

Jan. 6, 1970

N. C. WELSH

3,488,764

SAFETY RAZORS

Filed Dec. 1, 1967

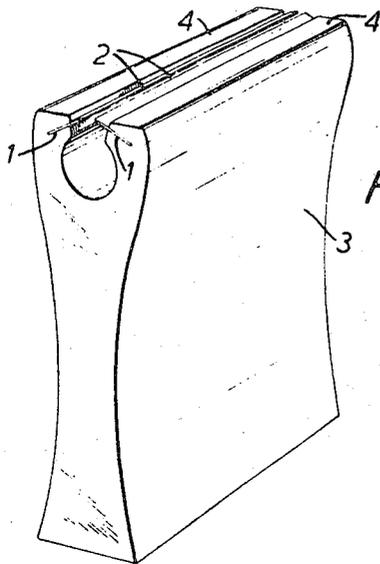


FIG. 1.

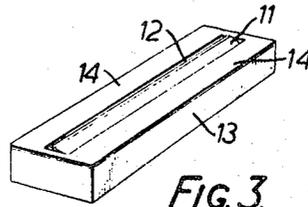


FIG. 3.

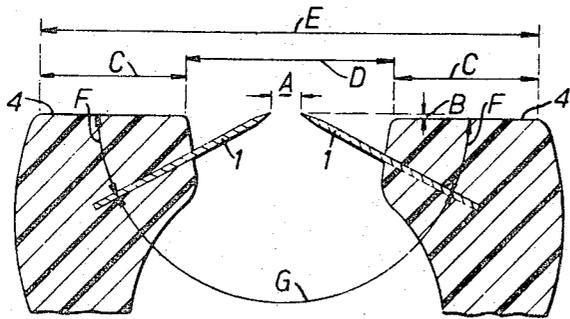


FIG. 2.

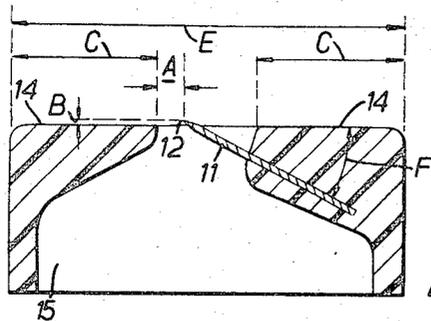


FIG. 4.

Norman C. Welsh  
INVENTOR

BY *Philip Colman &  
Creston J. Brazell*  
ATTORNEYS

1

2

3,488,764

**SAFETY RAZORS**

Norman C. Welsh, Bradfield, England, assignor to The Gillette Company, Boston, Mass., a corporation of Delaware

Filed Dec. 1, 1967, Ser. No. 687,185

Claims priority, application Great Britain, Dec. 8, 1966, 54,934/66

Int. Cl. B26b 21/08

U.S. Cl. 30—50

4 Claims

**ABSTRACT OF THE DISCLOSURE**

A safety razor wherein the head include two shoulders spaced apart from one another and in the gap between the shoulders extends the cutting edge of at least one razor blade, the blade being disposed at an arcuate angle to the plane of the shoulders, the head providing a guard support for the skin which extends parallel to the cutting edge. Alternatively, the head may comprise two oppositely disposed blades, the cutting edge of each blade constituting the guard support for the other blade, allowing shaving to be effected by to and fro movement. The blade or blades may be removably clamped in a suitable holder or they may be moulded into a disposable unit which constitutes a complete razor head or a complete razor.

This invention relates to safety razors and has for its general object the design of a razor head which is inherently safer than any conventional safety razor. The increased safety of razor heads in accordance with the invention may be exhibited in practice either by a reduction in the frequency or severity of damage to the skin when shaving, or by increased closeness of shave without any increase in the chance of cutting the skin, or by a combination of these two improvements.

The improved inherent safety of the new razor heads results from a reduction of the pressure between the skin and the cutting edge of the blade while shaving is taking place. This in turn is dependent upon several features of the head design.

One such feature is the provision of a guard support for the skin at a position only a very few hundredths of an inch in advance of the cutting edge, thereby minimizing the bulging of the skin into the gap between the cutting edge and the guard ahead of it.

A second such feature is the position and effective width of those surfaces of the razor head (herein referred to as "shoulders") which engage the skin on either side of the blade edge and in conjunction with the above mentioned guard serve to support the skin. The "effective width" of each shoulder is the width (measured perpendicular to the blade edges) over which the shoulder makes contact with the skin when the razor head is pressed against the face with ordinary force. The shoulders may be flat and coplanar (in which case the effective width is the same as the actual width), but it is also possible to employ shoulders having a convex surface, provided that the curvature is not so sharp as to reduce the effective width below the acceptable minimum. Where the shoulders are not flat and coplanar, "the plane of the shoulders" means the plane tangent to both shoulders.

In the razor heads of the present invention the guard closely adjacent the cutting edge may be constituted by the parallel cutting edge of a second oppositely disposed blade, so that shaving can be effected by moving the razor head forwards and backwards over the skin, each cutting edge in turn forming a guard for the other cutting edge. However, there may be only a single blade and the guard may then be constituted by the adjacent edge of the shoulder ahead of the blade.

