

PATENT SPECIFICATION

(11)

1 362 443

1 362 443

- (21) Application No. 11849/73 (22) Filed 14 March 1972
 (62) Divided out of No. 1 362 441
 (31) Convention Application No. 176 547 (32) Filed 31 Aug. 1971 in
 (33) United States of America (US)
 (44) Complete Specification published 7 August 1974
 (51) International Classification B26B 21/54 // 21/22 21/52
 (52) Index at acceptance
 B4B 33D1 33E 34F

(19)



(54) RAZOR BLADE UNIT

(71) We, THE GILLETTE COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, of Prudential Tower Building, Boston, Massachusetts, United States of America, 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:—

This invention relates to shaving systems and more particularly to a blade unit for a shaving system, the blade unit being of the type having a blade element permanently secured in predetermined geometrical relationship to a guard element.

It is an object of this invention to provide a new and improved blade unit for a shaving system. A variety of shaving systems have been proposed, the principal arrangements presently being used including systems in which a single or double edged razor blade is inserted into a holder by the user, and systems employing a cartridge which holds a length of band blade with successive shaving lengths being advanced by the user. Other proposed systems employ a body member that defines a guard structure with a razor blade permanently secured to the body member to provide a fixed geometrical relationship between the guard surface and the cutting edge. A more specific object of this invention is to provide an improved blade unit component of that type which, when coupled to a handle component, provides a balanced, sturdy, compact shaving system that is easy to manipulate and provides efficient and effective shaving.

Shavers frequently prefer a shaving system having a handle component of relatively long life which is used with replaceable blade units. When a blade unit is no longer fit for

use, the blade unit may be discarded or returned to a portion of a dispensing device designed to receive used blade units and another blade unit is attached to the handle component. Accordingly, another object of this invention is to provide an improved blade unit that has coupling structure which facilitates the attachment of the blade unit to a handle member.

A further object of the invention is to provide an improved blade unit which may be economically manufactured and easily and reliably attached to a handle member.

In accordance with the invention there is provided a razor blade unit having elongated leading and following blades with means along the length of the blades for supporting the cutting edges thereof in spaced parallel relation to one another and a guard surface disposed forwardly of the cutting edge of the leading blade to provide (as herein defined) a leading edge tangent angle in the range of 20-32° and a span (S_L) in the range of 0.030-0.080 inch, the cutting edge of the following blade being rearwardly offset from the leading cutting edge to define a span (S_F) of similar extent, and each cutting edge having an exposure from -0.002 inch to +0.004 inch.

The invention also resides in a blade unit comprising elongated planar leading and following blades and means along the length of the blades for permanently supporting them in fixed spaced parallel relation to one another between cap and base members of the unit, and a guard surface on the base member disposed forwardly of the cutting edge of the leading blade to provide (as herein defined) a leading edge tangent angle in the range of 20-32° and a span (S_L) in the range of 0.03-0.08 inch, the cutting edge of the following blade being rearwardly offset from the leading cutting edge to provide a span (S_F) of 90

SPECIFICATION AMENDED - SEE ATTACHED SLIP



similar extent, and each cutting edge having an exposure in the range of -0.002 to $+0.004$ inch.

In particular embodiments of the blade units, the coupling structure for coupling the blade units to razor handles, comprises recesses the bottom surfaces of which face toward one another and are spaced apart more than one half of either the width or depth of the unit, e.g., about 0.28 inch, and each said recess has a width of about 0.03 inch. Each recess is defined in part by an inwardly extending flange portion at the bottom of the body portion and in one embodiment a notch is formed in one of the flange portions for engagement with latch structure carried by the handle member to inhibit transverse movement of the blade unit on the handle member. In another embodiment, transverse movement is inhibited by a rib formed in the blade unit body. The coupling structure in such particular embodiments defines a plane and a planar blade element is disposed in the body portion at an angle in the range of about $20-45^\circ$ to that plane. In preferred embodiments, the body portion of the blade unit includes a molded plastic base member and a molded plastic cap member permanently connected together with the blade element disposed therebetween. The coupling structure is at the bottom of the base member and its width is more than one half the width dimension or the depth dimension of the blade unit. The blade unit may have a single blade member or a plurality of blade members.

