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(54) SHAVING HEAD FOR DRY-SHAVING APPARATUS

(71) We, N.V. PHILIPS' GLOEILAMPENFABRIEKEN, a limited liability company, organised and established under the laws of the Kingdom of the Netherlands, of Emmasingel 29, Eindhoven, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a shaving head for a dry-shaving apparatus, comprising a flexible perforated shear foil supported in a frame, and a reciprocable cutter which cooperates with the shear foil, the shear foil being supported in an arched position between two side members of the frame which are disposed opposite one another and extend parallel to the direction of reciprocatory movement of the cutter and each of which has a contact surface for the shear foil, against which surface the arched shear foil bears at its convex side and on which surface is formed a projection which engages in a corresponding opening in the shear foil to retain the shear foil in the frame.

Such a shaving head is described in Austrian Patent Specification 270,445. The flexible shear foil used in such shaving heads are comparatively thin and may easily be damaged, particularly if, as in the known shaving head, when the shaving head frame with the shear foil is removed from the shaving apparatus for cleaning purposes, the shear foil may become detached from the frame.

According to the invention there is provided a shaving head for a dry-shaving apparatus, comprising a flexible perforated shear foil supported in a frame, and a reciprocable cutter which cooperates with the shear foil, the shear foil being supported in an arched position between two side members of the frame which are disposed opposite one another and extend parallel to the direction of reciprocatory movement of the cutter and each of which has a contact

surface for the shear foil, against which surface the arched shear foil bears at its convex side and on which surface is formed a projection which engages in a corresponding opening in the shear foil to retain the shear foil in the frame, wherein the frame comprises two further members each disposed adjacent extending parallel to an associated one of the side members and having a first surface which extends parallel to the direction of movement of the cutter and a second surface which adjoins the first surface and which faces the contact surface of the adjacent side member and is spaced from the free end of the projection on that contact surface to form therewith a gap through which an edge of the shear foil can pass during assembly and dismantling of the shaving head, the first surfaces facing one another and defining two opposed parallel walls of an aperture through which the shear foil can be inserted into the frame during assembly of the shaving head, and the second surfaces lying in two planes which converge in the direction of the arched shear foil on the concave side thereof and in accordance with the curvature of the shear foil, and the second surfaces meeting the adjoining first surfaces at edges which lie in a plane which intersects the projections on the side members.

This construction provides a captive attachment of the shear foil to the shaving-head frame which ensures that the shear foil cannot inadvertently become detached from the shaving-head frame when the frame is removed from the shaving apparatus.

In one embodiment of the invention the contact surfaces of the side members are flat, the free end of the projection on each side member has a flat surface lying in a plane which is parallel to the plane containing the contact surface of that side member, and the plane containing the second surface of each further member is parallel to the plane containing the contact surface of the adjacent side member.

An embodiment of the invention will

now be described with reference to the accompanying drawings, in which:

5 Fig. 1 is a sectional view of a shaving head according to an embodiment of the invention, the section being taken in a plane normal to the direction of movement of the reciprocating cutter of the shaving head, and

10 Fig. 2 is a sectional view of the frame and shear foil of the shaving head shown in Fig. 1, the section again being taken in a plane normal to the direction of movement of the cutter and showing successive stages in the insertion of the shear foil into the frame during assembly of the shaving head.

15 The shaving head shown in Fig. 1 comprises a rectangular frame 1 which is symmetrical about a plane 2 extending longitudinally of the frame and which comprises two lateral end walls 3, which extend perpendicularly to the longitudinal plane of symmetry 2, and two longitudinal side members 4 and 5, which extend parallel to the longitudinal plane of symmetry. Each of the longitudinal frame members 4 and 5 has a flat contact surface 6 and 7 respectively for a flexible, perforated, rectangular shear foil 8 which is supported in an arched position between the frame members 4 and 5 by a movable cutter 11 of the shaving head. For retaining the shear foil in the frame 1, two projections 9 are provided on the contact surface 6, 7 of each of the two longitudinal frame members 4 and 5. Only one projection can be seen on each frame member, the two projections on each member being spaced longitudinally thereof. The projections 9 are engageable in corresponding openings 10 formed in the shear foil 8 adjacent the longitudinal edges thereof.

