

Oct. 26, 1965

B. FÜTTERER ETAL

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DRY SHAVER HAVING TWO INDEPENDENT SHEARING MEANS WITH MEANS  
TO DRIVE EACH SHEARING MEANS SEPARATELY

Filed Aug. 2, 1963

2 Sheets-Sheet 1

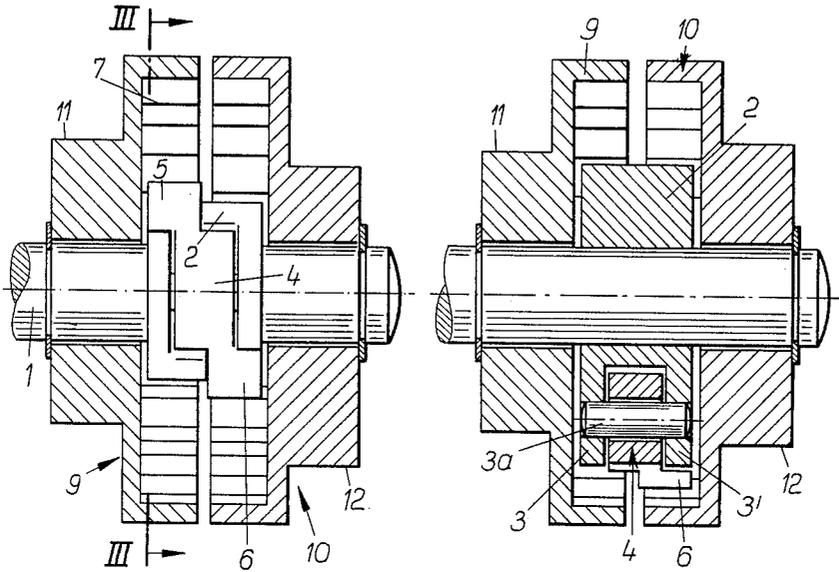


Fig. 1

Fig. 2

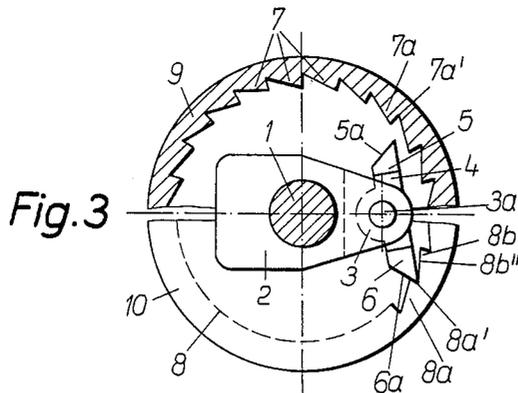


Fig. 3

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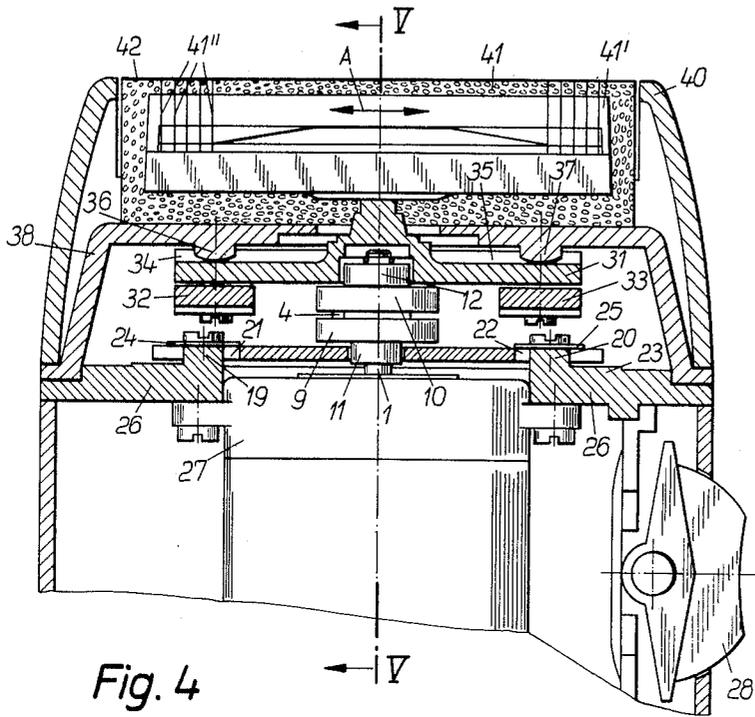