A blade unit in accordance with the invention is a compact member that has surfaces which define a predetermined shaving geometry and that is easily secured on a cooperating handle member to provide a relatively light and yet sturdy and balanced shaving implement which is convenient to use and which facilitates shaving of relatively inaccessible areas.

In order that the invention may be clearly understood and readily carried into effect, it will now be described more particularly, in conjunction with the accompanying drawings in which:

Fig. 1 is a side view of a shaving system incorporating a blade unit in accordance with the invention;

Fig. 2 is a perspective view of the shaving system shown in Fig. 1;

Fig. 3 is a bottom view of the blade unit employed in the shaving system shown in Figs. 1 and 2;

Fig. 4 is a sectional view taken along the line 4-4 of Fig. 3;

Fig. 4A is an exploded perspective view of components of the blade unit employed in the razor assembly as shown in Figs. 1, 3 and 4;

Fig. 4B is an enlarged view of a portion of the blade unit of Figs. 3, 4 and 4A, and illustrates certain geometric relationships.

The shaving system shown in Figs. 1 and 2 includes a handle component 10 and a blade unit component 12. The handle component includes a grip portion 14 that is $4\frac{1}{4}$ inches long and of generally square cross-sectional configuration with a slight taper along its axial length. Grooves 16 along a portion of the length of grip 14 facilitates its handling by the user. At the upper end of the grip portion 14 is a neck portion 18 which extends forwardly and upwardly from the upper end of grip portion 14 at an angle of 120° to the axis of grip portion 14 so that the end surface of neck portion 18 is offset a distance A of 0.27 inch from the axis of the grip portion. Secured to the end surface of neck portion 18 is a transversely extending support head 20 that has two outwardly directed flange or rail portions 22, the upper surfaces of which define a reference plane 24 that is perpendicular to the axis of neck portion 18. Reference plane 24 is spaced a distance B of 0.55 inch from the junction of neck portion 18 and grip portion 14 and a distance C of 0.195 inch above the end surface of neck portion 18. Two laterally extending slots 26 are formed in the base of support head 20, one on either side of the point of attachment to neck portion 18. A spring plate 28 functions as a resilient latch member and cooperates with the forward rail 22 of the support head 20 to secure the blade unit 12 on the handle 10.

The cooperating blade unit 12 has a transverse length of 1.56 inch, a width D of 0.426 inch and a depth E of 0.230 inch includes a base or platform member 30 molded of high impact polystyrene on which are supported two blade elements 32, 34 and an interposed spacer member 36 so that the shaving edges of the blade elements are maintained in spaced, parallel offset relation. Cap member 38, also molded of high impact polystyrene, has depending pins 40 (Fig. 4) which extend through apertures in the blades, spacer and base and are cold headed to secure the blade elements and spacer member to the base member 30.

The base member 30 defines an upper platform surface 42 on which the leading blade member 32 rests and includes a front wall portion 44 and a rear wall portion 46. Five webs 48 extend between the front and rear wall portions 44, 46 and the lower surfaces 50 of these webs define a plane that is disposed at an angle of 35° to the platform surface 42. Apertures 52 are aligned with apertures in blade 32 and

w of a portion
3, 4, 1 4A,
metric relation-

vn in Figs. 1 70
ponent 10 and
The har
portion
d of generally
uration with a 75
ngth. Grooves
gth of grip 14
user. At the
14 is a neck
orwardly and 80
of grip por-
to the axis of
end surface
a distance A
of the grip 85
t surface of
rsely extend-
as two out-
portions 22,
define a 90
perpendicular
8. Reference
B of 0.55
portion 18
stance C of 95
ace of neck
ending slots
upport head
point of
A spring 100
ment latch
to forward
to secure
10.
12 has a 105
a width D
0.230 inch
member 30
tyrene on
lements 32, 110
member 36
blade ele-
38, also
115
h extend
s, spacer
to secure
member to
120
an upper
leading
a front
portion
the front 125
a plane
5° to the
52 are
32 and 130

permit shaving debris to flow through base 30 away from the shaving zone. Extending downwardly perpendicularly away from surface 50 are two spaced wall extensions 54, each of which has at its lower end an inturned flange 56 that projects inwardly 0.018 inch to define a recess in the form of slot 58 that has a height of 0.026 inch. The space between flanges 56 is 0.244 inch. Notch 60 in front flange 56 has a width of 0.04 inch and a depth of 0.04 inch.

