

Dec. 12, 1950

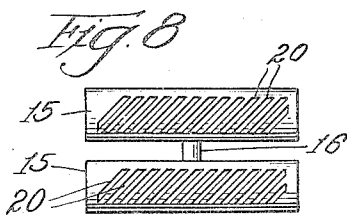
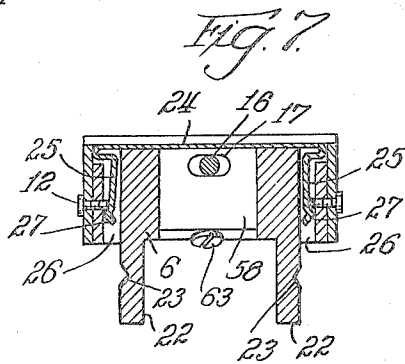
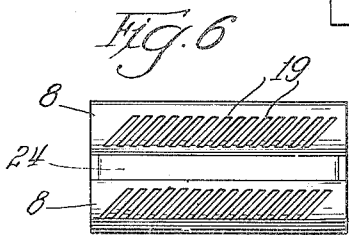
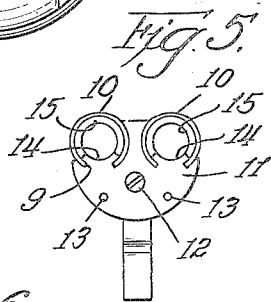
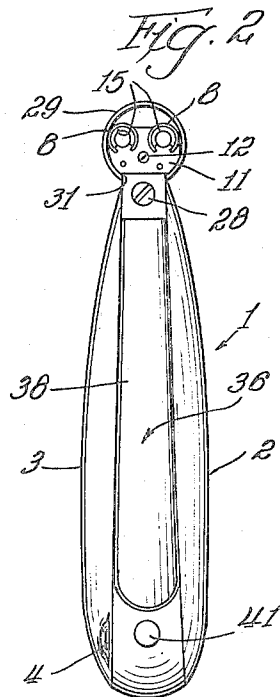
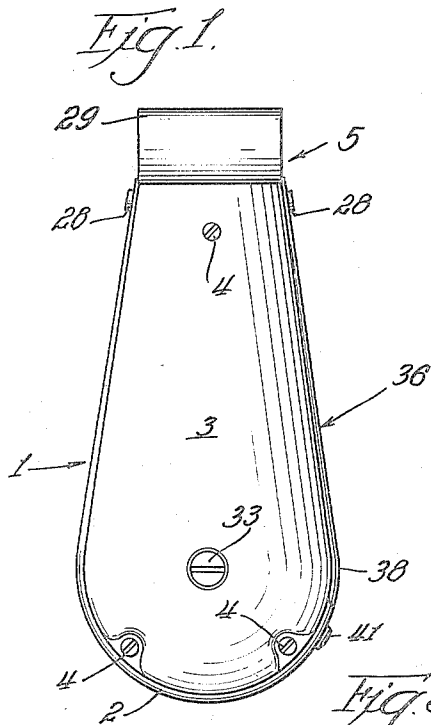
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2,533,807

