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| 3,786,563 | 1/1974 | Dorion..... | 30/50 |

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[63] Continuation-in-part of Ser. No. 408,848, Oct. 23, 1973, abandoned, which is a continuation-in-part of Ser. No. 398,104, Sept. 17, 1973.

Jan. 23, 1973 Great Britain 3365/73

- [52] **U.S. Cl.**.....30/346.58, 30/50, 76
[51] **Int. Cl.**.....B26b 21/54, B26b 21/22
[58] **Field of Search** 30/50, 76, 346.57, 346.58,
30/346.59

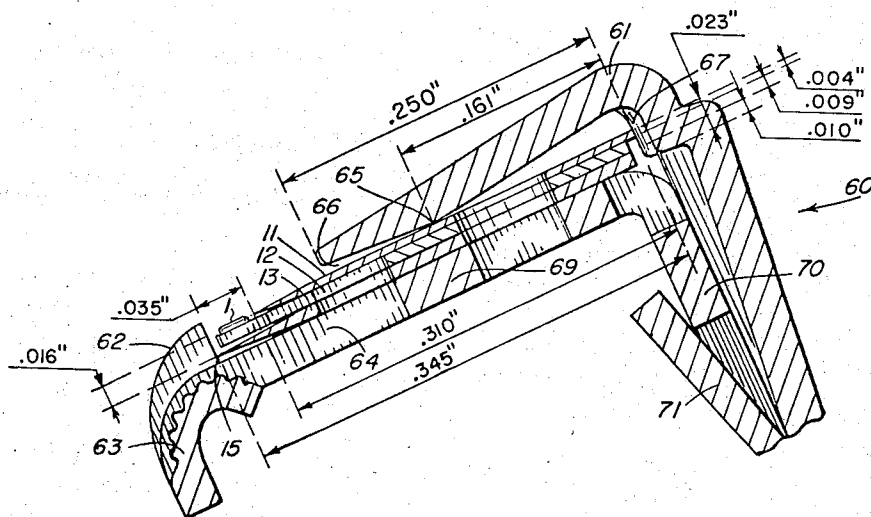
UNITED STATES PATENTS

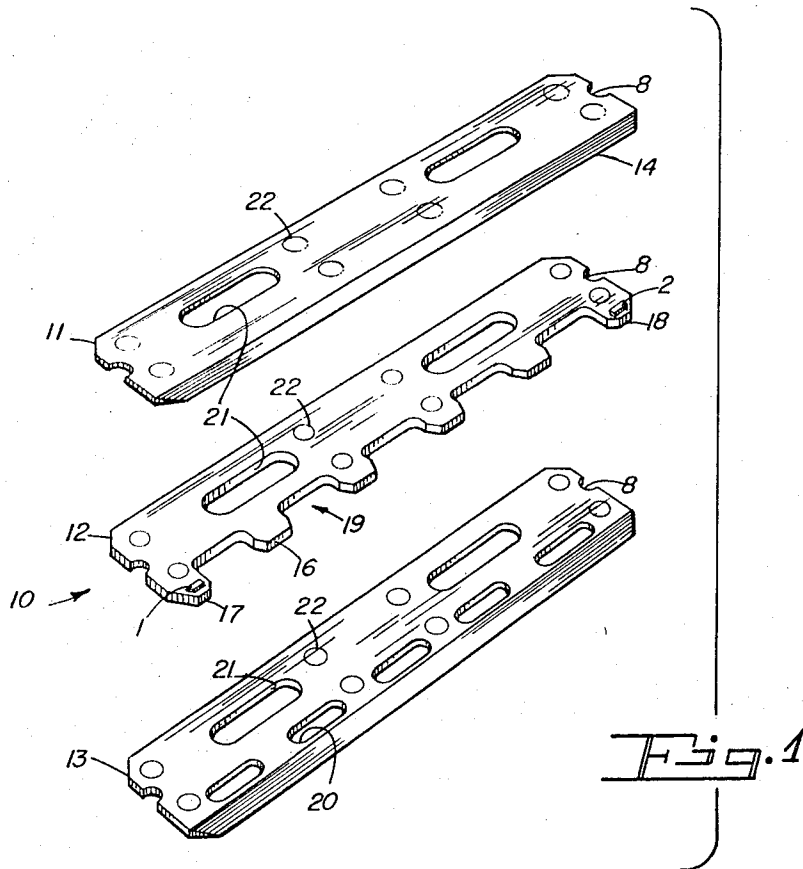
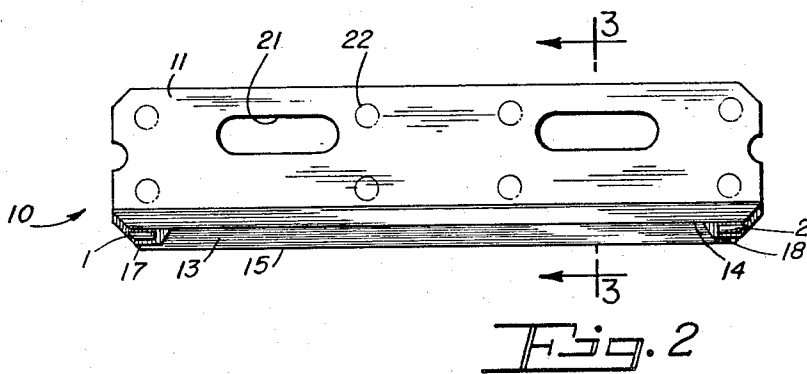
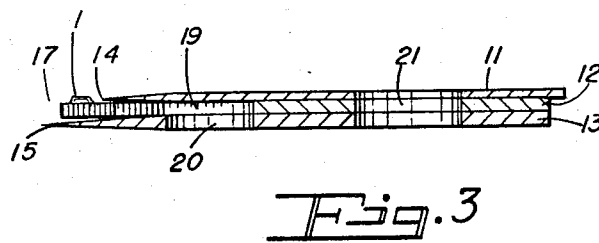
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[57] **ABSTRACT**

