Jan. 5, 1943. S. RICHARDSON ET AL 2,307,303

DRY SHAVER

Filed March 29, 1939

Fig. 1.

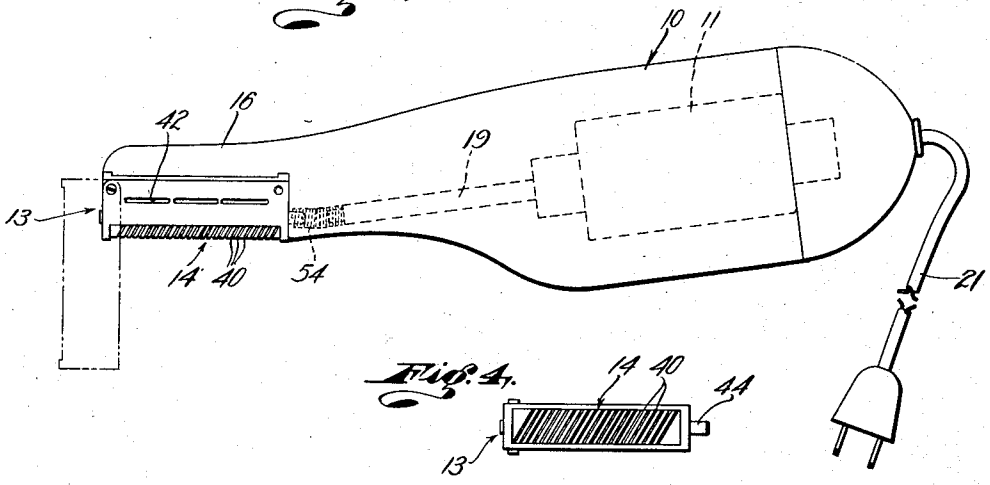


Fig. 4.

Fig. 2.

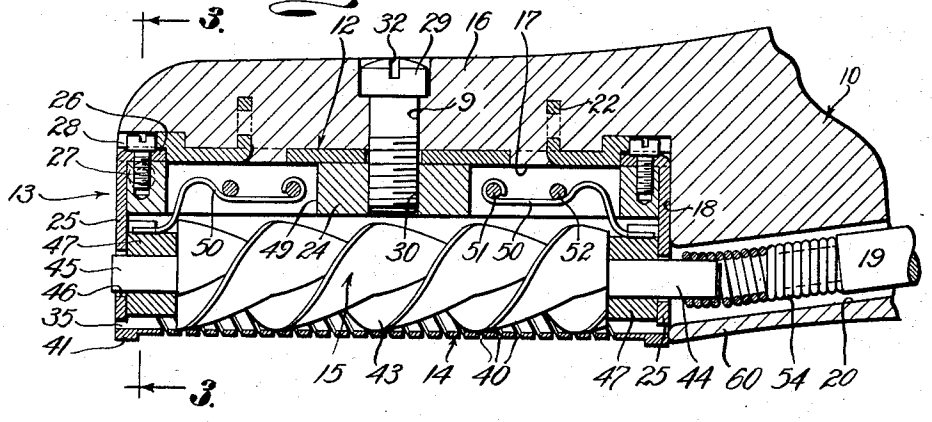


Fig. 3.

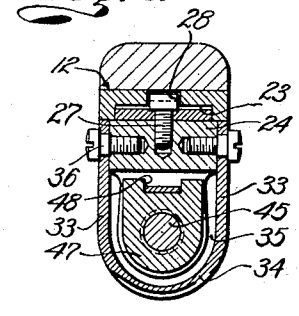


Fig. 6.

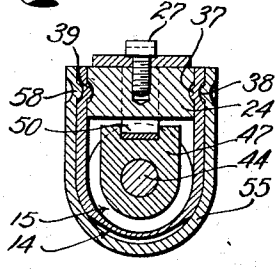
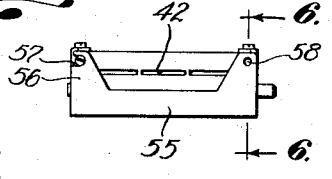


Fig. 5.



