United States Patent [19]

Meyer et al.

[11] **3,855,697**

[45] **Dec. 24, 1974**

[54] **SHAVING HEAD FOR DRY-SHAVING APPARATUS**

[75] Inventors: **Gerald Meyer; Leo Buzzi,** both of Klagenfurt, Austria

[73] Assignee: **U.S. Phillips Corporation,** New York, N.Y.

[22] Filed: **Mar. 1, 1973**

[21] Appl. No.: **337,090**

[30] **Foreign Application Priority Data**

Mar. 1, 1972 Austria 1697/72

[52] **U.S. Cl.** **30/34.1,** 30/43.92

[51] **Int. Cl.** **B26b 19/10**

[58] **Field of Search** 30/34.1, 346.51, 43.91, 30/43.92

[56] **References Cited**

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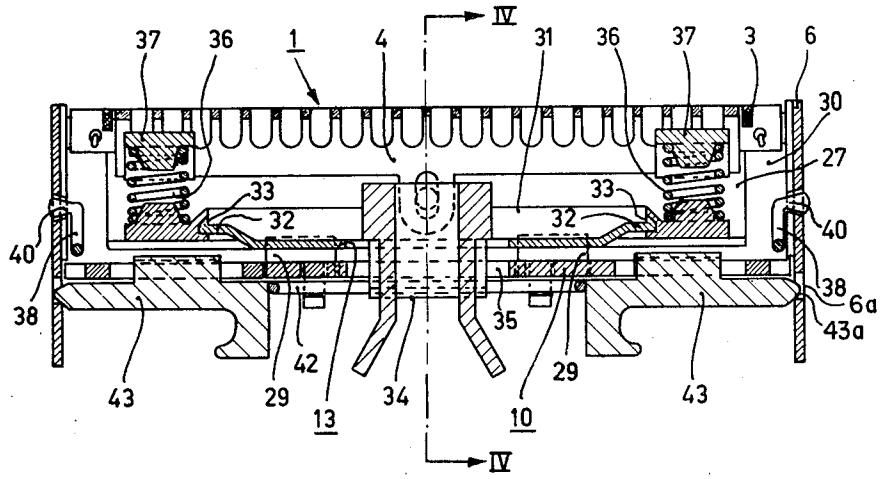
Primary Examiner—Al Lawrence Smith
Assistant Examiner—Gary L. Smith
Attorney, Agent, or Firm—Frank R. Trifari

[57] **ABSTRACT**

A shaving head for a dry-shaving apparatus having at least one trimmer and having reciprocating drivable cutters which are formed by separate members and are made to engage with associated fixed counter-cutters by a single spring device acting between the drivable cutters.

6 Claims, 4 Drawing Figures



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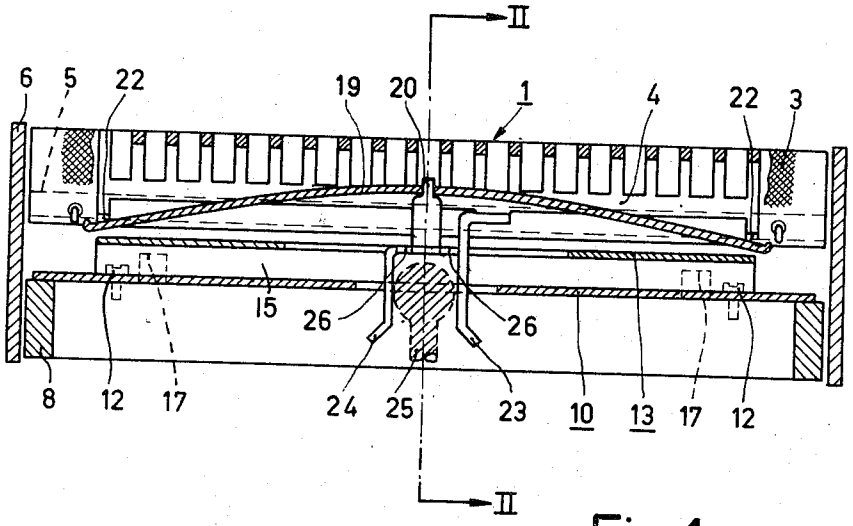


