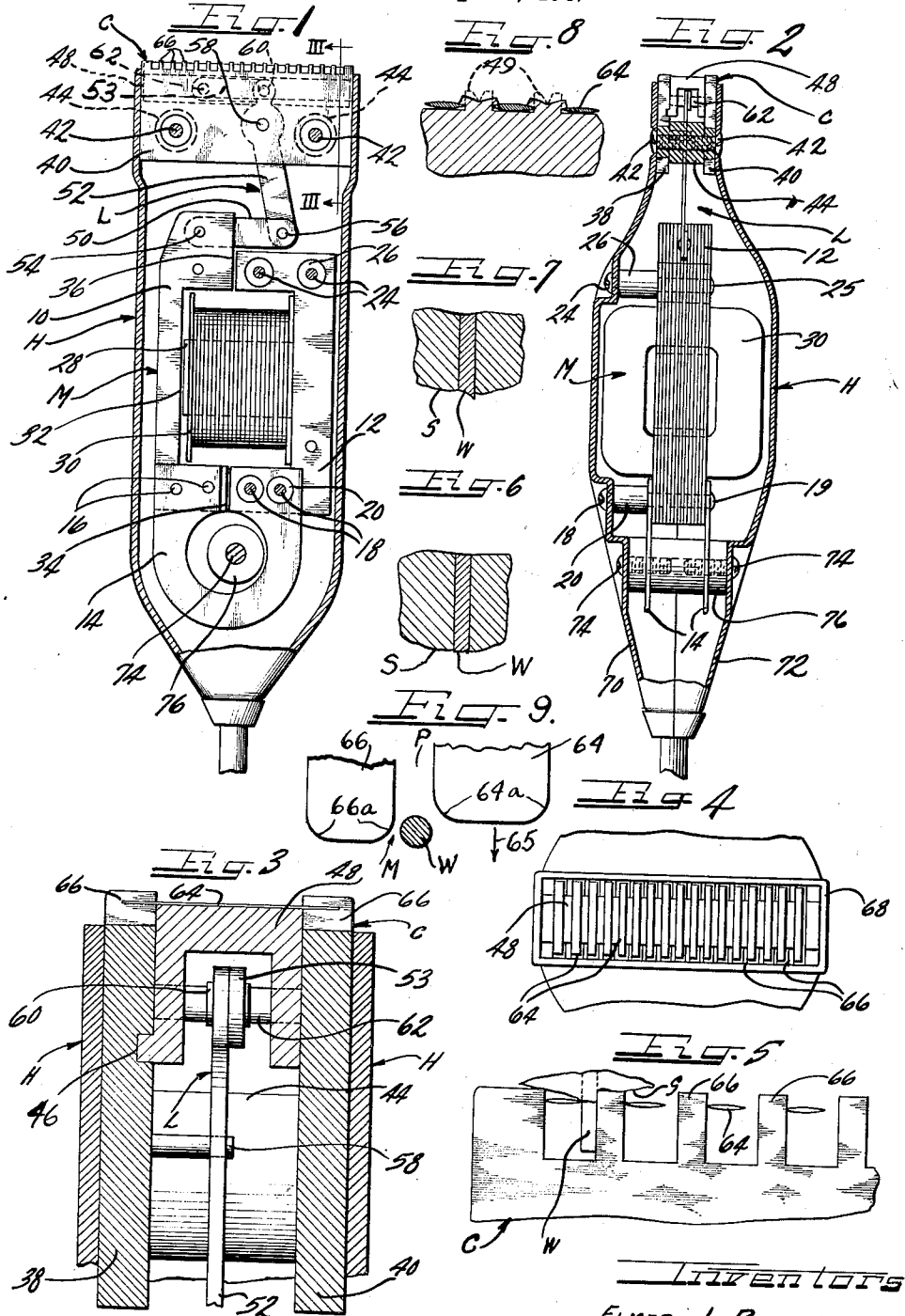


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NIPPER TYPE DRY SHAVER

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NIPPER TYPE DRY SHAVER

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Our invention relates to dry shavers and is particularly directed to a dry shaver wherein the whiskers of the user are automatically combed into correct position in the shaver to be trimmed or severed by pinching or chopping action between two members moving in directions to strike each other rather than by slicing or cutting between two members sliding relative to each other.