Web extensions 62 on the forward side of wall 44 support a transversely extending guard structure 64 that has a surface spaced 0.23 inch above surface 50 (dimension E — Fig. 1) and when the blade unit 12 is attached to the handle unit 10, that surface is offset 0.6 inch from the front surface of the upper end of the grip portion 14 (dimension F in Fig. 1).

Additional details of the blade unit 12 may be seen with reference to the exploded view of Fig. 4A. The base member 30 includes a planar support surface 50a in which are formed a series of four securing apertures 52a and a series of four drain slots 52. There is an upwardly extending vertical surface 56a at the rear of platform 50 in which are disposed two recesses 58a and a downwardly extending vertical surface 60a at the front of platform 50a. A recess 62a is formed at either end of platform 50a and end wall structures 48 extend downwardly and forwardly from either end of platform surface 50a. Guard structure 64 extends between the forward extending portions of the end walls 48 and in spaced relation 40 from front wall 60a of base 30. Spaced webs 48, which extend forwardly from wall 60a to the guard member 64, increase the rigidity of that guard member and define drain recesses between surface 60a and the guard. At either end of the guard member is an upwardly projecting vertical reference surface 68. Extending downwardly from the lower end of the base member 30 at the front and rear thereof are projections which include the inwardly extending flanges 56 at their outer ends that define with the lower surface of the base two parallel opposed grooves which are adapted to receive the rails 22 of the handle component to secure the blade unit 12 to that handle. Spring plate 28 engages a notch in the forward flange 56 to latch the blade unit against transverse movement.

Each blade element 32, 34 has parallel front and rear edges, the front edge of each blade element being sharpened to define a cutting edge 80a. Formed in each blade member are series of four axially extending slots 82a and four irregularly

shaped apertures 84. The forward edges 86a of apertures 84a are straight and of the same length as slots 82a while the rear edges 88a of apertures 84a have a curvature corresponding to the curvature of the securing apertures 52a in base member 30.

Spacer 36, interposed between the blade elements, has a length of 1-1/2 inches, a width of 0.24 inch and a thickness of 0.020 inch. Formed in the forward edge of spacer 40 are a series of recesses 98a, each of which is 0.080 inch deep and 1/8 inch long. These recesses define a series of spaced forwardly directed fingers 100a each of which is 0.056 inch in width. Each of the fingers 100a culminates in an 0.020 inch wide tip 102a which is defined by inclined surfaces 104a, 106a which extend rearwardly and outwardly towards the main body of the spacer member 36 and also are inclined vertically so that the top surface 108a of each finger is smaller than the corresponding bottom surface of that finger. The spacer is further provided with holes 110a that are alignable with the holes 52a at the base member and the holes 84a in the blade elements. Recesses 112a in the rear edge of the spacer 36 are alignable with the recesses 58a in the base member.

Cap member 38 molded of high impact polystyrene includes a transversely extending portion 118a disposed between end wall portions 120a, 122a. Pins 40 extend downwardly from the transversely extending portion 118a and are alignable with the holes 52a, 84a and 110a in the base, blades and spacer members, respectively. The pins are hollow at their free ends to facilitate cold heading. The top surface 126a of portion 118a is inclined at an angle of 73° to the axis of pins 40 and the top surfaces of end walls 120a, 122a project above surface 126a and are inclined at an angle of 70° to the axes of pins 40. The end walls 120a, 122a also extend beyond the forward edge of the cap surface 126a and each includes an exterior vertical reference surface 130a that is adapted to engage the reference surface 68 on base member 30 and interior vertical reference surfaces 134a and 136a which are used for locating the blade members 32, 34 relative to one another and to the guard structure 64 in the assembled blade unit. An elongated recess 138a defined by transverse portion 118a and the end wall portions 120a, 122a receives the wall surface 56a of the base member 30.