Fig.1

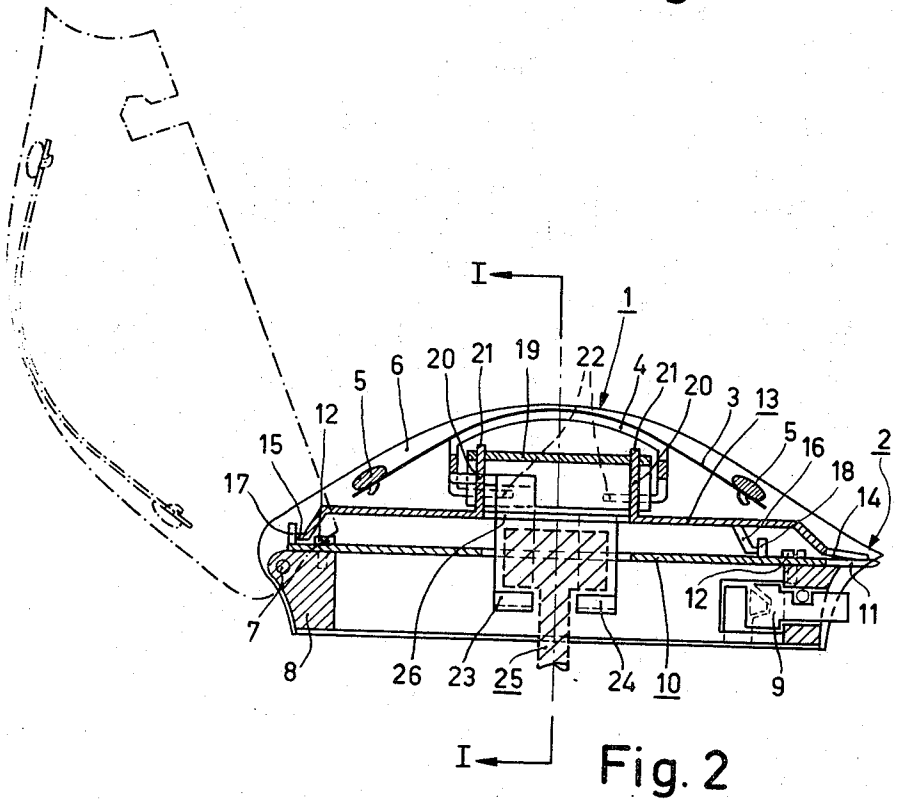
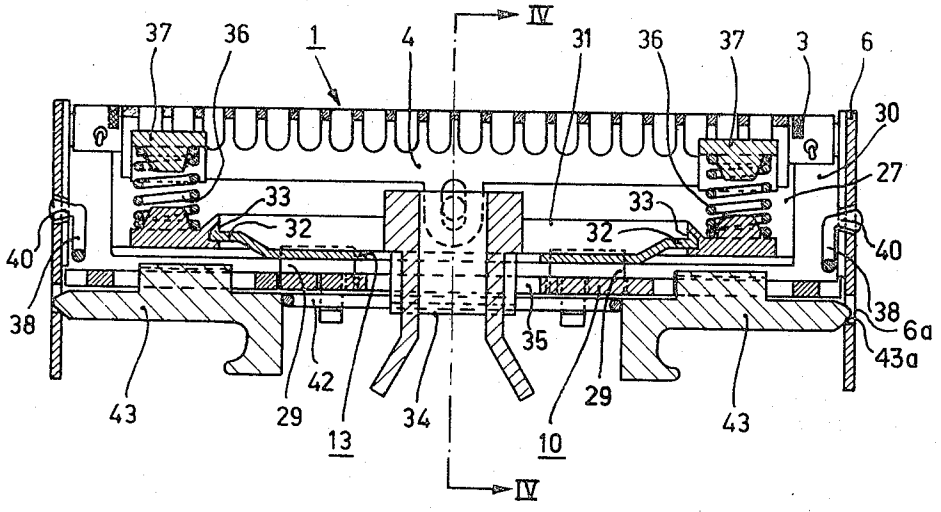