The specific disclosure provides a shaving unit having a spacer which includes a pair of spaced forwardly extending projections. A bottom razor blade is connected to the underside of the spacer with its cutting edge positioned beneath the projections or forwardly of the projections. A top razor blade is connected to the upperside of the spacer with its cutting edge positioned above the projections and rearwardly of the cutting edge of the bottom blade. Each one of the spacer projections includes a raised portion extending upwardly in front of a respective end of the cutting edge of the top razor blade.

20 Claims, 14 Drawing Figures





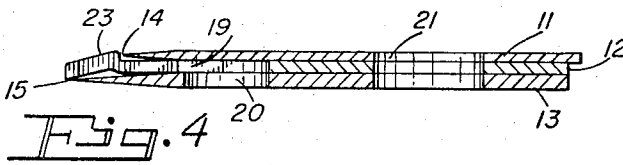
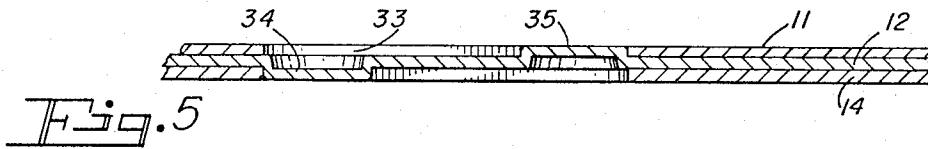
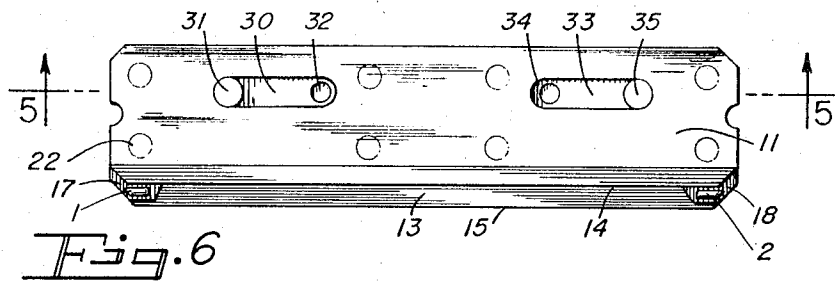
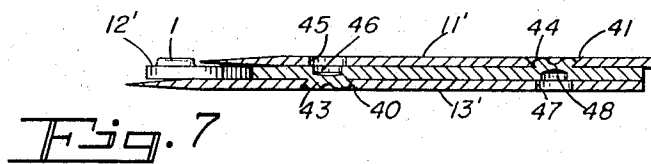
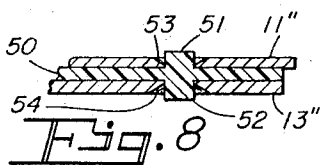
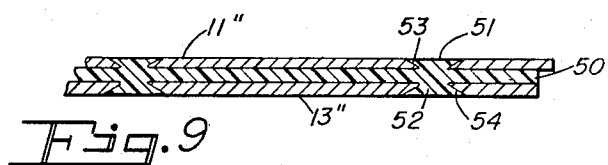
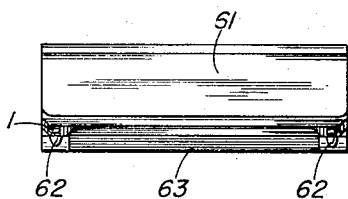