In accordance with the present invention a dry shaver is provided wherein a plurality of lengthly choppers are disposed in parallel array on a carriage and are in interposed relation with as many teeth extending therebetween. These teeth simulate a comb and as the shaver is moved back and forth over the skin the whiskers are combed into the space between the choppers and teeth. A vibrator motor is mounted within the housing of the unit and linked to the carriage to impart vibratory movements to the choppers, the movements being directed to cause each chopper periodically to approach the two teeth adjacent thereto. Whiskers extending into the region between any of the choppers and the teeth are subject to the impact of the choppers in their vibratory motions and are bottomed against the teeth with the result that they are severed by the pinching or chopping action to give the user a very close shave having no unpleasant burrs or points. Moreover, there are no wiping surfaces and consequently no tendency of the shaver to catch the whiskers and pull the same.

It is accordingly a general object of the present invention to provide an improved dry shaver wherein the whiskers of the user are trimmed by chopping or pinching rather than slicing or cutting.

A further object of the present invention is to provide an improved a dry shaver wherein no members are disposed between the chopping elements and the skin of the user, to the end that the chopping elements may be located close to the ends of the teeth with which they coact, thus achieving a close shave.

Still another object of the present invention is to provide an improved dry shaver having a plurality of blades attached to carriage members in a simple and effective manner.

Yet another object of the present invention is to provide an improved dry shaver having features of construction, combination and arrangement whereby it is inexpensive in manufacture and reliable in operation to the end that a unit of maximum usefulness is provided.

The novel features which we believe to be characteristic of our invention are set forth with

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particularity in the appended claims. Our invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing.

On the drawing:

Figure 1 is a side elevational view of an embodiment of the present invention with the outer housing portions broken away where they would otherwise obstruct the view;

Figure 2 is an end elevational view like Figure 1 but taken in a direction transverse to the direction of that view and showing portions of the head in cross section;

Figure 3 is a cross sectional view through the axis III-III, Figure 1;

Figure 4 is a top plan view of the chopper or head portion of the mechanism of Figure 1;

Figure 5 is a greatly enlarged fragmentary side elevational view of the chopper portion of the mechanism of Figure 1 and illustrating the action of the unit in severing whiskers;

Figures 6 and 7 are enlarged cross sectional views illustrating the results of the chopping action achieved by the mechanism of the present invention and the cutting action achieved with a conventional shaver, respectively;

Figure 8 is an enlarged fragmentary cross sectional view through an axis normal to the chopping elements and showing how the chopping blades are fastened to the carriage members; and

Figure 9 is a greatly enlarged fragmentary plan view of a tooth and chopper showing the rounded ends thereof and the manner in which a whisker is guided or combed into the space therebetween.

As shown on the drawings:

The dry shaver of the present invention includes a housing H in which is mounted the vibrator motor M and at the end of which is located the chopper or head portion C. A mechanical linkage L joins the motor M to the chopper or head portion C to cause vibratory movements of the latter when energizing current is supplied to the motor.

The vibrator motor M includes an armature member 10, Figure 1, supported from the core 12 by the resilient U-shaped support members 14. The latter members are attached to the armature 10 by rivets 16 and to the core 12 by the screws 18 and 19 which engage threaded hubs 20. The core 12 is sustained within the housing H by these screws and by the screws 24 and 25 which engage the threaded hubs 26.

The armature 10 and the core 12 are made of laminated magnetic material, such as thin sheets of silicon steel, to provide large magnetic fluxes without excessive eddy current losses.

The laminations of the core 12 are of a T-shape with a central tongue 28 extending to proximity with the armature 10. A coil 30 surrounds this tongue and is connected to a source of alternating electric potential, such as, for example, household electric current supply. Current flow in this coil sets up an alternating magnetic field which causes magnetic flux to follow the path through the tongue 28 to the armature 10 and about the two sides of the armature and core 12 back to the tongue 28. In this patent path three air gaps are provided; gap 32 located between the tongue 28 and the armature 10 and gaps 34 and 36 between the core 12 and armature 10, thus causing the flux to develop forces tending to swing the armature 10 against the core 12 and the tongue 28.

