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SHAVING HEAD FOR AN ELECTRIC SHAVER

Filed May 5, 1967

2 Sheets-Sheet 1

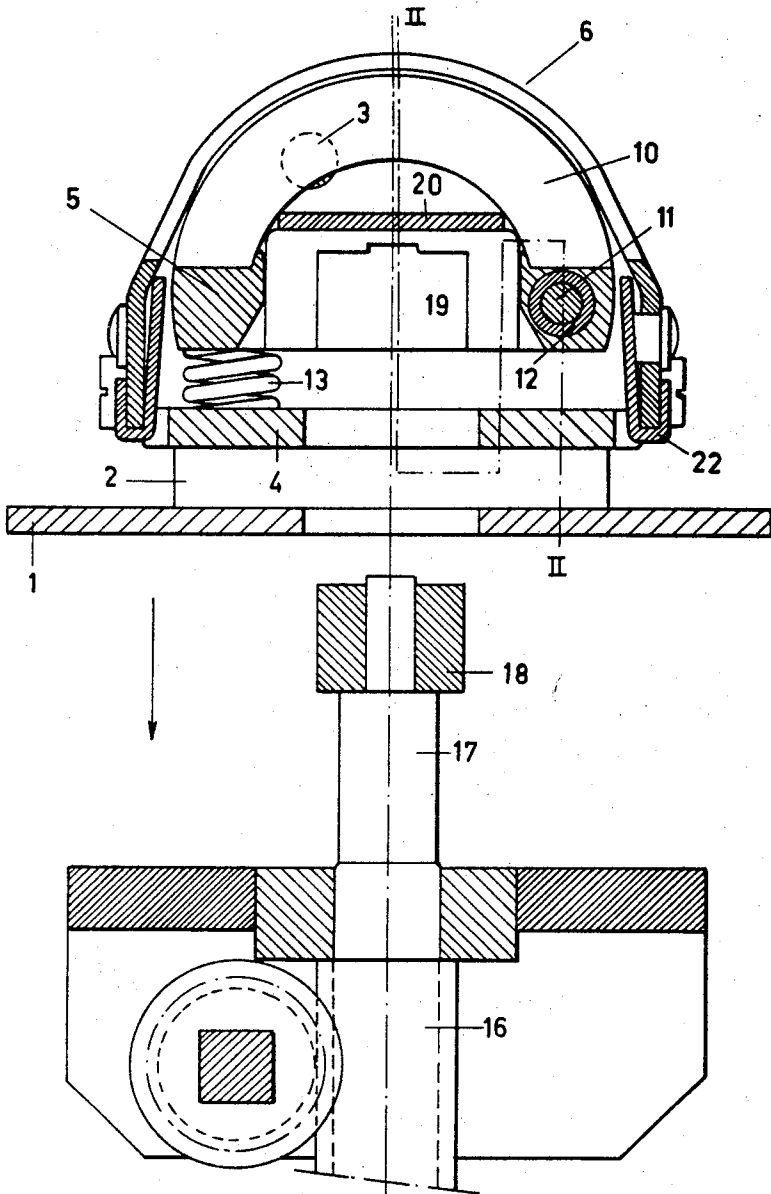


FIG. 1

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FIG. 2

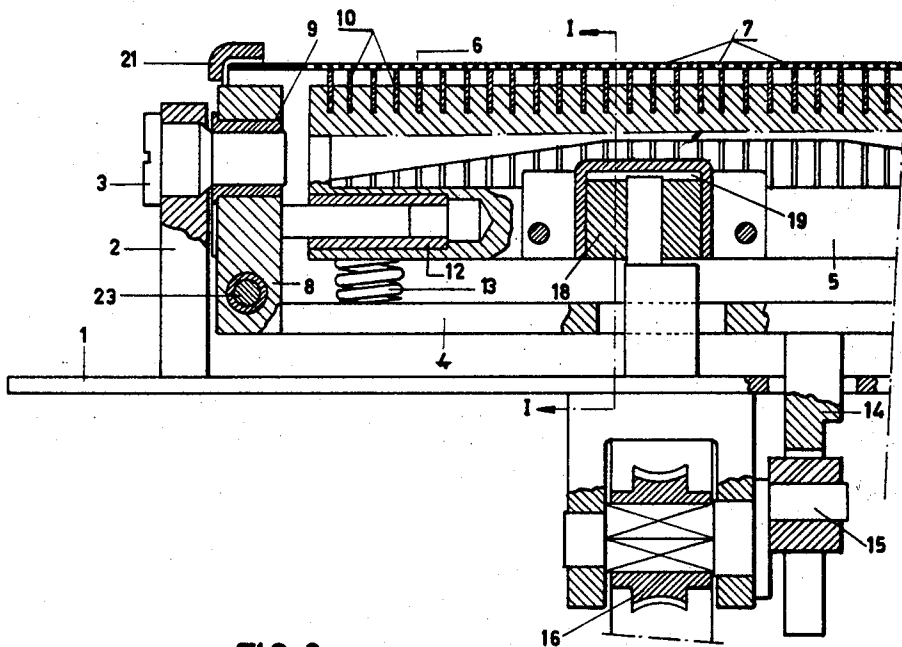
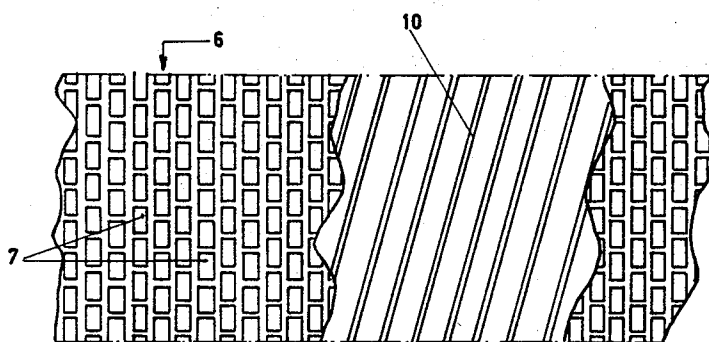


FIG. 3



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**SHAVING HEAD FOR AN ELECTRIC SHAVER**  
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 6615193

2 Claims. (Cl. 30—43.91)

### ABSTRACT OF THE DISCLOSURE

An electric shaver having a cutter head vibrational in its longitudinal direction and urged by springs against a shaving plate clamped on a frame which may perform a rocking movement about an axis extending parallel to the longitudinal axis of the cutter head, the frequency of the longitudinal movement of the cutter head being a multiple of the frequency of the rocking movement of the shaving plate, the cutter head participating in the rocking movement of the shaving plate; the coupling between the cutter head and the driving part coupled with the motor allowing a mutual movement of said parts transversely to the direction of the cutter head.

This invention relates to a shaving head for an electric shaver, comprising a cutter head movable in longitudinal direction with mainly semi-circular cutter blades which are pressed by springs against the inner surface of a shaving plate provided with shaving apertures and clamped on a frame, said frame being adapted to perform a rocking movement about an axis extending parallel to the longitudinal axis, which is effected by the same motor which is used to cause a longitudinal vibration movement of the cutter head, the frequency of said vibration movement being a multiple of the frequency of the rocking movement of the shaving plate.

In this known shaving head a suitable selection of the location of the rocking axis renders it possible that at various points of the circumference of the shaving head the moving parts of the shaving plate directed according to the radius and the tangent have a different relation so that by gradually changing the position of the shaver relative to the skin the most effective point may be found.

A drawback of this construction is that during the rocking movement the inner surface of the shaving plate also moves transversely to the longitudinal axis relative to the cutter blades, while, moreover, between the shaving plate and the cutter head considerable transverse forces of continually varying magnitude occur, the friction as well as the transverse forces being unequally distributed along the circumference of the shaving plate. This varying and irregular load of the shaving plate and the cutter head will result in fatigue and a rapid wear of this shaving plate and cutter head.

The invention aims at providing a shaving head of the afore-mentioned kind which does not present these drawbacks. For this purpose said shaving head is characterized in that the cutter head is supported by the frame of the shaving plate for longitudinal movement, the compression springs for the cutter head also acting on said frame so that the cutter head may participate in the rocking movement of the shaving plate, and in that the coupling between the cutter head and the driving part coupled with the motor allows a mutual movement of

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said parts transversely to the direction of vibration of the cutter head.