In assembly, the base 30, blade elements 32, 34, spacer 36 and cap member 38 are disposed in aligned relation with pins 40 extending through the corresponding holes 52a, 84a and 110a. The components are loosely held in stacked relation under light

pressure and suitable means such as a jet of air or a mechanical tool applies force through the openings defined by recesses 58a and cooperating portions of cap 38 to urge the two blade members 32, 34 forwardly against stop surfaces 134a, 136a, respectively. The assembly is then clamped firmly together and the free ends of the pins 40 are expanded in a cold heading operation to secure the components of the blade unit firmly together.

In the assembled blade unit, as indicated in Fig. 4B, the cutting edge 80a of the leading blade 32 extends over the recesses between forward wall 60a and the guard member 64, while the cutting edge 80a of the following blade 34 is located above the recesses 98a between fingers 100a of spacer 36 so that paths are provided for communication through the slots 82a and the forward ends of apertures 84a in the leading blade 32 and the slots 54a in the base member 30. These passages facilitate the flow away from the shaving zone of lather and debris resulting from the shaving operation.

Features of the geometry in the blade unit of Figs. 3, 4 and 4A are illustrated in Fig. 4B. With reference to that Figure, a first reference line 150a extends from the cutting edge 68 of following blade 34 to a tangent point 152a on guard 64 and the perpendicular distance E_L that the cutting edge 66 of the leading blade 32 projects beyond that line is the "exposure" of that blade. A similar reference line 154a extends from the cutting edge 66 of the leading blade 32 to a tangent point 156a on surface of cap 38 and the perpendicular distance E_F that the cutting edge 68 of the following blade 34 projects beyond from that line is the "exposure" of the following blade. Another relationship useful in defining shaving geometry is "blade tangent angle", which for leading blade 32 is the angle A_L between line 158a (a reference line which bisects the included angle of the cutting edge 66 of the leading blade 32) and the line 160a that extends from cutting edge 66 of blade 32 to the tangent point on guard member 64 (the latter point being slightly offset from point 152a). Preferably in the blade units of the invention, the line 160a will be at an angle of 30 to 50° to the axis of the grip portion a razor handle when the unit is secured to a razor handle. A further relationship of interest is "span", the distance between the cutting edge and a support point forward of that blade. Span for the leading cutting edge 66 is denominated S_L and is the distance between edge 66 and the tangent point on guard 64 while the span S_F for the trailing blade 34 is the distance between its

sharpened edge 68 and the sharpened edge 66 of the leading blade 32.

The blade unit in Fig. 4B has a blade tangent angle A_L for leading blade 32 of 26°, a blade tangent angle A_F for following blade 34 of 22°50'; exposures E_L and E_F each of 0.0015 inch; S_L of 0.059 inch; and S_F of about 0.062 inch.

It will be understood that the system may take many forms other than that of the particular above-described embodiment. For example, in alternative constructions more than two blades may be provided. Also, the plane of one or more of the following blades may be set at a different angle than the leading blade. The blade unit geometry may be used with various handle configurations. While there are advantages to the replaceable blade unit feature, it will be apparent that the shaving system may be incorporated in a device in which the handle is integral with the blade unit.

In our application no. 11842/72 (Serial No. 1 362 441), we describe and claim a razor blade unit comprising one or more elongated blades permanently mounted in fixed relation to a guard portion of the unit, and elongated coupling elements along the length of the unit spaced from each other to such an extent that one element is generally coextensive with one longitudinal margin of the area of the unit occupied by the blade or blades and the other element is generally coextensive with the other longitudinal margin of said area, said elements being adapted to cooperate with complemental coupling elements on a razor handle for securing the blade unit on the handle.

