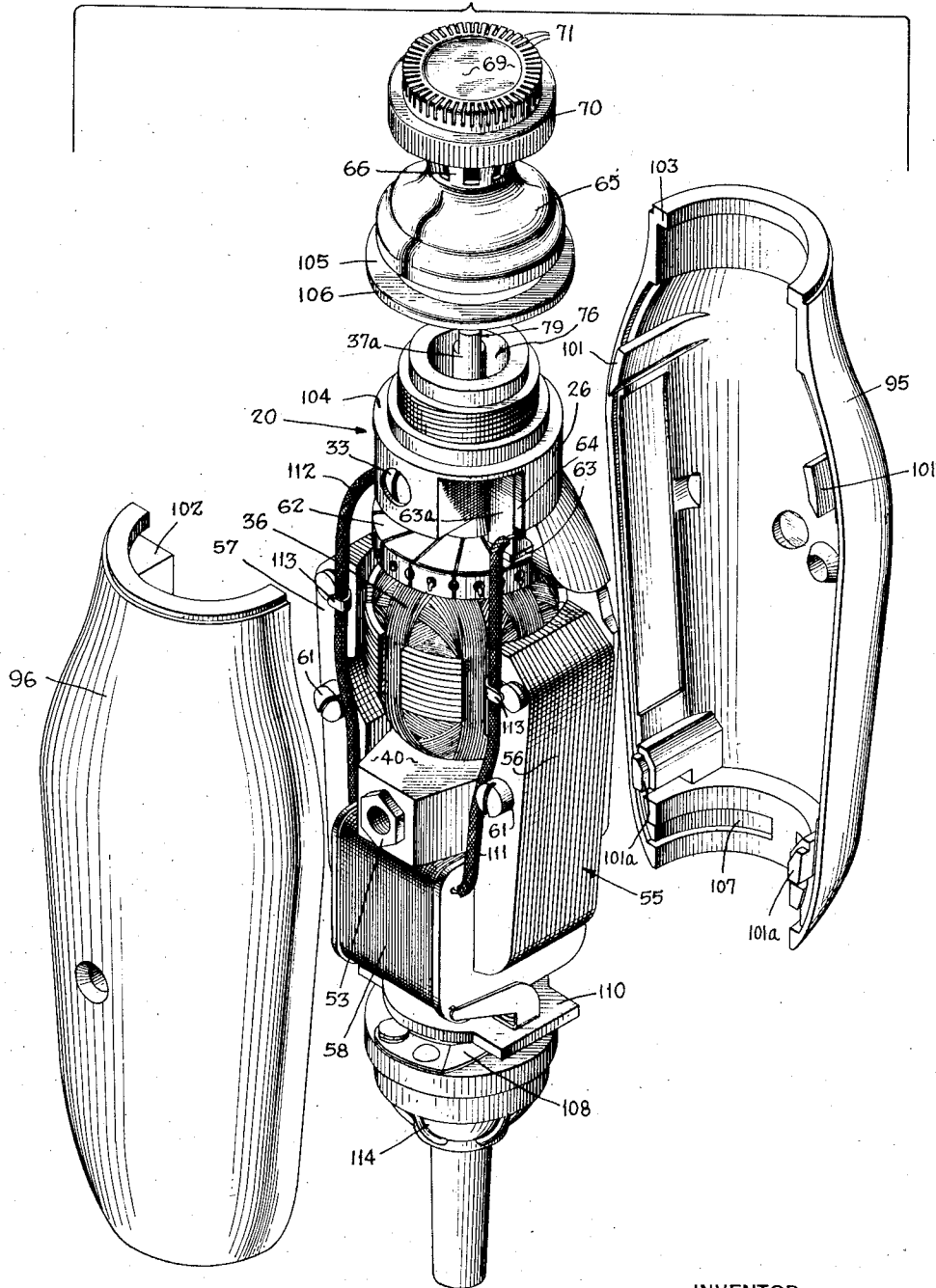
2,264,033

MOTOR

Filed July 30, 1938

4 Sheets-Sheet 2

Fig. 4



INVENTOR
Joseph Youhouse
BY *Samuel V. Johnson*
ATTORNEY

Nov. 25, 1941.