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2,307,303

UNITED STATES PATENT OFFICE

2,307,303

DRY SHAVER

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Los Angeles, Calif.

Application March 29, 1939, Serial No. 264,752

16 Claims. (Cl. 30—43)

This invention relates to shaving instruments and relates more particularly to power driven shaving devices or dry shavers. A general object of the invention is to provide an improved, long wearing, and particularly effective shaving instrument.

Another object of this invention is to provide a power driven shaving instrument embodying a cutter head or cutter assembly dependably secured in position and easily and quickly removable for repair, reconditioning, etc.

Another object of this invention is to provide a dry shaver in which the cutter head or cutter assembly is accurately positioned and tightly clamped against a metal plate permanently cast on the shaver body, by a single screw which may be conveniently engaged and manipulated to release and attach the assembly.

Another object of this invention is to provide a power driven shaving instrument embodying a rotary cutting element with one or more helical blades cooperating with a stationary slotted blade and related to the stationary blade to cut the hair by an effective shearing action.

A further object of our invention is to provide a dry shaver wherein a relatively stationary slotted blade is combined with a rotary cutting element and to hinge the stationary slotted blade at one end to the body or handle of the instrument in order that it may be swung bodily downwardly and outwardly away from the rotary cutting element in order to facilitate cleaning functions, inspections, repairs and adjustments, and to provide simple and efficient means whereby the free end of the hinged slotted blade is detachably engaged with and maintained in proper operative position upon the body or handle of the implement.

Another object of this invention is to provide a shaving instrument of the character referred to embodying loosely mounted bearings for the rotary blade element, spring held or spring urged in such a manner that the helical blades are at all times maintained in the most effective cooperation with the stationary blade to stabilize and centralize the rotary element through this cooperation and to assure the effective cutting of the hair.

Another object of this invention is to provide a shaving instrument of the character mentioned in which the bearings are of substantial length to be long wearing and to properly support the rotary blade element.

Another object of this invention is to provide a power driven shaving instrument embodying a simple, novel connection or coupling between the motor shaft and the shaft of the rotary blade element.

The various objects and features of our invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawing, in which:

Fig. 1 is a side elevation of the improved shaving instrument of the present invention. Fig. 2 is an enlarged fragmentary longitudinal detailed sectional view illustrating the cutter assembly and the adjacent parts. Fig. 3 is a transverse detailed sectional view taken substantially as indicated by line 3—3 on Fig. 2. Fig. 4 is an elevation view of the under side of the cutter assembly removed from the body. Fig. 5 is a side elevation of the cutter assembly and Fig. 6 is an enlarged transverse detailed sectional view taken as indicated by line 6—6 on Fig. 5.

The improved shaving instrument of the present invention may be said to comprise, generally, a body 10 containing a driving motor 11, a mounting plate 12 on the body 10, and a cutter head assembly 13 including a stationary blade 14 and a rotary blade element 15.

The body 10 carries and contains the various elements of the device and its major portion forms the handle of the device. This major handle portion of the body 10 is suitably shaped for convenient engagement and manipulation. The large handle portion of the body 10 is hollow or chambered to house the motor 11. The forward portion of the body 10 is reduced to carry the cutter assembly 13 for effective use, this reduced portion of the body being in the nature of a shank or stem 16. The stem 16 may be an integral part of the body 10 and its longitudinal axis is at an angle to the longitudinal axis of the main handle portion of the body. The under side of the stem 16 is notched out or cut away to receive the cutter assembly 13 and to have a longitudinal flat surface 17 and a forwardly facing shoulder 18. The body 10 may be constructed of any suitable material, for example, it may be formed of any of the so-called plastics. The motor 11 is suitably supported within the hollow handle portion of the body 10 and has a shaft 19 projecting forwardly in an opening 20 that terminates at the shoulder 18. The conductor or cord 21 for carrying the energizing current to the motor 11 may extend through an opening in the rear end of the body 10.

