April 12, 1966 J. C. BUFORD 3,245,145

TUBULAR TYPE ROTARY SHAVER

Filed Oct. 7, 1963 2 Sheets-Sheet 1

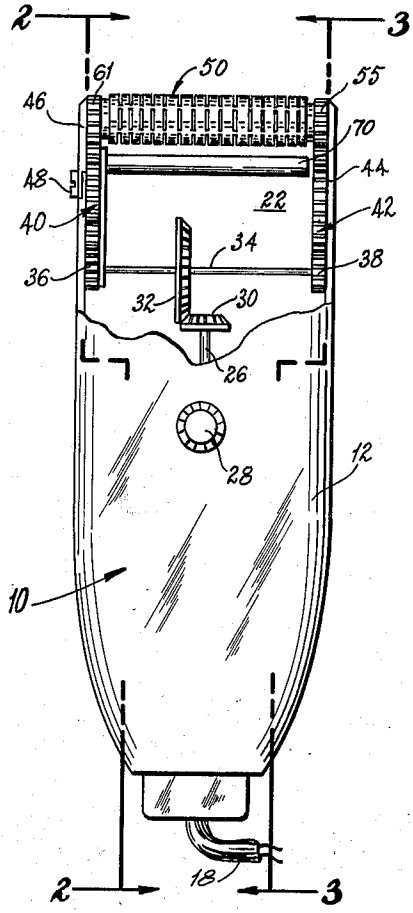


Fig. 1.

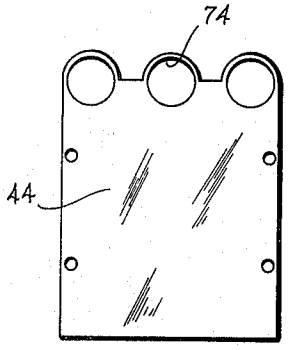


Fig. 7.

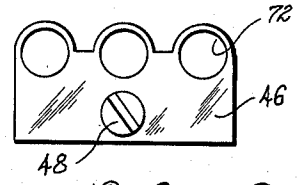


Fig. 8.

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TUBULAR TYPE ROTARY SHAVER

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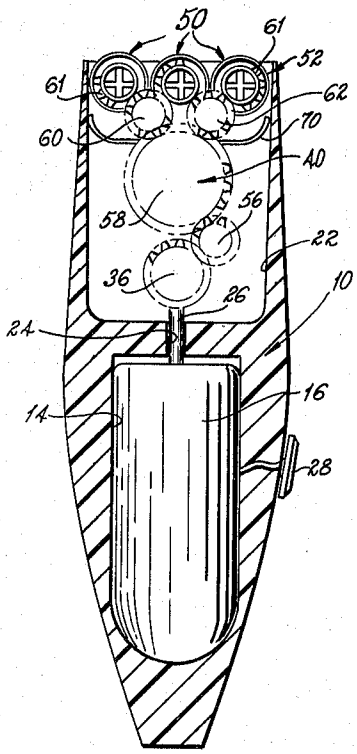


Fig. 2.

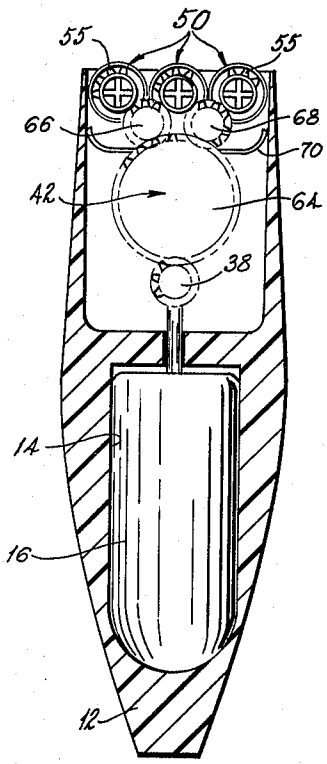


Fig. 3.

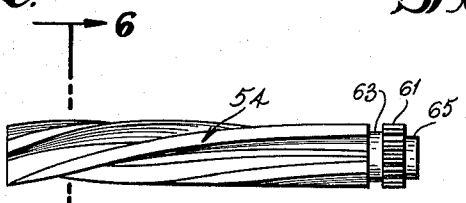


Fig. 4.

