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PATENT SPECIFICATION

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(54) RAZOR BLADE UNIT

(71) We, THE GILLETTE COMPANY, a corporation organised under the laws of the State of Delaware, United States of America, of Prudential Tower Building, Boston, State of 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 comprising two elongated blades permanently mounted in fixed relation to a guard portion of the unit, one adjacent a base member of the unit including the guard portion and the other adjacent a cap member of the unit, the cutting edges of the blades being parallel and extending in the same direction with the cutting edge of the blade adjacent the cap member rearwardly offset from the cutting edge of the blade adjacent the base member to permit simultaneous hair cutting engagement and two elongated coupling elements along the length of the unit spaced from each other to such an extent that one element is generally co-extensive with one longitudinal margin of the area of the unit occupied by the blades and

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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

- 5 a razor handle for securing the blade unit on the handle. Preferably, the coupling elements of the unit are substantially as long as the blades. They may suitably comprise elements adapted to be engaged by complementary
10 elements on the handle by sliding or snapping movement.

- In particular embodiments, the coupling elements of the unit are formed by spaced opposed parallel ribs provided with inturned
15 flanges to form recesses, and the bottom surfaces of the recesses 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
20 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
25 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
30 unit body. The coupling structure in such particular embodiments defines a plane and the blades are disposed in the body portion at an angle in the range of about 20—45° to that plane. In preferred embodiments, the
35 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
40 bottom of the base member and its width is more than one half the width dimension or the depth dimension of the blade unit.

- A blade unit in accordance with the invention is a compact member that has surfaces
45 which defined 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
50 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
55 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;

- 60 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;

- 65 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. 5 is an enlarged view of a portion of the blade unit of Figs. 3, 4 and 4A, and illustrates certain geometric relationships;

Fig. 6 is a top view of the grip component of the handle member employed in the shaving system shown in Figs. 1 and 2;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 6;

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 6;

Fig. 9 is an end view of the neck portion of the grip component as indicated by the line 9—9 of Fig. 8;

Fig. 10 is a bottom view of the support portion of the handle member employed in the shaving system shown in Figs. 1 and 2;

Fig. 11 is a side view of the support portion shown in Fig. 10;

Fig. 12 is an end view of the support portion shown in Fig. 10;

Fig. 13 is a top view of a coupling component of the handle employed in the system shown in Figs. 1 and 2;

Fig. 14 is a side view of the coupling components shown in Fig. 13;

Fig. 15 is an end view of the coupling component shown in Fig. 13;

Fig. 16 is a front view of the latch component employed in the shaving system shown in Figs. 1 and 2;

Fig. 17 is a top view of the latch component shown in Fig. 16;

Fig. 18 is a side view of a pin component employed in the system shown in Figs. 1 and 2;

Fig. 19 is an end view of a back component of the system shown in Figs. 1 and 2;

Fig. 20 is a side view of the back component shown in Fig. 19;

Fig. 21 is a side view, partially in section, of a subassembly of components shown in Figs. 10—20;

Fig. 22 is a front view of the subassembly shown in Fig. 21;

Fig. 23 is a perspective view of another embodiment of a handle unit;

Fig. 24 is a sectional view taken through the handle unit of Fig. 23;

Fig. 25 is a front view of a portion of the handle unit shown in Fig. 23;

Fig. 26 is a perspective view of portion of still another embodiment of a handle unit;

Fig. 27 is a sectional view of the handle unit of Fig. 26, and a cooperating blade unit; and

Fig. 28 is a perspective view of still another embodiment of a handle unit in accordance with the invention.

The shaving system shown in Figs. 1 and 2 includes a handle component 10 and a 130

blade unit component 12. The handle component includes a grip portion 14 that is 4-1/4 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 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 intumed 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 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 to 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 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. 5, 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. 5. 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). 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. 5 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.

Further details of the grip component 100 of the handle member are shown in Figs. 6—9. That grip component is molded of high impact polystyrene and has a generally rectangular configuration, having a height and width of about 0.33 inch at the section line 7—7 as indicated in Fig. 7 and a height and width of about 0.44 inch at its end. The

groove formed between interior side walls 102, 104 has raised rib portions 106, 108 that extend up from its base. Lands 110 are spaced along the length of the groove. At the upper end of the grip component is a neck portion that is disposed at an angle of 120° with end surface 112 being disposed 0.35 inch from transition point 114 and the front surface 116 being a smooth transition curve of 0.193 inch radius. Formed in the neck portion is a recess defined by walls 118, 120.