The plate 12 is secured to the body stem 16 and

forms a support or mounting for the cutter assembly 13. The plate 12 is a metal element and is permanently fixed to the stem 16. In the preferred construction the plate 12 is a flat, generally rectangular member cast or embedded in the underside of the stem 16 to be substantially flush with its surface 17. Spaced tabs or tongues 22 are bent laterally from the plate 12 and are embedded or cast in the material of the stem 16 to more securely fix the plate 12 to the stem. The opposite end portions of the plate 12 are thickened or pressed to have shouldered parts cast in the stem 16. The under sides of these end portions have polygonal flat-walled recesses 23. The recesses 23 are accurately shaped and positioned as they serve to locate the cutter assembly 13.

The cutter assembly includes a supporting block 24 adapted to lie against the underside of the mounting plate 12. The block 24 forms the carrier for the various elements of the cutter assembly 13. In the construction illustrated the block 24 is slightly narrower and slightly shorter than the plate 12 and is of substantial thickness. The cutter assembly 13 further includes end plates 25 engaged against the opposite ends of the block 24 and projecting downwardly or outwardly from the block. Inturned flanges 26 are provided on the upper ends of the end plates 25 and lie against the upper side of the block 24. The flanges 26 are shaped and proportioned to fit the recesses 23 of the plate 12 and their cooperation with the recesses 23 locates the cutter assembly 13 on the plate 12. Screws 27 are passed through openings in the flanges 26 and are threaded in openings in the block 24 to secure the end plates 25 in the block. The heads of the screws 27 are received in notches 28 in the ends of plate 12. Rivets or other securing devices may be employed in place of the screws 27. The outer extremities or lower ends of the end plates 25 are rounded or curved about a common axis extending parallel with the face of the plate 24 for the purpose to be hereinafter described.

The invention provides simple, yet very effective means for removably securing the carrier block 24 to the body stem 16 to tightly clamp against the mounting plate 12. This means includes a screw 29 threaded into an opening 30 in the central portion of the block 24 and extending upwardly through an opening in the mounting plate 12 and into an opening 9 in the stem 16. The opening 9 extends vertically through the stem 16 and the head or top of the screw 29 is adjacent its upper end. A screw driver slot 32 may be provided in the head or top of the screw 29. It will be apparent how the screw 29 may be turned to tightly clamp the block 24 against the plate 12 and how the screw may be rotated to release the block 24 for detachment.

The stationary blade 14 of the cutter assembly 13 is an elongate member trough-shaped or substantially U-shaped in transverse cross section. The blade 14 has spaced substantially parallel sides 33 and a curved portion 34 extending between and connecting the sides 33. The sides 33 are adapted to lie flat against the sides of the block 24 and are of substantial width to extend outwardly or downwardly from the block so that the curved portion 34 is a substantial distance from the under side of the block. The opposite ends of the stationary blade 14 may be substantially flush with the end plates 25 and the end plates, shaped as described above, provide or leave substantially semi-circular spaces 35 open at the opposite ends of the blade 14. The spaces 35 form outlets for the cut hair, etc. that may enter the stationary blade 14.

The stationary blade 14 is hingedly connected with the block 24 so that it may be swung downwardly or outwardly to expose the rotary blade element 15 and to permit easy cleaning, also inspection of the rotary blades and minor adjustment of its spring pressed bearings. The means for securing the blade 14 to the block 24 includes screws 36 passing through openings in the upper outer corner portions of the blade sides 33 and threaded in openings in the block 24. The screws 36 have heads at the outer surfaces of the blade sides 33 and form hinges or pivots for the blade. Rivets may replace the screws 36, if desired. Detent means is provided for releasably retaining the hinged or pivoted blade 14 in its normal operative position. The upper rear corner parts of the blade sides 33 are pressed or indented to have internal projections 37 and external indentations 38. The projections 37 cooperate with indentations 39 in the sides of the block 24 to releasably hold the hinged blade 14 in its normal operative position. When the blade 14 is in its normal position the upper edges of its sides 33 may engage against the under side of the mounting plate 12.