J. YOUHOUSE

2,264,033

MOTOR

Filed July 30, 1938

4 Sheets-Sheet 3

Fig. 7

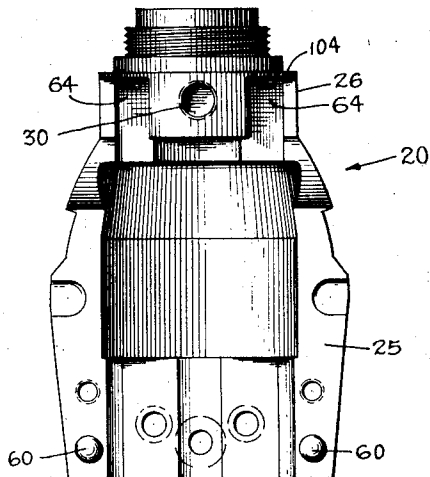


Fig. 8

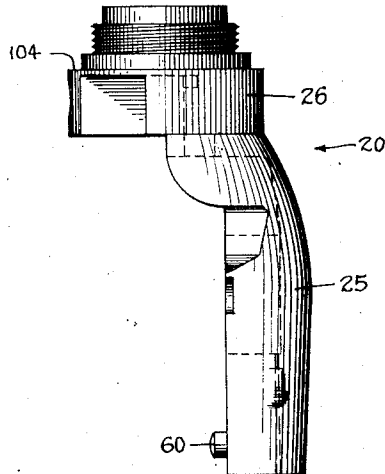


Fig. 9

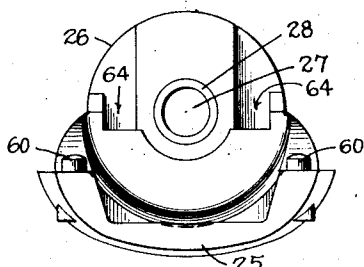


Fig. 10



Fig. 11

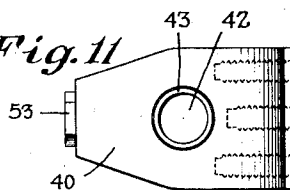


Fig. 12

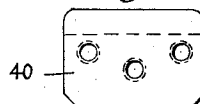
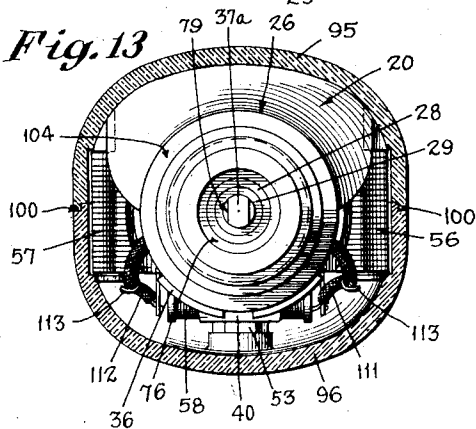


Fig. 13



INVENTOR
Joseph Youhouse
BY *Samuel J. Johnson*
ATTORNEY

Nov. 25, 1941.

J. YOUHOUSE

2,264,033

MOTOR

Filed July 30, 1938

4 Sheets-Sheet 4

Fig. 14

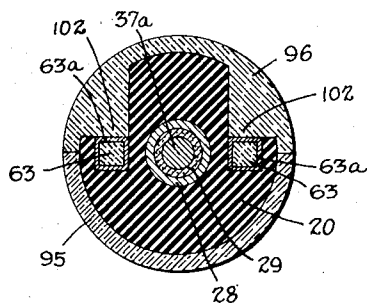


Fig. 15

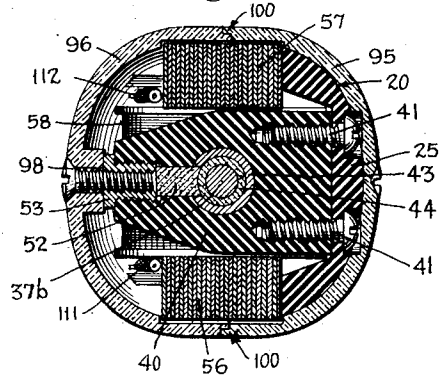
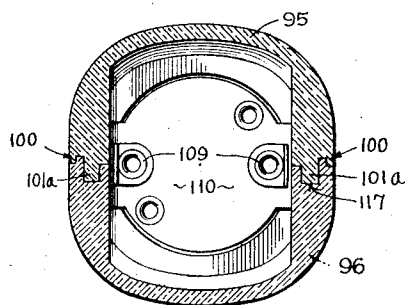