Fig. 11

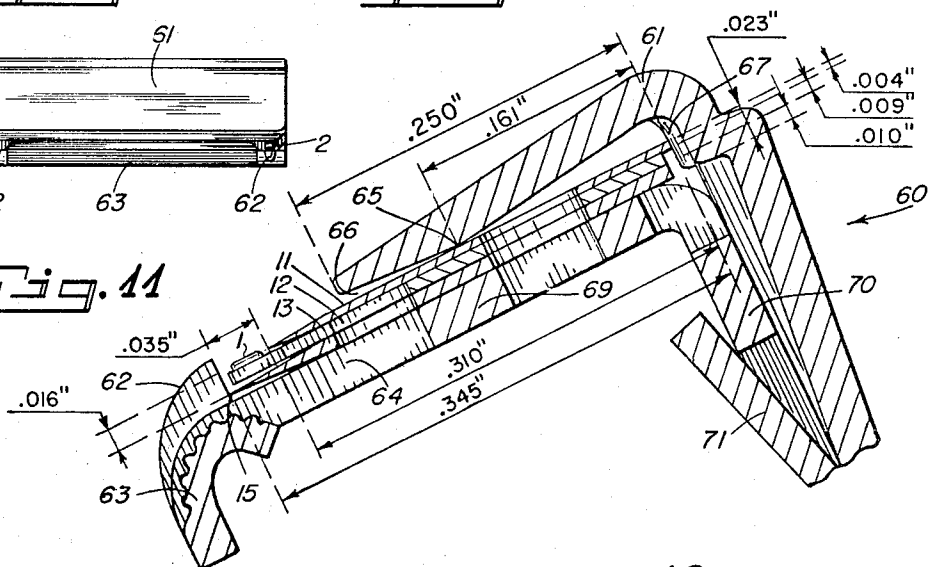
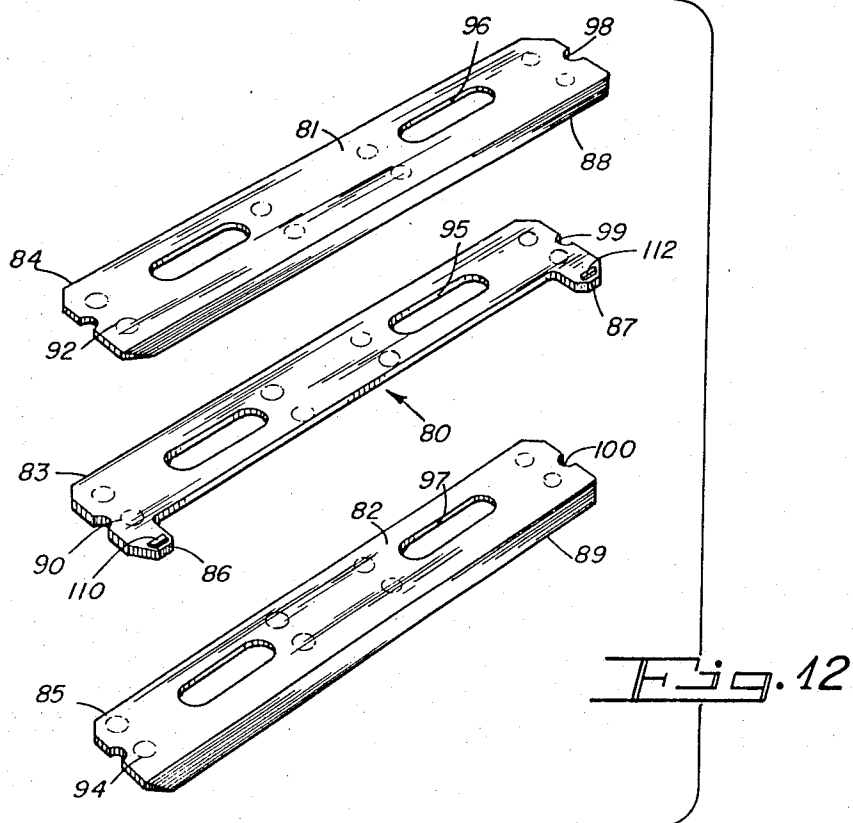
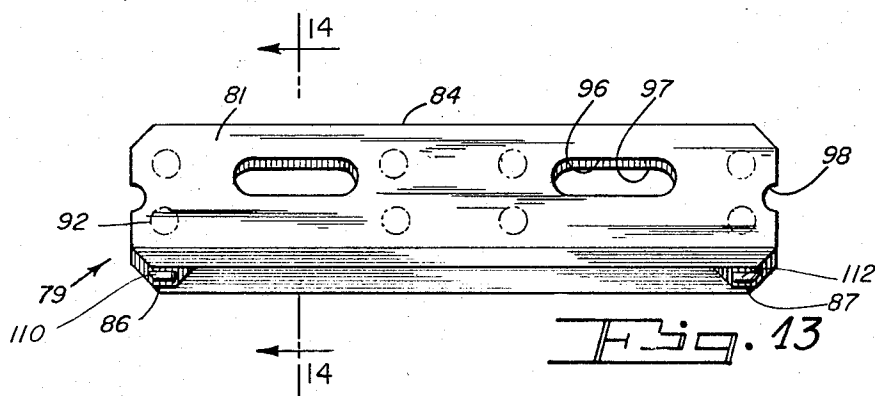
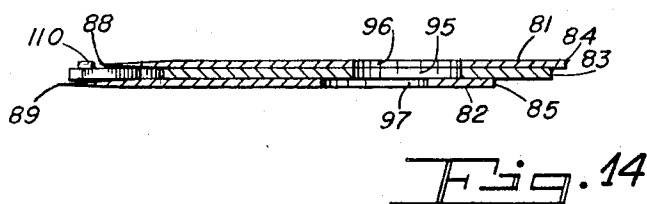


