Nov. 23, 1943. G. DALKOWITZ 2,334,995

SHAVING DEVICE

Filed June 2, 1938 4 Sheets-Sheet 1

Fig. 1.

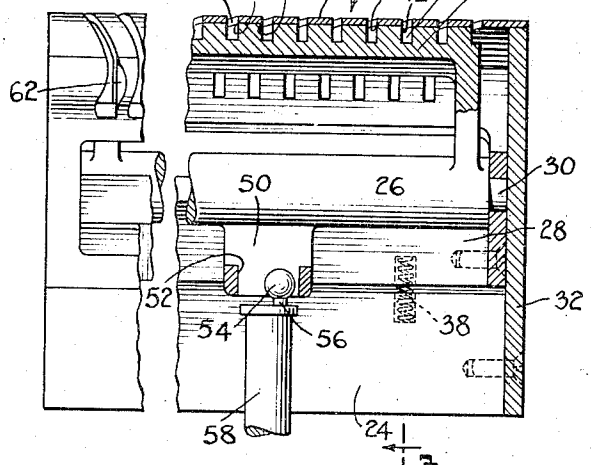


Fig. 3.

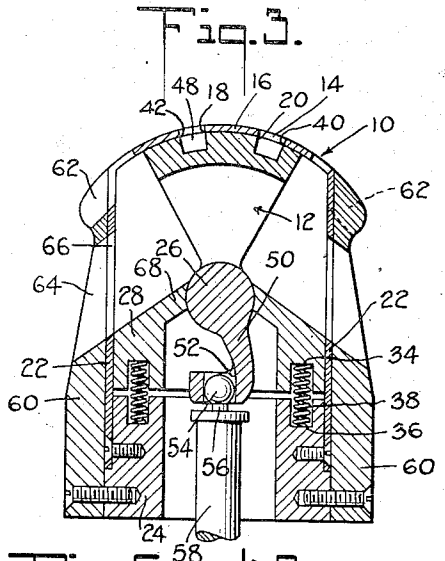


Fig. 2.

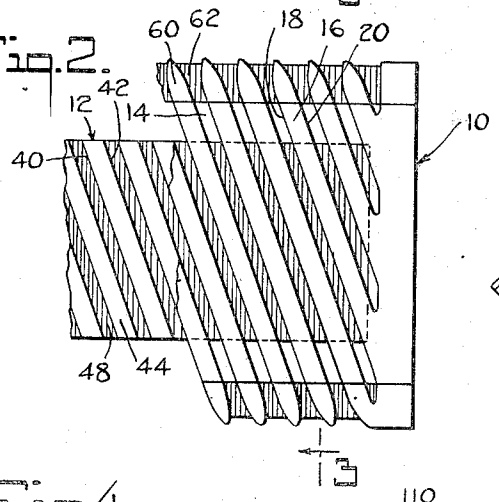


Fig. 5.

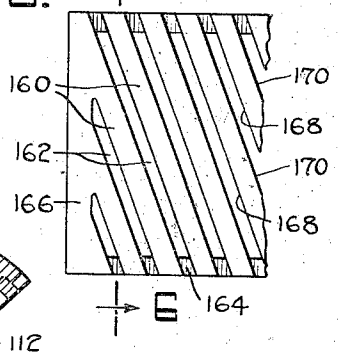


Fig. 6.

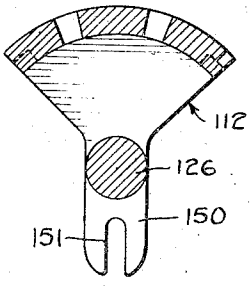
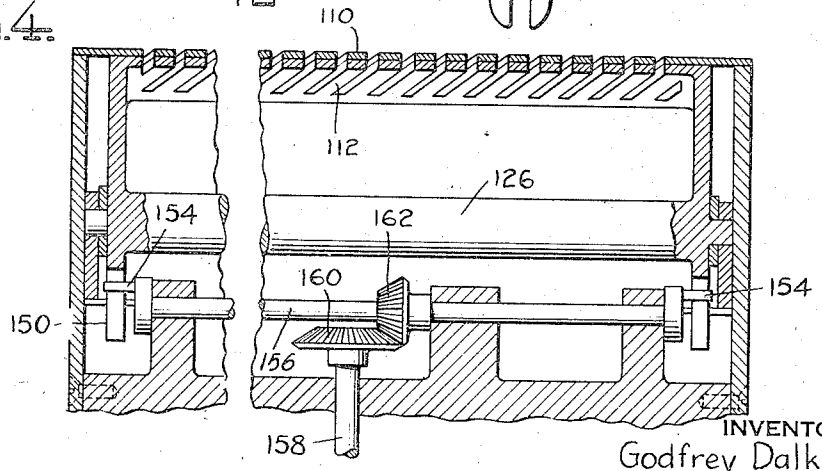


Fig. 4.