20 The movable cutter 11, which cooperates with the shear foil 8 in known manner, is secured on a support 12 which in turn is connected to a drive element 13 which is reciprocable by a motor (not shown) of the dry-shaving apparatus in a direction parallel to the longitudinal frame members 4 and 5. The connection between the support 12 and the drive element 13 is such as to permit limited movement of the support, and with it the movable cutter 11, towards and away from the shear foil relative to the drive element 13. To form this connection the support 12 is provided with two spaced walls 14 and 15 which fit slidably over two opposite sides of the drive element 13 and which have slots 18 and 19 in which two projections 16 and 17 on the element 13 slidably engage. Two helical springs 20 (only one can be seen) bear at one end against the support 12 and at the other end against the drive element 13 to urge these two parts away from each other so

that the movable cutter 11 is kept resiliently in engagement with the shear foil 8.

70 In addition to the shaving section described above the shaving head also comprises two reciprocating trimming cutters. These cutters each comprise a movable row of cutting teeth 21 and 23 respectively and a stationary row of teeth 22 and 24 respectively. The rows of teeth are formed on the longitudinal edges of two channel-shaped cutter plates 25 and 26. The cutter plate 25, on which the movable rows of teeth are formed, is rigidly connected to the drive element 13 and is thus drivable. The other, stationary cutter plate 26 bears against projections 27 and 28 on each of the two end walls 3 of the shaving-head frame 1 and is secured to these walls by means of two snap connections. These snap connections each comprise a projection 29 on one end of the cutter plate 26 and a corresponding opening or recess 30 in a respective one of the end walls 3 of the shaving-head frame 1 for engagement with the projection 29. Thus, the stationary cutter plate 26 constitutes an abutment for the forces exerted by the helical springs 20, so that the rows of cutting teeth 21 and 23 on the drivable cutter plate 25 of the two trimming cutters are urged against the rows of cutting teeth 22 and 24 on the stationary cutter plate 26 and the movable shaving cutter 11 is urged against the shear foil 8.

85 By releasing the snap connections between the cutter plate 26 and the shaving-head frame 1, the component parts of the shaving head can be dismantled. The cutter plate 26 forms a unitary assembly with the drivable part of the shaving head, namely the trimming cutter plate 25, the drive element 13 and the support 12 of the shaving cutter 11, which assembly can be bodily removed from the shaving-head frame 1. For this purpose, hook-shaped projections 31 and 32 are provided on the drive element 13 to engage beneath the cutter plate 26 at the edges of a central opening 33 in the plate 26, which edges also constitute a guide for the reciprocable drive element 13.

90 In the present example the projections 9 which serve for retaining the shear foil 8 in the frame 1 project from the frame members 4 and 5 in directions parallel to the longitudinal plane of symmetry 2. Disposed adjacent each of the two longitudinal frame members 4 and 5 and extending parallel thereto is a further longitudinal frame member 34 and 35 respectively. The further frame members 34 and 35 each have a first flat surface 36 and 37 respectively which extends parallel to the longitudinal plane of symmetry 2. These first

surfaces 36 and 37 face each other and define two opposed parallel walls of an aperture through which the shear foil can be inserted in the frame 1, as will be explained hereinafter. The surfaces 36 and 37 may lie in planes which are parallel with the longitudinal plane of symmetry 2 of the frame 1, as shown in the drawings, or they may lie in planes which converge in the direction of the arched operative position of the shear foil, which is the position shown in Fig. 1.

The two further longitudinal frame members 34 and 35 each have a second flat surface 40 and 41 respectively which adjoins the first surface 36 and 37 respectively and which faces the contact surface 6 and 7 respectively of the adjacent frame member 4 and 5 respectively and also faces the free ends 38 and 39 respectively of the projections 9 on the adjacent frame member 4 and 5. The surfaces 40 and 41 lie in two planes which converge in the direction of the arched shear foil on the concave side thereof and in accordance with the curvature of the shear foil and which intersect one another in the longitudinal plane of symmetry 2. The second surfaces 40 and 41 of the further frame members 34 and 35 meet the first surfaces 36 and 37 thereof at edges 42 and 43 respectively which extend longitudinally of the frame members 34 and 35 and which lie in a plane which is perpendicular to the longitudinal plane of symmetry 2 and which intersects the free ends 38 and 39 of the projections 9 on the frame members 4 and 5. The surfaces 40 and 41 are spaced from the free ends of the projections 9 by a distance which may be a multiple of the thickness of the shear foil so as to facilitate entry of the longitudinal edges of the shear foil into the gaps thus formed.