Fig. 16



INVENTOR
Joseph Youhouse
BY *[Signature]*
ATTORNEY

UNITED STATES PATENT OFFICE

2,264,033

MOTOR

Joseph Youhouse, Fairfield, Conn., assignor to
Casco Products Corporation, Bridgeport, Conn.,
a corporation of Connecticut

Application July 30, 1938, Serial No. 222,123

17 Claims. (Cl. 172—36)

This invention relates to shaving machines for personal use.

An object of the invention is to provide a shaving device which is sturdy and rugged in construction and which can be readily assembled with a minimum of operations.

A feature of the invention resides in the subframe construction on which is mounted the driving motor and the cutting means. The subframe assembly will carry the load of the operating parts and will relieve the casing from strain which would otherwise be imparted thereto were the operating parts mounted directly therein.

With the use of the subframe, the motor and cutting means can be assembled, and the assembled unit mounted in the casing of the shaving device as a unit. The casing of the shaving device is preferably a multipart casing of moldable material which completely surrounds the subframe and motor and forms a handle for the shaving device. The casing is secured to the subframe and held against relative rotation with respect thereto.

At the time when the casing is assembled about the subframe, a switch is disposed in the casing and held in proper relation thereto by the sections of the casing. The switch is rotatable on the casing and controls the circuit to the motor.

To prevent the sections of the casing from separating, a reinforcing ring is disposed around the outside of the casing and is locked in place to hold the casing sections against unintentional shifting with respect to one another.

As the casing which encloses the assembled unit is used as a handle, it is necessary that its diameter be maintained small so that it will not be unhandy to grasp in using the device.

In order to make the unit as compact as possible so that it will not make the handle of the razor of too large a diameter, a novel motor construction is employed in which a U-shaped field structure is carried by the subframe and the armature is mounted on the subframe between the legs of the U.

Space is further conserved by providing the armature with a flat disk-shaped commutator, and locating the brushes cooperating with the commutator, on the subframe so as to extend parallel to the axis to the armature shaft and thus reduce the width of that part of the assembly.

The cutting means is mounted on the end of the subframe and includes a casing having a fixed cutting blade or perforated head removably secured thereto. A cutting blade is mounted

within the head and coupled to the end of the motor shaft to be rotated thereby and cooperate with the fixed blade to sever hairs extending therethrough.

Other features and advantages of the invention will be apparent from the specification and claims when taken in connection with the drawings, in which:

Figure 1 is a longitudinal sectional view of the casing and subframe, taken along line 1—1 of Fig. 3.

Fig. 2 is a longitudinal sectional view of the casing and support, taken along line 2—2 of Fig. 3.

Fig. 3 is a top plan view of the device.

Fig. 4 is an exploded view of the device.

Fig. 5 is a side elevational view of the cutter blade and the coupling means therefor.

Fig. 6 is a top plan view of the cutter blade and coupling means.

Fig. 7 is a front elevational view of the base member of the subframe.

Fig. 8 is a side elevation of the base member of the subframe.

Fig. 9 is a bottom plan view of the base member of the subframe.

Fig. 10 is a side elevational view of the removable portion of the subframe.

Fig. 11 is a top plan view of the same.

Fig. 12 is an end view of Fig. 10, looking from the right.

Fig. 13 is a sectional view of the casing taken along line 13—13 of Fig. 1, showing the subframe in position therein.

Fig. 14 is a transverse section taken on the line 14—14 of Fig. 1.

Fig. 15 is a transverse section taken on the line 15—15 of Fig. 2.

Fig. 16 is a transverse section taken on line 16—16 of Fig. 1.

The shaving device of the present invention comprises a skeleton subframe 20 adapted to carry the moving parts of the shaving device, and a casing 21 surrounding the subframe and forming a handle for the device, whereby it can be grasped and manipulated during the shaving operation. Inasmuch as the subframe carries the moving parts, it will take the strain incident to the operation thereof, and the casing can be made of "Tenite" or other suitable moldable material which can be readily molded to form an attractive handle.