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Nov. 23, 1943. G. DALKOWITZ 2,334,995

SHAVING DEVICE

Filed June 2, 1938 4 Sheets-Sheet 2

Fig. 7.

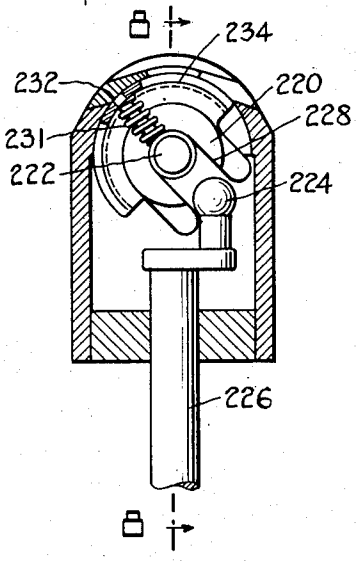


Fig. 8.

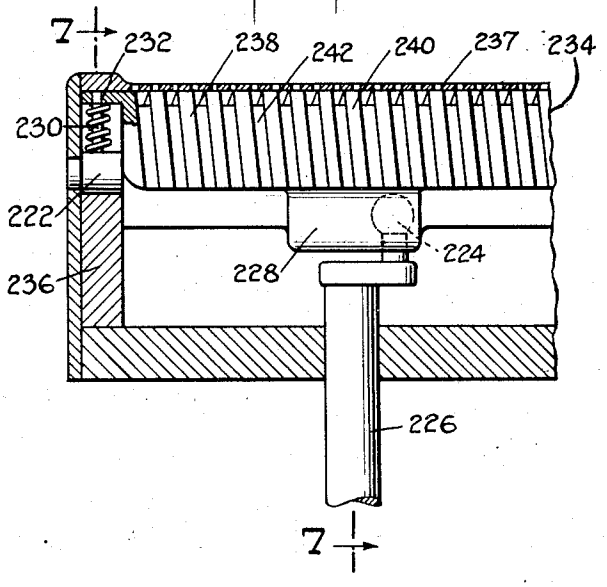
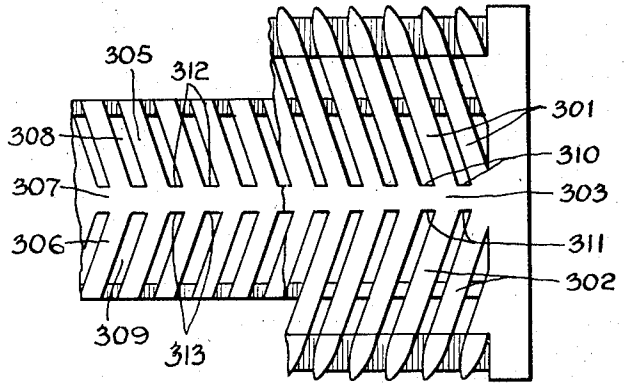


Fig. 9.



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Nov. 23, 1943. G. DALKOWITZ 2,334,995

SHAVING DEVICE

Filed June 2, 1938 4 Sheets-Sheet 3

Fig. 10.

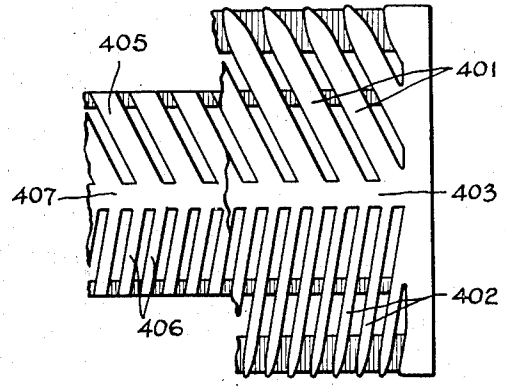


Fig. 11.

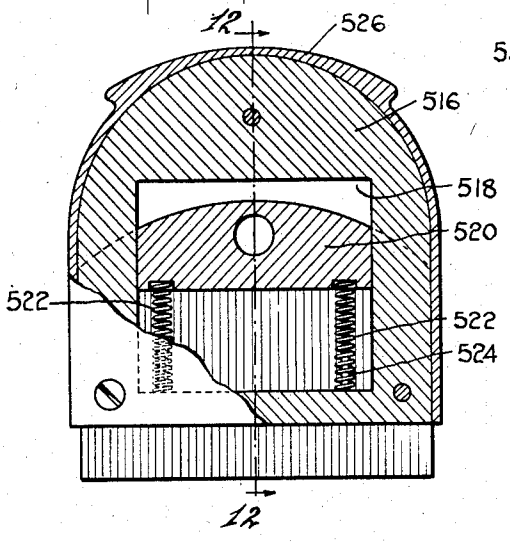
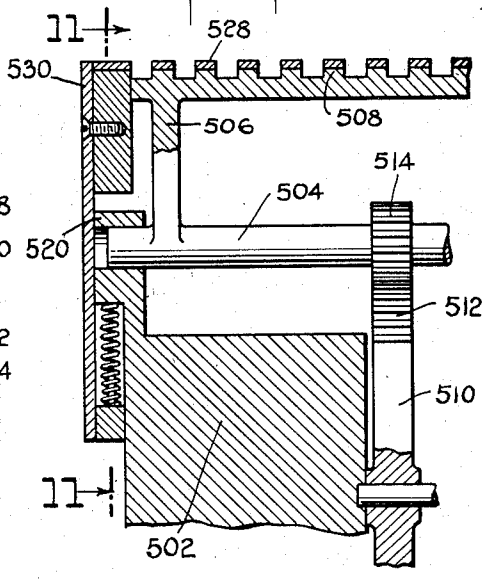


Fig. 12.