The curved portion 34 of the blade 14 is the active part of the stationary blade and is intended to be drawn or moved across the skin. A multiplicity of slots 40 is provided in the curved blade portion 34 to admit or receive the hair. The slots 40 extend transversely across the portion 34 from one side to the other and are preferably parallel slots. There is a large number of narrow slots 40 and the series of slots extends between points adjacent the opposite ends of the blade 14. In accordance with the invention the slotted active blade portion 34 has a thin wall so that the slots 40 have a minimum depth adapting the instrument to give a close shave. The outer surface of the portion 34 is ground off for a substantial circumferential distance and throughout the series of slots 40 so that the hair receiving slots occur in a very thin-walled part. In practice the ground off portion at the slots 40 may have a thickness of about .004 of an inch. The ground portion of the blade 14 has a smooth finished external surface adapted to readily move across the skin. In the preferred construction the ground part terminates at points spaced from the ends of the blade 14 leaving parts 41 of normal thickness which reinforce the blade. If desired a series of longitudinal slots 42 may be provided in one side 33 or both sides 33 of the blade 14 to allow the interior of the blade to be flushed or blown out with air or liquid.

The rotary blade element 15 is housed within the stationary blade 14 and is cooperable with the internal surface of the blade portion 34 to cut the hairs received in the slots 40. The blade element 15 is an elongate member having one or more helical cutting vanes or blades 43. In the construction illustrated there are two blades 43. The edges of the blades 43 are finished or sharpened to have effective shearing cooperation with the internal surface of the blade portion 34. In accordance with the invention the slots 40 and the helical blades 43 are of a different inclination or pitch to cooperate in a manner to most efficiently cut the hair by a shearing action. Thus in the case illustrated it may be assumed that the slots 40 have a pitch of about 30° while the blades 43 have a pitch of about 32°. It is to be understood that

the pitch of the slots 40 and the pitch of the blades 43 may be varied as found most desirable.

The rotary blade element 15 is rotatably supported in a novel effective manner to be urged aaginst the internal surface of the blade 14 and to be maintained in effective cutting relation to the blade. Shafts 44 and 45 project from the inner and outer ends, respectively, of the blade element 15 and are rigid with the element. The shafts 44 and 45 are received in openings 46 in the end plates 25. The shafts are received in the openings 46 with considerable clearance. The shaft 44 projects inwardly or rearwardly from the rear plate 25 for connection with the motor shaft 15, as will be subsequently described, while the forward shaft 45 may terminate at the forward plate 25. Tubular bearings 47 of substantial length are arranged on the shafts 44 and 45. The bearings 47 are engaged between the end plates 25 and the flat ends of the blades 43 to prevent endwise movement of the blade element 15. The upper or inner sides of the bearings 47 are provided with flat walled notches 48.

The bearings 47 are spring-urged to maintain the blade element 15 in proper cooperation with the stationary blade 14. Transverse slots or openings 49 are provided in the block 24 and leaf springs 50 are secured in the openings 49 to cooperate with the bearings 47. The springs 50 may have their upper end parts curled to turnably engage about pins 51 secured in openings in the block 24. The springs 50 are curved or shaped to extend toward the adjacent ends of the block 24 and to then extend downwardly from the openings 49 to have their lower portions received in the notches 48 of the bearings 47. Pins 52 carried by the block 24 and extending through the openings 49 engage the intermediate portions of the springs 50 to hold the springs in engagement with the bearings 47. The springs 50 are formed and mounted to urge the bearings 47 downwardly under a uniform pressure so that the blades 43 have the most efficient cooperation with the inner surface of the blade 14. The engagement of the lower parts of the springs 50 in the notches 48 holds the bearings 47 against rotation.

