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RAZOR BLADES

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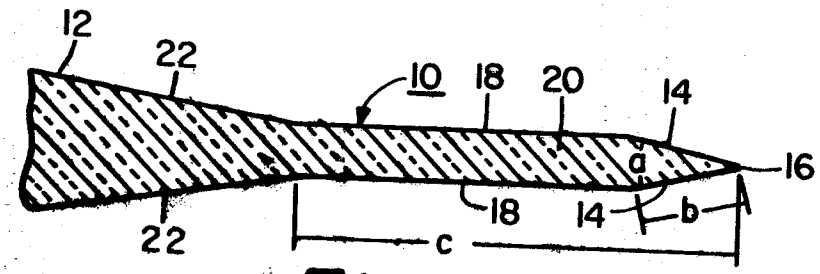


Fig. 1

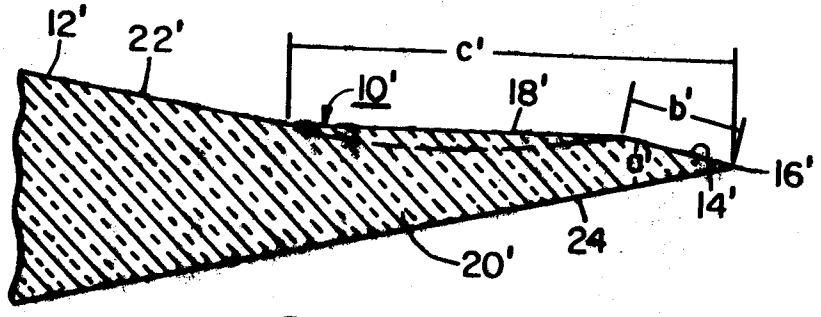


Fig. 2

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# RAZOR BLADES

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Original application Oct. 30, 1967, Ser. No. 678,846, now Patent No. 3,514,856, dated June 2, 1970. Divided and this application June 26, 1969, Ser. No. 862,548
Int. Cl. B26b 25/54
U.S. Cl. 30—346.55 3 Claims

## ABSTRACT OF THE DISCLOSURE

Razor blade construction having defined angular and dimensional limits of the converging surfaces forming the cutting edge and an effective recessed portion immediately adjacent thereto for improved cutting ease and shaving comfort.

## CROSS-REFERENCE TO RELATED APPLICATION

This application is a division of our co-pending application Ser. No. 678,846; filed Oct. 30, 1967 now Pat. No. 3,514,856.

## BACKGROUND OF THE INVENTION

The invention resides in the field of razor blade construction and particularly to the cutting edge configuration required to provide improved shaving comfort.

The prior art contains various chemical and mechanical procedures for preparing the cutting edge of razor blades; however, as a whole, the art lacks any criteria as to what is necessary to actually provide the ultimate in frictionless shaving. U.S. Pat. No. 2,262,588 to Mailman discloses a conventional V-shaped blade and a method of providing a double-edged hollow-ground blade which facilitates the formation of a keen cutting edge without excessive heat. However, the patent does not suggest any parameters or criteria necessary in order to produce a blade which provides a minimum amount of friction and discomfort during the shaving operation.

U.S. Pat. No. 3,071,858 to Alter sets forth the prior art concept of forming razor blades with multiple tapered facets. Although dimensions and angles are given with respect to the final converging facets which form the cutting edge, there is no indication as to the limits or parameters which provide improved shaving comfort, and in fact the patent leads one to believe that the only way to accomplish such result is to apply a coating to the blade.

The instant invention overcomes this void in the prior art by actually setting forth specific criteria for razor blade configurations to provide optimum shaving comfort based upon scientific investigations and experimental data.

## SUMMARY OF THE INVENTION

The present invention, in its simplest form, sets forth an optimum razor blade configuration for shaving comfort which not only includes a minimum and maximum included angle between the converging surfaces forming the cutting edge, but also the maximum length of such converging surfaces and the minimum length of an effective relief portion immediately adjacent such converging surfaces.

It thus has been an object of the present invention to provide an improved razor blade configuration having defined parameters which produce minimum whisker drag during shaving and accordingly afford the utmost in shaving comfort.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmental cross-sectional view of the cutting edge configuration of a preferred embodiment of the present invention.



FIG. 2 is a fragmental cross-sectional view in elevation of a further embodiment of the blade configuration shown in FIG. 1 but with one side extended for strength.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, a greatly enlarged blade portion **10** of a razor blade **12** is shown having a pair of converging surfaces or facets **14** forming a cutting edge **16**. Immediately behind the converging surfaces **14** and communicating therewith are a pair of substantially parallel surfaces **18** of a shank portion **20** forming an effective relief area. The surfaces **18** are not only substantially parallel to each other, but also are substantially parallel to a cross-sectional axis of the blade which bisects the included angle between facets **14**. A pair of tapered surfaces **22** extend rearwardly of the parallel surfaces **18** and join the shank portion **20** with the full body width of the razor blade **12**.

The included angle *a* formed by and between the converging surfaces **14**, which produce the cutting edge **16**, must be between 10° and 35°. Should the included angle *a* between the surfaces **14** exceed 35°, the resulting tip or cutting edge **16** exhibited to the skin whiskers, is so blunt that virtually no cutting action is achieved. If, on the other hand, the included angle *a* is less than 10°, the resulting razor blade tip is extremely weak and subject to failure. Further, the length of the converging surfaces of facets **14**, which form a nose portion, should be maintained as short as economically and/or structurally possible, to reduce shaving friction by presenting a minimal surface area to the skin and whiskers. In order to obtain a comfortable shave the maximum length *b* of the facets **14** should not exceed .002 inch, or otherwise an excessive frictional area is presented to the beard hairs resulting in undesirable irritation.