Another component of the handle is the support head 20 which is formed of 0.029 inch gauge brass and has a length of 1.56 inch and a height of 0.195 inch. Formed in the central base portion 130 of head 20 is a square aperture 132 that has a side dimension of 0.135 inch. Lateral base portions 134 extend upwardly at an angle of 5° in either direction from central base portion 130. Side walls 136, 138, 0.120 inch in height at each end, extend vertically from the base and flanges 140, 142 formed by bending the upper end of each side wall outwardly, define parallel transversely extending rail portions 22. The width between the outer surfaces of flanges 140, 142 is 0.275 inch and each flange has a depth of 0.0375 inch.

Details of a coupling component 150 employed in the handle unit are shown in Figs. 13—15. That coupling component is manufactured of bronze and has a body portion that is square in cross-section, being 0.2 inch in width and height. Its rear surface 152 is inclined at an angle of 30° and includes a bore 154 having an axis parallel to surface 152 and a counterbore 156. Projection 158 has a bore 160 to provide weakened side wall portions 162.

Spring member 28, shown in Figs. 16 and 17, is a brass member that has a base portion in body 170 in which is formed a circular aperture 172 and an upper portion having wings 174, 176 that are bent rearwardly along lines 178, 180, respectively, at an angle of 8°. A projection 184 having a 0.025 inch radius and a height of 0.015 inch beyond the plane of the body of the spring member provides a latching surface.

A coupling pin 190, shown in Fig. 18, has a head portion 192, a neck portion 194 and a body portion 196 in which is formed a spiral thread that defines a series of grooves 198.

A razor back component 200 of the handle unit 10 is shown in Figs. 19 and 20. That component is a brass member having a length of 3.34 inch, a width of 0.2 inch and a height of 0.215 inch. End surface 202 is inclined at an angle of 30° and includes a lip 204. A groove 206 extends the length of the back component 200.

An assembly of the razor back 200, head 20, spring latch 28, and coupling members 150 and 190 is shown in Figs. 21 and 22.

In assembly, aperture 132 of head 20 (Fig. 10) is inserted over projection 158 of component 150 (Figs. 13—15) and force is applied to form walls 162 outwardly (Figs. 21, 22) so that head 20 is connected to coupling member 150. The end 192 of pin 190 is inserted in bore 154 and material of the extension is forced into recess 194 in a ring staking operation. Spring plate 28 is then inserted over pin 190 and the razor back 200 is positioned on pin 190 so that lip 204 provides an aligning seat for the base of the spring. Crimps 210 are formed in the walls of the razor back and engage grooves 198 to secure pin 190 in the groove 206. Additional inwardly extending projections 212 are similarly formed along the remaining length of the razor back. That assembly is then inserted in groove between walls 102 and 104 of the handle component 100 (Fig. 6) under a pressure in the order of 300 pounds to force the projections 212 into the plastic material of ribs 106, 108 in a deforming operation so that the razor back and slide head assembly is secured to the grip component to form the handle unit 10 as indicated in Figs. 1 and 2.

In use, the blade unit 12 to be attached to the handle unit 10 is brought into adjacent relation to transverse support head 20 so that the rail elements 22 are aligned with recesses 58. The blade unit and handle unit are then moved transversely relative to one another so that the rails 22 slide into grooves 58 until the ridge portion 184 of leaf spring 28 engages recess 60 in the front flange 56 (Figs. 2, 3). In this position, the blade unit 12 is centered on the head 20 and in position ready for shaving. When it is desired to replace a blade unit, lateral pressure is applied to overcome the latching resistance of spring 28 so that the blade unit 12 slides along the rails 22 for removal from the handle unit.

Another embodiment of a handle unit 10' is shown in Figs. 23—25. That handle unit is a molded one-piece member of a suitable plastic material and includes a grip portion 14' having grooves 16', a neck portion 18' and an integral transverse head portion 20'. The handle 10' has the same dimension B as the embodiment shown in Fig. 1, the neck is disposed at the same angle (120°) and the grip portion tapers from a dimension of 0.45 inch to a dimension of 0.33 inch with a further taper in the neck portion to the dimension of 0.325 inch. The rails 22' are integral with head 20', with front wall 136' inclined at an angle of 30° to the axis of the neck portion. Four slots 26' are formed in the base of transverse head 20' to permit flow of shaving debris away from the blade unit. An integrally formed latch finger 28' is disposed in a gap in front wall 136' and has a thickness of 0.035 inch and a width of 0.100 inch.