In our Application no. 11848/73 (Serial No. 1 362 442), we describe and claim a razor blade unit comprising two elongated blades permanently mounted in fixed superposed parallel position between cap and base members and with a spacer member between the blades, said spacer having transversely spaced fingers extending forwardly in the direction of the cutting edges of the blades which edges are parallel and face in the same direction to permit simultaneous hair cutting engagement, and aligning abutment surfaces adapted to be engaged by the cutting edges of the blades, the spaces between the fingers of the spacer member providing access to passages through the blade unit and extending to the exterior thereof.

WHAT WE CLAIM IS:—

1. A razor blade unit having elongated leading and following blades with means along the length of the blades for supporting the cutting edges thereof in spaced parallel relation to one another and a

pressure and suitable means such as a jet of air or a mechanical tool applies force through the openings defined by recesses 58a and cooperating portions of cap 38 to urge the two blade members 32, 34 forwardly against stop surfaces 134a, 136a, respectively. The assembly is then clamped firmly together and the free ends of the pins 40 are expanded in a cold heading operation to secure the components of the blade unit firmly together.

In the assembled blade unit, as indicated in Fig. 4B, the cutting edge 80a of the leading blade 32 extends over the recesses 15 between forward wall 60a and the guard member 64, while the cutting edge 80a of the following blade 34 is located above the recesses 98a between fingers 100a of spacer 36 so that paths are provided for communication through the slots 82a and the forward ends of apertures 84a in the leading blade 32 and the slots 54a in the base member 30. These passages facilitate the flow away from the shaving zone of lather and debris resulting from the shaving operation.

Features of the geometry in the blade unit of Figs. 3, 4 and 4A are illustrated in Fig. 4B. With reference to that Figure, a first reference line 150a extends from the cutting edge 68 of following blade 34 to a tangent point 152a on guard 64 and the perpendicular distance E_L that the cutting edge 66 of the leading blade 32 projects beyond that line is the "exposure" of that blade. A similar reference line 154a extends from the cutting edge 66 of the leading blade 32 to a tangent point 156a on surface of cap 38 and the perpendicular distance E_F that the cutting edge 68 of the following blade 34 projects beyond from that line is the "exposure" of the following blade. Another relationship useful in defining shaving geometry is "blade tangent angle", which for leading blade 32 is the angle A_L between line 158a (a reference line which bisects the included angle of the cutting edge 66 of the leading blade 32) and the line 160a that extends from cutting edge 66 of blade 32 to the tangent point on guard member 64 (the latter point being slightly offset from point 152a). Preferably in the blade units of the invention, the line 160a will be at an angle of 30 to 50° to the axis of the grip portion a razor handle when the unit is secured to a razor handle. A further relationship of interest is "span", the distance between the cutting edge and a support point forward of that blade. Span for the leading cutting edge 66 is denominated S_L and is the distance between edge 66 and the tangent point on guard 64 while the span S_F for the trailing blade 34 is the distance between its

sharpened edge 68 and the sharpened edge 66 of the leading blade 32.

The blade unit in Fig. 4B has a blade tangent angle A_L for leading blade 32 of 26°, a blade tangent angle A_F for following blade 34 of 22°50'; exposures E_L and E_F each of 0.0015 inch; S_L of 0.059 inch; and S_F of about 0.062 inch.

It will be understood that the system may take many forms other than that of the particular above-described embodiment. For example, in alternative constructions more than two blades may be provided. Also, the plane of one or more of the following blades may be set at a different angle than the leading blade. The blade unit geometry may be used with various handle configurations. While there are advantages to the replaceable blade unit feature, it will be apparent that the shaving system may be incorporated in a device in which the handle is integral with the blade unit.

In our application no. 11842/72 (Serial No. 1362 441), we describe and claim a razor blade unit comprising one or more elongated blades permanently mounted in fixed relation to a guard portion of the unit, and elongated coupling elements along the length of the unit spaced from each other to such an extent that one element is generally coextensive with one longitudinal margin of the area of the unit occupied by the blade or blades and the other element is generally coextensive with the other longitudinal margin of said area, said elements being adapted to cooperate with complementary coupling elements on a razor handle for securing the blade unit on the handle.