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Nov. 23, 1943. G. DALKOWITZ 2,334,995

SHAVING DEVICE

Filed June 2, 1938 4 Sheets-Sheet 4

Fig. 13.

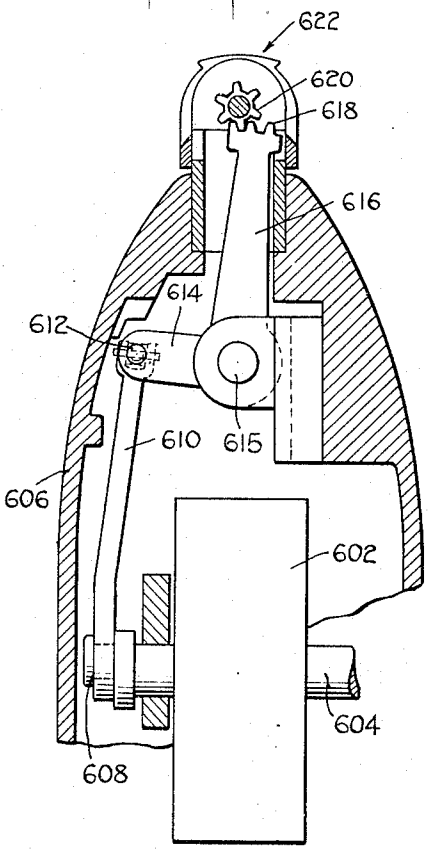
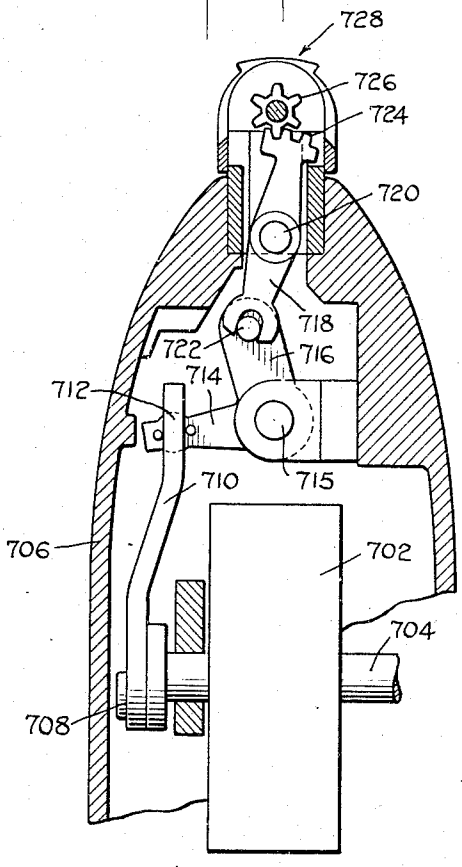


Fig. 14.



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2,334,995

UNITED STATES PATENT OFFICE

2,334,995

SHAVING DEVICE

Godfrey Dalkowitz, Brooklyn, N. Y., assignor to American Safety Razor Corporation, Brooklyn, N. Y., a corporation of Virginia

Application June 2, 1938, Serial No. 211,319

18 Claims. (Cl. 30—43)

This invention relates generally to shaving implements and more particularly to shaving implements of the type known as dry shavers, that are intended to be used on the flesh without the preparatory application thereto of shaving soaps, creams or similar substances, and which depend for their operation on the shearing or clipping action of relatively movable cutting edges.

Among the general objects of my invention is the provision in a dry shaver of an improved construction that is effective and economical in operation and manufacture.

Among the more particular objects of my invention is the provision in a dry shaver of coacting cutting edges, contoured substantially in the form of similar coaxial spirals that pass over each other with an oscillatory relative movement.

These objects and such other objects as will hereinafter appear or be pointed out are attained by the illustrative embodiments of my invention shown in the drawings, in which:

Figure 1 is a fragmentary view that is partly a front elevation and partly a medial, longitudinal section of a dry shaver head according to my invention.

Figure 2 is a fragmentary view of the shear plate and the cutter of the embodiment in Figure 1 in developed form; and

Figure 3 is a transverse sectional view through the dry shaver head of Figure 1, substantially on the line 3—3 of Figures 1 and 2, looking in the direction of the arrows, except that the section through shaft 26 is taken in a plane passing through the crank 50;

Figure 4 is a longitudinal sectional view, with portions broken away, of another embodiment of my invention;

Figure 5 is a developed view of the cutting edges of the cutter of the embodiment of Figure 4;

Figure 6 is a sectional view substantially on the line 6—6 of Figure 5, looking in the direction of the arrows.

