

Aug. 25, 1959

G. STARRE ET AL

2,900,720

DRY SHAVER WITH A SELF ADJUSTING SHEAR PLATE AND ROTARY CUTTER

Filed Dec. 27, 1956

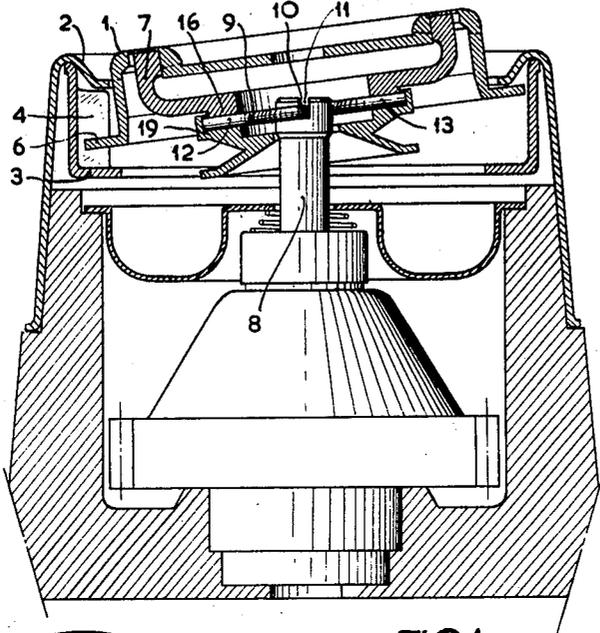


FIG. 1

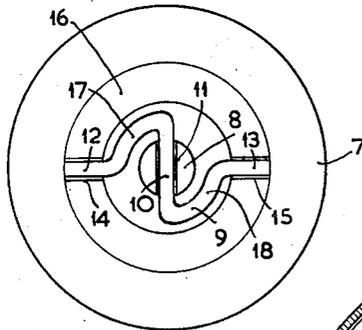


FIG. 2

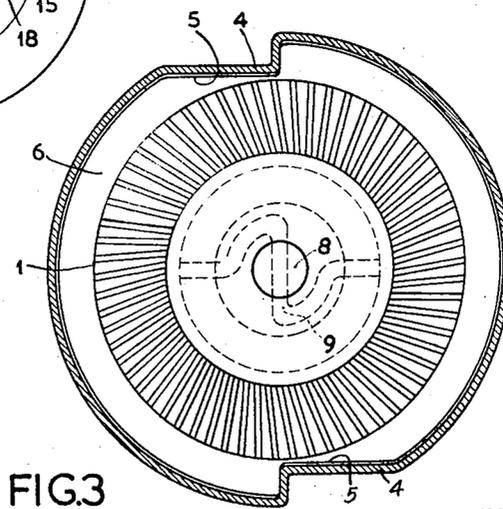


FIG. 3

INVENTOR
GERRIT STARRE
EPPE BAKKER

BY *Maul R. Jafari*
AGENT

1

2,900,720

DRY SHAVER WITH A SELF ADJUSTING SHEAR PLATE AND ROTARY CUTTER

Gerrit Starre and Eppe Bakker, Drachten, Netherlands, assignors, by mesne assignments, to North American Philips Company, Inc., New York, N.Y., a corporation of Delaware

Application December 27, 1956, Serial No. 630,824

Claims priority, application Netherlands
January 17, 1956

3 Claims. (Cl. 30—43)

This invention relates to improvements in or relating to dry-shaving apparatus having a shear plate adapted to take up an inclined position with respect to the axis of the apparatus and a rotary cutting member co-operating with said plate.

In dry-shaving apparatus having a shear plate adapted to take up an inclined position with respect to the axis of the apparatus and a rotary cutting member co-operating with said plate, it is known to connect this cutting member to the element driving it in a manner permitting of relative movement in order to enable this cutting member to adjust itself to the shear plate. In a known construction, the cutting member has a rectangular aperture, in which the end of the driving element having a corresponding cross-section is arranged with a certain amount of play. By a spring surrounding the driving element the cutting member is urged to the shear plate.

It has been found that the above known movable connection between the cutting member and the driving element is not always satisfactory. Frequently, this relative movement results in that during shaving the cutting member performs a rocking movement over the shear plate, so that not all the hairs extending through the apertures of the shear plate are cut off. This rocking movement also results in uneven wear of the shear plate and the cutting member, so that after prolonged use the cutting edges cannot accurately engage the shear plate.

The causes of this rocking movement have remained obscure a long time in spite of prolonged and intensive research. However, it has now been found that the known movable connection between the cutting member and the driving element prevents the cutting member from invariably adjusting itself accurately to the shear plate.

It is an object of the present invention to obviate this disadvantage.

According to the invention, this movable connection consists of a single thin spindle, the straight middle part of which is journaled in a groove formed in the end of the driving shaft, the straight ends of this spindle lying in a plane passing through the middle part so as to extend at right angles to this middle part and being journaled in the cutting member, while the parts connecting the straight ends to the middle part are spaced away from the driving shaft.

Thus, a simple highly movable connection is obtained which enables the cutting member to take up an inclined position with respect to the axis of the dry-shaving apparatus equally well in all directions, only a minimum friction having to be overcome. The fact that the connecting parts of the thin spindle are spaced away from the driving shaft ensures that they are not prevented by this shaft from following a change in position of the cutting member. In addition, the shear plate is now as little as possible prevented by the cutting member from taking up a position which conforms with the shape of the skin to which the shear plate is pressed. Even when the shear plate occupies an inclined position, the cutting member is completely free to adjust itself to the shear

2

plate. The combination of the connection according to the invention and of the movable shear plate ensures a more effective shaving action, since the cutting member can completely follow any change in position of this shear plate.

The above-mentioned effective shaving action can be further increased in that, while using a shear plate which is capable of axial movement, the cutting member is rigidly journaled in the axial direction, so that the shear plate is supported by the cutting member. Thus, by means of the pressure of the apparatus on the skin, the user can determine the pressure between the shear plate and the cutting member, which latter pressure must be greater for a person having a heavy beard than for a person having a light beard in order to ensure the optimum shaving efficiency. This effect can also be achieved by means of a shaving head according to a prior suggestion, in which the cutting member is rigidly journaled and the shear plate is displaceable only in a direction parallel to itself. In this proposed construction, the shear plate must be guided with a high degree of accuracy. Even with small deviations, the cutting member is likely to catch in the shear plate and to rip it open.

According to the invention, the surface area of the shear plate can be increased, since this plate is supported by the cutting member, so that the plate is less likely to sag or even break. It is also possible to arrange a number of plates concentrically with respect to one another, each plate being free to adjust itself with respect to the remaining plates.

In order to prevent the cutting member from performing axial vibrations, by which the cutting member might damage the shear plate, it is necessary in view of the rotary movement of the cutting member that the thin spindle is accurately centered with respect to the cutting member. According to a further feature of the invention, the cutting member is provided with an annular thickened portion having grooves formed in it, in which the straight ends of the thin spindle are journaled, a closing cover being clamped over the annular thickened portion.

This ensures a very effective and cheap centering of the cutting member, the shear plate being prevented from vibrating.

In order that the invention may readily be carried out, one embodiment of a dry-shaving apparatus in accordance with the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is a cross-sectional view of part of the dry-shaving apparatus in accordance with the invention,

Fig. 2 is a bottom plan-view of the cutting member and the thin spindle, the closing cover being removed, and

Fig. 3 shows a structural detail of the shear plate and the apparatus.

In the figures, corresponding parts are designated by like reference numerals.

A shear plate 1 is arranged in the apparatus between annular stops 2 and 3 so as to be freely adjustable. Along its circumference, the stop 3 is provided with at least one rib 4 arranged in recesses 5 in the rim 6 of the shear plate 1, so that this shear plate is prevented from rotating about its axis. Fig. 3 discloses two ribs 4 on opposite sides of the razor casing and arranged in recesses 5. Thus, the shear plate 1 is prevented from rotational movement about its axis by means of ribs 4 in recesses 5. However, limited axial movement of the shear plate 1 is permitted between the stops 2 and 3.

Below the shear plate 1 provision is made in the usual manner of a cutting member 7 which is coupled to a driving shaft 8 by means of a thin spindle 9. The straight middle portion 10 of this spindle is journaled

3

in a groove 11 of the driving shaft 8. Straight ends 12, 13 lie in the plane of the straight middle portion 10 so as to be at right angles thereto. The ends 12 and 13 are journalled in grooves 14, 15 of an annular thickened portion 16 of the cutting member 7. Between the ends 12, 13 and the straight middle portion 10 of the thin spindle 9 provision is made of connecting parts 17, 18 at some distance from the driving shaft 8, so that the spindle 9 can rotate about the straight portion 10 through a comparatively large distance.

In order to center the cutting member 7 with respect to the driving shaft 8, a closing cover 19 is clamped over the annular thickened portion 16, so that the position of the thin spindle 9 in the direction at right angles to the direction of the groove 11 is determined with respect to the cutting member 7 and consequently the position of the cutting member 7 also is determined with respect to the driving shaft 8. In the direction of the groove 11 the thin spindle 9 is sufficiently free to move relatively to the driving shaft 8.

The driving shaft 8 is rigidly journalled in the axial direction, so that the shear plate 1 is supported by the cutting member 7.

What is claimed is:

1. A dry shaver comprising a shear plate adapted to be positioned angularly relative to the axis of said shaver, a rotary cutting member co-acting with said shear plate and adjustable therewith, a driving shaft having a groove in one end thereof, means connecting said rotary cutting member to said driving shaft, said means including a sinuous spindle provided with a linear middle portion having part thereof in said groove, and straight end portions extending in the same plane as said middle portion and substantially at right angles thereto, said end portions secured to said cutting member, and parts connecting said end portions to said middle portion spaced from said driving shaft.

2. A dry shaver comprising a shear plate adapted to be positioned angularly relative to the axis of said shaver and movable, a rotary cutting member co-acting with said shear plate, means preventing said shear plate from rotational movement but permitting limited axial movement thereof, means rigidly journalling said cutting mem-

4

ber in the axial direction whereby said shear plate is supported by said cutting member, a driving shaft having a groove in one end thereof, means connecting said rotary cutting member to said driving shaft, said last mentioned means including a sinuous spindle provided with a linear middle portion having part thereof in said groove, and straight end portions extending in the same plane as said middle portion and substantially at right angles thereto, said end portions secured to said cutting member, and parts connecting said end portion to said middle portion spaced from said driving shaft.

3. A dry shaver comprising a shear plate adapted to be positioned angularly relative to the axis of said shaver and movable, a rotary cutting member co-acting with said shear plate, means rigidly journalling said cutting member in the axial direction whereby said shear plate is supported by said cutting member, a driving shaft having a groove in one end thereof, means connecting said rotary cutting member to said driving shaft, said last mentioned means including a sinuous spindle provided with a linear middle portion having part thereof in said groove, and straight end portions extending in the same plane as said middle portion and substantially at right angles thereto, said end portions secured to said cutting member, parts connecting said end portion to said middle portion spaced from said driving shaft, said cutting member having an annular thickened portion with slots therein, said straight end portions of said sinuous spindle in said slots, and a closing cover affixed to said annular thickened portion.

References Cited in the file of this patent

UNITED STATES PATENTS

2,119,284	Meyer	May 31, 1938
2,279,682	Jackson	Apr. 14, 1942
2,280,052	Bahr	Apr. 21, 1942
2,341,833	Volz	Feb. 15, 1944
2,677,884	Richard	May 11, 1954
2,716,278	Thompson	Aug. 30, 1955

FOREIGN PATENTS

974,147	France	Sept. 27, 1950
491,339	Italy	Mar. 4, 1954