A novel yet very effective coupling is provided for releasably connecting the shaft 44 with the motor shaft 19 so that the cutter element 15 is rotated by the motor 11. This connection or coupling comprises a helical spring 54 secured on a reduced end portion of the shaft 19. The spring 54 projects from the shaft 19 to protrude from the opening 20 so that it may receive the shaft 44. With the parts in their normal positions the shaft 44 is at an angle to the motor shaft 19 and the engagement of the shaft 44 in the spring 54 deflects or bends the spring. This causes the spring 54 to bind or frictionally grip the shaft 44 so that the spring forms a driving connection between the shaft 19 and the shaft 44. Further, the spring 54 may be formed or wound in such a manner that the rotational force transmitted through it tightens its convolutions on the shaft 44 to more tightly grip the shaft 44 when the instrument is in operation. It is to be understood that the shaft 44 may be easily inserted in and removed from the spring 54.

A protective shield 55 may be provided for the cutter assembly 13. The shield 55 is shaped to overlie or cover the curved portion 34 of the stationary blade and has sets of tongues 56 on its opposite ends adapted to extend upwardly at the sides 33 of the blade 14. The outer tongues 56 have notches 57 for releasably cooperating with the heads of the above described screws 36. The inner tongues 56 have indentations forming detent projections 58 for releasably cooperating with the above described indentations 38. When the shield 55 is in place it fully protects the slotted thin-walled portion of the stationary blade 14. The shield 55 may be readily removed from the blade 15 by the application of pressure which releases the projections 58 from the indentations 38, and by swinging the shield to a position similar to that indicated by the broken lines in Fig. 1 where the notches 57 may be easily disangaged from the screws 36.

When the motor lead or conductor 21 is connected with a source of electricity the motor 11 is operable to rotate the cutter element 15. The body 10 may be grasped and handled to move the curved blade portion 34 across the portion of the body to be shaved. The hair entering the slots 40 is sheared or cut off by the cooperation of the helical blades 43 with the internal surface of the slotted portion 34. After use it may be desired to clear the cutter assembly 13 of the hair. This may be done by blowing through the slots 42. The air thus blown through the slots 42 is adapted to drive the hair out through the spaces 35. Water or other fluid may be flushed through the cutter assembly 13 to remove the cut hair. When it is desired to give the assembly 13 a more thorough cleaning the blade 14 may be pivoted to its open position, indicated by the broken lines in Fig. 1, to expose the interior of the cutter assembly. The cutter assembly 13 may be removed from the body stem 16 to facilitate its repair or reconditioning. To effect this the screw 29 is unthreaded to release the block 24 for detachment from the stem 16. The block carrying the various parts of the assembly 13 is readily detached or removed from the mounting plate 12. Following the repair operation the projecting portion of the shaft 44 may be entered in the spring 54 to reconnect the cutter element 15 with the motor shaft 19 whereupon the assembly may be reapplied to the plate 12.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described our invention, we claim:

1. A shaving instrument comprising a body, and cutting means on the body comprising a substantially channel-shaped stationary blade hinged at one end to said body and having a curved slotted wall, a rotary cutter element mounted for yielding movement toward and away from said curved wall and having a plurality of helical blades cooperating with the inner surface of said wall and driving means located in the lower portion of said body and directly connected to the rear end of the rotary cutter element.

2. A shaving instrument comprising a body, a mounting plate cast in the body and having an exposed face, a cutter assembly including a carrier and stationary and rotary cutter elements supported by the carrier, the carrier being adapted to lie against said face of the plate, said stationary cutter being hinged at one end to said carrier so as to swing bodily toward and away from the

rotary cutter, and a single screw for removably clamping the carrier against said face.

