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Daniels

[11] **3,714,711**

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[54] **CUTTER DRIVE MEMBER MEANS FOR ELECTRIC DRY SHAVER**

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[52] **U.S. Cl.** **30/43.92**

[51] **Int. Cl.** **B26b 19/10**

[58] **Field of Search**..30/43, 43.3, 43.9, 43.91, 43.92, 30/346.51

[56] **References Cited**

UNITED STATES PATENTS

3,191,299	6/1965	Locke	30/43.92
3,365,796	1/1968	Tolmie et al.	30/43.92
3,504,433	4/1970	Futterer	30/43.92
3,590,482	7/1971	Carr	30/43.9

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[57] **ABSTRACT**

An electric dry shaver having a cutter head comprising a stationary and a movable cutter, a drive member for said movable cutter, and a motor for effecting operation of said drive member. Means are provided for mounting the drive member on the motor and which means include a plate member secured to the motor housing and detachable clamp means provided for detachably securing the drive member to the plate.

3 Claims, 5 Drawing Figures

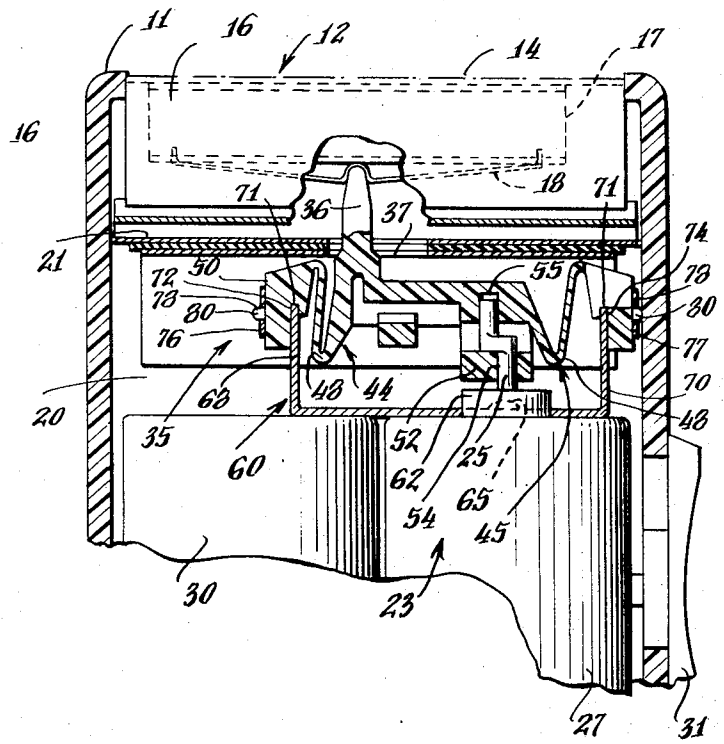


Fig. 1.

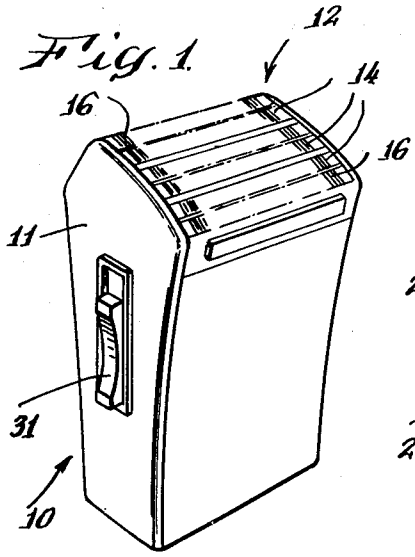


Fig. 2.