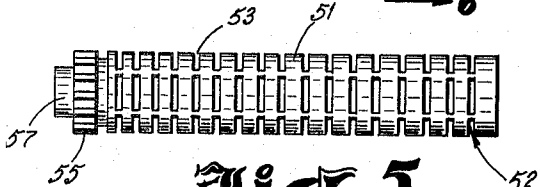


Fig. 5.

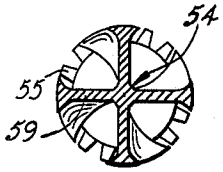


Fig. 6.

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TUBULAR TYPE ROTARY SHAVER

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2 Claims. (Cl. 30—43.5)

This invention relates to improvements in electric shaving devices and more particularly, but not by way of limitation, to a power driven rotary type shaving device.

Motor operated rotary type shaving devices are in wide spread use today and many have proven to be very efficient. One general type of rotary shaver includes a cutting element comprising an outer cylindrical member journalled in the shaver housing for rotation through physical contact with surface to be shaved as the cutting element is moved against the skin or face of the operator. In many instances an inner cutting member is provided having either a vibratory motion or is rotated about its longitudinal axis by the motor, or other power source. The rotation of the outer cylindrical is usually intermittent since the outer periphery thereof may slide along the skin in certain instances without rotating, and this results in a decreased cutting or shaving efficiency of the device.

The present invention contemplates a novel power driven shaver of the rotary type particularly designed and constructed for increasing the efficiency of a shaving operation. The novel shaving device is provided with a substantially cylindrical cutting element, or plurality of elements, having an outer cutter member rotatable in one direction and an inner cutter member rotatable in an opposite direction. The inner and outer cutting member, rotating in opposite directions about a common longitudinal axis, cooperate for efficiently shaving the hair during a shaving operation and substantially eliminate any uneven or intermittent rotation of the outer cutting head which is disposed against the skin or face of the operator while shaving.

It is an important object of this invention to provide a novel power driven shaving device of the rotary type particularly designed and constructed for increasing the efficiency of a shaving operation.

It is another object of this invention to provide a novel power driven shaving device of the rotary type having cutting elements cooperating in a manner to produce a greatly increased efficiency in a shaving operation.

Another object of this invention is to provide a novel power driven shaving device of the rotary type having cutting elements wherein one cutting member thereof is rotated in an opposite direction from another cutting element thereof for effectively cutting hair in a shaving operation.

Still another object of this invention is to provide a novel power driven shaving device of the rotary type which is simple and efficient in operation and economical and durable in construction.

Other objects and advantages of the invention will be evident from the following detailed description, read in conjunction with the accompanying drawings, which illustrate my invention.

In the drawings:

FIGURE 1 is a side elevational view of a shaving device embodying the invention with portions thereof broken away for purposes of illustration.

FIGURE 2 is an elevational view taken on line 2—2 of FIGURE 1.

FIGURE 3 is an elevational view taken on line 3—3 of FIGURE 1.

FIGURE 4 is an enlarged side elevational view of an inside cutter element of the invention.

FIGURE 5 is an enlarged side elevational view of an outer cutter element of the invention.

FIGURE 6 is a sectional view taken on line 6—6 of FIGURE 4.

FIGURE 7 is an elevational view of a side plate member of the invention.

FIGURE 8 is an elevational view of a removable side plate member on the invention.

Referring to the drawings in detail, reference character 10 generally indicates a shaving device comprising a suitable outer housing 12 which is preferably of a size and configuration particularly designed and constructed for ease of manual handling during a shaving operation, as is well known. The housing 12 may be provided with an internal chamber 14 for receiving a suitable electric motor 16, or the like, therein. As depicted herein, the motor 16 is of the usual electrical rotary type having the usual connector cord member 18 extending outwardly therefrom and through a bore (not shown) provided in the housing 12 whereby the cord 18 may be connected with a suitable source of electrical current, such as the normal house current, or the like. It is to be noted, however, that the motor 16 may be of any suitable type, such as battery actuated, or the motor may be remotely disposed with respect to the housing 12 and operably connected with the shaver 10 by means of a suitable connecting cable (not shown).

