

SPECIFICATION

Dry shaver assembly having a shaving head frame and a subframe insertable into the shaving head frame

This invention relates to a dry shaver having a shaving head frame and a subframe insertable into the shaving head frame.

10 Constructions of this type, which are known for example from German Patent Specification No. 2203926, have the disadvantage that the cutting foil is rigid in its mounting in the subframe and therefore cannot yield under shaving pressure so that it buckles, whereby the area of contact between the two cutting elements is reduced and in extreme cases the cutting foil can be damaged by buckling. This type of damage can also occur when the catch of the subframe in the shaving head frame is placed on the same side of the subframe as that on which the cutting foil is attached, since each time the subframe is removed, for example when cleaning hair from the shaving head, the cutting foil is required to bend.

25 Another known construction (Japanese Utility Model No. 45-67905, published under No. 49-2702) has similar shortcomings. In this construction arms are provided on the longitudinal side of the subframe, on which the cutting foil is also attached, and by means of these arms the subframe can be inserted into corresponding recesses in the shaving head frame. Here also the cutting foil is mechanically stressed each time the subframe is removed or replaced and can thereby be damaged. The cutting foil is, however, depending on the type of catch, not sufficiently fixed in the operating direction of the cutter, so that the cutting foil can be displaced by the cutting blade and caused to vibrate, whereby the cutting efficiency is greatly impaired.

40 Proceeding from this prior art, a preferred embodiment of the present invention is based on the problem of producing a mounting for the cutting foil in the shaving head frame which is flexible in the positive direction of the spring biasing the cutter towards the cutting foil and rigid in the operating direction of the cutter, and which enables easy removal of the cutting foil from the shaving head frame without the cutting foil undergoing excessive mechanical stress.

50 According to the invention, there is provided a dry shaver assembly incorporating a shaving head frame, a subframe removably mounted within the shaving head frame, and an arcuate cutting foil attached to the subframe, the assembly being intended to be used in conjunction with a cutter which is pressed against the foil by a spring and is capable of reciprocating movement in the direction of the longitudinal axis of the foil, wherein the subframe comprises a base adapted to be rigidly held within the shaving head frame, and at least one portion, to which the foil is attached, capable of limited resilient displacement towards the base in the direction of action of the spring pressing the cutter against the foil, the subframe being removable from the shaving head frame without it

being necessary to bend the foil in a direction transverse to its longitudinal axis.

Examples of the assembly according to the invention are shown in the accompanying drawings, in which:

Figure 1 is a longitudinal view of a shaving head of a dry shaver, the shaving head being cut away on the righthand side of the figure;

Figure 2 is a sectional view of the shaving head taken along the line II-II in *Figure 1*;

Figure 3 is a view of a side wall of the shaving head of *Figure 1*;

Figure 4 shows a detail of the shaving head on a larger scale; and

Figure 5 shows a variation of a detail of the shaving head of *Figure 1*.

Referring to *Figures 1* and *2*, a shaving head frame 2 is detachably provided on the casing 1 of a dry shaver, and in this shaving head frame 2 is inserted a subframe 3 to which a cutting foil 4 is attached in a manner subsequently described in more detail. The cutting foil 4 works in conjunction with a lower cutting blade 5 which is moved backwards and forwards by a motor (not shown) provided in the casing 1 by means of a rocking lever 6 to perform cutting. A helical spring 7 presses the lower cutting blade 5 against the cutting foil 4 in a known way.

On the longitudinal sides 8 of the subframe 3 are elongate portions 9 which are connected by X-shaped curved springs 10, that is curved springs having intersecting arms, to a base 11 of the subframe 3; these parts, that is to say the elongate portions 9, curved springs 10 and base 11, are as one piece and made of synthetic material in such a way that all three parts of the subframe 3 lie in one plane.

The special design of the curved springs 10 enables resilient displacement of the elongate portions 9 and the attached cutting foil 4, for example under shaving pressure, towards the base 11 of the subframe 3 and in conjunction with the helical spring 7 of the lower blade 5, but prevents any movement or swinging of the cutting foil 4 in the direction of operational movement (arrow A) of the lower cutting blade 5.

For securing the cutting foil 4 to the portions 9 of the subframe 3, the subframe 3 is provided with funnel-shaped indentations 12 and central welding plugs 13. The cutting foil 4 is provided with fixing holes 14 at suitable positions, the diameter of which holes 14 is at least as great as the diameter of the indentations 12. Finally, oblong sheets 15 are provided which have corresponding apertures at attachment points with flanged edges 16 which pass through the holes 14 in the cutting foil 4 and extend into the indentations 12 in the subframe 3. After assembly of the cutting foil 4 and the sheets 15 on the portions 9, the plugs 13 are heated to form rivet heads which overlap the edges 16, as is shown in the unshaded parts of *Figure 4*.

Strips 17 are provided on the sheets 15 to limit the degree of resilience allowed by the length of the arms of the X-shaped curved springs 10, and these strips 17 are attached to apertures 19 in the base 11 of the subframe 3 by means of hooks 18; the height of these apertures 19 therefore determines the

degree of resilience.

