April 12, 1955 R. R. LUNDY 2,705,834

SAFETY RAZOR BLADE

Filed Feb. 3, 1951

Fig. 1.

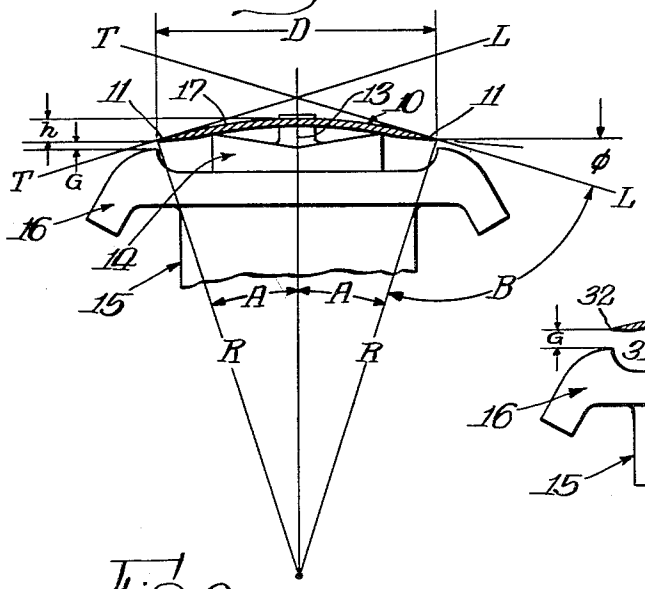


Fig. 4.

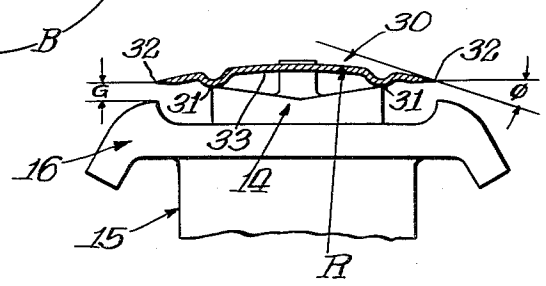


Fig. 2.

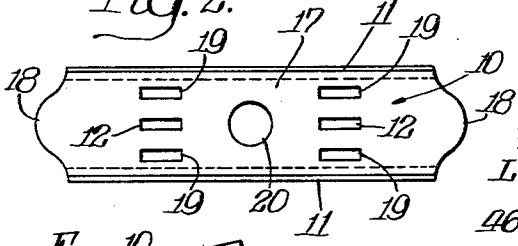


Fig. 5.

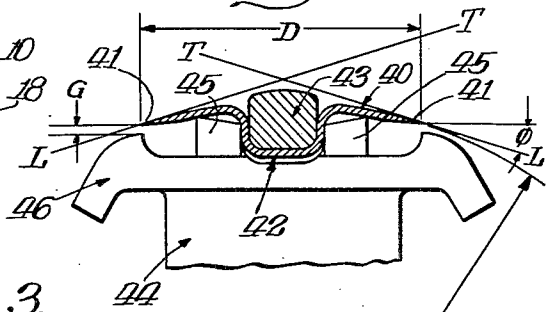
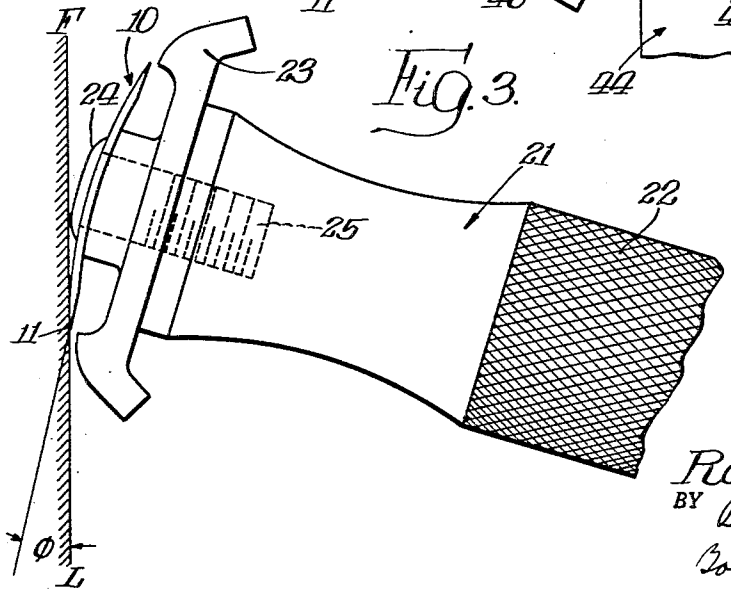


Fig. 3.