The length of the substantially parallel surfaces **18** along shank portion **20**, providing an effective relief area for the beard hairs, taken in conjunction with the length of the nose portion or point formed by facets **14** is critical for obtaining optimum shaving comfort. That is, shaving comfort is maximized by reducing the amount of drag or friction between the razor blade and the beard hairs during the actual cutting of the individual hairs. It has been found that the average thickness or diameter of a beard hair is between .004 and .006 inch, with about .005 being a median. Since our main criteria in devising a razor blade configuration for ultimate shaving comfort is to reduce the amount of razor blade surface area in contact with the beard hair as it is being cut, the blade length *c* as represented by the combined nose portion and shank between the cutting edge **16** and rear portion of the shank **20**, must not be less than the thickness of an average beard hair, or about .005 inch, so that the blade will pass entirely through the beard hair before the hair engages tapered surface **22** of the blade. That is, as the blade passes through a beard hair, facet **14** of minimal length is the only surface which engages the hair, since the parallel surfaced shank portion **20**, in effect, provides a relief area for the hair being cut, so that there is virtually no razor surface drag or friction created on the hair in the relief area.

Although the minimum blade length *c* between the cutting edge **16** and rear portion of shank **20** is about .005 inch, as determined by the size of the average beard hair, the maximum blade length *c* is determined by the thickness of the shank and the rigidity of the material utilized. We have found that when utilizing a glass blade with a shank thickness between parallel surfaces **18** of about .001 inch to about .0006 inch, the maximum blade length should preferably not exceed .01 inch in order to avoid an undesirable tendency of the blade length to flex and

thus bow one of the relief surfaces **18** into a friction surface. However, the maximum length which can be utilized without obtaining a flexing or bowing of the relief area will, of course, vary with the thickness of the shank and the material utilized.

The maximum thickness of the shank is limited by the fact that the facets **14** must not exceed .002 inch and must define an included angle between 10° and 35°. Accordingly, the maximum thickness of the shank is about .001 inch, since if made thicker, it would undesirably increase the length of the facets **14**. Although very small minimum shank thicknesses are theoretically possible, in the case of glass, we have found that a practical minimum from a strength standpoint is about .0006 inch, since the blade becomes fairly weak below this thickness. Again, it is conceivable that lesser thicknesses would be feasible with other materials.

The particular angle formed by tapered surfaces **22** is not critical to shaving comfort, since it begins at a point where the beard hair has already been severed by the cutting edge, and accordingly such surfaces may be formed with virtually any desired angular configuration.

Referring now to FIG. 2, a further embodiment of a razor blade construction is shown which is similar in many respects to that illustrated in FIG. 1. That is, a blade portion **10'** of a razor blade **12'** is shown having a sloped facet **14'**, cutting edge **16'**, a flat relief surface **18'**, and a tapered surface **22'**. Opposite facet **14'** is an extended facet **24**, which not only converges with facet **14'** to form cutting edge **16'**, but which also extends rearwardly at a substantially constant angle to join the body portion of the blade **12'**.

Blade portion **10'** is, in effect, one-half of blade portion **10**, with the parameters of angle *a'* and distances *b'* and *c'* being the same as those specified for angle *a* and distances *b* and *c*, respectively. The main difference between blade portion **10'** and blade portion **10** is the fact that either side of blade portion **10** may be presented to the skin for shaving since it has effective relief portions **18** on both sides thereof, whereas blade portion **10'** may only have one surface thereof presented to the skin for shaving since it only has one relief area surface **18'**. The main advantage derived from the configuration of blade portion **10'** is the fact that added rigidity and strength is obtained by increasing the thickness dimensions of the shank portion **20'**. Since the thickness of the shank portion **20'** is increased, the relief surface area **18'** may be slightly concave, if desired, as shown by the broken line in FIG. 2.



It should be appreciated that the invention disclosed herein is equally applicable to both single-ended and double-ended glass or metal razor blades. Although we have set forth the now preferred embodiments of our invention, it will be apparent to those skilled in the art that various changes and modifications may be made thereto without departing from the spirit and scope thereof as defined in the appended claims.

We claim:

**1.** An improved razor blade configuration comprising a main body portion, a pair of converging facets forming a cutting edge, said facets forming an included angle of between about 10° and 35°, one of said facets having a maximum length rearwardly of said cutting edge of .002 inch, a short relief area having a thickness less than said main body portion, one side of said relief area having a first surface communicating with said one facet and extending rearwardly thereof at an angle to a cross-sectional axis of said blade bisecting the included angle formed by said facets which is less than the angle to such axis formed by said one facet, a tapered surface communicating between said first surface and said main body portion at an angle to said axis which is greater than that formed thereto by said first surface, the other of said facets extending rearwardly at a substantially constant angle and communicating with said main body portion, and the combined length of said one facet and said relief area as measured along said cross-sectional axis having a maximum length of 0.1 inch.

**2.** An improved razor blade configuration as defined in claim **1** wherein said first surface forming one side of said relief area is substantially parallel to said cross-sectional axis.

**3.** An improved razor blade configuration as defined in claim **1** wherein said first surface is slightly concave.


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