Fig. 10



SHAVING UNIT FOR SAFETY RAZOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of co-pending U.S. Pat. application Ser. No. 408,848, filed Oct. 23, 1973, now abandoned which, in turn, is a continuation-in-part of co-pending U.S. Pat. application Ser. No. 398,104, filed Sept. 17, 1973.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to shaving units having a plurality of cutting edges for use in a safety razor. More particularly, the present invention relates to shaving units for safety razors with the shaving units having a plurality of single cutting edge blades bonded together on opposite sides of a spacer such that the cutting edges are tandemly arranged.

2. Description of the Prior Art

Shaving systems which provide for feeding single cutting edge blades to a safety razor from a separable dispenser are well known in the art and are commercially available. For example, dispensers such as described in U.S. Pat. Nos. 2,911,713 and 2,812,576 have an elongated key that is positioned in the head of a safety razor such as disclosed in U.S. Pat. Nos. 2,911,713, 2,911,714, 3,128,551, 3,177,581 and 3,203,093 to wedge apart a cap and a blade seat in the razor head. A finger-operated slide on the dispenser is then used to insert a blade between the cap and blade seat. After the key is removed from the razor head, the blade seat moves in the direction of the cap to clamp the blade between the blade seat and the cap, and to bias the cutting edge of the blade against a pair of spaced stops on the blade seat or cap.

Tomek U.S. Pat. No. 3,262,206 describes a shaving unit consisting of a pair of tandemly mounted single cutting edge blades which are vertically separated by a plastic spacer having a forward surface spaced inwardly from both cutting edges. The plastic spacer of Tomek has plastic posts extending through perforations in the two blades to bond the blades thereto. If the shaving unit of Tomek is clamped and biased against blade seat stops in the above-described razors, the ends or corners of the top blade cutting edge are set back from the razor stops to raise a risk of nicks and cuts from such ends or corners during use.