INVENTOR.
Robert R. Lundy,
BY Brown, Jackson,
Boettcher & Dienner
Attys.

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SAFETY RAZOR BLADE

Robert R. Lundy, South Bend, Ind.

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2 Claims. (Cl. 30—357)

My present invention is concerned with a new and improved disposable safety razor blade for use in safety razors or the like.

More particularly, my invention is directed to a new style of safety razor blade having a permanently formed transverse curvilinear configuration, and one of more sharpened longitudinal edges having one surface which lies coincident with the upper curvilinear surface of the blade, whereby it is possible to use such a blade in a suitable holder to gain a predetermined tangential relation between the surface to be shaved and the cutting edge of the blade, such resulting in an improved and efficient shaving action.

It is well recognized that a highly efficient and comfortable means for removing growing whiskers from an individual's face is obtainable with a straight razor. To gain the maximum shaving comfort and cleaning efficiency in operating such a straight razor, the skilled user holds the razor in a position such that the blade's cutting edge meets and severs the whiskers with a substantially transverse shearing action. With the blade in this position, the cutting edge thereof will ideally lie tangentially with the face line or surface to be shaved and the growing whiskers will be cropped off cleanly adjacent their point of exit from the skin with maximum ease and comfort.

It is also recognized that while commercially available safety razors may be more safe to operate, they are far less efficient and comfortable to shave with than a straight razor and give rise to much pulling and scraping in use which leads to unpleasant irritation of the facial tissues. This disadvantageous characteristic of presently available safety razors is primarily due to the fact that the face guard and blade clamping construction employed therein interferes with the position of the blade's cutting edge relative to the face line, or surface to be shaved, so that the cutting angle at which the blade edge is consequently held in normal operation by the user falls short of a tangential relationship with the surface to be shaved by approximately 15° or more. Further, depending on the clamping pressure exerted on the blade used in the presently familiar safety razor holder, the acuity of the angle which the blade's cutting edge forms with the surface to be shaved is variable, thus making for an uncertain and nonuniform cutting performance of the razor in day to day usage.

Consequently, I have invented a new and improved safety razor blade which can be mounted in a magnetic or mechanical style of holder to bring about a desired predetermined normal positioning of the cutting edge thereof tangentially in relation to the surface to be shaved, much as is possible with a straight razor. To gain this desirable end, I have provided a substantially rectangular thin metal blade with a permanently preformed transverse curvilinear configuration, that of a substantially circular arc being preferred, and have formed longitudinally extending, lateral cutting edges thereon, in such a manner that the upper surfaces of the cutting edges are adapted to lie tangentially to the face line, or surface to be shaved, in normal shaving usage of my blade, whereby I gain an efficient and improved cutting action.

One of the main objects of my invention is to set forth the features of a disposable safety razor blade having a permanently formed transverse curvilinear configuration, whereby it is possible to position lateral cutting edges thereof in tangential relation to the surface to be shaved.

Another important object of my invention is to describe the features of a new and improved transversely curved safety razor blade which is adapted, in normal operation,

when mounted in a suitable holder therefor, to present a cutting edge in tangential disposition with the surface to be shaved, thereby to bring about an efficient transverse shearing or cutting of the whiskers protruding from said surface.

Another object of my invention is to display a disposable safety razor blade having a predetermined transverse curvilinear configuration and laterally disposed longitudinal cutting edges which have the upper surface thereof coincident with the upper curved surface of the blade, whereby the acuity which the cutting edges form with the face line, or surface to be shaved, is fixed in a predetermined relation when the blade is held in its most efficient cutting position in a suitable holder.

The above and further objects and features of my invention will be recognized by one familiar with the art from the following explanatory specifications and detailed description, and with reference to the accompanying drawings.