A third feature is the exposure of the cutting edge or edges. By the "exposure" of a cutting edge there is meant the distance (measured perpendicular to the plane of the shoulders) from the cutting edge to that plane, the exposure being considered positive when the edge is on the outer (skin) side of that plane and negative when the edge is further from the skin than that plane. To obtain increased safety it is necessary to keep the exposure of the cutting edge within certain limits and where two blades are used it is also necessary to ensure that the two edges have the same exposure, or exposures which differ only by a very small amount.

A fourth feature is the angle of the blade to the plane of the shoulders.

These features of the design of the razor head are to some extent interdependent and the precise limits within which one parameter must be maintained in order to obtain increased safety in use are dependent upon the dimensions of the other parameters.

In the razor heads of the present invention the width of the gap between the cutting edge and the guard ahead of it is at least 0.015 inch, to allow easy entry of hairs into the gap, and does not in any case exceed 0.045 inch. The exposure (as above defined) which can be given to the cutting edge is closely dependent upon the width of the gap. The wider the gap, the lower are the limits of the permissible range of exposure between an excessive exposure that results in losing the extra safety of the system and an insufficient exposure that results in loss of shaving effectiveness. With a gap of 0.020 inch the exposure may be from as much as +0.004 inch down to as little as -0.001 inch. With a gap of 0.030 inch the permissible range of exposure is from +0.002 inch to -0.003 inch and with a gap of 0.040 inch, the exposure is between +0.001 inch and -0.004 inch. The use of negative exposure has the additional advantage of reducing the risk of damage to the cutting edges by accidental contact with hard objects.

Ideally, the exposure should be constant along the length of the cutting edge and where two cutting edges are used the exposures of the two edges should be exactly equal, but such precise uniformity is difficult to obtain in practice. Differences of up to about 0.002 inch between the exposures of different parts of the same cutting edge can be tolerated, the average exposure being maintained within the limits specified above. With two opposed cutting edges, the tolerable difference between the exposures of those parts of the two cutting edges which lie directly opposite one another is to some extent dependent upon the width of the gap between them. With a gap of 0.020 inch, this difference should not exceed 0.001 inch, but with a gap of 0.030 inch or more, differences of up to 0.003 inch can be tolerated.

The smaller the effective width of the shoulders the less is the safety, since a larger proportion of the load applied by the user is taken by the cutting edges. Wide

3

shoulders not only take a larger proportion of the load but also assist the user to position the razor head correctly on the skin. In the razors of the present invention each shoulder has an effective width of not less than  $\frac{1}{16}$  inch. The upper limit of the width of the shoulders is determined by the necessity for permitting easy access of the razor to difficult parts of the face, for example under the nose, and for this reason the aggregate of the effective widths of the two shoulders and of the width of the gap between shoulder not be more than  $\frac{1}{2}$  inch.

The angle at which the blade, or each blade, is inclined to the plane of the shoulders is preferably about  $27^\circ$  (so that when two blades are used the angle between their planes is approximately  $126^\circ$ ), but angles in the range  $22^\circ$  to  $32^\circ$  can be used.

Accordingly, a safety razor head in accordance with the present invention presents for engagement with the skin to be shaved two shoulders spaced apart from one another and in the gap between the shoulders the cutting edge of at least one razor blade, the effective width of each shoulder being at least  $\frac{1}{16}$  inch and the aggregate of the effective width of the two shoulders and of the width of the gap between them being at most  $\frac{1}{2}$  inch, the blade being disposed at an angle to the plane of the shoulders of from  $22^\circ$  to  $32^\circ$ , the head providing a guard support for the skin which extends parallel to the cutting edge and is spaced from it by a distance of from 0.015 to 0.045 inch, and the cutting edge of the blade having an exposure relative to the plane of the shoulders of from  $+0.004$  to  $-0.004$  inch, depending upon the width of the gap between cutting edge and the guard support.

As stated above, the head may comprise only a single razor blade, in which case the guard support is constituted by the edge of the shoulder ahead of the cutting edge of the blade, or it may comprise two oppositely arranged blades (each set at the specified angle and with the specified extent of exposure), in which case the guard support for each blade is constituted by the cutting edge of the other blade.

Safety razor heads\* in accordance with the invention may be constituted by renewable blades, or a renewable blade assembly, removably secured in an appropriate holder and the specification of patent application No. 648,184 describes blade assemblies which can form part of a double bladed razor head in accordance with the present invention. However, the invention also includes constructions in which the blade or blades are permanently secured in a unit which provides the required shoulders and constitutes a complete razor head, or even a complete razor, the whole unit being discarded and replaced when the blades have become blunted by use. A double bladed unit of this character, constituting a complete safety razor and a single bladed unit constituting a complete razor head are shown by way of example in the accompanying drawing, in which:

FIGURE 1 is a perspective view of a complete razor;

FIGURE 2 is an enlarged cross section through the head of this razor, indicating dimensions which are important to the attainment of increased safety;

FIGURE 3 is a perspective view of a single bladed razor head unit, and

FIGURE 4 is a cross sectional view (corresponding to FIGURE 2) of the unit shown in FIGURE 3.