In the present example the free ends 38 and 39 of the projections 9 have flat surfaces lying in planes which extend parallel to the planes containing the contact surfaces 6 and 7 of the frame members 4 and 5 respectively. It is possible for the free end surfaces of the projections 9 to have a shape other than flat; for example they may have a rounded shape. In the embodiment shown the second surfaces 40 and 41 of the further frame members 34 and 35 also lie in planes which extend parallel to the planes containing the contact surfaces 6 and 7 of the frame members 4 and 5 respectively. It is possible to arrange the surfaces 40 and 41 in planes which are not parallel with the planes containing the contact surfaces 6 and 7, provided they converge in the direction of the arched shear foil.

With the above construction a particularly reliable attachment of the shear foil

to the shaving-head frame is obtained, because the shear foil cannot become detached inadvertently, as will be explained hereafter with reference to Fig. 2. In Fig. 2 the initial position of the shear foil in the procedure for mounting the shear foil in the shaving-head frame 1 is indicated by the reference numeral 44. The shear foil is positioned against surfaces 45 and 46 of the further frame members 34 and 35 respectively, which surfaces are disposed on the opposite sides of these frame members to the surfaces 40 and 41. A manual pressure is now exerted on the shear foil at its centre, in the direction of the arrow 47, so that the shear foil is bowed in the direction of this arrow and then slides with its longitudinal edges 48 and 49 over the first surfaces 36 and 37 of the further frame members 34 and 35, which surfaces, together with the end walls 3 of the frame 1, thus define an insertion aperture for the shear foil. Pressure continues to be exerted on the shear foil until it has reached the position designated 50 in Fig. 2, in which position its longitudinal edges 48 and 49 are level with the gaps between the second surfaces 40 and 41 of the further frame members 34 and 35 and the free ends 38 and 39 of the projections 9. The manual pressure on the shear foil is now relaxed to allow the shear foil to straighten under the influence of its elastic flexibility, so that it assumes the position designated by the reference numeral 51 in Fig. 2. During this straightening of the shear foil the free ends 38 and 39 of the projections 9 become engaged in the corresponding openings 10 in the shear foil. The shear foil is now resting in a flat position on the edges 42 and 43 of the further frame members 34 and 35. It is to be noted that the openings 10 in the shear foil are not visible in Fig. 2, because in order clearly to show the shear foil resting on the edges 42 and 43, the cross-section of Fig. 2 has not been taken through the projections 9. In this position the shear foil is already captively attached to the shaving-head frame, because the free ends 38 and 39 of the projections 9 pass through the openings 10 in the shear foil and prevent the shear foil from becoming detached from the shaving-head frame. This is because the plane which contains the edges 42 and 43 of the further frame members 34 and 35 intersects the free ends 38 and 39 of the projections 9. If pressure is again exerted on the shear-foil in the direction of the arrow 47, which happens when the movable shaving cutter 11 is brought into its operative position, the shear foil is bowed into its arched operative position, in which it bears at its convex side against the contact surfaces 6 and 7 of the frame members 4 and 5 respectively,

as is shown in Fig. 1. If this pressure ceases to be exerted on the shear foil, for example when the shaving cutter 11 is removed from the shaving-head frame for cleaning purposes, the shear foil can return to the relaxed position designated 51 in Fig. 2, without becoming detached from the shaving-head frame, because the free ends 38 and 39 of the projections 9 still project through the openings 10 in the shear foil and thus captively retain the foil.

Thus, it is ensured that the shear foil cannot inadvertently become detached from the shaving-head frame, which as previously stated, is of particular importance when the shaving head is to be cleaned. Because of this reliable attachment of the shear foil to the shaving-head frame, the risk of damage to the shear foil is reduced.

If the shear foil is to be removed from the shaving-head frame, for example, in order to replace it, this is done by holding the frame in one hand, and with the shear foil held between a finger and thumb of the other hand near one of the frame members 4 and 5, bending the foil so that the free ends 38 and 39 of the projections 9 on the respective frame member 4 or 5 are disengaged from the corresponding openings 10 in the shear foil, and then pulling the shear foil out of the gap between the free ends of those projections 9 and the second surface 40 or 41 of the respective further frame member 34 or 35. The shear foil is subsequently withdrawn from the corresponding gap at the other side of the shaving-head frame to complete the removal of the shear foil. It is evident that this is an operation which can be performed only by intention and not by accident, which ensures that the shear foil cannot inadvertently become detached from the shaving-head frame.

WHAT WE CLAIM IS:—

1. A shaving head for a dry-shaving apparatus, comprising a flexible perforated shear foil supported in a frame, and a reciprocable cutter which cooperates with the shear foil, the shear foil being supported in an arched position between two side members of the frame which are disposed opposite one another and extend parallel

to the direction of reciprocatory movement of the cutter and each of which has a contact surface for the shear foil, against which surface the arched shear foil bears at its convex side and on which surface is formed a projection which engages in a corresponding opening in the shear foil to retain the shear foil in the frame, wherein the frame comprises two further members each disposed adjacent and extending parallel to an associated one of the side members and having a first surface which extends parallel to the direction of movement of the cutter and a second surface which adjoins the first surface and which faces the contact surface of the adjacent side member and is spaced from the free end of the projection on that contact surface to form therewith a gap through which an edge of the shear foil can pass during assembly and dismantling of the shaving-head, the first surfaces facing one another and defining two opposed parallel walls of an aperture through which the shear foil can be inserted into the frame during assembly of the shaving head, and the second surfaces lying in two planes which converge in the direction of the arched shear foil on the concave side thereof and in accordance with the curvature of the shear foil, and the second surfaces meeting the adjoining first surfaces at edges which lie in a plane which intersects the projections on the side members.

2. A shaving head as claimed in Claim 1, wherein the contact surfaces of the side members are flat, wherein the free end of the projection on each side member has a flat surface lying in a plane which is parallel to the plane containing the contact surface of that side member, and wherein the plane containing the second surface of each further member is parallel to the plane containing the contact surface of the adjacent side member.

3. A shaving head substantially as herein described with reference to the accompanying drawings.

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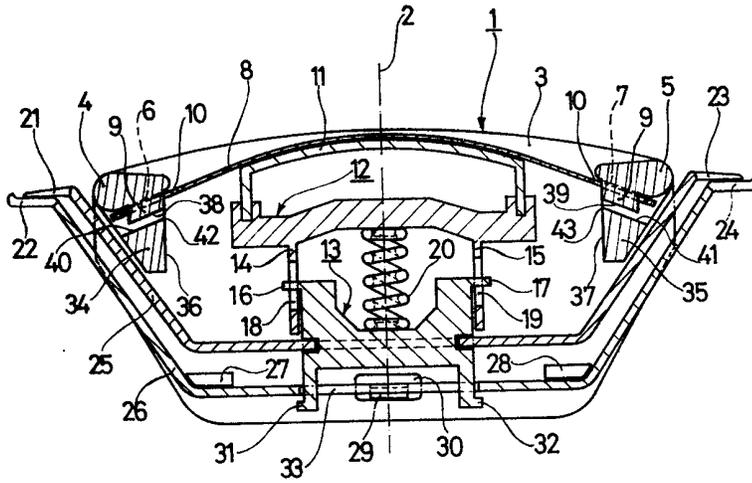


Fig.1

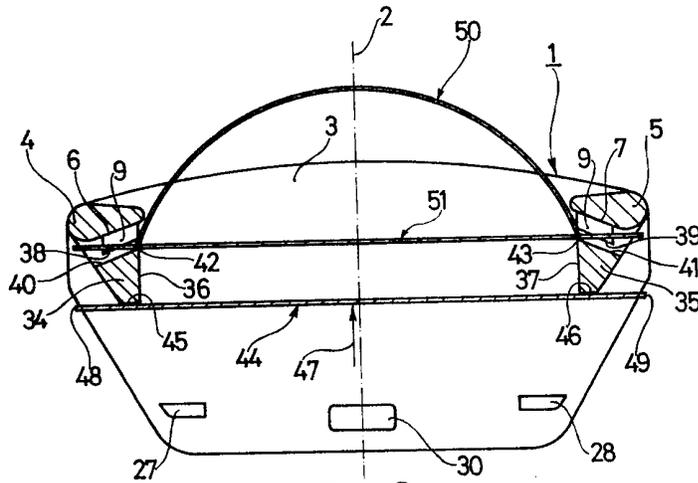


Fig.2