The housing 12 may be provided with a second internal chamber 22 disposed above the chamber 14, as viewed in the drawings. A substantially centrally disposed bore 24 extends between the chambers 14 and 22 whereby the drive shaft 26 of the motor or power supply 16 may extend into the chamber 22 for a purpose as will be hereinafter set forth. It is preferable to provide a suitable speed control switch 28 on the outer periphery of the housing 12 which is operably connected to the motor 16 in any well known manner whereby manipulation of the switch 28 will regulate the speed of the motor 16 as well as the motor on or off, as desired.

As hereinbefore set forth, the drive shaft 26 of the motor 16 extends into the chamber 22 and is provided with a suitable gear member 30 (FIGURE 1) at the upper end thereof in engagement with a complementary gear 32. As shown herein, the gears 30 and 32 are cooperating bevel gears for translating rotation from the drive shaft 26 to a shaft 34 which is disposed substantially perpendicularly to the shaft 26. The shaft 34 extends through the gear 32 and is suitably secured thereto for simultaneous rotation therewith and is provided with gear members 36 and 38 at the opposite ends thereof. The gear 36 drives a gear train, generally indicated at 40, and the gear 38 drives a second gear train, generally indicated at 42, for a purpose as will be hereinafter set forth. It is to be noted that whereas the particular embodiment of the invention depicted herein provides that both gear trains 40 and 42 are driven by the single motor 16, it may be desirable in some instances to provide a separate driving mechanism or power source for each gear train.

As particularly shown in FIGURE 7, a plate 44 is disposed on one side of the chamber 22 and may be integral with the housing 12 or substantially permanently secured thereto in any suitable manner (not shown) for supporting the gear train 42 in any well known manner. A second plate 46 is disposed on the opposite side of the chamber 22 and is removably secured to the housing 12 in any suitable manner, such as by a screw 48, or the like. The plate 46 supports at least a portion of the gear train 40 and is removable to permit access to the chamber 22 for a purpose as will be hereinafter set forth.

A plurality of cutting elements, generally indicated at 50, are journalled within the chamber 22 between the plates 44 and 46 in a manner as will be hereinafter set

forth. The cutting elements 50 preferably comprise an outer cutter member 52 and an inner cutter member 54. The gear train 40 drives the inner cutter head 54 and the gear train 42 drives the outer cutter member 52. Whereas three cutting elements 50 are depicted herein, it is to be understood that a single cutting element or substantially any desired number thereof may be utilized.

The outer cutter members 52 as depicted herein comprise a substantially cylindrical housing 51 provided with a plurality of slots 53 spaced both longitudinally and circumferentially therearound. The housing may be of a one piece construction or may comprise a plurality of individual cylinders disposed in end to end relation for independent rotation, either in the same directions or opposite directions. The slots 53 may be of any desired combination of shapes or forms as is well known in cutting elements of this general type. As depicted herein, the slots 53 are substantially straight and disposed substantially perpendicular to the longitudinal axis of the slot 51. It is to be understood, however, that the slots 53 of an angular disposition, such as a herring bone pattern, or may be substantially round apertures, or the like. In addition, a plurality of slightly raised longitudinally extending ridges (not shown) may be circumferentially spaced around the outer periphery of the cylinder 51 for facilitating picking up the hair during a shaving operation. A gear member 55 is disposed at one end of the cylinder 51 and is preferably slightly spaced from the slots 53, as clearly shown in FIGURE 5. The gear 55 may be integral with or rigidly secured to the cylinder 51, as desired, and an axially extending hub member 57 is provided on the exposed face of the gear 55 for facilitating securing of the cutting element 50 between the plates 46 and 44, as will be hereinafter set forth.

The inner cutter 54 preferably comprises a plurality of substantially radially extending arms 59 which define an outer circumference of a slightly smaller size than the inner circumference of the cylinder 51 whereby the inner cutter 54 may be readily inserted therein. The arms 59 may extend substantially straight throughout the longitudinal length of the inside cutter 54 or may be arcuate or helical as shown in FIGURE 4. The arms 59 may be of a configuration similar to an Archemedes screw, if desired. The cutter 54 may be of a solid or one piece construction or may comprise a plurality of segments disposed in end to end relation whereby the individual segments thereof may rotate independently. It is further anticipated that the cutter arms 59 may be spring mounted in any well known manner (not shown) whereby the arms 59 are constantly urged radially outwardly to maintain an even tension and compensate for any wear which may occur during use of the device 10.