In this way it is accomplished that the only mutual movement between the cutter head and the shaving plate is the longitudinal vibration movement of the cutter head, and that the load of the shaving plate and the blades, at least in circumferential direction, is mainly constant and uniform. In particular it is possible for the cutter head to be pivotally connected by means of bearing pins to the frame of the shaving plate at or near a longitudinal side by means of bearing pins; the compression springs acting at or near the other longitudinal side of the cutter head.

In particular, the rocking axis of the shaving head is situated sideways of the longitudinal centre plane of the shaving head, the bearing pins of the cutter head being arranged on the other side of said centre plane. The result is that the shaving plate performs near said bearing pins, where the plate is hardly yieldingly supported by the cutter head, a movement directed mainly transversely to the surface, whereas near the rocking axis, where mainly a movement parallel to the surface is carried out, said plate is yieldingly supported.

It is furthermore advisable to arrange the oblong shaving apertures of the shaving plate in rows extending perpendicular to the axis of the shaving head, and also to arrange the cutter blades of the cutter head obliquely relative to said axis.

If the shaver comprises a rotating motor the driving shaft of which extends perpendicular to the longitudinal axis of the shaving head and which by way of a crank drive or the like is coupled with the cutter head, the crank with the engaging coupling sleeve of the cutter head is constructed such that the crank is movable transversely to the axis of vibration in said sleeve.

The invention will be further explained below with reference to the accompanying drawings; these drawings show in:

FIG. 1 a cross-section of a shaving head according to the invention taken along the line I—I of FIG. 2 with exploded parts;

FIG. 2 a partial longitudinal section, mainly taken according to the line II—II of FIG. 1, in assembled condition; and

FIG. 3 a top plan view of a preferred embodiment of the shaving head according to the invention with broken-away portions.

On a base plate 1, with which the shaving head is secured on the shaver, there are provided two lateral supports 2. In said lateral supports there are mounted pivot pins 3 arranged in line with each other, the common axis of said pivot pins extending parallel to the longitudinal axis of the shaving head and mostly at some distance thereof as shown in the drawings. These pins 3 serve as fulcrums for the shaving head proper which consists of a frame 4, a cutter head 5 situated within said frame, and a shaving plate 6 clamped on the frame and provided in the usual way with shaving slots or shaving apertures 7. The frame 4 comprises two end pieces 8 in which bearing bushings 9 are provided, the pins 3 fitting into these bushings. The cutter head 5 is provided with a plurality of cutter blades 10, the circumference of which lies against the inner surface of the shaving plate 6.

In each end piece 8 there is furthermore provided near the circumference an inwardly projecting bearing pin 11, said pins being arranged in line with each other.

These pins have been inserted into bearing bushes 12 of the cutter head 5 which thus is rotatable and is supported somewhat slidably in longitudinal direction. At the other side a number of compression springs 13 are provided which press the cutter head against the shaving plate 6.

At the bottom side of the frame 4 there is secured a fork 14 gripping around a crank pin 15 or the like. This crank is driven through the intermediary of a worm gear reducer 16 by the shaft 17 of the motor of the shaver. Upon rotation of the motor the fork 14 is given a transversal reciprocating movement so that consequently the shaving head performs a periodic tilting movement about the shaft of the pins 3. At the upper end of the shaft 17 a crank pin 18 or the like is provided which fits in an adapted cross slot 19 of the cutter head 5. Upon rotation of the motor a longitudinal vibration is thus imparted to the cutter head, the cutter blades sliding past the slots 7 and cutting off the beard hairs projecting through said slots.

Since the cutter head 5 is supported by the frame 4 this head together with the frame performs a rocking movement so that the only mutual movement which these parts perform relative to each other is the longitudinal vibration movement of the cutter head which only has a very small length of stroke. In order to render this common rocking movement possible the transverse slot 19—which may be provided with a suitable bearing bushing 20—must be shaped such that a roller arranged on crank pin 18 has sufficient clearance in the direction of the shaft.

As shown in the drawings the shaft of the pivot pins 3 is situated on one side and the shaft of the bearing pins 11 on the other side of the longitudinal center plane of the head. The consequence thereof is that the movement of the shaving plate near a line connecting the center lines of bearing pins 11 comprises a relatively large component perpendicular to and a small component parallel to the surface. On the other hand the plate performs near a line connecting the center lines of pivot pins 3 practically only a parallel movement with a small length of stroke, and near the springs 13 a small perpendicular component is again added thereto.