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Projection 184' having a surface radius of 0.025 inch is adapted to engage notch 60 in the blade unit.

5 Still another embodiment of a handle unit is shown in Figs. 26 and 27. That embodiment is similar to the embodiment shown in Figs. 23—25 with the omission of latch finger 28' and the further provision of projections 300, one above each rib 302, that
10 separates apertures 26" from one another. Each projection 300 has a width of 0.06 inch, and includes vertical front surface 304, 0.05 inch high, surface 306 inclined at an angle of 35° to the axis of the neck portion and a
15 rear surface 308 inclined at an angle of 65° to the axis of the neck portion 18". A blade unit 12, rather than being slid onto the head structure as in the previous described embodiments, is snapped onto the rails 22" as indicated by the arrow in Fig. 27. The projections
20 300 are disposed on opposite sides of webs 48 of the blade unit and thus prevent lateral movement of the blade unit when it is positioned on the head structure while providing the same shaving geometry as indicated in Fig. 1.

Another embodiment of a handle unit is shown in Fig. 28. That handle unit includes an elongated grip portion 370 that has a slight taper along its axial length. Support structure 372 at the upper end of grip portion
30 370 extends transversely to the axis 374 thereof. That support structure includes two apertured planar surfaces 376, 378, each of which is disposed at an angle of about 37-1/2° to axis 374 and at an angle of about 75° to each other. Secured to each planar surface is a flange or runner structure 380 that has
35 two outwardly directed rails 382, the outer edges of the rails in each pair being spaced apart about 0.28 inch and each flange having a thickness of about 0.03 inch. A latch member 384 is disposed adjacent the lower flange of each pair for engaging a notch in a co-
40 operating razor blade unit when the razor blade unit is disposed on the flange structure as in the previously described embodiments. Suitable blade units 386, for example of the type shown in Figs. 3, 4, 4A and 5, may
45 be disposed on each pair of flange portions 380. In this embodiment, as in the other embodiments, the flange or runner portions that extend along the transverse length of the support structure may be interrupted if
50 desired rather than being continuous as in the illustrated embodiments.

55 In our application No. 11849/73, we have described and claimed 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
60 a leading edge tangent angle in the range

of 20—32° and a span (S_1) 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_2) of similar extent, and each cutting edge having an exposure from -0.002 inch to +0.004 inch.

70 In our application No. 11848/73 (Serial No. 1,362,442), we have described and claimed 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 member 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:—

90 1. A razor blade unit comprising two elongated blades permanently mounted in fixed relation to a guard portion of the unit, one adjacent a base member of the unit including the guard portion and the other adjacent a cap member of the unit, the cutting edges of the blades being parallel and extending in the same direction with the cutting edge of the blade adjacent the cap member rearwardly offset from the cutting edge of the blade adjacent the base member to permit simultaneous hair cutting engagement and two 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 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.

100 2. A blade unit according to claim 1, in which the coupling elements of the unit are substantially as long as the blades.

105 3. A blade unit according to claim 1 or 2, in which the coupling elements of the unit comprise elements adapted to be engaged by complemental elements on the handle by sliding or snapping movement.

110 4. A blade unit according to any one of the preceding claims, in which the coupling elements of the unit are formed by spaced opposed parallel ribs provided with inturned flanges to form recesses.

115 5. A blade unit according to claim 4, in which both ribs are on a base member of the unit, or one rib is on said base member

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In our application No. 11849/73, we have described and claimed a razor blade unit having elongated leading and following blades with means along the length of the blades
60 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
65 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.