Fig. 2


IV
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36
1
4
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36
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6
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32
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6a
43a
35
42
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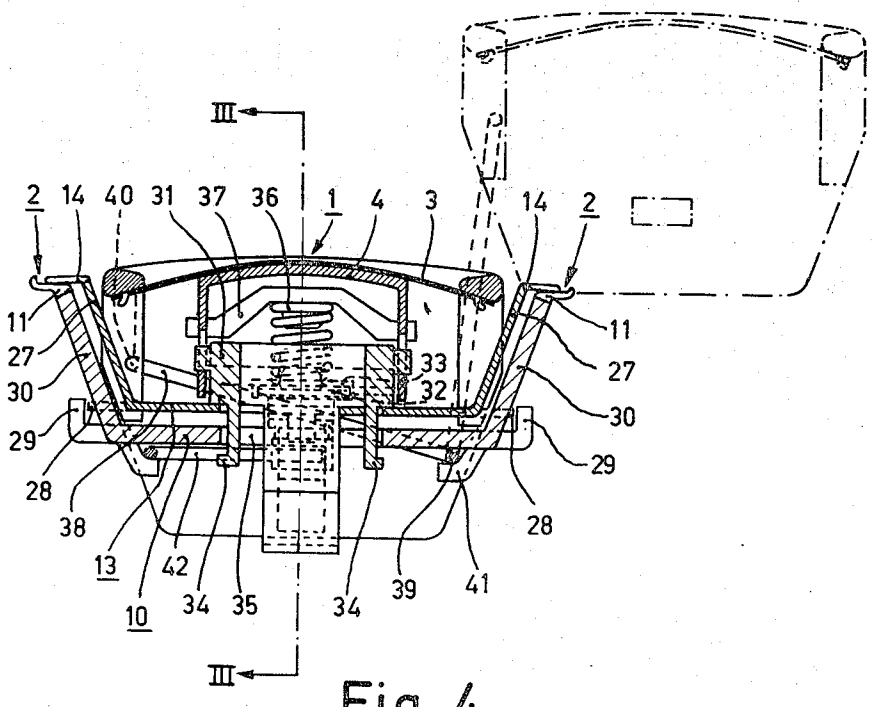
IV

Fig. 3


III
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III

Fig. 4

SHAVING HEAD FOR DRY-SHAVING APPARATUS

BACKGROUND OF THE INVENTION

The invention relates to a shaving head for a dry shaving apparatus having reciprocable cutters associated with a shaving section and at least one trimmer, which cutters are pressed into resilient engagement with associated stationary shear plates or countercutters. The reciprocable cutter of the shaving section is located on the side of the associated shear plate which faces away from the skin during use of the apparatus, and the reciprocable cutter of the trimmer is located on the side of the associated shear plate which faces towards the skin.

In such a shaving head, which is described in Austrian Patent No. 190,832, respectively the drivable cutters for the shaving section and for the trimmers are constituted by a single elastic foil member, which is interposed between the shear plates of the trimmers and of the shaving action. The shear plates of the trimmers are arranged on the frame of the shaving head, while the shear plate of the shaving section is accommodated on a support which can be readiy detached from the frame of the shaving head on which it is mounted. When mounting the carrier onto the frame of the shaving head the elastic foil member constituting the drivable cutters is pre-tensioned so that the cutters are resiliently pressed against the associated shear plates. Manufacturing such an elastic foil member is difficult, because it should comply with contradictory requirements, i.e. on the one hand the cutters constituted by the foil member should be as rigid as possible so as to obtain a proper cutting action, and on the other hand the foil member should be highly resilient so as to ensure that this member is in proper engagement with the shear plates under initial tension.