Figure 7 is a transverse sectional view taken substantially on the line 7—7 of Figure 8 and shows a further embodiment of my invention;

Figure 8 is a longitudinal sectional view substantially on line 8—8 of Figure 7, looking in the direction of the arrows;

Figure 9 is a view similar to Figure 2, and illustrates a modified form of shear plate;

Figure 10 is a view similar to Figures 2 and 9 and illustrates still another shear-plate form;

Figure 11 is a transverse sectional view substantially on the line 11—11 of Figure 12, and looking in the direction of the arrows, through a dry shaver head illustrating a further embodiment of my invention;

Figure 12 is a fragmentary longitudinal section view, through the dry shaver head of Figure 11, substantially on the line 12—12 thereof, and looking in the direction of the arrows;

Figure 13 is a fragmentary longitudnal sectional view through the head and casing of a dry shaver, and shows power transmission mechanism whereby power from the rotary drive shaft of a motor may be converted into an oscillatory movement of the cutter of a dry shaver head; and

Figure 14 is a view similar to Figure 13, showing another form of power transmission mechanism.

In Figures 1, 2 and 3 of the drawings 10 denotes the shear plate, of one embodiment of the invention. Its inner surface is a segment of a cylinder so that a cutter 12 having an outer cylindrical surface of the same radius may maintain sliding contact therewith.

The shear plate is shown as traversed by slots 14 the side walls of which are of helical or spiral contour. Between the slots and constituting the actual body of the shear plate are the bars 16, having cutting edges 18 and 20 formed at the meeting points of their sides with their inner surfaces.

Obviously the shear plate should be of a material that will satisfactorily perform the cutting function, and I have found various ferrous alloys satisfactory for this purpose. By way of example I have also indicated the shear plate, as made of sheet material and as provided with side pieces or legs 22 by means of which the shear plate may be mounted in any suitable or preferred manner on a block 24 that constitutes the base of the shaver head. Within the enclosed space formed by these parts is positioned the aforementioned cutter 12, which is shown as mounted on a rock shaft 26 journalled in bearings carried by a block 28, as indicated at 30. The block 28 is slidable in the space between the side pieces 22 of the shear plate 10 and end walls 32 carried by 24. In order to urge the block 28 and with it the cutter 12 against the shear plate 10, so as to maintain them in contact, which is a condition necessary for the satisfactory operation of the dry shaver, I have shown, by way of example, coil springs 38, nested in recesses 34 of the block 24 and recesses 36 of block 28.

In the embodiment of Fig. 1 the movable cutter 12 is shown as slidably mounted on block 28 and

this block is urged upward so as to press the cutter against the shear plate by an arrangement comprising springs 38.

The cutter 12 is shown as provided with cutting edges 40 and 42 formed on the side walls of ribs 44 carried on the cylinder wall 46 of the cutter, and separated from each other by grooves 48. The cutting edges 40 and 42 are also spirally contoured and the pitch of their spirals are identical with those of the cutting edges 18 and 20 of the shear-plate.

In order to effect the cutting operation by the interaction of the cutting edges of the shear plate and the cutter, I have shown means comprising an arm 50 carried by the rock-shaft 26, this arm being provided with a slot 52 into which projects a ball 54 carried by a wrist-pin 56 positioned on the end of a drive shaft 58. The latter may be rotated by any suitable or preferred power means, such as the electric motor customarily housed in the handle of the modern commercial dry shavers.

Since the cutting edges 18 and 20 and the cutting edges 40 and 42 are of similar spiral contour, it follows that if the cutter is oscillated to a sufficient extent in one direction the edges 18 and 42 will meet in a clipping action, and these edges meet simultaneously at all points thereof due to the identical pitch of the spirals on which they are formed. However it will be observed that the cut has a strong slicing component in it due to the inclination of the cutting edges to the direction of relative motion. Similarly, when the cutter is oscillated to a sufficient extent in the opposite direction, the cutting edges 20 and 40 again meet in a clipping action.

In the illustrative embodiment of Figures 1 to 3 I have shown the ribs and bars and the grooves and slots of the cutter and shear plate respectively of the same width, and the cutter is shown in its mid-position, so that the ribs of the cutter are covered by the bars of the shear-plate. This construction, while not necessary in the practice of my invention, is convenient in that the cutting edges of the cutter need only traverse the width of the slots 14 in order to effect a cut, and the amplitude of oscillation of the cutter need therefore be relatively small. For that reason also the slots 14 and grooves 48 are shown of less width than the bars 12 or ribs 44.