SUMMARY OF THE INVENTION

In accordance with an aspect of the present invention, there is provided a shaving unit for a safety razor wherein the razor comprises a guard bar, spaced stop members for locating the shaving unit relative to the guard bar, and means for biasing the shaving unit to the stop members. The shaving unit comprises a razor blade having a cutting edge positioned upwardly and rearwardly of a cutting edge on another razor blade. Means interconnect the two blades for vertically spacing the blades apart. Means extend forwardly from the spacing means and in front of each end of the cutting edge of the upper blade for preventing contact with the ends of the upper blade cutting edge during use to thereby prevent nicks and cuts from such ends. In accordance with another aspect of the present invention, the outer ends of the lower blade are located behind

the razor stops to prevent nicks and cuts from the ends of the lower blade.

BRIEF DESCRIPTION OF THE DRAWINGS

5 FIG. 1 is an exploded view of an embodiment of a shaving unit constructed in accordance with the present invention;

FIG. 2 is a top plan view of the shaving unit embodiment of FIG. 1;

10 FIG. 3 is a cross-sectional view of the shaving unit taken along Lines 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view of another embodiment of a shaving unit constructed in accordance with the present invention;

15 FIG. 5 is a cross-sectional view of an embodiment of the present invention taken along Lines 5—5 of FIG. 6;

FIG. 6 is a top plan view of an embodiment of the invention showing blade and spacer orientation means;

20 FIG. 7 is a cross-sectional view of an embodiment of the invention for bonding the blades and spacer together;

FIGS. 8 and 9 are cross-sectional views showing another embodiment for bonding the blades to a plastic spacer;

25 FIG. 10 is a cross-sectional view of the FIG. 1 embodiment seated in a safety razor;

FIG. 11 is a front elevational view of the razor and shaving unit of FIG. 10;

30 FIG. 12 is an exploded view of yet another embodiment of a shaving unit constructed in accordance with the present invention;

FIG. 13 is a top plan view of the embodiment of FIG. 12; and

35 FIG. 14 is a cross-sectional view taken along Lines 13—13 of FIG. 13.

DESCRIPTION OF SPECIFIC EMBODIMENTS

40 With reference to FIGS. 1-3, one embodiment of the present invention provides a shaving unit 10 having a top single edge razor blade 11 and a bottom single edge razor blade 13 connected to opposite surfaces of a spacer member 12. The spacer member 12 has a pair of spaced forwardly extending projections 17, 18 at the outer ends thereof, and a plurality of forwardly extending teeth 16 between the projections 17, 18. The cutting edge 15 of the bottom blade 13 is positioned forward of the projections 17, 18, and the cutting edge 14 of the top blade 11 is positioned above the projections 17, 18 and rearwardly of the cutting edge 15 of the bottom blade 13. Each one of the projections 17, 18 has a raised portion 1, 2 extending upwardly in front of the outer ends or corners of the cutting edge 14 of the top blade 11 to prevent nicks and cuts from such ends.

45 As shown in FIG. 3, the forward extension of the teeth 16 is terminated short of the cutting edge 14 of the top blade 11. However, the upper surfaces of the teeth 16 can alternatively be beveled, and the beveled surfaces can then extend forwardly a slight distance from beneath the cutting edge 14 of the top blade 11. Spaces 19 formed between the teeth 16 are in fluid communication with elongated perforations 20 formed in the bottom blade 13. The spaces 19 and the perforations 20 provide shaving residue flow paths from between the cutting edges 14, 15 of the blades 11, 13.

50 The blades 11, 13 and the spacer member 12 have a pair of spaced elongated slots which may be used as an

aid to handling materials and the blades 11, 13 and spacer member 12 during manufacture and assembly of the shaving unit 10. Each one of the blades 11, 13 and the spacer member 12 has a cut-out portion 8 at each end thereof. During assembly of the shaving unit 10, the cut-out portions 8 are aligned as shown in FIG. 2 to orient the blades 11, 13 and the spacer member 12 prior to bonding the blades 11, 13 to the spacer member 12.