Fig. 4

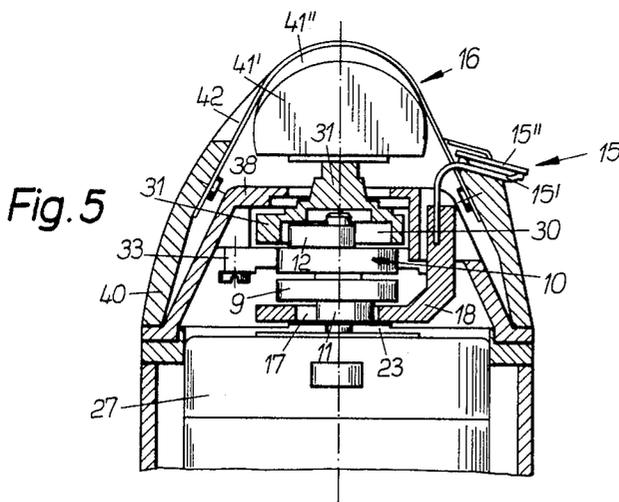


Fig. 5

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**DRY SHAVER HAVING TWO INDEPENDENT SHEARING MEANS WITH MEANS TO DRIVE EACH SHEARING MEANS SEPARATELY**

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7 Claims. (Cl. 30—34.1)

This invention relates in general to dry shaver construction and to drive couplers, and particularly to a new and useful dry shaver having coupling means for independently driving a separate long hair cutter as well as a short hair cutter or trimmer.

The present invention has particular application in respect to power-driven dry shavers having rotating drives with a rotatable element, such as a shaft, which may be selectively rotated in opposite directions. The invention relates to a coupling drive for devices of this nature and in particular to a shaver construction which includes a usual cutter for cutting short hair and an additional cutter for long hair or for trimming.

Shavers have been constructed with separate short hair and long hair cutting elements which are either permanently secured with the casing or which can be detached therefrom. With shavers of this type the short hair cutter is driven by an electric motor through a drive which does not permit its disconnection. In some instances, an associated short hair cutter may be connected or removed from the drive, but in all instances the short hair cutter operates when the electric motor is connected.

According to another known type of shaver construction, the dry shaver casing can be selectively fitted with different exchangeable cutting heads of different cutting characteristics, that is, the casing may be fitted with a head for short hair cutting or with a head for trimming purposes. It is also known to arrange a trimmer assembly at the detachable head frame of a shaver casing, the head frame being mountable on the casing in two different positions in one of which the trimmer is coupled with the drive of the casing, while in the other it will be out of engagement with the drive (in the opposite position.)

The known constructions have disadvantages. In the constructions where the short hair cutter is always operated, even if the trimmer assembly is to be used, additional energy is necessary to operate the short hair cutter and results in additional load on the drive. If the short hair cutter elements are operated while the trimmer assembly is to be employed, then unnecessary mechanical wear of the short hair cutting elements will result. In shavers which can be fitted with different cutting heads, manipulation and operation are more cumbersome, and the constructional elements necessary to permit easy exchangeability of the different cutter heads on the casing are more complicated and tend to become worn and may break. All of the prior art constructions have in common the principal disadvantage that for the purpose of selectively operating the shaver, two manipulations are required, namely: (1) to couple the cutting elements for the desired cutting operation (or the uncoupling of the element for that cutting operation which is not desired), and (2) actuation of the switch for starting up the motor.

In accordance with the present invention, improved coupling devices are provided which overcome the disadvantages of the prior art. These coupling devices are particularly applicable for use with a dry shaver of the

type having permanent short hair and long hair cutters and having a drive which may be selectively operated in opposite rotational directions.

A coupling constructed in accordance with the invention includes a double armed coupling pawl which is carried on a follower which is affixed to a driving shaft which shaft may be selectively rotated in either direction. The double arm coupling pawl is effective to engage with teeth formed on a first rotatable drive wheel member which is arranged to drive a first cutting element when the shaft is rotated in one direction, and the pawl is arranged so that it will engage the teeth of a second drive wheel member for driving a second cutting element when the shaft is rotated in an opposite direction.