SUMMARY OF THE NEW INVENTION

The invention avoids these problems in a simple manner in that drivable cutter is characterized in that the reciprocable cutters for the shaving section and the trimmer are formed by separate members and are subject to the action of a spring device, which presses the two cutters apart and simultaneously causes them to engage with their associated stationary shear plate. The two reciprocable cutters are coupled to the drive system of the dry-shaving apparatus so as to obtain a common reciprocating movement. Thus both the cutters and the spring device can be dimensioned for an optimum result. It suffices to provide a single spring device for bringing the reciprocable cutters into engagement with the associated shear plates. Finally, the common drive of the two cutters ensures a smooth movement and consequently also a perfect engagement of the cutters with the shear plates.

It is advantageous when the drivable cutter is characterized in that the reciprocable cutter and the associated stationary shear plate for two trimmers are each formed by a channel-shaped member having bent sides provided with combs, and that the reciprocable cutter of the shaving section lies within the channel-shaped reciprocable cutter of the trimmers, and said cutter, in turn, lies within the channel-shaped sher plate of the trimmers, the two cutters of the trimmers being in engagement with each other along the combs only. This results in a compact construction, so that the cutting faces of the trimmers and of the shaving section can be

substantially coplanar. Owing to the channel-shaped cross-section of the cutter and of the shear plate of the trimmers, these cutters are, moreover, very strong, thus ensuring a perfect engagement of the sliding combs.

In this respect it furthermore proves to be advantageous, when on the two side walls of one of the two channel-shaped members of the trimmers at least one lateral projection is provided: this is in order to ensure that the straight-line guidance of the reciprocable cutter of the trimmers is in sliding engagement with an opposite side wall zone of the other channel-shaped member. As can be seen, this ensures straight-line guidance of the drivable cutter by the simplest means. It has proved to be particularly benificial for the projections to be arranged on the reciprocable cutters of the trimmers for the sidewall zones of the channel-shaped member of the shear plate near the projections to be constituted by outwardly bent tabs. By bending the tabs which are readily accessible on the external channel-shaped member, simple and accurate adjustment of the guidance is possible.

It has proved to be extremely simple and effective, for the channel-shaped member of the shear plate of the trimmer to form the frame of the shaving head. This simple construction can be realized in the present case owing to the previously mentioned, extremely stable behaviour of a channel-shaped cutter.

Shaving heads are known in which the shear plate of the shaving section is formed by a shear foil and is arranged on a support which is pivoted to the frame of the shaving head and is retained in the operating position by a detachable locking device; such a shaving head can be readily cleaned in the opened condition, and the fixed connection of the individual parts thereof also ensures that these parts can only be re-assembled in the correct manner. If with such a shaving head according to the invention the channel-shaped shear plate of the trimmer itself forms the frame of the shaving head, it proves to be advantageous, for simply tilting the support away from the channel-shaped profile of the frame, when the support of the shear foils is pivoted to the frame by means of two arms and the carrier is hinged to the arms and the arms, in turn, to the frame. The arms are simply formed by the legs of a U-shaped bracket, which has bent free ends extending parallel to its yoke, the bent free ends and the yoke of the bracket serving as a swivel axis, both for the support and for the bracket.

In a construction which is extremely advantageous as regards manufacture, an actuating member has been provided for the coupling to the drive system for the dry-shaving apparatus, to which the drivable cutter of the trimmer is attached and against which the spring device cooperating with the drivable cutter of the shaving section rests. The drivable cutter of the shaving section is arranged on said member so as to be movable in the direction of the force of the spring device and pivotable about an axis which is perpendicular to this direction and to the direction of the reciprocating movement of the cutter. In this manner, when viewed from the drive system, the drivable cutter and the spring device together with the actuating member form a unit which is reciprocated as a whole.