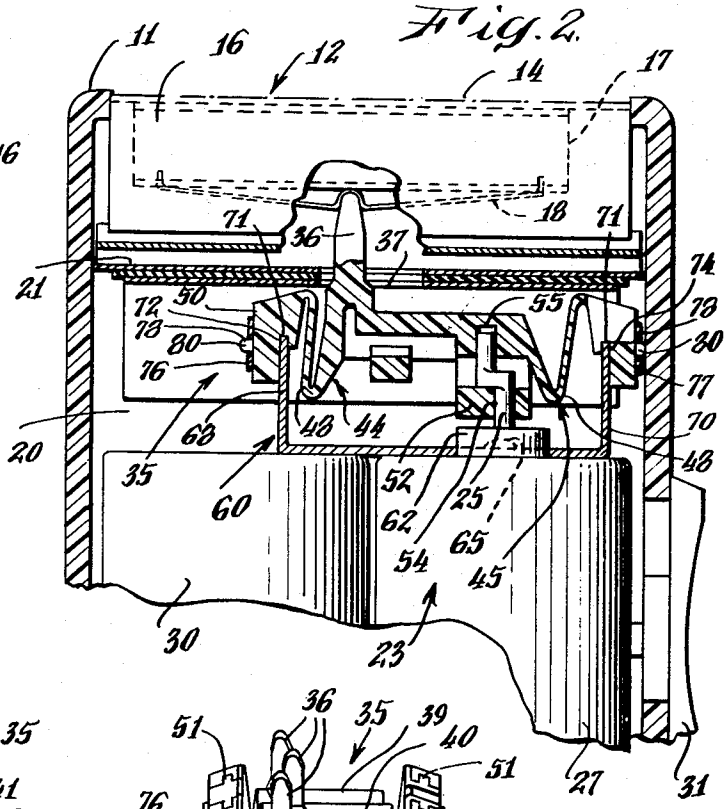


Fig. 4.

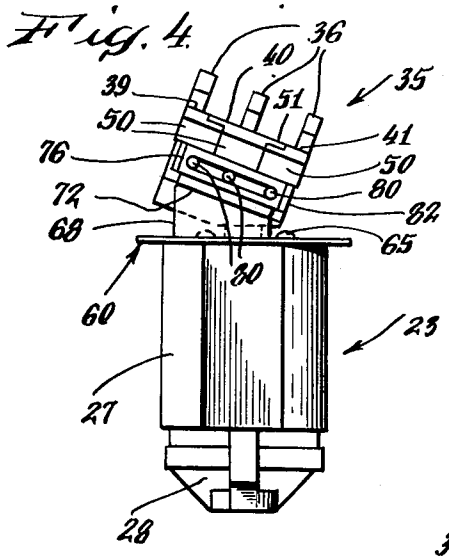


Fig. 3.

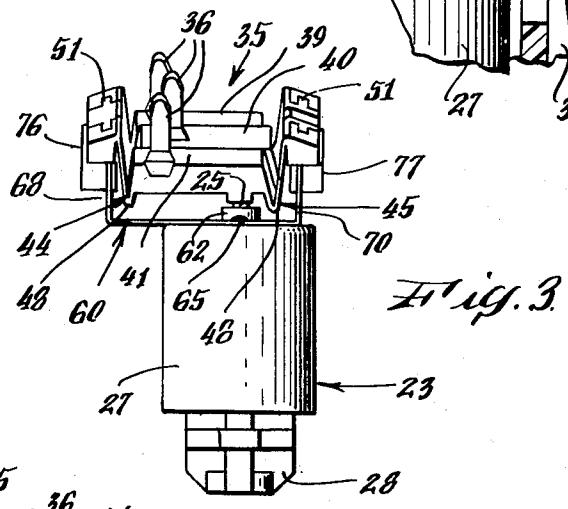
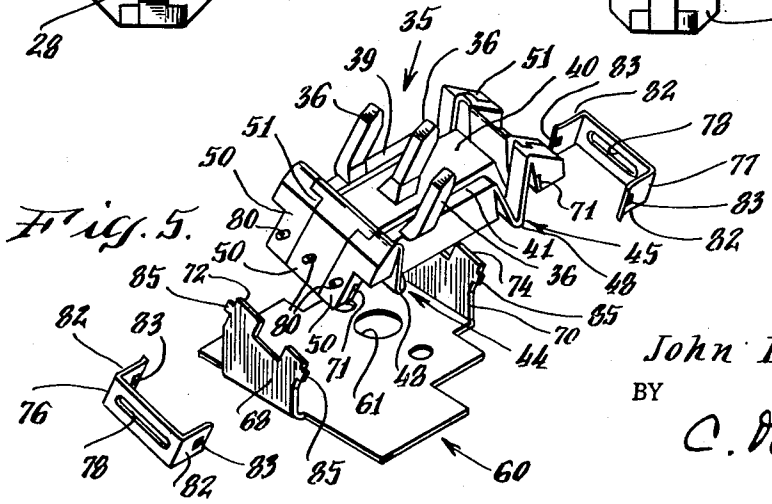


Fig. 5.



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CUTTER DRIVE MEMBER MEANS FOR ELECTRIC DRY SHAVER

BACKGROUND OF THE INVENTION

This invention relates to new and useful improvements in electric dry shavers and more particularly to means for mounting a cutter drive member in operative position within a shaver casing.