The subframe, as shown in Figs. 7 through 12, comprises a base portion 25 having at one end thereof a collar 26. The collar is preferably

formed integrally with the base portion and is provided with an axial bore 27 in which is positioned a metallic sleeve 28, preferably brass, carrying a bearing 29.

The bearing is of the self-lubricating type and is made of a metal alloy or other material which will absorb a lubricant. The lubricant may be supplied to the bearing in any desired manner. In the preferred form of the invention, the collar 26 is provided with a transverse bore 30 terminating in an aperture 31 in the sleeve 28. A wick 32 is saturated with a lubricant and is disposed in the bore and aperture so that it engages the surface of the bearing 29. The transverse bore is closed after the wick has been inserted therein by a plug 33 threaded therein.

The shaving device of the present invention is powered by an electric motor 35. The armature 36 of the motor has a drive shaft or armature shaft projecting from each end thereof. One end 37a of the shaft is adapted to be received in the bearing 29 in the collar and to project therethrough as shown in Figs. 1 and 2. The other end 37b of the shaft is supported in a bearing carried by a lug 40 extending transversely of the razor and secured to the other end of the base portion of the subframe by a pair of screws 41. The lug is provided with a central aperture 42 which, when the lug is secured to the base portion of the subframe, is in alignment with the bore in the collar, and has a metal sleeve 43 therein which carries a bearing 44 adapted to receive the end 37b of the armature shaft.

The lug not only supports the end of the shaft for rotation, but it also carries the thrust of the shaft. To accomplish this, the bearing of the illustrated form of the invention is provided with a shoulder 45 at its lower end to receive and support a thrust plate 46. The lower end 37b of the armature shaft is provided with a recess 47 in which is mounted a ball bearing 48 adapted to rest on the thrust plate when the shaft is in place. The bearing 44 is made of material similar to bearing 29 and is lubricated in a similar manner, the lug 40 having a bore 50 extending from the end thereof and terminating in an aperture 51 in the sleeve 43. A wick 52 containing lubricant is disposed in the sleeve and held in contact with the bearing by a bushing 53.

In assembling the armature on the subframe, the end 37a of the armature shaft is inserted in the bearing 29 in the collar portion 26 of the subframe. The bearing 44 in the lug portion is then positioned over the end of the armature shaft and the lug is secured to the base portion of the subframe. With the lug secured in place, the armature will be firmly held on the subframe. If desired, the bearings can be of the self-aligning type and thus greatly facilitate assembly of the motor and subframe.

In order to make the razor compact so that the handle portion thereof will not be too large, several novel features have been employed in the motor. One of these features resides in the field structure for cooperating with the armature to complete the motor. In the preferred form of the invention, a field structure 55 is formed with a substantially U-shaped field piece, with the legs 56, 57 thereof extending longitudinally of the axis of the razor, and is provided with a field coil 58 surrounding the bow 59 of the U. The field piece is located with respect to the subframe by a pair of locating pins 60 on the subframe and is secured in place by a pair of screws 61. When the field piece is so located and secured to

the subframe, the legs of the U will be substantially parallel to the shaft of the armature, and the field coil will be disposed at one end of the motor instead of at the sides thereof as is in the usual motor construction so that the motor has a minimum diameter.

Another feature of the motor which tends to reduce its diameter resides in the novel commutator and brush construction. Instead of having the usual cylindrical commutator with the radially extending brushes, the present preferred form of the invention employs a flat disk-shaped commutator 62 secured to the end 37a of the shaft by a bushing 62a of insulating material secured to the commutator. The wires of the armature coils are connected to the commutator segments in the usual manner. A pair of brushes 63, cooperating with the flat face of the commutator, are disposed in holders 63a positioned in pockets 64 and the collar portion of the subframe, as shown in Figs. 1 and 4, so as to extend parallel to the axis of the armature shaft.

With the armature and field thus rigidly mounted on the subframe, any strain set up by the rotation of the motor will be carried by the subframe.

The subframe may be of any desired material, but preferably it is molded from Bakelite, or a similar hard moldable material, and the sleeves 28 and 43 are molded in the collar and lug at the time when they are made.