OSCILLATING RACK ACTUATED DRIVE

Filed Sept. 1, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

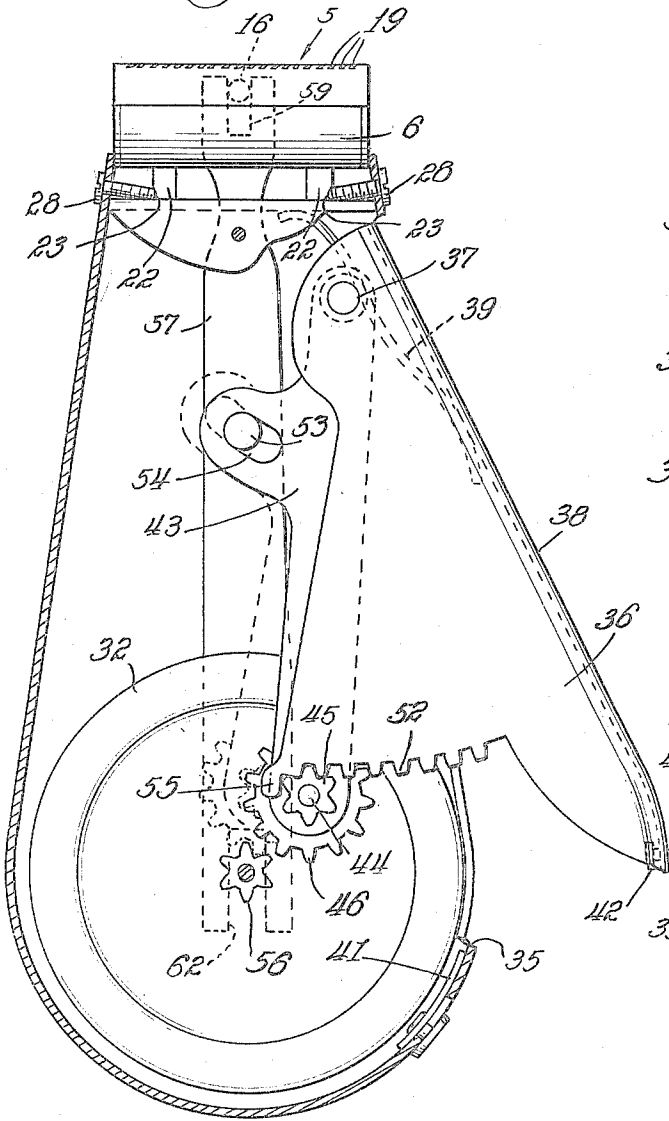
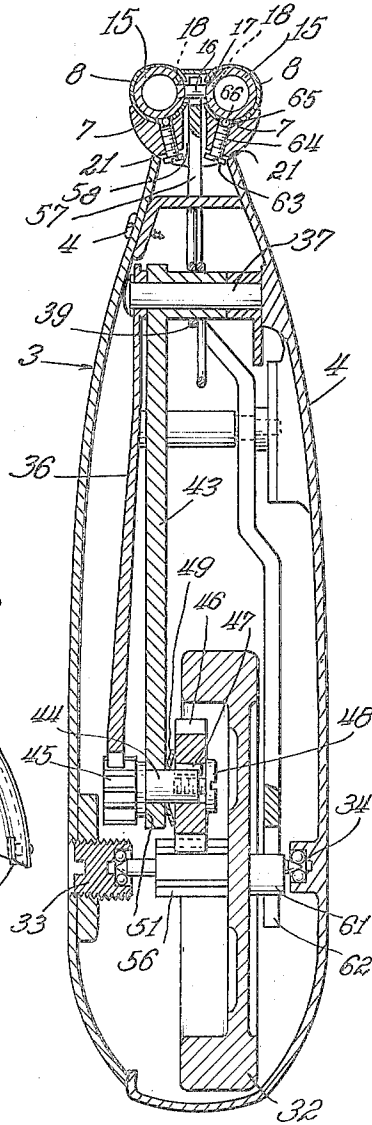


Fig. 4



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# UNITED STATES PATENT OFFICE

2,533,807

## OSCILLATING RACK ACTUATED DRIVE

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Application September 1, 1945, Serial No. 614,020

1 Claim. (Cl. 74-133)

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Among other objects hereinafter appearing, the main objects of my invention reside in the provisions of a novel, practical and efficient mechanical shaver which is hand-operated and so, not being dependent upon electric current for its operation, can be used anywhere, and which may be constructed so as to be of convenient shape, light in weight, and not cumbersome, so that it is convenient in use and may be conveniently carried in a person's pocket.