It is well-known to provide cutter drive members within an electric dry shaver casing. These members are interposed between the cutter head and the shaver motor and are adapted to transmit and/or translate motion from the shaver motor to the movable cutter member of the cutter head. One type cutter drive member which has proven satisfactory in use is shown in U.S. Pat. No. 3,365,796 to Robert J. Tolmie, et al., dated Jan. 30, 1968. A cutter drive member of the mentioned patent includes a main movable body portion comprised of a plurality of movable parallel surfaces each having a drive arm engaging a movable cutter of a cutter head assembly having a plurality of movable cutters equal in number to the movable surfaces. The drive surfaces of the drive members are each arranged parallel to a movable cutter and connected to the motor driven operating means. The latter includes an eccentric means for reciprocating the plurality of surfaces and their associated movable cutters in opposite direction. The opposite ends of the surfaces are provided with flexible leg portions arranged in supporting structure provided in the walls of the shaver casing.

Although these drive members have proven effective to provide true linear reciprocating motion of the movable cutters, various problems are presented in that relatively complex casing structure is needed for maintaining the cutter drive members in operative position in that additional wall structure is required within the casing having molded thereon suitable supports for receiving the ends of flexible leg portions of the drive member. To avoid providing this wall structure the end bell of the motor has been provided with specially formed support structure for drive members of this general type such as in the manner disclosed in U.S. Pat. No. 3,191,299 to David R. Locke, dated June 29, 1965. These latter type arrangements have proven suitable; however, for each different motor there is required a different shaped end bell resulting in design limitations in the manufacture of an electric dry shaver.

It is an object of the present invention to provide novel means for supporting a cutter drive member within an electric dry shaver.

Another object is to provide novel means for detachably securing a cutter drive member to the motor driven operating means whereby the member is readily attached and detached from the motor housing.

Another object is to provide a novel and economical mount for a cutter drive member whereby the cutter drive arms thereof can be arranged in any selected plane relative to the cutter operating means in accordance with the particular casing configuration of the shaver.

A still further object is to provide novel means for mounting a cutter drive member on an electric dry shaver motor wherein a novel clamp arrangement is provided for maintaining a plurality of driven surfaces of the drive member in operative position.

SUMMARY OF THE INVENTION

The present invention contemplates an electric dry shaver having a cutter head provided with at least one movable cutter, a drive member for said movable cutter, and a motor having operating means for effecting movement of the drive member to move the movable cutter. A plate member is secured to the motor and is formed with flange portions upon which is seated the opposite end portions of the cutter drive member and which end portions comprise flexible leg members adapted to be flexed in a plane of movement of the movable cutter upon operation of the motor operating means. Clamp means are provided at the opposite ends of the plate member for detachably securing the leg portions of the drive member to the flange portions of the plate member.

The above and other objects and advantages of the present invention will appear more fully hereinafter from a consideration of the detailed description which follows taken together with the accompanying drawing wherein an embodiment of the invention is illustrated.

DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of an electric dry shaver incorporating the present invention;

FIG. 2 is a fragmentary partial cross-sectional view of the electric dry shaver of FIG. 1 taken longitudinally through the cutter drive member and showing portions of the interior of the shaver;

FIG. 3 is a front elevational view of the motor and cutter drive member removed from the electric dry shaver casing;

FIG. 4 is a side elevational view of the motor and cutter drive member; and

FIG. 5 is an exploded perspective view of the cutter drive member and mounting plate therefor.

DETAILED DESCRIPTION

Referring now to the drawings for a more detailed description of the present invention and more particularly to FIGS. 1 and 2, the reference numeral **10** generally indicates an electric dry shaver having a casing **11** which includes in the upper portion thereof (FIGS. 1 and 2) a cutter head assembly **12**. Cutter head assembly **12** is of a known type structure and comprises three individual and identical cutter head units **14** of the general type shown and described in U.S. Pat. No. 2,793,430 to L. C. Carissimi dated May 28, 1907. Each cutter unit as partially shown in FIG. 2 includes an elongated stationary outer cutter **16** in which is disposed a movable inner cutter **17** to which is attached a leaf spring **18** for urging inner cutter **17** into cooperative cutting position with outer cutter **16**.

As seen in FIG. 2 a motor compartment **20** is provided within casing **11** beneath wall portion **21** and has provided therein a motor **23** of a usual type structure having a rotatable drive shaft **25** which projects through the upper surface of motor housing **27** which comprises a cylindrical metal member having an end bell **28** provided at the base thereof. A battery **30** partially shown in FIG. 2 for providing a source of power for energizing motor **23** upon manipulation of the switch member **31** in a usual and well-known manner is disposed adjacent motor **23** in motor compartment **20**.