3. A shaving instrument comprising a body, a mounting plate cast in the body and having an exposed face, a cutter assembly including a carrier and stationary and rotary cutter elements supported by the carrier, the carrier being adapted to lie against said face of the plate, said stationary cutter being hinged at one end to said carrier so as to swing bodily toward and away from the rotary cutter, engaging parts on the plate and carrier for positioning said assembly, and a single screw for removably clamping the carrier against said face.

4. A shaving instrument including a body having a reduced stem, a mounting plate permanently fixed on the stem, a cutter assembly comprising a carrier block adapted to fit against the plate, a rotary cutting element carried by the block, a substantially channel-shaped relatively stationary cutting element hinged at one end to said block and adapted to swing bodily toward and away from the rotary cutting element, interfitting parts on the plate and block accurately positioning the assembly on the body stem, and a single screw removably clamping the block against the plate to secure the assembly to the body stem.

5. A shaving instrument including a body having a reduced stem, a mounting plate permanently fixed on the stem, a cutter assembly comprising a carrier block adapted to fit against the plate, a rotary cutting element carried by the block, a substantially channel-shaped relatively stationary cutting element hinged at one end to said block and adapted to swing bodily toward and away from the rotary cutting element, interfitting parts on the plate and block accurately positioning the assembly on the body stem, and a single screw removably clamping the block against the plate to secure the assembly to the body stem, the stem having a transverse slot and the screw including an operating part in the slot accessible at the surface of the stem.

6. In a shaving instrument, a cutter assembly including a carrier, a substantially channel-shaped stationary blade having spaced side walls hinged at one end to the sides of the carrier so as to swing bodily toward and away from said carrier and a transversely curved wall connecting the side walls, said curved wall presenting a concave inner surface and a convex outer surface and having a series of spaced hair receiving slots, a rotary cutting element mounted for rotation in said carrier and receiving the stationary blade, said rotary cutting element having a helical blade cooperating with said concave inner surface, and end plates on the carrier substantially closing the ends of the stationary blade but spaced from said curved wall to leave cleaning openings.

7. In a shaving instrument, a cutter assembly including a carrier, a substantially channel-shaped stationary blade having spaced side walls extending outwardly from opposite sides of the carrier and a transversely curved wall joining the side walls and spaced from the carrier, the curved wall presenting a concave inner surface and a convex outer surface and having a series of spaced hair receiving slots, a rotary element journalled for rotation on the carrier within the stationary blade and having a helical blade cooperating with said internal surface to cut the hair, and means pivotally connecting the sides of the stationary blade at one end to the carrier whereby the stationary blade may be swung bodily away from the carrier and the rotary element.

8. In a shaving instrument, a cutter assembly including a carrier, a substantially channel-shaped stationary blade having spaced side walls extending outwardly from opposite sides of the carrier and a transversely curved wall joining the side walls and spaced from the carrier, the curved wall presenting a concave inner surface and a convex outer surface and having a series of spaced hair receiving slots, the side walls of said stationary blade being pivotally connected at one end to said carrier in order to be swung bodily away from said carrier, a rotary element arranged for operation on said carrier within the stationary blade and having a helical blade cooperating with said internal surface to cut the hair, bearings for said rotary element, the slotted portion of said curved wall being ground away to be of reduced thickness, and resilient means on the carrier for supporting the bearings of the rotary element.

9. A shaving instrument including a body having a stem, a removable cutter assembly on the stem comprising a substantially channel-shaped stationary blade and a rotary blade, said stationary blade being hinged at one end so as to swing bodily away from the rotary blade, spring pressed bearings for the ends of said rotary blade, means removably attaching the assembly to the stem, a motor carried by the body and having a shaft, a shaft fixed to the rotary blade, and a releasable coupling between said shafts comprising a helical spring engaged on adjacent ends of the shaft.