The subframe of the present invention not only carries the motor but is adapted to have the cuttings means mounted thereon. As shown in Figs. 1 and 2, the drive shaft of the motor extends beyond the collar and is adapted to drive the cutting means of the razor. The cutting means of the present invention comprises a substantially truncate collar 65 adapted to be threaded to the reduced end of the collar 26 of the subframe, and has an outwardly flared casing 66 secured to a reduced neckportion 67 of the collar 65 so as to extend outwardly thereof and form a hollow casing surrounding the drive shaft.

The outer face of the hollow casing supports an outwardly projecting flange 68 of a thin cutter head 69 which is locked to the casing by a flanged ring 70, as clearly shown in Figs. 1 and 2. The cutter head is provided with a plurality of hair-receiving apertures 71, herein disclosed as radial slots extending through the face and side wall of the cutter head.

Within the cutter head is mounted a cutter blade 72 shaped so as to present cutting surfaces 73, 74 which cooperate with the slots in the cutter head to sever hairs extending therethrough upon relative rotation of the blade with respect to the head. The cutter blade is coupled to the drive shaft for rotation therewith. In the preferred form of the invention, the coupling means comprises a sleeve 75 adapted to fit over the end 37a of the armature shaft or drive shaft and extend into a recess 76 formed in the collar. The sleeve has a tight fit with the armature shaft, and is provided with a transverse wall 77 having a socket 78 formed therein to receive the end of the drive shaft. The end of the drive shaft is provided with flat sides 79 and the socket is correspondingly shaped so as to provide a positive drive connection between these two elements.

Upon rotation of the coupling sleeve, the cutter blade, which is mounted in an open transverse slot 75a in the upper end of the sleeve, will

be driven through the engagement of the walls of the slot with the blade.

As is usual in razor constructions, the cutter blade is yieldingly urged into engagement with the removable cutter head by a spring 80. In order to prevent the cutter blade from becoming separated from coupling member under the urge of the spring when the head is removed as in prior constructions, means which are disclosed and claimed in copending application Serial No. 226,655, filed August 25, 1938, have been utilized for engaging the outer surface of the cutter blade to limit its outward movement. This means comprises a spring clip 81 having its ends 82 engaging a shoulder 83 formed on the coupling member with the middle portion 84 extending transversely across the blade. Preferably, the blade is provided with a notch 85 in the upper surface thereof for receiving the portion 84.

With the device of the present invention, when the head is removed, the blade will be moved until it engages the portion 84 and will be held in position on the coupling member. The end of the coupling member can be provided with notches 86, if desired, which will prevent the spring clip from rotating on the coupling member and will hold the portion 84 so that it will always extend transversely of the blade.

It is to be understood that the spring clip will not in any way prevent the blade from moving into engagement with the cutter head for cooperation therewith and that the yielding clip can be readily manipulated, when desired, so that the blade will be released.

Also, as described and claimed in said copending application, means have been provided to prevent the blade from unintentionally moving sideways and becoming disengaged from the coupling member. A blade-engaging element 90 is slidably mounted in the bore in the coupling member and is disposed between the spring 80 and the blade. As shown in Figs. 1 and 2, the member is received by a slot 91 in the undersurface of the blade. The element is of a diameter which is slightly smaller than the width of the slot in the blade, so that the blade, while held against slipping sideways out of the slot, is permitted a limited lateral movement whereby it can readily align itself with the cutter head so as to be in proper position with relation to the slots therein to cooperate therewith to sever hairs extending through the slots.

The subframe and motor mounted thereon are completely enclosed by the casing 21. In the preferred form of the invention, the casing is made up of two parts 95, 96. The part 95 is secured to the subframe by a screw 97 extending through the base portion thereof and into the lug 40. The part 96 is secured to the subframe by a screw 98 threaded into the bushing 53 secured to the end of the lug 40. Thus the lug, in addition to serving as a mounting for the end of the armature shaft, forms a connector for the two parts of the casing and reinforces the casing intermediate the length thereof against compressional strains.

The two sections have their adjoining surfaces formed with interfitting parts as shown in Figs. 4 and 13 and indicated at 100. This forms a dust-proof cover and also holds the parts in register. A plurality of projecting guides 101 and 101a are carried by the sections 95. The guides 101 lay in slots in the surface of the subframe as shown in Fig. 1 and are received by the section 96. The guides 101a are received in pockets 117

of section 96 as shown in Fig. 16. The guides 101, 101a and associated elements aid in the proper assembling of the casing.