In our application No. 11848/73 (Serial No. 1,362,442), we have described and claimed a razor blade unit comprising two
75 elongated blades permanently mounted in fixed superposed parallel position between cap and base members and with a spacer member between the blades, said spacer member having transversely spaced fingers extending forwardly
80 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
85 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 comprising two elongated blades permanently mounted in fixed relation to a guard portion of the unit, one adjacent a base member of the unit including the guard portion and the other adjacent a
95 cap member of the unit, the cutting edges of the blades being parallel and extending in the same direction with the cutting edge of the blade adjacent the cap member rearwardly offset from the cutting edge of the blade adjacent the base member to permit simultaneous
100 hair cutting engagement and two 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 blades and the other element is generally coextensive with the other longitudinal margin of said area, said elements being adapted to cooperate with complemental
105 coupling elements on a razor handle for securing the blade unit on the handle.

2. A blade unit according to claim 1, in which the coupling elements of the unit are substantially as long as the blades.

3. A blade unit according to claim 1 or 2, in which the coupling elements of the unit comprise elements adapted to be engaged by complemental elements on the handle by sliding or snapping movement.

4. A blade unit according to any one of the preceding claims, in which the coupling elements of the unit are formed by spaced opposed parallel ribs provided with inturned
120 flanges to form recesses.

5. A blade unit according to claim 4, in which both ribs are on a base member of the unit, or one rib is on said base member
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and the other rig is on a cap member of the unit.

6. A blade unit according to any one of claims 3 to 5, in which the distance between the bottoms of the recesses is more than half of the width of the unit.

7. A blade unit according to claim 6 wherein the said distance is about 0.28 inch and each recess has a width of about 0.03 inch.

8. A blade unit according to claim 3, in which the engagement is by sliding movement and in which means is provided on the unit for restraining relative sliding movement of the coupling elements of the unit and handle when a desired position of the blade unit on the handle has been reached.

9. A blade unit according to claim 8, in which the restraining means on the unit comprises a notch.

10. A blade unit according to claim 3, in which the engagement is by snapping movement and in which a surface such as a rib is provided on the unit to prevent relative transverse movement of the blade unit and handle.

11. A blade unit according to any one of the preceding claims, in which the planes of the blades are at an angle of 20—45° to the plane of the coupling elements of the unit.

12. A blade unit according to any one of the preceding claims in which the two blades are parallel and there is a spacer member between the blades.

13. A blade unit according to claim 12, in which the spacer member is an elongated member extending parallel to the blades and substantially throughout the length thereof.

14. A blade unit according to claim 12 or 13, in which the spacer member has transversely spaced fingers extending forwardly in the direction of the cutting edges of the blades.

15. A blade unit according to claim 14, in which the spaces between the fingers of the spacer member provide access to passages through the blade unit and extending to the exterior thereof.

16. A blade unit according to claim 15, in which the base member and the blade adjacent thereto have aligned unobstructed openings providing a passage to the exterior of the unit.

17. A blade unit according to any one of claims 14 to 16, in which each spacer finger comprises a forward edge from which wall surfaces extend rearwardly and outwardly to the main body of the spacer member, and planar top and bottom surfaces constituting

extensions of the corresponding surfaces of the spacer member.

18. A blade unit according to claim 17, in which the top surface of the finger is of less area than the bottom surface.

19. A blade unit according to any one of claims 12 to 18, in which the spacer member is of metal.

20. A blade unit according to any one of claims 12 to 19, in which openings through the blades for the passage of securing means are sufficiently large so that blades of the same form can be used in either of the offset positions, and means are provided for properly locating the blades in said positions.

21. A blade unit according to claim 20, in which the blade locating means comprises abutment surfaces engaged by the cutting edges of the blades.

22. A blade unit according to claim 21, in which the abutment surfaces are on forwardly extending projections at each edge of the cap member.

23. A blade unit according to any one of claims 12 to 22, including openings providing access to the blades from the outside of the unit for moving them to their proper positions.

24. A blade unit according to any one of claims 12 to 23, in which the guard portion of the base member is separated from the remainder of said member by a slot and the blade adjacent to the base member extends over part of said slot.

25. A blade unit according to any one of claims 12 to 24, in which the means for the permanent mounting of the blades comprises pins on one of the cap and base members extending through holes in the blades and corresponding holes in the other of said members.

26. A blade unit according to claim 25, in which the ends of the pins are expanded to effect the permanent mounting.

27. A blade unit according to any one of claims 12 to 26, in which the base and cap members are of molded plastic material.

28. A razor blade unit according to claim 1 substantially as hereinbefore described with reference to Figs. 3, 4, 4A and 5 of the accompanying drawings.

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