The invention will be better understood by reference to the accompanying drawing forming a part hereof and in which—

Figures 1 and 2 are side elevational views of a mechanical shaver embodying my invention and taken at right angles with respect to each other;

Figure 3 is a side elevational view of the shaver in elevation corresponding with that of Figure 1 and having parts broken away and shown in section;

Figure 4 is a longitudinal sectional view of the shaver in elevation corresponding with that of Figure 2 and taken substantially on the line 4—4 of Figure 3;

Figure 5 is an end elevational view of the cutter head of the shaver;

Figure 6 is a top plan view of the cutter head of the shaver;

Figure 7 is a vertical longitudinal section of the cutter head on the shaver and taken substantially on the line 7—7 of Figure 5; and

Figure 8 is a top plan view of the two cutters of the cutter head of the shaver together with the driving pin thereof.

Referring to the drawing, an elongated enclosure forming body of oblong transverse cross section is generally designated at 1 and comprises a main part 2 forming one broad side wall and the narrow side wall of the body and a cover part 3 forming the other broad side wall of the body and detachably secured on the main part as designated at 4. See Figures 1 to 4 inclusive.

An elongated cutter head generally designated at 5 is carried at the upper end of the body 1 and extends longitudinally of the major axis of the transverse cross section of the body, and comprises as follows:

An elongated base member 6 is provided at the top thereof with two parallel upwardly facing transversely concave comb seats 7 extending longitudinally thereof, and two parallel elongated tubular combs 8 are respectively seated in these comb seats and thus extend longitudinally of the base member. See Figures 3 to 7. The combs are

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provided with arcuate end slots 9 at opposite ends thereof, and plates 11 are secured at opposite ends of the base member by screws 12 and locating pins 13 and are provided with spaced undercut projections 14 which are respectively engaged in the slots 9 of the combs to secure the combs longitudinally and downwardly on the comb seats 7. Two elongated tubular cutters 15 are respectively slidably engaged within the combs for reciprocation longitudinally of the major axis of the transverse cross section of the body 1 to cooperate with the combs in the shaving operation. A cutter driving pin 16 extends across between the intermediate portions of the cutters and through longitudinally extending openings 17 of the combs, and are engaged in radial bores 18 of the cutters for simultaneously reciprocating the same, the driving pin being secured in at least one of the bores 18, as by being press fitted therein, to longitudinally fix the pin. The combs 8 are each provided with a series of diagonal transverse slots 19 arranged longitudinally thereof, and the cutters 15 are each provided with a series of diagonal transverse slots 20 arranged longitudinally thereof and extending correspondingly and having shearing relation with the comb slots 19, see Figures 6 and 8, the diagonal arrangement of the comb slots insuring entry of the hair into these slots throughout the longitudinal extent of the slotted portions of the combs as the combs are passed over the skin during the shaving operation and the extending of the cutter slots correspondingly with the comb slots effecting shearing action throughout the extent of the comb and cutter slots with a desirably short reciprocating stroke of the cutters. The comb slots 19 are preferably slightly wider than the cutter slots 20 so that the entry of the hair into the comb slots is facilitated.

A cover member 24 extends longitudinally of and between the combs 8 and bridges the space therebetween, and is provided with two longitudinally spaced lateral extensions 25 which extend through vertical openings 26 through and spaced longitudinally and disposed adjacent opposite ends of the base member 6 and have their lower free end portions below the screws 12 turned oppositely and away from each other to form retaining lugs 27 which underlie the inner ends of the screws 12 to detachably secure the cover member 24 on the cutter head, the cover member being conveniently detachable from and installable on the cutter head while the screws 12 are partially unscrewed to permit the lugs 27 to pass thereby.

The base member 6 is engageable downwardly on a seat 21 on the upper end of the body 1, as shown in Figure 4, and is provided with two extensions 22 spaced longitudinally and disposed adjacent opposite ends thereof and which extend downwardly within the body and are provided with oppositely disposed laterally facing recesses 23 as shown in Figures 3 and 7. Two headed screws 28 are screwthreaded through opposite narrow side wall portions of the body 1 adjacent the upper end thereof, see Figure 3, and the inner ends of these screws are engaged in the recesses 23 of the base member extensions 22 to detachably secure the cutter head on the body 1.

A tubular cutter head enclosing cover 29 is provided with a longitudinally extending slot 31 adapted to accommodate a portion of the body 1 therebetween, as shown in Figures 1 and 2, and has longitudinal sliding engagement with the body for the installation of this cover on the shaver in cutter head enclosing position and for the removal of the same, this cover serving to protect the cutter head when the shaver is not in use.