In the variation shown in Figure 5, an aperture 20 is provided in each of the two longitudinal sides 8 of the subframe 3, and, in each aperture 20, suspended on the X-shaped curved springs 10, an elongate portion 9.1 is provided, the dimension of which in the directions of resilience 38 of these springs is smaller than the inside width of the aperture 20 in the vertical direction by an amount sufficient to enable the permitted degree of resilience. The inner edges of these apertures 20 thus serve as end stops for the portions 9.1.

So as to avoid any mechanical stress on the cutting foil 4 when inserting or withdrawing the subframe 3 from the shaving head frame 2, the means for mounting the subframe 3 in the frame 2 are placed on the front sides 21, 22 of the subframe 3; they are formed by two lugs 23, 24 of limited flexibility which hook into indentations 27, 28 on the inner surface of the side walls 29, 30 of the frame 2 by means of hemispherical projections 25, 26. As an outer support and as means for easier handling of the subframe 3, holding plates 31, 32 are provided on the front sides 21, 22, and these holding plates 31, 32 come to lie on the outer surfaces 33, 34 of the side walls 29, 30 of the shaving head frame 2 when the subframe 3 is inserted.

Also to obtain better assembly and disassembly of the shaving head, the side walls 29, 30 of the shaving head frame 2 are provided with gripping surfaces 35, 36, in such a way that, when the subframe 3 is inserted, its holding plates 31, 32 lie beneath these gripping surfaces 35, 36, as shown in Figure 3.

Finally the subframe 3 has a flange 37 running round it, on which the shaving head frame 2 rests after the two components have been fitted together. This flange 37 can therefore be used as a knocking edge when cleaning the shaving head which, especially when the shaving head frame 2 has a metallic finish, prevents too hard an impact.

For assembly and disassembly, the shaving head frame 2 is grasped with the fingers of one hand around its gripping surfaces 35, 36, while the fingers of the other hand grip the holding plates 31, 32 of the subframe 3. In this way the catch of the subframe 3 can be operated as desired, without this action having any repercussion on the cutting foil and without the resilience of the spring in the cutting foil mounting being impaired in any way.

CLAIMS

1. A dry shaver assembly incorporating a shaving head frame, a subframe removably mounted within the shaving head frame, and an arcuate cutting foil attached to the subframe, the assembly being intended to be used in conjunction with a cutter which is pressed against the foil by a spring and is capable of reciprocating movement in the direction of the longitudinal axis of the foil, wherein the subframe comprises a base adapted to be rigidly held within the shaving head frame, and at least one portion, to which the foil is attached, capable of limited resilient displacement towards the base in the direction of action of the spring pressing

the cutter against the foil, the subframe being removable from the shaving head frame without it being necessary to bend the foil in a direction transverse to its longitudinal axis.

2. A dry shaver assembly according to claim 1, wherein the subframe has two elongate portions to which the cutting foil is attached, which elongate portions are connected to the base of the subframe by curved springs.

3. A dry shaver assembly according to claim 2, wherein the curved springs have intersecting arms which are in one piece with the elongate portions and the base of the subframe.

4. A dry shaver assembly according to claim 2 or 3, wherein means are provided between the elongate portions and the base of the subframe which limit the degree of resilience of the subframe.

5. A dry shaver assembly according to claim 2, 3 or 4, wherein the elongate portions are each fitted in an aperture in the subframe, the inside width of each aperture being greater than the dimension of the elongate portions in the direction of resilience by an amount sufficient to enable the permitted degree of resilience.

6. A dry shaver assembly according to claim 2, 3 or 4, wherein, between the elongate portions and the base of the subframe, strips are provided which engage apertures in the elongate portions or base of the subframe by means of hooks.

7. A dry shaver assembly according to claim 6, wherein strips are provided on a cover sheet.

8. A dry shaver assembly according to any preceding claim, wherein lugs of limited flexibility, each with a hemispherical projection, are provided as holding means for the subframe, these lugs gripping the side walls of the shaving head frame when the subframe is within the shaving head frame, and holding plates are also provided on the subframe which come to lie on the outer surfaces of these side walls when the subframe is inserted into the shaving head frame.

9. A dry shaver assembly according to claim 8, wherein gripping surfaces are provided on the side walls of the shaving head frame in such a position that, on insertion of the subframe, the holding plates come to lie beneath the gripping surfaces.

10. A dry shaver assembly according to claim 2 or any one of claims 3 to 9 when appended directly or indirectly to claim 2, wherein welding plugs lying in indentations are provided on the outer sides of the elongate portions of the subframe for attaching the cutting foil, fixing holes are provided in the cutting foil of a diameter corresponding to the diameter of these indentations, and sheets are provided which overlie the cutting foil in the vicinity of the fixing holes and have corresponding apertures at the attachment points, which apertures have flanged edges which extend into the indentations of the subframe after passing through the fixing holes in the cutting foil.