In the drawings:

Figure 1 is an end elevational view of a safety razor blade, made in accordance with the teachings of my invention, showing one form of the curved configuration therefor and its mounted position on a magnetic style of holder, with the razor blade being shown in cross section and the illustrative holder therefor in partial end elevation;

Figure 2 is a top plan view of the blade illustrated in Figure 1, showing the locating means utilized therein for positioning my blade on either a magnetic or mechanical style of holder therefor;

Figure 3 is an end elevational view demonstrating the mounted condition of my blade shown in Figure 1, as such will appear in a mounted position on a conventional mechanical style of holder;

Figure 4 is an end elevational view, similar to Figure 1, illustrating a modified form of my blade and its mounted relation to a magnetic style of holder, with the holder therein being illustrated in partial elevation; and

Figure 5 is an end elevational view, similar to Figures 1 and 4, illustrating a still further modified form of my preformed blade especially adapted for mounting with a mechanical or magnetic style of holder which has an overlying clamping bar for holding the blade tightly to the head of the holder.

Referring now to Figures 1 and 2 of the drawings, it will be recognized that I propose to gain the unique advantages of my invention with a safety razor blade **10**, illustrated therein, having a substantially concavo-convex curvilinear transverse body cross section, that of a circular ring sector being preferred, as illustrated, whereby I am enabled to gain the particular improvement of my blade over those presently available on the market by the formation of laterally disposed longitudinal cutting edges **11**; such edges defining a line of tangent contact when the upper curved surface of my blade, adjacent said edges, is placed in tangential relation with a surface to be shaved. The blade, as illustrated in Figure 1, may be made from a section of previously formed curved stock of a desired transverse curvature or from solid metal bar stock formed, as by grinding or similar operation; to a substantially concavo-convex transverse curvature. The blade **10** is preferably of a cross sectional thickness, in the nature of .004 inch, although thicknesses greater than this value are satisfactory as well.

Suitable apertures **12**, **12** are located on the longitudinal center line of the blade **10** for the reception therein of thrust prongs **13** associated with a magnet **14** in a magnetic holder and guard **15**, as illustrated. As further illustrated in Figure 1, the magnet of the holder **15** is so designed that the blade **10** therein rests along longitudinal parallel lines of contact only, which makes for easier removal of the blade from the magnet **14**.

In the preferred form **10** of my blade, as illustrated, I have found that an overall width D of .427 inch is entirely satisfactory, with the blade having an external radius R of .7302 inch and an overall vertical height *h* of substantially .032 inch, although again other values for these dimensions may serve equally as well. Opposite lateral edges of the blade **10** are sharpened outwardly from the imaginary center line of the blade, preferably on the underside only, to form sharp lateral cutting edges

therefor, with an included cutting edge angle ϕ of substantially 17° being found most satisfactory in use. I have further found that with a blade of this style mounted on the holder **15**, as illustrated in Figure 1, a height G of .014 inch above the upper edge of the face guard **16** thereof is entirely satisfactory in permitting tangential cutting in the user's beard, as I propose. With the blade placed so that either of the cutting edges **11** thereof lies tangentially of a theoretical planar face line F—L, as illustrated in Figure 3, I find that extremely satisfactory shaving conditions are gained with the blade serving to crop off the beard close to the face line with a substantially transverse shearing action of the individual whiskers. It will be observed, from Figure 1, that there is no obstruction between the upper surface **17** of the blade **10** and the face line to interfere with the tangential positioning of the blade relative to line F—L. This latter feature is especially possible with a magnetic style of holder, as partially illustrated in Figure 1, although the familiar three piece mechanical style of holder may be adapted for the same purpose as illustrated in Figure 3, which will be described more fully later herein.