A flywheel 32 is rotatably mounted on bearings 33 and 34 within the body 1 in the region of the lower end thereof on an axis extending longitudinally of the minor axis of the transverse cross section of the body. See Figures 3 and 4. The body is provided with an opening 35 extending longitudinally of one narrow side thereof, and an actuating lever 36 is pivotally mounted on a stud 37 carried by the body 1 and disposed upwardly within the body and adjacent the opening 35, the pivotal axis of this lever extending longitudinally of the minor axis of the transverse cross section of the body. The lever 36 extends from its pivotal axis in the direction of the lower end of the body and is pivotally movable between extending and non-extending positions relative to the narrow side of the body having the opening 35, as respectively shown in Figures 3 and 1, and has a grip portion 38 which is shaped to close the opening 35 when the lever is in its non-extending position. A torsion spring 39 encircles the stud 37 and, reacting on the body, actuates the lever 36 to its extending position, and the lever is adapted to be actuated into its non-extending position by squeezing it and the body 1 in the hand. A latch 41, slidably mounted on the body, is releasably engageable with a latch stud 42 on the lower end of the lever to retain the lever in non-extending position when the shaver is not in use.

An arm 43, within the body 1, is pivotally mounted on the stud 37 and extends toward the lower end of the body. A shaft 44 extends through the lower end of the arm 43 and is rotatably mounted thereon on an axis extending longitudinally of the minor axis of the transverse cross section of the body, as shown in Figure 4, and has a gear pinion 45 of relatively small diameter fixed thereon on one side of the arm 43. Another gear 46 of relatively large diameter is slidably keyed, as designated at 47, on the shaft 44 on the other side of the arm 43, and a headed screw 48 screwthreaded into the shaft and engaging the gear 46 serves to retain this gear on the shaft. A concave spring washer 49 encircles the shaft 44 between the arm 43 and the gear 46 and serves to frictionally engage a shoulder 51 of the shaft against the arm 43 to yieldably resist rotation of the shaft and the gears 45 and 46 which are angularly fixed thereon, the frictional resistance being adjustable by means of the screw 48. It is

to be noted that the gears 45 and 46 and the parts related thereto are all disposed within the body 1.

The actuating lever 36 is provided with a segmental gear rack 52 disposed coaxially of this lever, and this rack projects within the body 1 and is permanently meshed with the gear pinion 45. A stud 53 is carried by the body 1 and is disposed within the body intermediate the flywheel 32 and the upper end of the body, and the arm 43 is provided with a slot 54 engaging this stud to limit pivotal movement of this arm and consequently bodily movement of the gears 45 and 46. A stop 55 on the inner end of the gear rack 52 is engageable with the gear 45 to limit outward movement of the lever 36, it being noted that bodily movement of this gear is limited by the slot 54 engaging the stud 53. A gear pinion 56 of relatively small diameter, within the body 1 is disposed coaxially of and is secured with the flywheel 32 for rotation therewith, and the gear 46 is adapted in opposite positions of the bodily movement thereof to be respectively in and out of mesh with the gear pinion 56.

A lever 57 within the body 1 is intermediately pivoted on the stud 53 on an axis extending longitudinally of the minor axis of the transverse cross section of the body and has its upper portion extending between the extensions 22 of the cutter head base member 6 and into an intermediate vertical opening 58 through the cutter head base. The upper end of the lever 57 is disposed between the combs 8 and is provided with a radial slot 59 in which the cutter driving pin 16 engaged to effect reciprocation of the cutters 15 with oscillation of this lever, this lever and the cutter driving pin being arranged underneath the cover member 24 and being concealed thereby. By reason of the engagement of the slot 59 by the cutter driving pin 16, the lever 57 and the cutter driving pin are conveniently engageable and disengageable as incidents of the mounting and dismounting of the cutter head with respect to the body 1. A rotatable eccentric 61 is disposed coaxially of the flywheel 32 and is angularly fixed therewith, and the lower end of the lever 57 is provided with a radial slot 62 in which the eccentric is engaged so that rotation of the flywheel effects oscillation of the lever 57 and consequent reciprocation of the cutters 15 for the shaving operation.