The razor of FIGURES 1 and 2 comprises two similar blades 1, each some  $1\frac{1}{2}$  inches in length and some  $\frac{1}{8}$  inch in width, each sharpened along one longitudinal edge to a cutting edge 2. The blades are disposed with their cutting edges parallel and facing one another, the unsharpened longitudinal edges of the blades being permanently secured in a unitary moulding 3 of a suitable synthetic resin "plastics" material, shaped to afford a convenient hand grip, a pair of substantially flat, coplanar shoulders 4 on the two sides of the cutting edges, and an open ended channel 5 behind the cutting edges, serv-

4

ing to receive shaving debris and to allow easy rinsing of the blades.

The gap between the cutting edges of the blades (dimension A) is 0.020 inch. The exposure of each of the cutting edges beyond the plane of the shoulders 4 (dimension B) is 0.001 inch. The width of each shoulder 4 (dimension C), is  $\frac{3}{32}$  inch and the width of the gap between them (dimension D) is  $\frac{1}{8}$  inch, so that the overall width of the head (dimension E) is  $\frac{1}{16}$  inch. The angle between the plane of each blade and the plane of the shoulders 4 (dimension F) is  $27^\circ$ , so that the angle between the blades (dimension G) is  $126^\circ$ .

The razor head unit of FIGURES 3 and 4 could be used alone as a shaving instrument, but is intended to be held removably in a handle of any convenient construction, to allow easier manipulation. A single blade 11 measuring  $1\frac{1}{2}$  inch by  $\frac{1}{8}$  inch has a cutting edge 12 and has its unsharpened edge permanently secured in a synthetic resin plastic moulding 13 in the form of a shallow box, open at the bottom whose top provides a pair of shoulders 14 with a slot between them in which the cutting edge of the blade is located. The interior 15 of the box serves to receive shaving debris, the handle being preferably so constructed that the bottom of the box is left at least partly open to allow removal of such debris. The dimensions A, B, C and F are as given above, while dimension E is  $\frac{1}{4}$  inch.

It will be understood that details of these particular designs are given by way of example only and that each of the dimensions may be varied within the limits indicated above.

A razor head unit of the box-like form shown in FIGURES 3 and 4 (having either a single blade, as shown in those figures, or two opposed blades arranged as shown in FIGURES 1 and 2) may be secured removably to a handle in many different ways. For example, the handle may comprise a pair of jaws adapted to engage the outer surfaces of the two side walls of the box, one jaw at least being of spring construction so that the jaws tend to close together to resiliently grip the box, but can be forced apart to allow removal of the box unit and insertion of a fresh unit. The jaws may engage the end walls instead of the side walls of the box. Instead of being sprung inwardly against the outer surfaces of the box walls, the jaws may engage within the box and be sprung outwardly against the inner surfaces of the walls, the jaws being pressed together when the head unit is to be replaced. The jaws may be arranged to hold the head unit in any position and at any angle relative to the part of the handle which is to be grasped by the user. Such a razor head unit can also be secured permanently to a handle to form a disposable razor, for example by cementing it to a projection on the handle shaped to fit within the box.

I claim:

1. A safety razor head which presents for engagement with the skin to be shaved two shoulders spaced apart from one another and in a gap between the shoulders a cutting edge of at least one razor blade, the effective width of each shoulder being at least  $\frac{1}{16}$  inch and the aggregate of the effective width of the two shoulders and of the width of the gap between them being at most  $\frac{1}{2}$  inch, the blade being disposed at an angle to the plane of the shoulders of from  $22^\circ$  to  $32^\circ$ , the head providing a guard support for the skin which extends parallel to the cutting edge and is spaced from it by a distance of from 0.015 to 0.045 inch, and the cutting edge of the blade having an exposure relative to the plane of the shoulders of from  $+0.004$  to  $-0.004$  inch depending upon the width of the gap between the cutting edge and the guard support.

2. A safety razor head in accordance with claim 1, which comprises only a single blade, the said guard support being constituted by an edge of the shoulder in front of the cutting edge of the blade.

5

3. A safety razor head in accordance with claim 1, which comprises in the gap between the shoulders two oppositely arranged blades, the cutting edge of each blade constituting the guard support for the other blade, each blade being set at the specified angle and with the specified extent of exposure, the exposures of parts of the two cutting edges lying directly opposite to one another not differing by more than 0.003 inch.

4. A safety razor head in accordance with claim 1 in which the blade is permanently secured in a unit which provides the shoulders and constitutes a complete razor head.

6

## References Cited

## UNITED STATES PATENTS

1,383,783	7/1921	Billingsley	-----	30—50
1,418,191	5/1922	McGarvey	-----	30—50

ROBERT C. RIORDON, Primary Examiner

G. F. GRAFEL, Assistant Examiner

U.S. Cl. X.R.

30—32, 51