In the embodiment shown in FIGS. 1-3, the blades 11, 13 are bonded to the spacer member 12 by a plurality of spot welds 22. Alternatively, the spacer member 12 can have a plurality of upwardly extending and downwardly extending projections having a height of approximately 0.003 inch. In this alternative embodiment, the blades 11, 13 are bonded to the spacer member 12 by a projection welding process such as described in Metals Handbook, Vol. 6 Welding and Brazing, Page 445, American Society for Metals, Metals Park, Ohio 44073, 1971.

The raised portions 1, 2 of the FIGS. 1-3 embodiment are spaced a slight distance forwardly of the cutting edge 14 of the top blade 11. FIG. 4 is a modification of the embodiment of FIGS. 1-3 wherein the projections 17, 18 of FIGS. 1-3 are upwardly deformed to provide stops 23 against which the outer ends of the cutting edge 14 of the top blade 11 are seated. The stops 23 may be used as an aid to orient the top blade cutting edge 14 with respect to the spacer member 12 and the bottom blade cutting edge 15. Further, the stops 23 also prevent nicks and cuts from the outer ends or corners of the top blade cutting edge 14.

FIGS. 5 and 6 show another modification of the embodiment of FIGS. 1-3 wherein the spacer member 12 has a pair of upwardly extending posts 31, 35 which are located in the outer portions of the top blade slots 30, 33, and a pair of downwardly extending posts 32, 34 which are located in the innermost portions of the bottom blade slots. The posts 31, 32, 34, 35 are used to orient the blades 11, 13 with respect to the spacer member 12.

FIG. 7 shows another embodiment of the present invention wherein the top and bottom blades 11', 13' have a plurality of beveled holes 40, 41. The spacer member 12' is upwardly and downwardly deformed 46, 48 by a punch or the like inserted through holes 45, 47 to form relatively flat-headed rivets 43, 44 in the beveled holes 40, 41.

FIGS. 8 and 9 show another embodiment of the present invention wherein the spacer 50 is formed of plastic and has a plurality of posts 51, 52 extending upwardly and downwardly through beveled holes 53, 54 formed in the top and bottom blades 11'', 13''. The posts 51, 52 are staked or compressed in any known manner, such as by ultrasonics, heat and/or pressure, to fill out the beveled holes 53, 54 as shown in FIG. 9.

With reference to FIGS. 12-14, the shaving unit 79 has approximately equally dimensioned top and bottom blades 81, 82. A significant difference between the top and bottom blades is that the top blade 81 distance between the rear edge 84 and the cut-out portions 98 is greater than the bottom blade 82 distance between its rear edge 85 and its cut-out portions 100. The blades 81, 82 and the spacer 80 have a pair of elongated slots 95, 96, 97 which may be used for handling the components during manufacture. The unit 79 of FIGS. 12-14 is assembled by aligning the cut-out portions 98, 99,

100 of the blades 81, 82 and the spacer 80, and the blades 81, 82 are then bonded to the spacer member 80 by a plurality of spot welds diagrammatically represented as 90, 92, 94 or by projections welding such as described hereinabove with respect to the embodiment of FIGS. 1-3.

The cutting edge 89 of the bottom blade 82 is positioned forwardly of the projections 86, 87 of the spacer, and the cutting edge 88 of the top blade 81 is positioned above the projections 86, 87 and rearwardly of the bottom blade cutting edge 89. The outer ends or corners of the top blade cutting edge 88 are positioned behind raised portions 110, 112 formed on the projections 86, 87 to prevent nicks and cuts from the corners of the top blade cutting edge 88 during use. The rear edge 83 of the spacer 80 extends rearwardly of the rear edge 85 of the bottom blade 82, and the rear edge 84 of the top blade 81 extends rearwardly of the rear edge 83 of the spacer.

The shaving units of the present invention can be dispensed from a modified form of well-known and commercially available single edge blade dispensers. Single edge blade dispensers are described in many patents such as U.S. Pat. Nos. 2,911,713 and 2,812,576. The dispenser modifications essentially consist of thickening an elongated key of the dispenser such that a wedging action occurs between a cap portion of the razor head and a blade seating plate of the razor to permit insertion of the shaving unit between the cap portion and the seating plate. It is also apparent that a blade exit slot of the well-known single edge blade dispenser must be dimensioned to permit removal of shaving units therefrom under the action of a finger-operated pusher.