In the portion near the line connecting the center lines of bearing pins 11 the shaving plate is hardly yieldingly supported against transverse forces on account of the proximity of this axis, whereas this support near the axis yields so that in that region the shaving plate can be somewhat depressed. The various distributions of velocity and supports are now made use of in the following manner.

Skin portions supported by jaw-bones will in general be shaved best with the aid of that part of the shaving plate which is situated near the line connecting the center lines of bearing pins 3. The shaving plate can yield somewhat and fit itself to the slightly yielding skin surface, and in consequence of the small parallel movement of the shaving plate the skin is stretched and at the same time flattened hairs get the opportunity to stand up in the apertures of the shaving plate.

Non-supported skin portions, such as of the cheeks and the throat, are much more difficult to shave, since in consequence of the yielding property of the skin the hairs are not pressed outwards so that smooth shaving is rendered difficult. While the skin on the cheeks is still supported by relatively firm muscular tissue, this is not the case with the skin of the throat so that the latter is much more flaccid, and may penetrate into the openings of the shaving plate which may give rise to injuries. When the shaving head performs a periodic movement perpendicular to the skin and with such velocity that a local depression of the skin is not restored as a result of the inertia before the next stroke of the shaving plate arrives, the hairs in a yielding skin portion are erected and pressed outwards as a result of the skin being stretched.

The shaving plate portion near the line connecting the center lines of bearing pins 11 which performs the largest transverse movement, is preeminently suitable for shaving the cheeks, whereas for shaving the throat depending on the sensitiveness of the skin a shaving plate portion of smaller transverse movement may be selected, which is located between the line connecting the center lines of bearing pins 11 and the line connecting the center lines of bearing pins 3 or close to the springs 13.

As is apparent from the preceding lines these various movements are carried out by the various shaving plate portions so that by directing the shaver or by turning it a shaving action adapted to the skin surface can always be obtained.

If the shaving plate comprises rectangular apertures the latter must extend obliquely relative to the blades in order to obtain a shearing action as well as to prevent the edges of the blades from striking against a straight edge of these apertures and thus being damaged. In the usual shavers the blades are arranged transversely to the longitudinal edges of the shaving head, the apertures being arranged in rows extending obliquely relative to said longitudinal axis. In the case of a rocking head according to the invention, however, such obliquely arranged apertures are less favourable, since especially in those parts where the component of movement parallel to the shaving plate surface is large the hairs situated opposite an aperture may be flattened during the rocking movement by a dam between the apertures. It is therefore to be preferred to have the rows of the apertures extend transversely to the longitudinal axis of the shaving head so that then the blades of the cutter head must be arranged at an angle relative to said axis.

It is furthermore necessary to cover the ends of the shaving plate to prevent injuries. For this purpose an end cap 21 is provided at each end of the shaving head. These end caps cover the end portions of the shaving plate with sufficient clearance thus preventing the occurrence of friction between the end caps and the end portions.

In order to be able to clean the shaving unit easily it is preferable to clamp the shaving plate on an auxiliary cage 22 on which also the end caps 21 are secured and which are connected with the frame 4 at least in a partly detachable manner by means of a pivot or a snap lock 23 on one side and a snap lock on the other side.

From the preceding description it clearly appears that the shaving head according to the invention constitutes an independent unit which simply may be removed from the shaver and replaced by another one. This unit may be fastened on the mantle of the shaver for example by a simple snap lock. Furthermore this shaving head comprises only a small number of parts which can be assembled and taken to pieces in a simple manner.

I claim:

1. A shaving head for an electric shaver having a housing and a motor, said head comprising a frame mounted for rocking movement with respect to said housing; means operatively connecting said frame and said motor to effect said rocking movement; a shaving plate removably fixed on said frame; a cutter head having a plurality of substantially semi-circular blades mounted within said frame for longitudinal movement with respect to said plate; means pivotally connecting said cutter head to said frame, said latter connection being near one longitudinal side of said cutter head; resilient means disposed between the other longitudinal side of said cutter head and said frame to urge said blades against said plate; and means operatively connecting said motor and said cutter head to cause longitudinal vibration of said cutter head with respect to said plate, the frequency of said vibration being a multiple of the frequency of said rocking movement.

2. The shaving head of claim 1, wherein the rocking axis of said frame and said one longitudinal side of said

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cutter head are located on opposite sides of the longitudinal center plane of the shaving head.

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