The section 96 of the casing is provided with a pair of blocks 102, one of which is shown in Fig. 4, which are adapted, when the section is in place, to fit into and close the pockets 64 in the collar portion of the subframe in which the brushes 63 for the commutator are located as shown in Fig. 14.

The two sections 95, 96 are provided at their upper ends with an inwardly projecting flange 103 which snugly engages a shoulder 104 formed on the collar 26 adjacent the collar 65.

To prevent the parts of the casing from separating, a ring 105 is disposed about the outside surface thereof. Preferably, this ring has a flange 106 and is disposed over the flanged end of the casing and is clamped in place by the truncated collar 65 of the cutting member, when the latter is threaded on the end of the collar 26 on the subframe.

A switch means of the type described in copending application Serial No. 208,512, filed May 18, 1938, is rotatably mounted in suitable grooves 107 in the casing. The switch broadly has a pair of contacts 108 which are movable into engagement with a pair of contacts 109 carried by a fixed contact plate 110 and completes the circuit to the motor, one of the fixed contacts being connected to the field coil 58, which is connected to one of the brushes by a conductor 111, and the other fixed contact is connected to a conductor 112 from the other brush, as shown in Fig. 1. The switch has an actuator 114 which projects from the end of the casing and serves to control the operation of the motor.

The conductors 111, 112 are held in place on the subframe assembly by a pair of clips 113, so that the danger of the conductors engaging the rapidly rotating armature is eliminated.

In assembling the device, it will be seen that the motor and cutting means can be assembled on the skeleton subframe, which is made of durable moldable material, to form a unit, and the unit as a whole can then be inserted into the casing. This is advantageous inasmuch as the moldable casing, when used as a foundation for assembling the moving parts of the razor, often becomes cracked and broken during the assembling operation.

The subframe not only serves as a base for the assembling of the unit, but also serves to reinforce the handle against compressional strains.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a portable motor driven device, a drive motor; a subframe for supporting the motor; a multipart casing secured to the subframe and enclosing the same; and a locking ring engaging the outer surface of the multipart casing to hold the sections of the casing against separation.

2. In a portable motor driven device, an elongate casing of generally oval form, said casing having a reduced portion adjacent one end thereof forming a gripping surface; a motor mounted within the casing and having an armature shaft extending longitudinally of the casing, said shaft forming a tool-carrying member projecting exteriorly of the casing adjacent the gripping surface thereof; a disk commutator for the motor disposed within said casing adjacent the reduced end thereof; and brushes cooperating with the

face of the disk commutator and extending parallel to the longitudinal axis of the casing.

3. In a portable motor driven device, a skeleton frame having a base portion provided with an integral collar at one end of the base portion and a removable lug at the other end; coaxial bearings in the lug and collar; and a motor mounted on the frame, said motor having an armature shaft mounted in the bearings and a field structure mounted on the base portion on the frame.

4. In a portable tool having a driving motor therein; a skeleton frame supporting the armature and field of the motor in fixed relative positions; a casing enclosing the skeleton frame; a tool secured to one end of the skeleton frame and exposed exteriorly at one end of the casing; and a switch means for controlling the motor held in place by the casing.

5. In a portable motor driven device, a skeleton frame having a base portion provided with an integral collar at one end of the base portion and a removable lug at the other end; coaxial bearings in the lug and collar; and a motor mounted on the frame, said motor having an armature shaft, the opposite ends of which are mounted in the bearings, the one end of the shaft extending beyond the end of the collar and forming a tool-carrying member.

6. In a portable motor driven device, a drive motor; a skeleton frame supporting the armature and field of said motor in fixed relative positions; a multipart casing enclosing the skeleton frame; a flanged ring engaging the outer surface of the multipart casing; and a tool secured to one end of the skeleton frame and locking the flanged ring in place.

7. In a portable motor driven device, a skeleton frame having a base portion provided with a collar at one end; an axial bearing in the collar; an armature having a shaft, one end of the shaft being disposed in the bearing in the collar; a lug having a bearing therein secured to the other end of the base portion with the bearings in alignment with the bearing in the collar and receiving the other end of the armature shaft; and a field structure secured to the base portion of the frame and extending into cooperative relation with the armature.