When the shaver is to be used, the cover 29 is removed and the actuating lever 36 is released from the latch 41 whereupon the spring 39 actuates this lever to its extending position, and the intermediate gear element comprising the gears 45 and 46 is bodily positioned with the gear 46 out of mesh with the driven flywheel pinion 56 as shown in full lines in Figure 3. To effect rotation of the flywheel, the body 1 and lever 36 are squeezed in the hand to actuate this lever to its non-extending position. Because of the frictional resistance to rotation of the intermediate gear element comprising the gears 45 and 46, as effected by the spring 39, initial movement of the lever 36 from its extending position toward its non-extending position effects bodily movement of the intermediate gear element to mesh the gear 46 with the flywheel pinion 56, as shown in dot and dash lines in Figure 3, after which further movement of the lever 36 toward its non-extending position effects rotation of the flywheel and consequent reciprocation of the cutters 15 for the

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shaving operation. When the lever 46 reaches the end of its movement into its non-extending position, the flywheel pinion 56, because of its rotation, effects bodily movement of the intermediate gear element to place the gear 48 out of mesh with the flywheel pinion after which the flywheel continues to rotate under its momentum for the shaving operation. The lever 36 is reciprocated as many times as is necessary to attain sufficient flywheel speed and is reciprocated from time to time during the shaving operation as the flywheel speed decreases.

By reason of the gear pinions 45 and 56 being of relatively small diameter and the gear 48 being of relatively large diameter, the angular velocity of the flywheel is relatively high as compared to the reciprocatory velocity of the actuating lever 36 so that sufficient flywheel velocity is conveniently attained.

Referring again to the cutter head, two screws 63 are screwthreaded upwardly into bores 64 through the cutter head base 6 and are disposed radially of respective of the combs 8 at the intermediate portions thereof. See Figures 4 and 7 and particularly Figure 4. Radial bores 65 through the walls of the combs aline with the bores 64 and consequently with these screws, and bearing balls 66 are respectively engaged in the bores 65 and are engaged between the inner ends of respective of these screws and the cutters 15, thus providing adjustable bearings for establishing and maintaining close shearing engagement between the cutters and combs.

While I have thus described my invention, I do not wish to be limited to the precise details described, as changes may be readily made without departing from the spirit of my invention, but having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

In a device of the character described, the combination with an elongated enclosure forming body of oblong transverse cross-section, of a flywheel rotatably mounted within said body in the region of one end thereof and on an axis extending longitudinally of the minor axis of said transverse cross-section, an actuating lever pivotally mounted on said body for pivotal movement with respect thereto on an axis extending longitudinally of said minor axis and disposed in the region of the other end of said body and said actuating lever extending from its pivotal axis in the direction of said first mentioned end of said body and being pivotally movable between extending and non-extending positions relative to a narrow side of said body and adapted to be actuated into its non-extending position by squeezing it and said body in the hand, spring means operative to actuate said actuat-

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ing lever into its extending position, a segmental gear rack on said actuating lever and disposed coaxially thereof and extending within said body, a rotatable driven gear of relatively small diameter within said body and disposed coaxially of and angularly fixed with said flywheel, an intermediate rotatable gear element within said body and disposed on an axis extending longitudinally of said minor axis and mounted for bodily pivotal movement on the pivotal axis of said actuating lever and comprising coaxial angularly fixed second and third gears respectively of relatively small and large diameters of which said second gear is permanently meshed with said gear rack and of which said third gear is adapted in opposite positions of the bodily movement of said intermediate gear element to be respectively in and out of mesh with said driven gear, stop means operative to limit bodily movement of said intermediate gear element in both directions, and yieldable means operative on said intermediate gear element to resist rotation thereof to an extent sufficient to cause it to mesh with said driven gear with initial movement of said actuating lever in one direction.

ALEX HORVATH.

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