During the time current flow in the coil 30 is of large value, the flux passing across the air gaps 32, 34, and 36 is of correspondingly large value and the armature 10 is drawn toward the core 12 with relatively great force. The U-shaped support members 14 are accordingly flexed and the armature shifted to approach the core 12. When the current is of small or zero value, the support members 14 bias the armature away from the core 12 towards the position shown in Figure 1, thus causing the armature 10 to execute vibratory motions relative to the core 12 and the tongue 32.

The construction of the head or chopper portion C can best be understood by reference to Figures 1 and 2, together with the enlarged cross sectional view of Figure 3. As will be evident from these figures, a pair of transverse guide bars 38 and 40 are supported from the housing H by the screws 42 which are in threaded engagement with corresponding threaded holes in the spools 44. A groove or keyway 46 is provided in the bar 38 and extends the length thereof in a direction substantially perpendicular to the lengthy axis of the housing H. This channel or keyway receives a correspondingly shaped key portion on the generally U-shaped carriage 48 to which is attached the blades or choppers 64, Figure 3.

The carriage 48 is attached to the armature 10 by the linkage L, this linkage comprising levers 50, 52, and 53. As seen in Figure 1, the lever 50 is pivotally attached to the armature 10 by pin 54 and to the lever 52 by the pin 56. The lever 52 is pivotally attached to the housing H by the pin 58 which is attached to guide bar 38 by brazing or similar means. Lever 52 is also attached to the lever arm 53 by the pin 60. Lever arm 53 is attached to the carriage 48 by the pin 62 as seen in the view of Figure 3. Thus as the armature 10 executes vibratory motions relative to the core 12, the slide 48 is caused to execute similar vibratory or oscillatory movements relative to the guide bars 38 and 40.

The chopping elements or blades 64 extend across the slide 48 and extend over the edges thereof as seen in the view of Figure 3. They are held in position relative to the slide 48 by the V-grooved projections 49 provided in that member. These projections are initially of shape shown in the dotted lines of Figure 3 and are peened over as shown in the solid lines of that figure to hold the choppers securely in place and

providing a simple but effective attachment between the various blades and the slide 48.

The transverse guide bars 38 and 40 are each provided with a plurality of teeth 66 which extend upwardly between the overhanging edge portions of the adjacent chopping elements or blades 64. Two of these teeth are shown in elevational view in Figure 3, and the entire array is shown in top plan view in Figure 4. In a shaver actually constructed in accordance with this invention, for example, we provide a total of 16 chopping elements or blades spaced approximately 0.045 inch and 17 teeth to engage these blades.

As will be evident from the side view of Figure 5, each chopper 64 is of pointed oval cross section having a relatively thick center portion to provide mechanical strength and opposed sharp edges to provide good chopping action against the whiskers. The choppers are mounted on the carriage 48 to form an array of paralleled equally spaced elements. The opposed edge portions of the choppers are disposed in a common plane so that when vibratory motion in this plane is imparted to the carriage 48 the various choppers execute vibratory movements with one or the other of their edges in the forward position where they are most effective in severing the whiskers of the user.

As will be seen in the view of Figure 3, the edges of the choppers 64 extend over the edges of the carriage 48 and are free in these regions to strike against the whiskers of the user. The teeth 66 extend upwardly from the guide bars 38 and 40 in these regions and are disposed in interleaved relationship with the choppers as seen in the view of Figure 4. The teeth are equally spaced and are of such size that they are close to the points of maximum travel of the choppers as they execute vibratory movements in each direction, thus providing barriers against which the whiskers bottom after impact by the choppers.

The housing H which surrounds the vibrator motor M and forms a support for the head or chopper C is preferably constructed of stamped sheet metal formed in a convenient and attractive shape such as that indicated in the figures. It may, for example, be composed of two stamped sections 70 and 72, Figure 2, held together at the head end of the unit by the screws 42 which engage the spools 44 and at the other end of the unit by the screws 74 which engage the spool 76.