A gear 61 is provided at one end of the arms 59 and is preferably slightly spaced therefrom by a circular spacer 63. Both the spacer 63 and gear 61 are preferably integral or suitably rigidly secured to the arms 59. A hub member 65 extends axially outward from the exposed face of the gear 61 for cooperation with the hub 57 of the outer cutter 52 to journal the cutting elements 50 between the plates 44 and 46. It will be apparent that upon insertion of the inner cutters 54 within the outer cutters 52, a compact unit is provided which may be journalled between the plates 44 and 46 by the hubs 57 and 65 and which is provided with a gear member at each end thereof.

Referring particularly to FIGURE 2, the gear train 40, as shown herein, comprises a gear 56 engaging the driving gear 36 for transferring rotation to a second gear 58. The gear 58 in turn engages a pair of idler gears 60 and 62 for transmitting rotation simultaneously to all three inside cutter heads 54 by engagement with the respective gears 61 thereof. The gears 56, 58, 60 and 62 which comprise the gear train 40 are disposed within the chamber 22 and are mounted on the housing 12 and removable plate member 46 in any well known manner (not shown) whereby the plate 46 may be removed by releasing the thumb screw 48 when it is necessary to provide access to the interior of the chamber 22 for any reason, such as for replacement of parts or repair of the device 10, or the like.

The gear train 42, as particularly shown in FIGURE 3, preferably comprises a gear 64 driven by the gear 38 for transmitting rotation to a pair of idler gears 66 and 68 which in turn simultaneously drive or rotate the gears 55 of the outer cutter heads 52. It will be apparent that the gear train 42, not having a gear corresponding to gear 56 of the gear train 40, will rotate the gears 55 in an opposite direction from the gears 61 as driven by the gear train 40. Thus, the outer cutters 52 will be driven in one rotational direction while the inner cutters 54 will be driven in an opposite rotational direction.

A removable tray 70 may be inserted through a slot (not shown) in the housing 12 for disposition within the chamber 22 beneath the cutting elements 50 and interposed between the gear trains 42 and 40. Whiskers or hair which is cut during operation of the device 10 and which are not discharged from the housing 12 will drop onto the tray 70 and will be retained therein until such a time as the tray may be manually removed from the housing 12. Of course, the cut hair contained therein may be readily removed when the tray 70 is out of the housing for facilitating cleaning of the shaving device 10.

As hereinbefore set forth, the cutting elements 50 are journalled between the plates 44 and 46 in any well known manner. The plate 46 may be provided with a plurality of spaced apertures 72 in substantial alignment with a plurality of similar spaced apertures 74 provided in the plate 44. The hub members 65 of the inner cutting head 54 may be suitably journalled in the apertures 74 and the hubs 57 of the outer cutting heads 52 may be similarly journalled in the apertures 72. It is preferable that the hubs 57 and 65 also be removably disposed within the respective apertures 72 and 74 for permitting removal of the cutting elements 50 for cleaning, replacement or repair.

Whereas the driving mechanism shown herein for transmitting rotation to the inner and outer cutting members 54 and 52, respectively, is depicted as two independent gear trains, it will be apparent that any suitable driving mechanism may be utilized in lieu thereof, such as a chain drive device (not shown) or a separate motor for the inner heads and outer heads, or the like. In addition, the motor 16 may be either internally or externally disposed with respect to the housing 12 and may be substantially any desired type, such as electrically energized from a house current, or battery powered, or the like. It is further anticipated that the inner cutting heads 54 may be so arranged as to vibrate in either a longitudinal or lateral direction as the outer heads 52 are rotated. Furthermore, the outer cutting member 52 and inner cutting member 54 may rotate in the same direction, if desired, and in this instance it is preferable that the rotating speed of the outer head be slower than the rotating speed of the lower head. It is also to be noted that the inner cutting member 54 may be of a cylindrical configuration having a plurality of circumferentially spaced longitudinally extending slots for providing cutting edges in lieu of the radial arms 59.