The invention is described in more detail, by way of example, with reference to the drawings in which two embodiments are given.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal section of a shaving head in which the spring device is by a leaf spring;

FIG. 2 is a section taken through line II—II of FIG. 1;

FIG. 3 is a longitudinal section of a shaving head in which the spring device is constituted by two helical springs;

FIG. 4 is a section taken along line IV—IV of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1 and 2 show a shaving head which comprises a shaving section 1 and a trimmer 2. The shaving section 1 has an upper or counter-cutter or shear plate formed by a shear foil 3, one surface of which faces the skin during use of the dry-shaving apparatus. Instead of a shear foil, which is flexible as a whole, it would of course also be possible to mount a cutter which in itself is rigid. A cutter 4 adapted to be driven in a reciprocating manner, is in engagement with the surface of the shear foil which faces away from the skin, the cutter 4 being formed by an assembly of circuate blades. The shear foil is attached to the bridges 5 of a support or carrier 6 by means of apertures made in its longer sides, said carrier being pivotable about a spindle 7 to a frame 8 of the shaving head and being retained in the operating position by means of a locking device 9 which can be manually released; the dash-dot lines in FIG. 2 show the carrier 6 when it is pivoted out of its operating position.

The trimmer has a counter-cutter 10 which during use of the apparatus faces away from the skin. This counter-cutter is plate-shaped, has a comb 11 along one longitudinal side and is secured to the frame of the shaving head with the aid of screws 12. This counter-cutter cooperates with a cutter 13 adapted to be driven in a reciprocating manner. This cutter 13 is also substantially plate-shaped and has curved longitudinal sides, one of which is provided with a comb 14 which faces the skin when using the apparatus. The other bent longitudinal side 15 and at least one of tabs 16 bent out of the cutter 13 slide along the projections 17 and 18 provided on the counter-cutter 10, thus ensuring straight-line guidance for the cutter 13.

The drivable cutter 4 of the shaving section as well as the drivable cutter 13 of the trimmer, which as previously explained are formed by separate parts, are made to engage resiliently with the associated counter-cutters in the usual manner. For this purpose a spring device 19 has been provided, which presses the two cutters 4 and 13 apart, and at the same time causes these cutters to engage the associated counter-cutters 3 and 10 of the shaving section and the trimmer respectively. In the present case the spring device consists of a leaf spring 19, which with its center portion rests on two tabs 20 protruding from the cutter 13 of the trimmer, projections 21 provided on the tabs extending through the corresponding apertures in the leaf spring, thus defining the position of the leaf spring relative to the cutter 13. The free ends of the leaf spring bear against the projections 22 provided on the two ends of the cutter 4 of the shaving section. As a result, the leaf spring 19 acts between the two cutters 4 and 13 and presses them apart, thus causing the cutters to engage with the associated counter-cutters. The leaf spring 19 is tensioned when the counter-cutter 3 of the shaving section is moved into the operating position, as will be described hereinafter.

The two cutters 4 and 13 of the shaving section and the trimmer respectively can be driven jointly by the drive system of the dry-shaving apparatus, thus ensuring a uniform motion. For this purpose two cutters 4 and 13 are each provided with two tabs which are offset with respect to each other relative to the longitudinal plane of symmetry, each tab 23 on the cutter 4 being arranged opposite a tab 24 on the cutter 13 and vice versa, so that the four tabs together form a channel, as indicated schematically in FIGS. 1 and 2 with dashed lines, which the free end 5 of a rocking arm of the drive system can engage. In this manner the two cutters can be made to reciprocate jointly and over the same distance.