Accordingly it is an object of this invention to provide improved coupling means, particularly for dry shavers, permitting selective operation of two independent cutters.

A further object of the invention is to provide a dry shaver having means for selectively operating one or two cutters.

A further object of the invention is to provide a dry shaver having a long hair cutter and a trimmer for short hair and including coupling means connected to a shaft which is selectively rotatable in either direction, the coupling means being such that upon rotation of the shaft in one direction the first cutter is operated, and upon rotation of the shaft in the opposite direction the second cutter is operated.

A further object of the invention is to provide a shaver having a rotatable shaft driven by an electric power source which is rotatable in one direction for driving a first cutter for short hair cutting and is rotatable in an opposite direction for driving a second cutter for long hair or trimming operation.

A further object is to provide an electric shaver with short and long hair cutters which may be operated independently under the control of a switch.

A further object of the invention is to provide a dry shaver and a coupling construction which are simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a longitudinal section of a coupling for a dry shaver constructed in accordance with the invention; FIG. 2 is a section similar to FIG. 1 but offset by about 90° relative to FIG. 1;

FIG. 3 is a section taken on the line 3—3 of FIG. 1;

FIG. 4 is a partial longitudinal section of a shaver constructed in accordance with the invention; and

FIG. 5 is a section taken on the line 5—5 of FIG. 4.

Referring to the drawings in particular, coupling means or a coupling device generally designated for a dry shaver constructed in accordance with the invention, as indicated in FIGS. 1 to 3, includes a follower 2 which is affixed to a drive shaft 1 for rotation therewith and pawl means or a double armed pawl generally designated 4 which is engageable with one of two drive wheels in accordance with the direction of rotation of the shaft 1. The follower 2 is bifurcated and includes two radially extending arm portions 3 and 3' which form bearing supports for a rotatable pin 3a which carries the double-armed coupling pawl 4. The drive shaft 1 may be rotated in either direction, and when so rotated correspond-

ingly rotates the follower 2 which carries the double-armed coupling pawl 4.

In accordance with the invention the double-armed pawl 4 is mounted adjacent drive wheels generally designated 9 and 10 which are freely rotatable about the drive shaft 1. Each of the drive wheels 9 and 10 includes interior annular gearing or ratchet teeth elements 7, for the wheel 9, and 8, for the wheel 10.

In accordance with the invention, the double-armed coupling pawl 4 includes a first arm or arm portion 5 which is engaged in recesses 7a' between internal teeth 7 of the wheel 9 when the shaft 1 is rotated in one direction of rotation. The double-armed coupling pawl 4 further includes a second arm or arm portion 6 which will engage in recesses 8a' between internal teeth 8 of the drive wheel 10 when the shaft 1 is rotated in the opposite direction.

As indicated in FIG. 3 in which the lower part of the wheel 9 has not been shown for clarity of illustration purposes, the coupling pawl 4 engages with its arm 6 between teeth 8 of the wheel 10 when the drive shaft 1 rotates in a clockwise manner. The arm 5 of the coupling pawl 4 is completely lifted out of engagement range of the teeth 7 of the wheel 9. This is so because the slanted or oblique flange 6a of the arm 6 will engage in the recess 8a' between the teeth 8, so that the wheel 10 of the coupling will be rotated in the same direction and at the same speed as the shaft 1.

Upon reversal of rotation of direction of the drive shaft 1 the arm 6 of the coupling pawl 4 is rocked away from the engagement range of the inner gearing 8 of the wheel 10, it being deflected outwardly by the oblique flank 8b'' of the tooth 8. This deflection causes the pawl arm 5 to move into the engagement range of the teeth 7 of the wheel 9. In doing so, the arm 5 of the coupling pawl engages with its oblique face 5a into the recess 7a' formed between teeth 7, so that the other arm 6 is moved completely out of range of the teeth 8 of the wheel 10. Upon rotation of the shaft 1 in a counterclockwise direction the wheel 9 will thus be taken along in the same rotational direction. By again reversing the rotational direction of the shaft 1, coupling arm 5 will be rocked outwardly by being deflected by the oblique flank 7a of the teeth 7 to cause the arm 6 to engage between the teeth 8 of the wheel 10.

In FIGS. 4 and 5 the coupling is indicated in association with a power-driven dry shaver, and each combination driving wheel 9 and 10 includes respective eccentric portions 11 and 12 for operating a long hair trimmer portion generally designated 15 and a short hair cutter generally designated 16, respectively.