FIG. 10 is a cross-sectional view of a head 60 of a single edge razor currently manufactured by the Schick Safety Razor Company, Division of Warner-Lambert Company. The razor shown in FIG. 10 functions essentially in the same manner as the razor disclosed in U.S. Pat. No. 2,911,713, which patent is incorporated herein by reference.

With reference to FIGS. 10 and 11, the razor head 60 has a frame member 61 having a forwardly extending cap in transverse line contact with the top blade 11 at point 65. From point 65, the underside of the cap is beveled at 66 away from the top blade 11. The head 60 also includes a blade seating plate having a generally flat forwardly projecting flange 69 underlying the cap of the frame 61 to constitute the blade seat for the shaving unit. The seat 69 terminates along its front edge in a downwardly curved serrated guard bar 63. Behind the guard bar 63 is a clearance opening 64 formed in the seat 69. An upwardly extending blade stop 62 is formed on the seat 69 at each end of the guard bar 63. The stops 62 each have a vertical surface 68 against which the forwardly extending projections 86, 87 are biased. The outer ends or corners of the bottom blade cutting edge 15 are located behind the razor stops 62. At least one indent 67 is formed in the frame 61 for abutting engagement with the rear edge of the top blade 11. As described in U.S. Pat. No. 2,911,713, an upper part of a spring 71 bears against a flange portion 70 of the blade seating plate to clamp the seat 69 both upwardly and rearwardly such that the shaving unit is firmly clamped between the cap line-contact 65 and the seat 69, and biased forwardly against the verti-

cal surfaces 68 of the spaced stops 62 by the indent 67.

Suitable dimensions for the razor head are shown in FIG. 10. The horizontal distance between the cutting edges of the blades shown in each one of the foregoing embodiments is preferably between about 0.035 to about 0.055 inches, and the vertical distance between the cutting edges of the two blades is preferably between about 0.010 to about 0.026 inches. Suitable dimensions for the embodiment of the shaving unit shown in FIGS. 1-3 are provided in FIG. 10.

The shaving unit of FIGS. 12-14 can be suitably constructed of a 0.006 inch by 1.50 inch by 0.311 inch top razor blade 81, a 0.006 inch by 1.50 inch by 0.296 inch bottom razor blade 82, and a spacer member 80 having dimensions of 0.008 inch by 1.50 inch by 0.318 inch, such that the vertical height between the cutting edges 88, 89 is 0.014 inch. Further, the horizontal distance between the cutting edges 88, 89 can be 0.037 inch, and the horizontal distance between the cutting edge 89 of the bottom blade 82 and the front edges of the projections 86, 87 can suitably be 0.125 inch. Still further, the upwardly extending raised portions 110, 112 on the projections 86, 87 discussed hereinabove can suitably extend upwardly 0.005 inch to avoid nicks and cuts from the corners of the top blade cutting edge 88.

The slots 95 in the spacer 80 can be eliminated, and a perforation can be formed off-center of the spacer 80 for orienting the spacer 80 during assembly.

The razor blades of each one of the foregoing embodiments can be composed of martensitic stainless steel commonly used for razor blades, or of any other material suitable for razor blades. The spacer may be composed of plastic as described with reference to FIGS. 8 and 9, or of metal such as stainless steel or aluminum. Suitable spacer stainless steels are American Iron and Steel Institute Types 302 or 430.

The present invention also contemplates more than two single edge blades tandemly arranged with the spacers therebetween providing blade corner guards 1, 2; 110, 112.

What is claimed is:

1. A replaceable shaving unit for a safety razor, wherein said razor comprises a transverse guard surface, spaced stop means for locating said shaving unit with respect to said guard surface, a blade seat member, a cap member extending forwardly above said blade seat member, and means for biasing said shaving unit in abutting engagement with said stop means and said blade seat member upwardly to clamp said shaving unit between said cap and said blade seat member, said shaving unit comprising:

- a. a spacer member including a transversely elongated center portion, a pair of spaced projections extending forwardly from said center portion, a raised portion on each one of said projections, an underside, and an upper side;
- b. a first razor blade connected to said underside, said first razor blade including a lower surface for abutting engagement with said blade seat member and an elongated cutting edge dimensioned for locating each outer end thereof behind a respective one of said stop means to prevent contact with the ends of the first blade cutting edge during use; and

c. a second razor blade connected to said upper side, said second razor blade including an upper surface for abutting engagement with said cap member and an elongated cutting edge positioned above said projections and rearwardly and parallelly with the cutting edge of said bottom razor blade, the cutting edge of said second razor blade having each outer end thereof located behind and spaced rearwardly from a respective one of the raised portions to prevent contact with the ends of the second blade cutting edge during use;

d. said second razor blade having a predetermined thickness, and the raised portions extending upwardly from said projections a distance less than said predetermined thickness.

2. The shaving unit of claim 1, wherein said spacer member further includes a plurality of teeth between said projections, said teeth extending forwardly from said center portion for a distance less than the forward extension of said projections.

3. The shaving unit of claim 2, wherein said first razor blade further includes a plurality of perforations between said teeth.

4. The shaving unit of claim 1, wherein each one of said first and second razor blades further includes a transversely elongated slot, the slots being vertically aligned; and wherein said spacer member further includes a pair of transversely spaced posts, one of said posts extending upwardly into one end of the slot in said second razor blade, and the other of said posts extending downwardly into the end of the slot in said first razor blade opposite said one end.

5. The shaving unit of claim 4, wherein each one of said first and second razor blades further includes another transversely elongated slot, the another slots being vertically aligned; and wherein said spacer member further includes another pair of transversely spaced posts, one of said another posts extending upwardly into one side of the another slot in said second razor blade, and the other of said another posts extending downwardly into the side of the another slot in said first razor blade opposite said one side.

6. The shaving unit of claim 1, wherein said first razor blade has a blunt rear edge positioned beneath said center portion, and wherein said second razor blade has a blunt rear edge positioned rearwardly of said center portion.

7. The shaving unit of claim 6, wherein said center portion of said spacer member includes a transverse rear surface positioned forwardly of the blunt rear edge of said second razor blade.

8. The shaving unit of claim 7, wherein said first and second razor blades have unequal distances from respective cutting edge to blunt rear edge.

9. The shaving unit of claim 7, wherein said first and second razor blades have identical length, width and thickness dimensions.

10. The shaving unit of claim 8, wherein each one of said first and second razor blades has a thickness of 0.006 inch, and wherein said spacer member has a thickness of 0.08 inch.

11. The shaving unit of claim 7, wherein the cutting edge of said second razor blade is in a horizontal plane 0.014 inch above another horizontal plane defined by the cutting edge of said first razor blade.

12. The shaving unit of claim 10, wherein a pair of vertical planes defined by the cutting edges of said first

and second razor blades have a spacing therebetween of about 0.33 inch to about 0.41 inch.

13. The shaving unit of claim 1, wherein said first and second razor blades are connected to said spacer member by a plurality of spot welds.

14. The shaving unit of claim 1, wherein said first and second razor blades are connected to said spacer member by a plurality of projection welds, the weld projections being initially formed on said spacer member.

15. The shaving unit of claim 1, wherein each one of said first and second razor blades further includes a plurality of apertures, and wherein said center portion of said spacer member is deformed through said apertures to connect said first and second razor blades to said spacer member by integral rivets.

16. The shaving unit of claim 1, wherein each one of said first and second razor blades further includes a plurality of apertures, and wherein said center portion of said spacer member has a plurality of posts extending through said apertures, said posts being deformed

at the outer ends thereof to connect said first and second razor blades to said spacer.

17. The shaving unit of claim 1, wherein a pair of vertical planes defined by the cutting edges of said first and second razor blades have a spacing therebetween of from about 0.035 inch to about 0.055 inch.

18. The shaving unit of claim 17, wherein a pair of horizontal planes defined by the cutting edges of said first and second razor blades have a spacing therebetween of from about 0.01 inch to about 0.026 inch.

19. The shaving unit of claim 6, wherein the distance between the cutting edge and the blunt rear edge of said second razor blade is greater than the distance between the cutting edge and the blunt rear edge of said first blade.

20. The shaving unit of claim 1, wherein the thickness of one of said second and first razor blades is less than the thickness of the other of said second and first razor blades.

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