11. A dry shaver assembly according to any preceding claim, wherein the subframe has a circular flange on which the shaving head frame rests.

12. A dry shaver assembly substantially as hereinbefore described with reference to, and as

degree of resilience.

In the variation shown in Figure 5, an aperture 20 is provided in each of the two longitudinal sides 8 of the subframe 3, and, in each aperture 20, suspended on the X-shaped curved springs 10, an elongate portion 9.1 is provided, the dimension of which in the directions of resilience 38 of these springs is smaller than the inside width of the aperture 20 in the vertical direction by an amount sufficient to enable the permitted degree of resilience. The inner edges of these apertures 20 thus serve as end stops for the portions 9.1.

So as to avoid any mechanical stress on the cutting foil 4 when inserting or withdrawing the subframe 3 from the shaving head frame 2, the means for mounting the subframe 3 in the frame 2 are placed on the front sides 21, 22 of the subframe 3; they are formed by two lugs 23, 24 of limited flexibility which hook into indentations 27, 28 on the inner surface of the side walls 29, 30 of the frame 2 by means of hemispherical projections 25, 26. As an outer support and as means for easier handling of the subframe 3, holding plates 31, 32 are provided on the front sides 21, 22, and these holding plates 31, 32 come to lie on the outer surfaces 33, 34 of the side walls 29, 30 of the shaving head frame 2 when the subframe 3 is inserted.

Also to obtain better assembly and disassembly of the shaving head, the side walls 29, 30 of the shaving head frame 2 are provided with gripping surfaces 35, 36, in such a way that, when the subframe 3 is inserted, its holding plates 31, 32 lie beneath these gripping surfaces 35, 36, as shown in Figure 3.

Finally the subframe 3 has a flange 37 running round it, on which the shaving head frame 2 rests after the two components have been fitted together. This flange 37 can therefore be used as a knocking edge when cleaning the shaving head which, especially when the shaving head frame 2 has a metallic finish, prevents too hard an impact.

For assembly and disassembly, the shaving head frame 2 is grasped with the fingers of one hand around its gripping surfaces 35, 36, while the fingers of the other hand grip the holding plates 31, 32 of the subframe 3. In this way the catch of the subframe 3 can be operated as desired, without this action having any repercussion on the cutting foil and without the resilience of the spring in the cutting foil mounting being impaired in any way.

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the cutter against the foil, the subframe being removable from the shaving head frame without it being necessary to bend the foil in a direction transverse to its longitudinal axis.

2. A dry shaver assembly according to claim 1, wherein the subframe has two elongate portions to which the cutting foil is attached, which elongate portions are connected to the base of the subframe by curved springs.

3. A dry shaver assembly according to claim 2, wherein the curved springs have intersecting arms which are in one piece with the elongate portions and the base of the subframe.

4. A dry shaver assembly according to claim 2 or 3, wherein means are provided between the elongate portions and the base of the subframe which limit the degree of resilience of the subframe.

5. A dry shaver assembly according to claim 2, 3 or 4, wherein the elongate portions are each fitted in an aperture in the subframe, the inside width of each aperture being greater than the dimension of the elongate portions in the direction of resilience by an amount sufficient to enable the permitted degree of resilience.

6. A dry shaver assembly according to claim 2, 3 or 4, wherein, between the elongate portions and the base of the subframe, strips are provided which engage apertures in the elongate portions or base of the subframe by means of hooks.

7. A dry shaver assembly according to claim 6, wherein strips are provided on a cover sheet.

8. A dry shaver assembly according to any preceding claim, wherein lugs of limited flexibility, each with a hemispherical projection, are provided as holding means for the subframe, these lugs gripping the side walls of the shaving head frame when the subframe is within the shaving head frame, and holding plates are also provided on the subframe which come to lie on the outer surfaces of these side walls when the subframe is inserted into the shaving head frame.

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10. A dry shaver assembly according to claim 2 or any one of claims 3 to 9 when appended directly or indirectly to claim 2, wherein welding plugs lying in indentations are provided on the outer sides of the elongate portions of the subframe for attaching the cutting foil, fixing holes are provided in the cutting foil of a diameter corresponding to the diameter of these indentations, and sheets are provided which overlie the cutting foil in the vicinity of the fixing holes and have corresponding apertures at the attachment points, which apertures have flanged edges which extend into the indentations of the subframe after passing through the fixing holes in the cutting foil.

11. A dry shaver assembly according to any preceding claim, wherein the subframe has a circular flange on which the shaving head frame rests.

12. A dry shaver assembly substantially as hereinbefore described with reference to, and as



illustrated in, Figures 1 to 4 or these Figures as
modified by Figure 5 of the accompanying drawings.

Printed for Her Majesty's Stationery Office, by Croydon Printing Company
Limited, Croydon, Surrey, 1982.
Published by The Patent Office, 25 Southampton Buildings, London,
WC2A 1AY, from which copies may be obtained.