Since the slots 14 and grooves 48 must receive the hairs in order that clipping thereof may take place, it is obviously disadvantageous from this standpoint to reduce the width of the grooves because a narrower groove can receive fewer hairs than a wide one. However, since the slot width must necessarily be small both from the aforementioned considerations and the circumstances that narrow grooves prevent the entry of flesh between the cutting edges and keep the hairs in position before and during the clipping action, I have added a compensating feature to my dry shaver in the form of guard plates 60 positioned at both sides of the shaver head and having slots 62 therein in registration with the slots 14 of the shear-plate. The inner portions of the slots 62 may be of the same width or of less width than the slots 14, but their outer portions are flared outwardly, whereby they will, between them, receive practically all of the hairs encountered, and will guide them smoothly into slots 14.

It will be observed that the slots 14 of the shear plate are shown as extending into the legs 22 to a depth sufficient to admit hairs of considerable length, and which depth exceeds by many times the thickness of the shear plate as illustrated. The slots 62 of the guard shoes are shown as of corresponding depth.

Openings 64 and 66 have been shown in the guard plate 62 and legs 22 respectively whereby shaving waste entering the shaver head may pass outwardly without clogging the shaver parts. In order to prevent the waste from entering the inner portions of the head I have further shown the block 28 as provided with walls 68 that run into close engagement with the rock-shaft 26 and that have their upper surfaces sloping downward and merging with the lower surfaces of the openings 64 and 66.

While I have shown the guards or "shoes" 60 as separate pieces, it is obvious that they may be made integral with other portions, such as the legs 22, and the block 24, and similarly the shear plate might be made an integral part of the block 24. However the advantages of the illustrated construction have been pointed out.

Where the shear plate is made of material other than the sheet material described, it need not be made of uniform thickness as shown in Figure 1. On the contrary it may be found of advantage to have different portions thereof of different thicknesses. For example the medial portion, transversely considered, may be made extremely thin, so as to bring the cutting edges as close to the flesh as possible, while the lateral portions may be made thicker, so as to provide the necessary strength. According to one practical embodiment, the inner surface of the shear-plate may be a segment of a cylindrical surface, while its outer surface may also be a segment of a cylindrical surface, but formed on a larger radius than the inner surface, and eccentric thereto.

A second embodiment of my invention, which is in the main similar to the first embodiment but differs therefrom in the details of construction is shown in Figures 4, 5 and 6. In these figures 110 denotes the shear-plate which may be of the same type as that of the first embodiment, and may be similarly mounted. Underneath the shear plate and in sliding contact therewith is a cutter 112 carried by a rock-shaft 126 that may be mounted similarly to the rock-shaft 26 of the first embodiment, and the details of which it is therefore unnecessary to describe.

Adjacent each end thereof the rock-shaft 126 is shown as provided with a slotted arm 150 into the slot 151 of which extends a crank pin 154 carried by a shaft 156, rotated in any suitable or preferred manner, as by the bevel gears 160 and 162, from the drive shaft 158.

In Figures 5 and 6 I have illustrated the detailed construction of the teeth of the cutter 112. It will be observed on viewing said figures that the teeth are shown as in the form of spirally contoured bars 160 (shown as straight bars in the developed view of Figure 5) separated by slots 162 and held together at their ends by longitudinally extending members 166. Each bar 160 is provided at the meeting of its outer and side walls with cutting teeth 168 and 170. In this construction the slots 162 permit the shaving waste to pass from the cutting zone through the cutter, whereas in the first embodiment the shaving waste can only leave the cutter at the ends of the grooves 48 thereof. In the slotted construction the danger of clogging is therefore greatly reduced.

It will further be observed that the cutter 112 has a surface corresponding to a 90° sector of a cylinder, while the cutter 12 corresponds to a

60° sector. While I do not intend to restrict myself to such limits, I have found that by making the segments of cutters between these limits, a highly satisfactory practical construction results.

In the further embodiment of Figures 7 and 8 I have shown a yoke **220** mounted for oscillation about trunnions **222** journalled in the casing **236** and actuated by a crank **224** carried by a rotating drive shaft **226** slidable in the slot **228** provided on the yoke. A pin **230** is shown as projecting from each trunnion **222** and as having its end fitting into an opening or slot **232** provided in a slotted cutter plate **234**, which is shaped so as to contact with the inner wall of an arched shear plate forming part of the casing **236**, this shear plate having its inner surface constituting a portion of a cylinder. A coiled compression spring **231** is shown as positioned on each pin **230**, and as abutting against the trunnion **222** at one end and against the cutter plate at its other end, so as to press the cutter plate **234** against the shear plate.

The shear plate proper is constituted by ribs **237** having slots **238** between each pair of ribs and the cutter is similarly constituted by ribs **240** having slots **242** intermediate each pair of ribs. The cutting edges are formed on both side walls of the ribs and as the cutter is oscillated the respective cutting edges of the cutter and the shear plate effect a cutting action as in the other embodiments heretofore described. It will be understood that other features mentioned in the preceding embodiments and not in connection with this embodiment may also be incorporated therein.

In Figure 9 I have shown a further embodiment of my invention in which instead of stationary and movable cutters along similarly pitched spirals, I have two sets of spiral cutters on both the movable and stationary member separated by a solid intermediate portion, one set on the movable cutter being pitched similarly to and parallel to the corresponding set on the stationary cutter, and the other set being similarly related to the second set on the stationary cutter.

Upon viewing this figure of the drawings, it will be observed that at **301** I show one set of spiral cutters on the stationary member, and at **302**, show another set with the solid portion **303** therebetween and directed longitudinally of said stationary member or shear plate. It will be observed that while the cutters comprising each set are similarly pitched, the cutters of one set are pitched at an angle to that of the other.

The movable cutter is also similarly provided with two sets of cutters **305** and **306** each pitched similarly, that is, the cutters in each set being pitched similarly with reference to each other, but at an angle with reference to the other set, and so that the cutters of the set **305** are pitched parallel to the cutters of the set **301** of the shear plate, and so also the cutters of the set **306** are pitched similarly to the cutters **302** of the shear plate.

The cutters may or may not be separated by a solid intermediate portion, and in the embodiment illustrated in Figure 9 I have shown them as separated by the solid intermediate portion **307**, although, as will be understood, the cutting edges can meet and merge into each other.

It will further be observed that the cutters **305** and **306** are spaced by slots **308** and **309** respectively, and that, as in the embodiment of Figure 5, the shaving waste can drop through the cutter.

I may further provide cutting edges on the end walls of the slots both of the stationary and of the movable cutter, and these edges are indicated at **310** and **311** on the fixed cutter and at **312** and **313** on the movable cutter. By suitably dimensioning the parts and regulating the throw of the movable cutters these additional cutting edges may be made to interact with each other as well as with the spiral edges to effect the shaving operation.

In Figure 10 I have shown another form of cutter and shear plate that lie within the bounds of my invention. In that figure the shear plate comprises two sections, separated by a solid portion **403**, one section being provided with relatively wide and steeply pitched ribs or bars **401**, while the other section is provided with relatively narrow and slightly pitched ribs **402**, these ribs being provided with cutting edges, as in Figure 2. The movable cutter is shown as having two sections the teeth of which are similar to the teeth of the respective sections of the shear plate and the sections are separated by a solid portion **407**. The ribs of the cutter underlying the ribs **401**, and which are numbered **405**, are of the same width and pitched identically with the said ribs **401**, and the same is true of the ribs **406** in relation to the ribs **402** of the stationary cutter.

By an arrangement such as just described the two sides will serve for the attainment of different shaving effects. To obtain this result it is not necessary that the ribs of the two sections be pitched in opposite directions as shown. The direction of pitch might be the same, but the amount of pitch different.

In Figures 11 and 12 is shown an arrangement in which instead of the cutter being movably mounted on the base block the cutter is fixedly mounted and the shear plate is movable and means are provided for urging the shear plate into contact with the cutter.

The particular means illustrated in Figures 11 and 12 for attaining this result comprises a base block **502** within which is mounted for oscillation a rock shaft **504** carrying the cutter **506** provided with teeth **508**, and oscillation may be imparted to a shaft **504** by a pivoted lever **510** provided with rack teeth **512** engaging the pinion **514**. Slidably mounted on the block **502** is a structure comprising a pair of plates **516**, having an opening **518** therein into which may project an extension **520** of the block **502**. A pair of coil springs **522** are shown as mounted on pins **524** projecting from the lower wall of the opening **518** and the upper ends of these springs are shown as extending into recesses in the lower wall of the projecting portion **520**. The springs **522** are under compression and as a result they urge the plate **516** downward. The shear plate **526** provided with teeth **528** is mounted on the end plates **516** and an end plate **530** is shown as covering up the opening in the plates **516**.

It will be understood that the construction shown may be used with any of the tooth forms and mechanisms heretofore described.

In Figures 13 and 14 I have shown transmission mechanism by which the rotary movement derived from a type of motor at present used in modern commercial dry shavers may be converted into an oscillating movement suitable for the operation of shaver heads such as described hereinabove.

In Figure 13 **602** indicates the rotor and **604** the rotor shaft of a motor positioned within the casing **606** of a dry shaver of conventional form.

It will be observed that the rotor shaft 604 runs transversely through the casing and carries on its end an eccentric pin 608. This pin serves to move a link 610, the other end of which is connected by any suitable or preferred mechanism 612 to the short arm 614 of a bell crank lever pivoted at 615, the long arm 616 of which is provided with rack teeth 618 that engage the teeth of a pinion 620 carried by the movable cutter of a shaver head 622.

A second form of transmission is shown in Figure 14 in which 702 is the rotor and 704 the rotor shaft of a motor mounted in the casing 706. The rotor shaft carries a crank pin 708 that actuates a link 710 the motion of which, through mechanism 712, is transmitted to the arm 714 of a bell crank lever pivoted at 715, the other arm 716 of which serves to actuate one end of a lever 718 pivoted at 720, as by the pin and slot connection shown at 722. The other end of the lever 718 is provided with rack teeth 724 adapted to engage the teeth of a pinion 726 carried by the movable cutter of the shaving head 728.

It is to be observed that the mechanism shown in Figures 13 and 14 is adapted for use in connection with any of the tooth forms shown hereinabove.

While I have herein disclosed several embodiments of my invention it will be understood that the same may be embodied in many other forms, as will be obvious to those skilled in the art, without departing from the spirit thereof, and that the disclosure herein is intended to be by way of illustration merely, and is not to be interpreted in a limiting sense, and that I do not limit myself other than as called for by the prior art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:

1. A dry shaver having a pair of relatively movable cooperating cutting edges, said edges being segments of similar coaxial spirals, said edges being alternatively movable into and out of contact with each other by an oscillatory movement about the axis of said spirals, whereby said cutting edges will be caused to meet simultaneously at all points along their length.

2. In a dry shaver, an arched shear-plate having its inner wall curved cylindrically, a cutter having its outer surface complementary to said cylindrical inner wall of said shear-plate, a mounting for said cutter whereby its outer surface is held in sliding engagement to the inner surface of said shear-plate, said shear-plate comprising similar spiral bars spaced from each other by spiral slots, spiral cutting edges formed at the meeting point of the side walls of said bars with the inner surface of said shear-plate, spiral ribs, of the same pitch as the spiral bars in the shear-plate, in the outer surface of the cylindrical cutter, said bars having spiral cutting edges of the same pitch as the cutting edges of the shear-plate formed thereon, said cutter being oscillatable about the axis of said spirals, whereby said respective cutting edges will be caused to meet simultaneously at all points along their length.

3. In a shaver head, an arched shear plate, an oscillating cutter, a mounting for said cutter permitting it to have a movement spacing it toward or away from said shear plate, said shear plate and cutter having complementary cylindrical surfaces with spirally disposed cutting teeth thereon having the same pitch, and yieldable means for keeping said surfaces in contact.

4. In a shaver head, an arched shear-plate having a cylindrical inner surface, a cutter having a cylindrical surface complementary to said shear-plate mounted for oscillation about the axis of the cylinder, spirally disposed cutting teeth of the same pitch on said cutter and said shear-plate and the cutter being oscillatable about the axis of the cylinder so as to cause said respective cutting edges to meet intermittently, whereby when they meet said cutting edges will contact each other simultaneously at all points thereof.

5. A hollow shaver head having a shear-plate on its upper face, a member slidably mounted in the hollow of said shaver head, a cutter mounted for oscillation in said member, said shear-plate and said cutter having complementary contacting cylindrical surfaces, spiral slots in said shear-plate having cutting teeth formed on their walls, means for keeping said surfaces in contact, discharge openings in the side walls of said shaver head for discharging shaving waste, said member being provided with an upper surface that forms a portion of the bottom wall of a continuous passage for leading said shaving waste to a discharge opening.

6. A hollow shaver head having a shear-plate on one side thereof, a member slidably mounted in the hollow of said shaver head, a cutter mounted for oscillation in said member, said shear-plate and said cutter having complementary contacting cylindrical surfaces, spiral slots in said shear-plate having cutting teeth formed on their walls, means for keeping said surfaces in contact, discharge openings in the sides of said shaver head for discharging waste, and said member having an upper surface inclined outwardly so as to conduct shaving waste toward said discharge openings.

7. In a dry shaver, an arched shear-plate supported on lateral walls, said shear plate and walls being formed from a single piece of sheet metal, spiral slots in said shear-plate, said slots extending into said walls to a depth several times the thickness of the shear-plate, and guard shoes laterally positioned in relation to said shear-plate and secured to said lateral walls and having spiral slots therein that are a continuation of the spiral slots of the shear-plate, and are of substantially the same depth as the extensions of said slots in said walls.

8. In a dry shaver, a cutting member having two rows of cutting teeth, the teeth of one row being portions of similar coaxial spirals arranged in spaced relation, and the teeth of the other row also being portions of similar coaxial spirals arranged in spaced parallel relation, but the teeth of the first row being pitched in a direction opposite to the teeth of the second row, a second cutting member having two rows of cutting teeth, the teeth of one row of said second cutting member being contoured and pitched similarly to the teeth of one of the rows of said first cutting member and being positioned for cooperation therewith in a cutting action, and the teeth of the other row of said second cutting member being contoured and pitched similarly to the teeth of the other row of said first cutting member and positioned for cooperation therewith in a cutting action, said cutting members being oscillatable relatively to each other about the axis of the spirals so that the cutting edges of both rows of said respective cutting members meet in a clipping action, said meeting being simultaneous along all portions of the coacting edges where

said edges are similar spirals, and being at a progressively shifting point where said coacting edges are oppositely pitched.

9. In a dry shaver head, a cutter mounted for oscillation about an axis, said cutter having a cylindrical outer surface provided with similar spiral cutting teeth, a shear plate provided with spiral cutting teeth pitched similarly to the teeth of the cutter and having its inner surface contoured complementarily to the outer surface of the cutter, and yieldable means for maintaining contact between said outer surface of the cutter and said inner surface of the shear-plate.

10. In a dry shaver head, a cutter mounted for oscillation, said cutter having a cylindrical outer surface provided with similar spiral cutting teeth, a shear plate provided with spiral cutting teeth pitched similarly to the teeth of the cutter and having its inner surface contoured complementarily to the outer surface of the cutter, and means for maintaining contact between said outer surface of the cutter and said inner surface of the shear-plate, said means being in the form of a slidable member within which the cutter is mounted, and resilient means for urging said member in a direction to maintain said contact.

11. For driving a dry shaver head having a shear plate and a cutter mounted for oscillation in said head, toothed means carried by said cutter for imparting oscillation thereto, pivotally mounted toothed means for meshing with said first toothed means, a rotary motor, and means intermediate said motor and said pivotally mounted toothed means for converting the rotary movement of the motor into an oscillating movement of said pivotally mounted toothed means.

12. For driving a dry shaver head having a shear plate and a cutter mounted for oscillation in said head, toothed means carried by said cutter for imparting oscillation thereto, a bell crank having one of its arms provided with teeth adapted to engage said toothed means, a rotary motor having this axis of its rotor disposed in a plane parallel but spaced from the axis of oscillation of said cutter, and means intermediate said motor and the other arm of said bell crank for converting the rotary movement of the motor into an oscillating movement of said pivotally mounted toothed means.

13. For driving a dry shaver head having a shear plate and a cutter mounted for oscillation in said head, toothed means carried by said cutter for imparting oscillation thereto, a pivotally mounted lever having teeth thereon for meshing with said toothed means, a rotary motor, and means intermediate said motor and said pivotally mounted toothed means for converting the rotary movement of the motor into an oscillating movement of said pivotally mounted toothed means.

14. In a dry shaver, an arched shear-plate supported on lateral walls, said shear-plate and walls being formed from a single piece of sheet metal, spiral grooves in said shear-plate provided with cutting teeth on their edges, guard shoes positioned laterally of the walls of said shear-plate and having spiral slots therein that are a continuation of the spiral grooves of the shear-plate, a block mounted for sliding movement between said walls, openings in said lateral walls and said guard shoes for the discharge of waste, said block having its top walls downwardly inclined from its midportion, and said openings having their bottom walls inclined and forming continuations of the top walls of said block, and a cutter provided with spiral grooves similarly pitched to the spiral slots of the shear-plate and having cutting teeth on the edges of its slots adapted to coact with the cutting of the shear-plate in a cutting action, said cutter being mounted for oscillation in said block, said cutter being oscillatable so that its teeth alternately move into and out of contact with the teeth of the shear-plate, and means acting on said block for urging said cutter against said shear-plate.

15. In a dry shaver head, a cutter having a cylindrical outer surface, said cutter being mounted for oscillation about its cylindrical axis, said outer surface being provided with spiral cutting teeth arranged in sections, each section having cutting characteristics determined by a construction comprising similar spiral ribs spaced from each other by spiral slots, and the cutting characteristics of each section being different from that of the other sections.

16. In a dry shaver head, a shear-plate comprising two sections provided with cutting edges, the cutting characteristics of each section being determined by its construction which comprises similar spiral ribs uniformly spaced from each other by spiral slots and said cutting teeth being formed on the edges of said ribs, and the cutting characteristics of one section being different from the cutting characteristics of the other section.

17. In a shear-head, a stationary cutter comprising a series of rows of arcuate-shaped cutter bars having a perforatory slot on each side of each cutter bar, the width of each of the perforatory slots being substantially greater than the width of said cutter bars, said cutter bars and slots extending over substantially the entire length of said cutter, the bars and slots of each adjacent pair of rows thereof being inclined oppositely relative to the long axis of said shear head, there being an even number of such rows of cutter bars whereby the extreme outside perforatory slots on opposite edges of the shear head are inclined in opposite directions, all of said cutter bars lying substantially in a common uniform arcuate surface, and vertically extending perforatory slots in the sides of the cutter formed and adapted to communicate with the angular slots in the face of said cutter positioned adjacent the side edges thereof.

18. In a dry shaver, a cutting member having two rows of cutting teeth, inclined relative to the longitudinal axis of said cutting teeth, the teeth of the first row being pitched in a direction opposite to the teeth of the second row, a second cutting member having two rows of cutting teeth, the teeth of one row of said second cutting member being inclined and pitched similarly to the teeth of one of the rows of said first cutting member and being positioned for cooperation therewith in a cutting action, and the teeth of the other row of said second cutting member being inclined and pitched similarly to the teeth of the other row of said first cutting member and positioned for cooperation therewith in a cutting action, said cutting members being oscillatable relatively to each other.

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