Operation

The shaving device 10 may be utilized in substantially any shaving operation and upon energization of the motor 16 in the usual manner by connection with a suitable power source, the drive shaft 26 will transmit rotation to the gear 32 for simultaneously rotating the gears 36 and 38. The gear 36 drives the gear train 40 for transmitting rotation to the inner cutting members 54 and the gear 38 drives the gear train 42 for transmitting rotation to the outer cutting members 52. As hereinbefore set forth, the gear trains 40 and 42 are

so arranged that the direction of rotation of the inner cutting members is opposite from the direction of rotation of the outer cutting members. It will be apparent that the ratio of gear sizes in the gear trains **40** and **42** may be selected for providing substantially identical rotational speeds for both the inner and outer heads or the gear ratios may be so selected as to provide a different rotational speed for the inner and outer cutters respectively.

The device **10** may be moved against the face of an operator whereby the hairs will project through the slots **53** of the outer cutting members **52**. The rotating inner cutter members will efficiently shear or cut the whiskers for providing an efficient shaving operation. As hereinbefore set forth, it may be desirable to provide a plurality of radially outwardly extending spaced ribs of a very small dimension to facilitate picking up the whiskers or hair to be cut during the shaving operation. A majority of the severed whiskers or cut hairs will drop into the tray **70** and will accumulate therein. The tray **70** may be readily removed for discharge of the cut whiskers and to facilitate cleaning of the shaving device **10**. Of course, the removable plate **46** also facilitates cleaning and repair when necessary.

When the shaving device **10** is placed adjacent the face, the outer cutting member **52** will rotate there against in one direction. When the shaver is turned over whereby the opposite side of the cutting member **52** is disposed adjacent the face, or another of the cutting members **52** is disposed adjacent the face, the relative direction of rotation of the cutter with respect to the face will be reversed. Thus, the most efficient rotational direction for the particular shaving operation may be selected in accordance with the desires of the operator thereof. In addition, the speed of rotation of both the inner and outer cutting heads may be regulated, as desired, through the manipulation of the speed control switch or knob **28**.

From the foregoing, it will be apparent that the present invention provides a novel shaving device of the rotary type having inner and outer cutting heads driven in opposite rotational directions for providing an efficient shaving operation. The novel shaver is simple and efficient in operation and economical and durable in construction.

Changes may be made in the combination and arrangement of parts as heretofore set forth in the specification and shown in the drawings, it being understood that any modification in the precise embodiment of the invention may be made within the scope of the following claims, without departing from the spirit of the invention.

What is claimed is:

1. In a shaving device driven by a power source, a plurality of spaced cutting members disposed in substantially parallel relationship, each of said cutting members comprising a substantially cylindrical outer cutting member journalled for rotation about the respective longitudinal axes thereof, each of said outer cutting members being provided with a plurality of spaced apertures, an inner cutting member disposed within each outer cutting member, said inner cutting members being journalled for independent rotation with respect to the outer cutting members, a plurality of substantially radially extending cutting arms provided on each of said inner cutting members and rotatable simultaneously therewith, a first gear member provided on one end of each outer cutting member for rotation simultaneously therewith, a second gear member provided on one end of each inner cutting member for rotation simultaneously therewith and oppositely disposed with respect to the first gear members, first driving means interposed between the power source and the first gear members for transmitting simultaneous and continuous rotation thereto in a single rotary direction whereby each outer cutting member is rotated continuously and simultaneously in a single common rotary direction, second driving means interposed between the power source and the second gear members for transmitting simultaneous and continuous rotation thereto in a single rotary direction opposite to the rotary direction of the first gear members whereby each inner cutting member is continuously and simultaneously rotated in a single common rotary direction opposite from the rotary direction of the respective outer cutting member.

2. In a shaving device driven by a power source, a plurality of spaced cutting members as set forth in claim **1** wherein the radially extending cutting arms provided on each inner cutting member comprise a plurality of circumferentially spaced spiral flanges extending longitudinally therealong and therearound, the outer edge of each cutting arm having a flat top surface with the leading edge of rotation being sharp to provide a shearing action in conjunction with the respective outer cutting member.

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