8. In a portable motor driven device, a skeleton frame having a base portion provided with a collar at one end; an axial bearing in the collar; an armature having a shaft, one end of the shaft being disposed in the bearing in the collar; a lug having a bearing therein secured to the other end of the base portion with the bearing in alignment with the bearing in the collar and receiving the other end of the armature shaft; a field structure secured to the base portion of the frame and extending into cooperative relation with the armature; and a two-part casing secured to the skeleton frame and enclosing the same.

9. In a portable motor driven device, a skeleton frame having a base portion provided with a collar at one end; an axial bearing in the collar; an armature having a shaft, one end of the shaft being disposed in the bearing in the collar; a lug having a bearing therein secured to the other end of the base portion with the bearing in alignment with the bearing in the collar and receiving the other end of the armature shaft; a field structure secured to the base portion of the frame and extending into cooperative relation with the armature; a two-part casing secured to the skeleton frame and enclosing the same; and a switch rotatably carried by the two-part casing for con-

trolling the motor comprising said armature and field structure.

10. In a portable motor driven device, a skeleton frame having a base portion provided with a collar at one end; an axial bearing in the collar; an armature having a shaft, one end of the shaft being disposed in the bearing in the collar; a lug having a bearing therein secured to the other end of the base portion, the bearing in the lug being in alignment with the bearing in the collar and receiving the other end of the armature shaft; and a field structure secured to the base portion of the frame and extending into cooperative relation with the armature.

11. In a portable motor driven device, a skeleton frame having a base portion provided with a collar at one end; an axial bearing in the collar; an armature having a shaft, one end of the shaft being disposed in the bearing in the collar; a lug having a thrust bearing therein secured to the other end of the base portion with the thrust bearing in alignment with the bearing in the collar and supporting the other end of the shaft; and a field structure secured to the base portion of the frame and extending into cooperative relation with the armature.

12. In a portable motor driven device, a drive motor; a subframe, said drive motor being secured to and supported by the subframe; and a multipart casing surrounding the subframe and having means on at least one part thereof engageable with cooperating means on the other part thereof for guiding the parts during assembly and preventing relative movement between said parts, said means also engaging the subframe to guide the casing into proper position therewith during assembly.

13. In a portable motor driven device, a motor; a shaft driven by said motor; a subframe for supporting the motor and having an integral collar projecting at one end thereof; an axial bearing fixed in said collar and supporting one end of said shaft; a bearing secured to the opposite end of said subframe and supporting the other end of said shaft; a multipart casing enclosing the subframe; and a tool head secured to said projecting collar.

14. In a portable motor driven device, a motor; a shaft driven by said motor; a subframe for supporting the motor having a threaded collar projecting from one end thereof; an axial bearing fixed in said collar and supporting one end of said shaft; a bearing secured to the opposite end of said subframe and supporting the other end of said shaft; a multipart casing enclosing the subframe with the collar thereof projecting exteriorly of the casing; and a tool head threaded onto said projecting collar.

15. In a portable motor driven device, a motor; a shaft driven by said motor; a subframe for supporting the motor and having an integral collar projecting at one end thereof; an axial bearing fixed in said collar and supporting one end of said shaft; a bearing secured to the opposite end of said subframe and supporting the other end of said shaft; a multipart casing enclosing the subframe; a flanged ring circumscribing the multipart casing and having a portion engaging the outer surface thereof; and a tool head secured to said projecting collar and locking the flanged ring in place.

16. In a portable motor driven device, a motor; a subframe supporting the armature and field structure of said motor in fixed relative position; a threaded collar projecting from one end of the

frame; a bearing secured in said collar and supporting one end of the armature shaft; a multi-part casing enclosing the subframe with the threaded collar of the frame projecting at one end thereof; a ring circumscribing the collar and having a flange engaging the outer surface of the casing; and a tool head secured to the projecting collar of the frame for locking the flanged ring in place, said head cooperating with a tool secured to the end of the shaft supported by said bearing.

17. In a portable motor driven device, a sub-

5 frame provided with an integral collar at one end thereof; a removable lug disposed at the other end of said frame; coaxial bearings carried by the lug and collar; a motor mounted on said frame having an armature shaft, the opposite ends of which are supported by said bearings; a two-part casing surrounding said frame and enclosing the same and said motor; and means for securing the two parts of the casing together about said frame, said means including 10 screws threaded into opposite sides of said lug.

JOSEPH YOUHOUSE.