The shaving head is mounted such taht, when the support 6 pivoted away from the frame of the shaving head, the cutter 13 can be placed on the counter-cutter 10 of the trimmer; next the leaf spring 19 is arranged between the bridges 26 which connect the tabs 23 to the cutter 4, and the projections 22, and the spring is then positioned on the tabs 20 of the cutter 13. Finally, the support 6 is pivoted towards the frame of the shaving head, until the support is retained by the locking device 9, this shear foil pressing onto the cutter 4 cooperating with it, which the cutter is moved in the direction of the cutter 13 of the trimmer, so that the leaf spring 19 is tensioned. Thus, a single spring device 19 brings the cutter 4 into engagement with the counter-cutter 3 and brings the cutter 13 of the trimmer into engagement with counter-cutter 10 of the trimmer.

FIGS. 3 and 4 show an embodiment of a shaving head having a shaving section 1 and two trimmers 2. The drivable cutter 4 and the counter-cutter 3 of the shaving section are similar to those in the embodiment according to FIGS. 1 and 2. The counter-cutter 10 of the two trimmers has the shape of a channel in cross-section transverse to the longitudinal axes, with bent longitudinal sides, each carrying a comb 11. The channel defies a bottom part and upward extending side walls 30. This counter-cutter 10 forms the frame of the shaving head, which is possible as a result of the great strength of such a profile. The drivable cutter 13 of the two trimmers also has the shape of a channel with bent longitudinal sides each provided with a comb 14. The channel of the cutter 13 extends within the channel of the counter-cutter 10 of the trimmer, the cutter and the counter cutter being in engagement with each other along the combs 11, 14 only which comprise the top edges of their respective side walls. The drivable cutter 4 of the shaving section extends within the channel of the drivable cutter 13 of the trimmers. This results in a very compact construction, thus enabling the cutting faces of the shaving section and of the two trimmers to extend substantially in one plane, so that they can be put into operation at the same time.

For straight-line guidance of the cutter 13 of the trimmers two laterally projecting tabs 28 have been provided on the two side walls 27 of the channel of said cutter, which are located behind each other viewed in the longitudinal direction of the channel and which slidingly engage the tabs 29 projecting from the side walls 30 of the channel of the counter-cutter 10 of the

trimmers. By bending the tabs **29** on accurate adjustment of the guidance is possible.

The cutter **13** of the trimmers is mounted on a member **31,** which is driven by the drive system of the dry-shaving apparatus. The cutter **13** is mounted on the member in such a way that the tabs **32** projecting from the bottom of the channel are pressed into recesses **33** in the member. The cutter **4** of the shaving section is also mounted on the member, in such a manner that it is movable in a direction perpendicular to the counter-cutter **3** of the shaving section and that it can pivot about an imaginary axis which is perpendicular to said direction and to the direction of the reciprocating movement, so that this cutter can always fully engage with the counter-cutter. In this way the two cutters **4** and **13** together with the member **3** form a unit, which can be driven jointly by the drive system of the dry-shaving apparatus. Also mounted on the member **31** are hook-shaped resilient projections **34,** by means of which said unit can be attached movably, though captively but per se detachably, to the counter-cutter **10,** which forms the frame for the shaving head, because these projections **34** can be positioned so as to snap behind an opening **35** in the frame of the shaving head which serves for the passage of the drive system.

In this embodiment the spring device consists of two helical springs **36,** which at one end rest against the member **31** at the other end against supports **37** connected with the cutter **4** of the shaving section. In this way the two springs, which are mechanically arranged in parallel with each other, operate between the two cutters **4** and **13** of the shaving section and the trimmers respectively, causing them to engage with the associated counter-cutters. Since the helical springs **36** together with the unit consisting of the cutters **4** and **13** and the member **31** are jointly reciprocated by the drive system, they are not subject to bending stressed, so that they always press the cutters against the associated counter-cutters, which is important for an effective cutting action.