As indicated in the drawings, the eccentric portion 11 engages in a slot 17 of a coupling piece 18 which carries a movable cutting portion 15' of the long hair trimmer 15. The slot 17 is of a size so that rotation of the eccentric 11 causes a reciprocating movement of the coupling piece 18 in the plane of FIG. 4. The coupling piece 18 is guided in a straight line by means of cutouts 21 and 22 which accommodate guide pins 19 and 20, respectively, which are formed as upstanding extensions of an intermediate wall 26. Securing discs 24 and 25 are secured over the guide pins 19 and 20 and prevent undesired lifting of the coupling piece 18 which glides on a bearing support 23 formed as a portion of the intermediate wall 26.

In order to start operation of the respectively desired cutting portion, the drive has to be imparted with the desired rotational direction. The drive preferably consists of a direct current motor which is pole-reversible. After the motor 27 has been switched on in the desired rotational direction, the coupling automatically connects the respective desired cutting portion of the shaver. In order to couple the desired cutting elements, be it the long hair or the short hair cutter, with the drive of the shaver, it is only necessary to provide a reversing switch 28 which

is connected in the direct circuit of the motor 27. The switching positions of the switch 28 are indicated by legends or markings (not shown) which indicate the respective cutter to be selected. The switch 28 is preferably constructed in a manner to cause it to interrupt the motor circuit and thus shut the motor down completely when in between two operational positions as indicated in FIG. 4. The drive motor 27 is secured to the intermediate wall 26.

By correspondingly actuating the switch 28 which is situated in the circuit of the motor, the rotational direction of the shaft 1 can be selectively chosen. If this rotational direct is chosen in such a manner that the pawl 4 of the coupling takes along the wheel 9, then the eccentric portion 11 of the wheel causes the coupling piece 18 to reciprocate together with the cutting portion 15' which glides along adjacent stationary cone portion 15''. In this manner the long hair cutter 15 of the shaver has been placed into operation.

If the short hair cutter 16 is to be operated, then the rotational direction of the motor shaft is changed by rocking the switch 28 in the opposite switching position, so that the rotational movement of the pawl is now transmitted to the driven wheel 10 of the coupling. The eccentric portion 12 formed as a portion of the wheel 10 then engages into a longitudinal slot 30 in the coupling piece 31 to cause the back and forward movement thereof. The coupling piece 31 is guided in a straight line manner between bearings 32 and 33 formed as inward extensions of the shaver casing at a hood-shaped casing wall 38 which closes the upper portion of the shaver. Coupling piece 31 is also guided between guide pins 36 and 37 which engage into the longitudinal grooves 34 and 35 of the coupling piece 31. The coupling piece 31 is connected with the knife head 41 which is longitudinally movable in the frame-like casing head 40. The knife head 41 is formed in the known manner of the knife head frame 41' and knives 41'' are inserted therein transversely to the movement direction. The coupling piece 31, with the knife head 41, is thus reciprocated in the direction of the arrows A by means of the eccentric portion 12, so that the knife 41'' glides along the perforated foil or head plate 42 for the purpose of effective short hair shaving. If after the use of the short hair cutter 16 the drive of the shaver is to be stopped, the reversal switch 28 is rocked into a center position as indicated in FIG. 4, to disrupt the electrical connection to the motor 27.

The invention is not limited to the illustrated embodiments, but many modifications may be effected with regard to the construction of the coupling which is dependent on the rotational direction of the shaft. It is also within the scope of the invention to arrange such a coupling in dry shavers having a rotating cutter system. The rotating cutter element for long or short hair, respectively, may thus be associated, either directly or indirectly, with respective driven wheels of the coupling, and, if associated indirectly, then this may be accomplished through a suitable transmission means, for example by coaxial shafts. Finally, the inventive coupling is capable of combining in a single shaver cutting elements of different systems, and the coupling may then selectively couple a desired one of these systems with the dry shaver.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A dry shaver comprising a casing, an electric driving motor mounted in said casing having a drive shaft, said motor being capable of rotating said drive shaft in both directions of rotation, a first member with openings for receiving hair for cutting a first cutter mounted for sliding movement in said casing adjacent said first member for cutting the hair presented through the openings thereof, a second member with openings for receiving hair for

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cutting, a second cutter mounted for sliding movement in said casing adjacent said second member for cutting the hair presented through the openings thereof, a coupling mounted in said casing and connected between said drive shaft and said first and second movable cutters, said coupling including first and second rotatable wheels connected respectively to said first and second movable cutters, and means carried by said shaft in engagement with said first wheel for moving the cutter upon rotation of said shaft in one direction, and engageable with said second wheel for moving said second cutter upon rotation of said shaft in a second direction.

2. A power-driven shaver according to claim 1, wherein said first and second wheels are freely rotatable on said shaft and include internal gearing, said means carried by said shaft including a follower member and a pawl pivotally carried by said follower member engageable with the gearing of said first wheel upon rotation of the shaft in a first direction and engageable with the second wheel upon rotation of the shaft in an opposite direction.

3. A dry-shaver according to claim 1, wherein each of said wheels includes an eccentric portion, said first and second cutters having a portion which is slotted, said eccentrics being confined in respective ones of said slots and being of a size to reciprocate the associated first and second cutter upon rotation of the eccentric portion.

4. A power-driven dry shaver including a casing, a motor mounted in said casing, switch means connected to said motor for rotating said motor in both directions and for stopping said motor, said motor having a shaft which is rotatable in selective directions in accordance with the orientation of said switch, a follower member affixed to said shaft for rotation therewith, a pawl pivotally carried at the end of said follower member, a first coupling wheel having internal gearing adapted to be engaged by said pawl upon rotation of said pawl in a first direction, a second coupling wheel rotatable on said shaft and having internal gearing adapted to be engaged by said pawl upon rotation of said pawl in an opposite direction, each of said first and second wheels including eccentric portions, first member with openings for receiving hair for cutting, a first long hair cutter slidably mounted in said casing adjacent said first member for cutting the hair presented through the openings thereof, said first long hair cutter having a slotted portion engageable over the eccentric portion of said first coupling wheel, the slotted portion and the eccentric portion being of a size so that said long hair cutter is reciprocated upon rotation of the eccentric portion, a second member with openings for receiving hair for cutting, and a second cutter mounted on said casing for slidable movement adjacent said second member for cutting the hair presented through the openings thereof and including a slotted portion engaged around the eccentric portion of said second coupling wheel and being movable by the said eccentric portion for reciprocating said second cutter.

5. A dry shaver according to claim 4, wherein said first and second coupling wheels are axially offset, said pawl having a first arm portion adapted to engage in the gearing of said first coupling wheel and a second arm portion adapted to engage in the gearing of said second coupling wheel, said first arm portion being shaped to be deflected outwardly by the gearing of said first coupling wheel upon rotation in one direction and for engagement in the gear-

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ing of said first coupling wheel upon rotation in an opposite direction.

6. A dry shaver comprising a casing, an electric driving motor mounted in said casing having a drive shaft, said motor being capable of rotating said drive shaft in both directions of rotation, a first member with openings for receiving hair for cutting, a first cutter mounted for sliding movement in said casing adjacent said first member for cutting the hair presented through the opening thereof, a second member with openings for receiving hair for cutting, a second cutter mounted for sliding movement in said casing adjacent said second member for cutting the hair presented through the openings thereof, and coupling means connected between said drive shaft and said first and second movable cutters for causing movement of said first cutter when said drive shaft is rotated in one direction and for causing movement of said second cutter when said drive shaft is rotated in an opposite direction.

7. A dry shaver comprising a casing, an electric driving motor mounted in said casing having a drive shaft, said motor being capable of rotating said drive shaft in both directions of rotation, a first member with openings for receiving hair for cutting, a first cutter mounted for sliding movement in said casing adjacent said first member for cutting the hair presented through the opening thereof, a second member with openings for receiving hair for cutting, a second cutter mounted for sliding movement in said casing adjacent said second member for cutting the hair presented through the openings thereof, and coupling means connected between said first and second movable cutters for causing movement of said first cutter when said drive shaft is rotated in one direction and for causing movement of said second cutter when said drive shaft is rotated in an opposite direction a switch mounted on said casing and connected to said motor, said switch being movable in one direction to energize said motor to rotate said drive shaft in one direction and being movable in an opposite direction to energize said motor to rotate said drive shaft in an opposite direction.

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