10. A shaving instrument including a body having a stem, a removable cutter assembly on the stem comprising a substantially channel-shaped stationary blade and a rotary blade, spring pressed bearings for the ends of said rotary blade, means removably attaching the assembly to the stem, said stationary blade being hinged at one end so as to swing bodily away from the rotary blade, a motor carried by the body and having a shaft, a shaft fixed to the rotary blade, said shafts being in angular relation, and a releasable coupling for connecting the shafts whereby the motor drives the rotary blade comprising a helical spring secured on one shaft and projecting therefrom to receive the other shaft and frictionally engaging said other shaft by reason of said angular relation of the shafts and the tightening action of the torque on its convolutions.

11. A shaving instrument comprising a body, a substantially channel-shaped stationary blade having a curved slotted wall, said stationary blade being hinged at one end to said body so as to swing bodily away from the body, co-operating means on the free end of the stationary blade and the body for releasably maintaining said blade in closed position upon said body, floating bearings on said body adjacent the ends of said stationary blade, a rotary cutting element journalled in said bearings, means for rotating said rotary cutting element and a helical blade on said rotary cutting element co-operating with the inner surface of the curved slotted wall of the stationary blade.

12. A shaving instrument comprising a body, a substantially channel-shaped stationary blade having a curved slotted wall, said stationary blade being hinged at one end to said body so as to swing bodily away from the body, co-operating means on the free end of the stationary blade and the body for releasably maintaining said blade in closed position upon said body, floating bearings on said body adjacent the ends of said stationary blade, a rotary cutting element journalled in said bearings, means for rotating

said rotary cutting element, a helical blade on said rotary cutting element co-operating with the inner surface of the curved slotted wall of the stationary blade and yielding pressure means acting on said floating bearings for maintaining the blade of the cutting element in effective co-operation with the inner surface of the curved slotted wall of the relatively stationary blade.

13. In a dry shaver, a body, a substantially channel-shaped stationary blade carried by and mounted to move bodily toward and away from said body, independently acting spring pressed bearings at the ends of said stationary blade, a rotary cutter journalled in said bearings, which rotary cutter includes a helical blade that co-operates with the inner surface of the curved cutting wall of the stationary blade, a motor within said body, the shaft of which motor extends lengthwise through the forward portion of said body and flexible means directly connecting the forward end of the motor shaft with the rear end of said rotary cutter.

14. In a dry shaver, a body, a substantially channel-shaped stationary blade carried by and mounted to move bodily toward and away from said body, said blade having a curved slotted wall, readily releasable means for maintaining said blade in closed position upon said body, independently acting floating bearings in the ends of said stationary blade, a rotary cutting element journalled in said bearings, which cutting element includes a helical blade that cooperates with the inner surface of the curved slotted wall of the stationary blade, a motor within said body, the shaft of which motor extends lengthwise through the forward portion of said body and flexible means directly connecting the forward end of the motor shaft with the rear end of said rotary cutter.

15. In a dry shaver the combination with a body, and a mounting plate carried by said body, of a cutter assembly including a carrier detachably connected to said body and mounting plate, bearings at the ends of said carrier, a rotary cutting element journalled in said bearings and provided with a helical blade, a substantially channel-shaped stationary blade mounted upon and adapted to move bodily toward and away from said carrier, said stationary blade having a curved slotted wall, the inner surface of which cooperates with the cutting edge of the helical blade, a motor within said body, the shaft of which motor extends lengthwise through the forward portion of said body and flexible means directly connecting the forward end of the motor shaft with the rear end of said rotary cutter.

16. In a dry shaver the combination with a body, of a cutter assembly comprising a carrier, means for detachably securing said carrier to said body, supports carried by the ends of said carrier, independently acting spring pressed bearings supported by said plates, a rotary cutter journalled in said bearings, which rotary cutter is provided with a helical blade, driving means mounted for operation in the body to the rear of the cutter assembly and directly connected to the rear end of the rotary cutter for driving the same and a stationary blade mounted upon and adapted to move bodily toward and away from said carrier, said stationary blade having a curved slotted wall, the inner surface of which cooperates with the edge of the helical blade of said rotary cutting element.

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