The counter-cutter of the shaving section, for example a shear foil **3,** is again arranged on a support **6,** which via two arms **38** is pivoted, to the counter-cutter **10** forming the frame of the shaving head, the support, in turn, being pivoted to the arms and the arms to the counter-cutter **10.** The arms **38** are formed by the legs of a U-shaped bracket, which has bent free ends **40** which extend in parallel with the yoke **39.** The yoke **39** is pivoted to the counter-cutter **10** by means of bent tabs **41** thereof. The support **6** is pivoted to the free ends **40** by widening them by means of an upsetting operation, after they have been inserted in the corresponding apertures in the support. Thus, the support can be pivoted so far relative to the frame of the shaving head, as shown in FIG. **4** by the dashed lines, that all the cutters, for example for cleaning purposes, are readily accessible. The support can be locked in its operating or closed position on the frame of the shaving head by means of two latches **43,** which can be moved so that tips **43***a* extend into aperture **6***a* in support **6,** when the latches are urged by the action of an expanding spring **42.**

In a simlar way as in the embodiment according to FIGS. **1** and **2,** the spring device formed by the two helical springs **36** is tensioned when the support **6** is brought into the operating position, i.e. the shear foil **3** presses the cutter **4** towards the frame of the shaving head, the combs **14** of the cutter **13** being simultaneously brought into engagement with the combs **11** of the counter-cutter **10** of the trimmer. This means that a single spring device again causes the drivable cutters of the shaving section as well as the trimmers to engage with the associated counter-cutters.

It is obvious that various modifications of the aforementioned embodiments are possible within the scope of the invention.

What is claimed is:

1. In a shaving head for a dry shaving apparatus, the shaving head including a shaving section having a shaving shear plate and an adjacent and cooperating shaving cutter reciprocably movable along their common longitudinal axis, a trimmer having a trimmer shear plate and an adjacent and cooperating trimmer cutter reciprocally movable along their common longitudinal axis which is parallel to said shaver section axis, drive means coupled to both of said cutters to produce common reciprocal motion, the improvement in combination therewith, wherein said trimmer shear plate and trimmer cutter are channel-shaped in cross-section transverse of said longitudinal axes and are generally concentric, each channel defining a bottom part, side walls extending outward of the bottom part, and top edges of said walls with cutting combs defined on corresponding and adjacent top edges of the trimmer's shear plate and cutter, and said shaver section is situated within said channel shape of said trimmer, with the shaver and trimmer cutters being spaced apart, the shaver shear plate being outward of the shaver cutter and the trimmer shear plate inward of the trimmer cutter, the shaving head further comprising spring means intermediate the two cutters urging them apart and resiliently against their respective shear plates.

2. Apparatus according to claim **1** wherein said trimmer shear plate and cutter comprise a mating pair of elements, the shaving head further comprising a projection extending from one of said pair of elements, and a coresponding straight-line part extending longitudinally on the other of said pair, the projection being slidably engaged to said straight line part to ensure relative straight line motion between said elements.

3. Apparatus according to claim **2** wherein said projection extends from the trimmer cutter, with the straight line part on said trimmer shear plate.

4. Apparatus according to claim **1** wherein said channel-shaped trimmer shear plate comprises a frame of the shaving head.

5. Apparatus according to claim **4** wherein said shear plate comprises a perforated foil, said shaving head further comprises a support means to which said foil is attached and which support means is pivotally secured to the frame.

6. Apparatus according to claim **1** wherein said trimmer shear plate has a comb on each of its two top edges, and said trimmer cutter has a corresponding comb on each of its two top edges, forming two pairs of cutting elements.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,855,697 Dated December 24, 1974

Inventor(s) GERALD MEYER ET AL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The "Foreign Application Priority Data" should be

changed to --Austrian.....A1697/72--

Col. 1, line 63, "sher" should be --shear--

Col. 4, line 15, "5" should be --25--

line 19, "takt" should be --that--

Col. 5, line 1, "on" should be --an--

Claim 2, line 5, "coresponding" should be --corresponding--

Signed and sealed this 6th day of May 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks