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A. LONER ET AL

3,456,341

CUTTER HEAD FOR DRY SHAVING APPARATUS

Filed July 14, 1967

2 Sheets-Sheet 1

FIG. 1

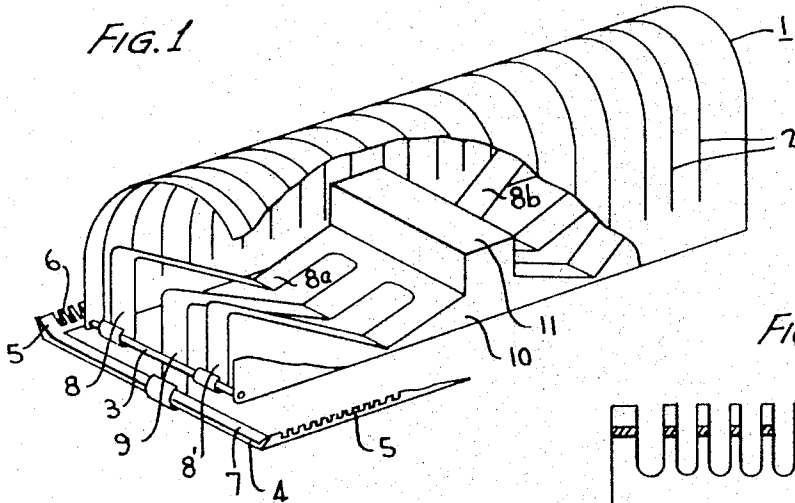


FIG. 2

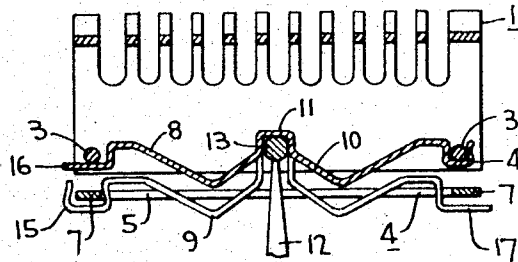


FIG. 1a

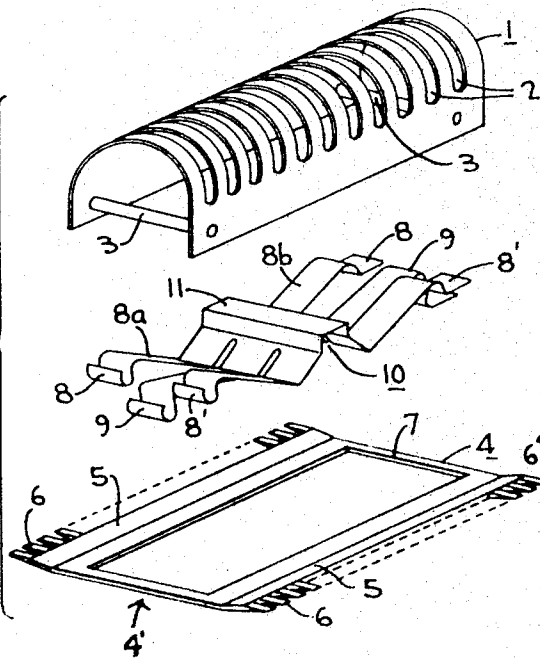
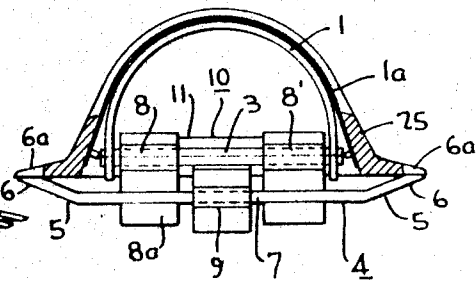


FIG. 1b



INVENTORS,
ALDO LONER
OTTO MEIER

BY *Watson, Cole, Grindle & Watson*
ATTORNEYS

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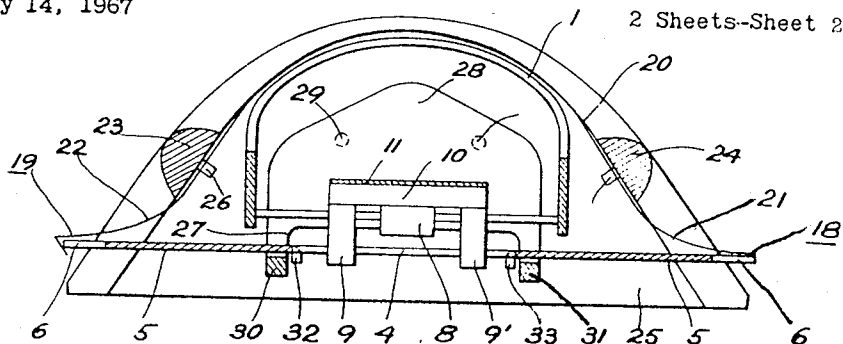


Fig. 3.

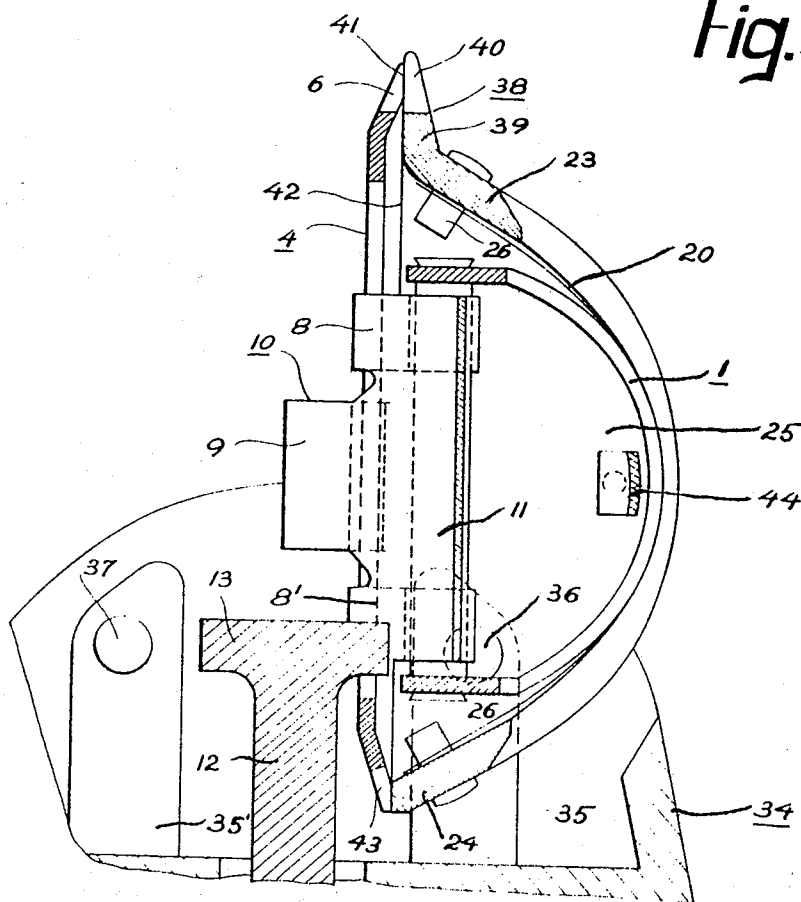


Fig. 4.

INVENTORS

Aldo Loner
Otto Meier

BY

Water, Cole, Grindle & Watson
ATTORNEYS

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CUTTER HEAD FOR DRY SHAVING APPARATUS
Aldo Loner and Otto Meier, Klagenfurt, Austria, assignors
to Firma Carinthia Elektrogerate Gesellschaft m.b.H.

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A 7,746/66

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5 Claims

ABSTRACT OF THE DISCLOSURE

A cutter head for dry shaving with a razor part and a lateral trimmer each having a stationary upper cutter and a reciprocatory lower cutter. A frame supports both cutters and a unitary spring bridge presses the lower cutter against the upper cutter.

This invention relates to cutter heads for dry shaving apparatus, in which there are, arranged on a frame, a perforated cutter foil as upper cutter for the razor part, and, at least on one longitudinal edge of the frame, an upper cutter for a lateral trimmer, and these stationary upper cutters cooperate with reciprocatory driven lower cutters, pressed against them resiliently.

In a known cutter head of this kind, the lower cutter for the razor part, cooperating with the perforated cutter foil, is made in one piece with the lower cutter for the lateral trimmer, so that both lower cutters can be driven together. Springs acting on this unitary part forming the lower cutters provide for pressing against the associated upper cutters. With this formation of the lower cutters in a unitary component, there can arise an unequal engagement of the lower cutters with the associated upper cutters, so either only one or the other lower cutter engages fully with the associated upper cutter. A complete engagement of the cutting surfaces of the cooperating cutters is however decisive for a good shaving or trimming operation.

These difficulties are, in accordance with the invention, overcome in a cutter head of the kind described above, while maintaining a simple total construction, in that the lower cutters for the razor part and for the lateral trimmer are formed separately from one another, and that a unitary spring bridge is provided for pressing the lower cutters against the associated upper cutters, with the middle part of which bridge there engages the driving member for the cutter drive, while this spring bridge carries at least two spring bars extending in the longitudinal direction of the lower cutters from end face to end face of the latter, advantageously of leaf spring shape, each of which engages with its opposite ends against one of the lower cutters. This has the result that each lower cutter is in itself pressed resiliently against the upper cutter associated with it, but the drive of the lower cutter nevertheless take place together. Thus by a simple structural assembly a complete engagement of the lower cutters with the upper cutters and thus also a complete shaving and trimming action is ensured.

The spring bridge is advantageously made symmetrical with respect to its longitudinal centre line, and possibly also with reference to its transverse centre line, and can consist of a piece of sheet metal with a channel-like central part for the engagement of the driving member, and spring tongues jutting out on each side of the latter, lying substantially parallel alongside one another, while each two inflected, opposite spring tongues form a spring bar. The resilient bars engaging with the one lower cutter should advantageously lie symmetrically to the resilient bars engaging the other lower cutter. In this way both lower cutters are equally pressed against their upper

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cutter and also uniformly driven, so that they perform an exactly lineal reciprocatory motion.

FIGURE 1 is an isometric in oblique view showing the principle of the support of the lower cutters, in a cutter head according to the invention;

FIGURE 1a is an exploded view of the parts of the razor of FIGURE 1;

FIGURE 1b is a cross-sectional view of the razor;

FIGURE 2 shows, in a section taken outside the central plane running in the longitudinal direction, another arrangement of lower cutter together with a driving member;

FIGURE 3 is a sectional view showing a complete cutter head, with a third arrangement; and

FIGURE 4 is a sectional view showing a cutter head as a fourth arrangement in accordance with the invention arranged to tilt on the apparatus housing.

In FIGURE 1 there is shown a lower cutter 1, which is intended to cooperate with a performed cutter foil 1a and which is curved cylindrically, and the cutting edges of which are formed by thin sheets, indicated simply by lines 2. At each of the two end faces there is provided a bar 3 for stiffening of the lower cutter. The lower cutter 4 of the lateral trimmer is formed like a rectangular frame 4'. The longitudinal parts 5 of this frame extend laterally beyond the lower cutter 1 and carry a row of cutter teeth 6. At the end faces of the frame a transverse member 7 forms in each case the connection of the two longitudinal members 5.

To press a lower cutter against the associated upper cutter it is in itself already known to provide a leaf spring extending in the latter's longitudinal direction from end face to end face, which in its central part has a channel-shaped part running transverse to the longitudinal direction, with which the driving element, e.g. an oscillatory lever, cooperates, in order to impart to the lower cutter a reciprocating working movement. If the leaf spring is brought into cooperating connection with the driving element, it is deflected perpendicularly to the lower cutter in the direction towards the upper cutter, so that it is stressed, and thus exerts a component of force on the lower cutter, by which the latter is pressed against the upper cutter. In the present construction, such a leaf spring is associated with each lower cutter, and these leaf springs are, in the neighbourhood of their central parts, connected together, so that they form a unitary spring bridge 10. In FIGURE 1 the bridge has three spring bars or leaf springs, namely two outer leaf springs 8, 8' associated with the lower cutter 1, and a middle leaf spring 9 associated with the lower cutter 4. The middle portion, which is unitary with all the leaf springs, and with which the driving member (not shown), engages, is indicated at 11. Each leaf spring is formed by two spring tongues jutting out in opposite directions from the central portion 11, e.g. the leaf spring 8 by the two spring tongues 8a and 8b. The ends of the leaf springs are fastened respectively to the end face bars 3 and the transverse members 7 at the end faces of the lower cutters. In this manner each lower cutter 1 and 4 is arranged to be resilient in itself, nevertheless the drive to both lower cutters takes place together from the central part 11 of the spring bridge.

Conveniently the spring bridge is made of a piece of spring sheet metal. If in these circumstances one wishes to make the individual spring bars with different properties, this can easily be done, e.g. by choosing the breadth or the curvature of the spring bars to be different.

FIGURE 2 shows an arrangement in which only one leaf spring 8 is associated with the lower cutter 1 and likewise only one leaf spring 9 with the lower cutter 4. In these circumstances the leaf springs 8 and 9 are arranged to left and right from the central plane running

longitudinally through the lower cutter, conveniently closely alongside this. The section taken in FIGURE 2 outside this central plane is taken through the leaf spring 8. The driving member for the lower cutter is an oscillatory lever 12, having a cylindrically formed end 13 which engages in the channel-shaped central portion 11 of the spring bridge 10 and thus transmits its swinging movement to the spring bridge and through the latter to the lower cutters 1 and 4.

In the example according to FIGURE 2, for transmission of this movement to the lower cutters, there is always only one spring end, 14 or 15 respectively, connected with the associated lower cutter for transmission of power, while the other spring end, 16 or 17 respectively, is formed only as support for the respective lower cutter. The power-transmitting connections of the two leaf springs with the associated lower cutters occur moreover at the opposite end faces of the lower cutters. In this way each spring has a possibility of performing a displacement movement in its longitudinal direction. This is important, because small undesired stresses can arise in the springs, so soon as they are brought into driving connection with the driving member and thus are stressed. In some circumstances it has also appeared desirable, if the power-transmitting connections of the ends of the leaf springs with the lower cutters are all effected at the same end face of the lower cutters. This then corresponds to an arrangement according to FIGURE 1, in which the spring ends which are not visible in this figure are formed as support for the lower cutters.

The cutter head shown in FIGURE 3 has a razor portion with perforated cutter foil 20, and two lateral trimmers, one lateral trimmer being a so-called "open lateral trimmer" 18 and the other a so-called "closed lateral trimmer" 19. The upper cutters of these lateral trimmers are, in known manner, formed by the edge zones of the perforated cutter foil 20. For this purpose, simple teeth are cut in the longitudinal edges 21 of the perforated cutter foil to form the upper cutter for the open lateral trimmer 18, while the longitudinal edge 22 is formed with an angle and the teeth are made in this angle, so that with this part a closed lateral trimmer is produced. The perforated cutter foil 20 itself is fastened to the longitudinal bars 23 and 24 of the cutter head frame 25, and in fact it is engaged, by means of openings provided in it, on pins 26 arranged on the longitudinal bars 23, 24.

The lower cutter cooperating with the perforated cutter foil is again indicated at 1, and the frame-like lower cutter of the lateral trimmers at 4, while the latter on its longitudinal sides 5 has teeth 6. Both the lower cutters are connected together by means of a spring bridge 10 with a common central portion 11, while a leaf spring 8 of this bridge provides the connection to the lower cutter of the razor part 1, and two leaf spring 9, 9', which are arranged symmetrically close to the spring 8, provide the connection to the lower cutter 4 of the lateral trimmers.

To hold the lower cutters 1, 4 in the cutter head there is provided a U-shaped stirrup 27. The side faces 28 of this stirrup have projections 29 to form catches, which cooperate with corresponding recesses in the end faces of the frame of the cutter head, and in fact on insertion of the stirrup in the cutter head frame these projections catch in the recesses and thus define the position of the stirrup. A base portion of the stirrup 27 is formed by two bars 30 and 31. The lower cutter 4 of the lateral trimmers itself has two bent-out tabs 32 and 33. The spacing of the bars 30 and 31 from one another is so chosen that these bars, on assembly of the stirrup 27 with the lower cutter from the side turned away from the perforated cutter foil, come to lie laterally adjacent to the tabs 32 and 33. In this way, the stirrup, in addition to forming the mounting of the lower cutters 1, 4 in the cutter head, also acts as a lateral guide for the lower cutter 4 of the lateral trimmers. Such a guide is particularly important, for thus the teeth 6 of the lower cutter of the lateral trimmers,

which cooperate with the upper cutters 21, 22 of the lateral trimmers, always assume an accurately defined position, and thus the spacing of the teeth tips from the upper to the lower cutters always remains the same.

In FIGURE 4 there is shown a cutter head together with an apparatus housing 34. The cutter head is in this case arranged to tilt on the apparatus housing, between the operative position and a position tilted through about 90°, in which it is shown in the figure. By this means the device can be cleaned in a simple manner. To achieve this ability to tilt, a spring tab 35 is arranged at each of the end faces of the apparatus housing, which carries a stub shaft 36, which extends into a corresponding opening in the end face of the cutter head frame 25. To connect the cutter head with the apparatus housing, these spring tabs are bent away from one another and the cutter head is fitted onto the stub axes. On the opposite end faces of the apparatus housing there are provided further spring tabs 35', each of which carries a projection 37. These projections 37 form together with depressions, not shown, in the opposite end faces of the cutter head frame, a catch device, which holds the cutter head in its position of use.

The cutter head itself also consists of a cutter head frame 25, onto longitudinal bars 23 and 24 of which the perforated cutter foil 20 is fastened by means of pins 26. The lower cutter 1 cooperates with this perforated cutter foil. The cutter head according to FIGURE 4 has only one open lateral trimmer 38. The upper cutter of this lateral trimmer is formed by a ledge 39 jutting out laterally from the longitudinal bar 23, in which cutter teeth 40 are made. The cutting surface 41 of the upper cutter then travels in the base plane 42 of the cutter head frame, so that it can simply be made by grinding of the base plane. The lower cutter 4 of the lateral trimmer is also made frame-like. On one longitudinal frame side it carries the teeth 6 which cooperate with the upper cutter, and on the other longitudinal side an upstanding flange 43, which forms a sliding edge, with which the lower cutter likewise abuts the cutter head frame, in particular on the longitudinal bar 24. The surfaces mentioned on the lower cutter of the lateral trimmer are likewise made in a simple manner by grinding, so that, seen as a whole, an entirely full engagement of the lower cutter with the upper cutter occurs. The connection between the lower cutter 1 of the razor part and the lower cutter 4 of the lateral trimmer is again formed by a resilient bridge 10, having a leaf spring 9 connected with the lower cutter of the lateral trimmer and two leaf springs 8 and 8' connected with the lower cutter 1 of the razor part, and also a common channel-shaped central portion 11.

The cutter head construction described above is particularly advantageous, because, compared with the construction according to FIGURE 3, a total separation exists between the perforated cutter foil and the upper cutter of the lateral trimmer. Thus any interacting influence of these cutter parts via the upper cutters is also avoided. Further, the fact that the lower cutter of the lateral trimmer solely engages with a massive component, namely the cutter head frame, leads to a satisfactory cooperation of the upper and lower cutter of the lateral trimmer. In this way a very good cutting action results in both cutter parts. Nevertheless, the total construction is, however, simple, because the drive of the lower cutters takes place in common.

In FIGURE 4 there is also visible the driving member for the lower cutters in the form of an oscillating lever 12. Its cylindrical portion 13 remains, both in operating position, and also in the tilted position of the cutter head as shown, in engagement with the channel-shaped central portion 11 of the resilient bridge 10. Thus, on return tilting of the cutter head into the operating position, no additional manipulations are necessary, in order to bring the oscillating lever and the spring bridge into operative connection, because this connection is indeed never broken; such a breaking of the driving connection only first occurs,

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if the cutter head is taken entirely off the apparatus housing, an occurrence which however is extremely seldom necessary. In the operating position of the cutter head, the part 13 is in operative connection with the central region of the channel-shaped middle portion 11 of the spring bridge, so that the driving force operates symmetrically or

equally on the leaf springs 8, 8' and 9. To retain the lower cutters in the cutter head frame, there is a stirrup 44, which can be introduced into the concavity of the lower cutter 1, and after insertion of the lower cutter into the cutter head frame can be fixed to the end faces of the cutter head frame by means of catch devices arranged laterally on it.

Naturally a variety of departures from the described constructional examples are possible, without leaving the scope of the invention. For example, the cutter head according to FIGURE 4 could also be made with two open lateral trimmers, or the form of the spring bars could be altered in various ways.

We claim:

1. A cutter head for dry shaving apparatus including a razor part and a lateral trimmer, said part and trimmer each comprising a stationary upper cutter and reciprocatory lower cutters, the upper cutter of the razor part being a perforated cutter foil, and the lower cutters being components separate from one another, a frame supporting both said cutters, and a unitary spring bridge adapted to press both said lower cutters upwards against the respective upper cutter and to transmit reciprocatory motion to the lower cutters, said spring bridge comprising a middle part adapted to receive a reciprocatory drive and three spring bars each of which extends longitudinally from end to end of the lower cutters, one of said bars being connected to one of said lower cutters and the other two of said bars being connected to the other of said lower cutters.

2. A cutter head according to claim 1, in which said spring bridge is a piece of sheet metal, said middle part is a transverse channel in said sheet metal, and each of said spring bars is constituted by two tongues of said sheet metal, extending in opposite directions from said middle part.

3. A cutter head according to claim 1, in which a first end of each of said spring bars is attached to a respective one of said lower cutters in a manner to transmit reciprocatory motion while a second, opposite, end of each of said bars imparts only pressing force to a respective lower cutter.

4. A cutter head according to claim 1, in which said first ends of said bars are all adjacent the same end of said head.

5. A cutter head according to claim 1, including a U-shaped stirrup having side surfaces and a base constituted by two bars which engage beneath the lower cutter of said lateral trimmer, means releasably latching said side surfaces to said frame, and means on said lower cutter of said lateral trimmer locating said bars laterally.

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MYRON C. KRUSE, Primary Examiner

U.S. Cl. X.R.

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