If desired, an ornamental ring 68, Figure 4, may be pressed over the ends of teeth 66 to provide a neat attractive appearance for the head portion C and to protect the user against any sharp corners on the teeth 66.

The operation of our invention may best be understood by reference to the enlarged view of Figure 5 which shows a number of teeth 66, together with the choppers 64 disposed between them. When the coil 30, Figure 1, is energized with alternating current, the armature 10 executes vibratory movements, thereby causing reciprocation of the carriage 48 and imparting corresponding motion to the choppers 64. This causes these elements to travel periodically across the spaces between adjacent teeth 66. When a whisker W, Figure 5, extends into one of these spaces the corresponding chopper 64 strikes against it and forces it to bottom against one or the other of the adjacent teeth 66. When the whisker W bottoms against the tooth, the chopper 64 continues its motion, thereby biting into the whisker and eventually stopping only when

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a substantial portion of the whisker has been cut or crushed, the whisker then falling off either due to its own weight or the striking of a portion of the mechanism against it.

It will be observed from the view of Figure 5 that there are no caps or obstructions between the chopping elements 64 and the base of the whisker where it passes into the skin S. There are accordingly no limitations as to the degree with which the chopping elements 64 approach the tips of the teeth 66 and it is thus possible to locate these very close thereto. Consequently, the whisker W may be chopped off at a point very close to the base where it enters the skin S and a smooth close shave obtained.

Moreover, the chopping action achieved with the present invention provides a smoother shave than is possible with cutting or shearing action where the whiskers are cut by the motion of one blade against an adjacent blade. As is shown in the view of Figure 6, the whisker W is severed by the punching action of the chopping elements against the teeth in a direction substantially transverse to the length of the whisker and only a small broken pinched portion exists. On the other hand, when a whisker is cut by the motion of one blade against an adjacent blade as is done in conventional dry shavers, the whisker receives a sharp projecting point or burr such as is shown in the view of Figure 7, this burr resulting from the inability of the sliding parts to execute perfect stripping action. These points or burrs cause the resulting shave to be rough and unpleasant as distinguished from the smooth shave achieved by use of the present invention.

As shown in Figure 9 the blades 64 have rounded ends such as 64a. The teeth 66 have similar rounded ends such as 66a. Guide paths such as P with conveying mouths such as M are provided for the whiskers W to automatically comb the whiskers into position as the shaver is operated on the skin by motion in direction of the arrow 65.

From the foregoing it will be seen that the chopping or pinching action whereby the whiskers are removed takes place in the two spaced areas of the shaver head C where the teeth 66 are placed. The movements incident to shaving, of course, prevent an uneven shave since these areas are moved over the skin in random fashion and result in substantially constant effectiveness over the entire skin.

While we have shown a particular embodiment of our invention, it will of course be understood that we do not wish to be limited thereto since many modifications both in the elements employed and their cooperative structure may be

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made without departing from the spirit and scope of our invention. We, of course, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

We claim as follows:

1. In a dry shaver having an open ended elongated casing and a vibrator motor disposed within said casing, a shaving head comprising a pair of spaced parallel guides disposed in the open end of said casing and having integrally formed teeth projecting beyond the casing, a blade block slidably journaled between said parallel guides, said block being linked to said motor for vibratory movement, a plurality of separate blades having parallel cutting edges, and means carried by said block and engaging said blades to secure the blades to said block, said blades being aligned with their cutting edges in parallel relation and extending transversely between said teeth, said teeth extending beyond said blades in directions both parallel and normal to said cutting edges, for guiding whiskers into the space between adjacent teeth for subsequent cutting upon movement of said blades.

2. A nipper type shaver comprising a casing, an electric motor core affixed in said casing, an armature in said casing, a resilient U-shaped support means having one leg connected to the core and the other leg connected to the armature, elongated head means secured on one end of the casing having exposed spaced parallel rows of teeth along the length thereof, a blade block slidable in said head means, a plurality of individual transverse blades spaced along the length of the block and each extending between the teeth of both rows for nipper-like cutting action therewith, a lever pivoted intermediate its ends to said head means, a first link connecting the lever on one side of the pivot to said block, and a second link connecting the armature to said lever on the other side of said pivot for causing the motor to reciprocate the block.

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