A cutter drive member 35 is provided on motor 23 and which drive member 35 is formed of premolded plastic material and includes a plurality of cutter actuating arms 36 each engaged with an inner cutter 17 of cutter head assembly 12 (as seen with respect to one cutter 17 in FIG. 2) for reciprocating the cutter upon operation of the motor 23. As seen in FIGS. 3 and 5 cutter drive member 35 includes three portions 39, 40 and 41 with each of said portions provided with a pair of depending leg portions 44 and 45. As shown with respect to one portion 40 in FIG. 2 flexible leg members 44 and 45 include and extend V-shaped flexible joint 48 having one arm depending from the portion 40 and the other connected to an end block 50. Portion 40 is disposed between outer portions 39 and 41 and as shown includes a separate member interlocked to portions 39–41 by dove-tail connections 51.

An interconnecting drive element 52 partially shown in FIG. 2 of the type shown in the mentioned U.S. Pat. No. 3,365,796 interconnects portions 39 – 41 is connected in driving engagement with eccentric 54 of motor drive shaft 25 which has its free end in driving engagement at slot 55 with portion 40 whereby in operation the portions 39–40–41 are driven in out of phase relationship.

As mentioned the feature of the present invention is to provide novel means for mounting cutter drive member 35 on motor 23. To this end a generally rectangular-shaped plate 60 (FIGS. 2–5) is disposed over the upper portion of motor housing 27. An aperture 61 is provided in the base of the plate 60 which fits over bearing portion 62 of motor 23. Plate 60 is secured to housing 27 by rivots 65. The opposite end portions of plate 60 comprise upwardly extending flanges 68 and 70 respectively. Seats 71 are formed in block end surfaces 50 of cutter drive portions 39, 40 and 41 (as shown with respect to portion 40 in FIG. 2) which are seated on flanges 68–70 to locate the drive member thereon. The upper edges of flanges 68–70 designated 72 and 74 respectively (FIG. 5) are inclined relative to the base of the plate 60 thereby presenting drive member 35 at an angle thereto.

Clamp means including a pair of spaced clamp members 76 and 77 are provided for securing cutter drive member 35 to flanges 68 and 70. Each clamp 76–77 is provided with an elongated slot 78 in the bite portion thereof that fits over bosses 80 (FIGS. 4 and 5) provided in end blocks 50. The detenting opposite ends 82 of each clamp 76–77 are provided with apertures 83 which are snap fitted over projections 85 on flanges 68–70 thereby securely detenting cutter drive member 35 in position on plate member 60.

As will be appreciated cutter drive member 35 is readily removable from flanges 68 and 70 by detaching clamp members 76–77.

It will be apparent from the foregoing description that the novel means for mounting the cutter drive member 35 on motor 23 has many advantages in use. One advantage is the fact that no additional casing wall structure is provided within the casing or motor housing for mounting the drive member. The novel clamp means for attaching the cutter drive member provides ready means for assembling the cutter drive member to the shaver and for removing the same when necessary. As will be appreciated a further advantage is that motor 23 and cutter drive member 35 can be removed as an operable unit from shaver 10 without disturbing other parts of the shaver.

Although one embodiment of the present invention has been illustrated and described in detail it is to be expressly understood that the invention is not limited thereto. Various changes can be made without departing from the spirit and scope of the invention as the same will now be understood by those skilled in the art.

What is claimed is:

1. An electric dry shaver comprising,
   a. a casing,
   b. a cutter head having at least one movable and one stationary cutter mounted on said casing,
   c. a cutter drive member in said casing for moving said movable cutter, said drive member having a drive portion adapted for movement in a reciprocating path,
   d. a motor for effecting operation of said cutter drive member to drive said drive portion in said reciprocating path,
   e. said drive member including laterally extending flexible leg portions, said leg portions being flexible relative to said drive portion,
   f. means for detachably mounting said drive member on said motor, said mounting means including a plate member and clamp means, said plate member secured to the motor and having flange portions, said leg portions respectively including seat means for positioning the drive member on said flange portions, said flange portions engaged with said flexible leg portions of said drive member, and said clamp means detachably securing said flexible leg portions to said flange portions, and
   g. said clamp means comprising a pair of spaced clamp members of U-shaped configuration each secured to one of said flange portions of the plate member, each of said clamp members having a bite portion and spaced arms, said bite portions respectively adapted to be mounted against one of the leg portions of the drive member, and the arms of each clamp member comprising portions adapted for grasping the side edges of said flange portions thereby detenting the leg portions of said drive member to said flange portions.

2. The shaver of claim 1 wherein securing means are provided on adjacent portions of the clamp members and drive member leg portions.

3. The shaver of claim 2 wherein said securing means includes a slot in said bite portion of each clamp member and a boss on each leg portion, each of said clamp members being positioned over the boss on the leg portion associated therewith.

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