In our Application no. 11848/73 (Serial No. 1362 442), we describe and claim a razor blade unit comprising two elongated blades permanently mounted in fixed superposed parallel position between cap and base members and with a spacer member between the blades, said spacer having transversely spaced fingers extending forwardly in the direction of the cutting edges of the blades which edges are parallel and face in the same direction to permit simultaneous hair cutting engagement, and aligning abutment surfaces adapted to be engaged by the cutting edges of the blades, the spaces between the fingers of the spacer member providing access to passages through the blade unit and extending to the exterior thereof.

WHAT WE CLAIM IS:—

1. A razor blade unit having elongated leading and following blades with means along the length of the blades for supporting the cutting edges thereof in spaced parallel relation to one another and a



sharp edge
4B has a blade
ing blade 32 of
A_r for follow-
posures E_L and
of 0.059

that the system
er than that of
cribed embodi-
alternative con-
blades may be
f one or more
y be set at a
leading blade.
y be used with
s. While there
laceable blade
arent that the
orporated in
is integral

42/72 (Serial
and claim a
one or more
mounted in
tion of the
ing elements
spaced from
that one ele-
ve with one
a of the unit
es and the
tensive with
of said area,
to cooperate
elements on
blade unit

8/73 (Serial
and claim a
elongated
in fixed
between cap
spacer mem-
spacer hav-
extending
the cutting
edges are
direction to
engage-
surfaces
the cutting
between
provide-
the blade
thereof.

elongated
th means
support-
in spaced
and a

guard surface disposed forwardly of the cutting edge of the leading blade to provide, (as hereinbefore defined) a leading edge tangent angle in the range of 20-32° and a span (S_L) in the range of 0.030-0.080 inch, the cutting edge of the following blade being rearwardly offset from the leading cutting edge to define a span (S_R) of similar extent, and each cutting edge having an exposure from -0.002 inch to +0.004 inch.

2. A razor blade unit comprising elongated planar leading and following blades and means along the length of the blades for permanently supporting them in fixed spaced parallel relation to one another between cap and base members of the unit, and a guard surface on the base member disposed forwardly of the cutting edge of the leading blade to provide, (as hereinbefore defined) a leading edge tangent angle in the range of 20-32° and a span (S_L) in the range of 0.030-0.080 inch, the cutting edge of the following blade being rearwardly offset from the leading cutting edge to provide a span (S_R) of similar extent, and each cutting edge having an exposure in the range of -0.002 to +0.004 inch.

3. A blade unit according to claim 1 or 2, in which the tangent angle of the following cutting edge is less than that of

the leading cutting edge, e.g. a leading edge tangent angle of about 26° and a following edge tangent angle of about 23° with spans (S_L) and (S_R) each about 0.060 inch.

4. A blade unit according to claim 1 or 2, in which the exposure of each cutting edge is about 0.001 inch.

5. A blade unit according to any one of the preceding claims, the parts of which are so dimensioned and arranged that, when the unit is secured to a razor handle with an angular neck extension at one end of an elongated grip portion of the handle, a guard surface of the unit will be spaced at least one-half inch forward of the adjacent surface of the elongated grip portion, and a line tangent to said guard surface and defining the leading edge tangent angle will be disposed at an angle in the range of 30-50° to the axis of the grip portion.

6. A razor blade unit according to claim 1 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

A. A. THORNTON & CO
Chartered Patent Agents
Northumberland House
303/306 High Holborn
London, W.C.1.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1974.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

PATENTS ACT 1949

SPECIFICATION NO 1362443

In accordance with the Decision of the Principal Examiner, acting for the Comptroller-General, dated 18 January 1979 this Specification has been amended under Section 14 in the following manner:-

Page 5, delete lines 41 to 44 insert 5. In combination, a blade unit according to any one of the preceding claims and a co-operating razor

Page 5, line 47, after handle, insert the parts being so dimensioned and arranged that when the unit is secured to the handle

THE PATENT OFFICE
20 February 1979

Bas 53484/2



* C L N S *