It further will be observed from Figure 1 that the blade is formed symmetrically of a vertical center line thereof, with the minor central angles A of the blade subtending approximately 17°. When a blade is made in the proportions as set forth above, it is then possible for its cutting edges **11** to lie tangentially of the theoretical face line F—L, with angles B measured between a radial line passing through the center of the radius of blade curvature R and the outer edge of the cutting edges **11** and a theoretical line designated T—L, which passes tangentially to the upper surface of the blade, at the lateral limit thereof, to be geometrically 90° as is desired for the tangential cutting relationship with surface of line F—L. In the act of shaving, when the tangential line T—L coincides with the theoretical face line F—L, an ideal tangential positioning of the leading edge of the blade cutting edge **11** will exist so that protruding whiskers may be sheared along the line F—L with a transverse shearing action, as is accomplished with a straight razor. It is very important, for the maintenance of this tangential cutting condition, that all parts of the blade and all parts of the holder therefor do not protrude above the intersection of the theoretical tangential lines T—L passing tangentially of the upper surface of the blade through the lateral limits of the cutting edges thereof, as shown in Figure 1. Further, although the included cutting angle ϕ for the cutting edges **11** of blade **10** have been specified above as 17°, I have found that a variance of such included cutting angle ϕ may be made between the limits of 9° to 17° with 12° being a suitable average.

As will be recognized from Figure 2 of the drawings, the blade **10** is provided with a substantially rectangular profile and protruding ends **18** to assist the user in removing the blade quickly from the magnetic style of holder, such as is illustrated in Figure 1. It further will be observed that a series of locating apertures **12, 12** and **19, 19** have been formed through the blade, with apertures **12, 12**, which are located on the theoretical longitudinal center line of the blade, being utilized to receive the locating thrust prongs **13** in the magnetic style of holder, illustrated in Figure 1. A central circular aperture **20** is also provided for adapting this blade to be mounted on a familiar mechanical style of holder of the three-piece variety, as is illustrated in Figure 3. A study of Figure 3 will demonstrate that the holder **21** therein illustrated is comprised essentially of a holding handle member **22**, a face guard **23**, and an upper clamping plate **24** adapted to be held to the handle and face guard by means of an attached central screw member **25**, all in a conventional manner. It is worthy to note, however, that in adapting such a mechanical holder **21** for use with my blade **10**, the armature or clamp plate **24** thereof has been narrowed somewhat over its familiar appearance, and is maintained extremely thin so that there will be no interference or protrusion of any part of the holder or blade above the intersection of the theoretical tangential lines T—L, as shown in Figure 1, thus eliminating interference with the positioning of the cutting edges **11** of the blade tangentially to the face line F—L in use.

In Figure 4, I have illustrated one modified type **30** of my preformed blade, which is similar in all respects

to the blade **10** illustrated in Figures 1 and 2, with the exception of the provision thereon of a pair of spaced apart, longitudinal, downwardly protruding, reentrantly formed ribs **31, 31** positioned adjacent and spaced slightly inwardly of the lateral cutting edges **32, 32** thereof. The cutting edges are formed with an included cutting angle ϕ, as before, with blade **10**. It further will be observed that the ribs extend downwardly from the lower surface **33** of the blade **30** of this figure; such being adapted to rest upon the upper edges of the magnet **14**, associated with a magnetic style of holder **15** similar to that illustrated in Figure 1. By this expedient, I am enabled to vary the dimension G, whereby the positioning of the cutting edges above the face guard **16** of the holder may be regulated as determined by the downward extent of the rib members **31** of the blade. Distance G may likewise be varied by the value of the radius R of the blade curvature, whereby a flatter blade will increase dimension G and conversely a blade of smaller curvature will decrease dimension G, to meet various conditions of the user's beard, such as resiliency and toughness for gaining optimum cutting action with a blade of the type herein described. In this connection, I have found that the dimension G, if lying within the limits of .014 to .032, should meet most conditions of beard toughness and resiliency to bring forth a satisfactory cutting action in accordance with the teachings of my invention. The blade **30**, as illustrated in Figure 4, of course, is especially designed for use with the magnetic style of holder, although its utilization in a mechanical three-piece style holder, as illustrated in Figure 3, is likewise possible.

Still another modified form of my blade is illustrated by blade **40** in Figure 5, which is adapted for use with magnetic or mechanical styles of holders, but particularly the latter, as will be described. A blade of this type is again formed with the radius of curvature R and laterally disposed longitudinal cutting edges **41, 41** having included angles ϕ, in accordance with the teachings as set forth in connection with blade **10** illustrated in Figure 1. Because of the difficulty of maintaining of minimum protuberance above the upper surface of a blade **10**, as illustrated in Figure 1, when mounting such in a mechanical style of holder **21**, as shown in Figure 3, I have provided my modified blade **40** with a central downwardly projecting, reentrantly bent, longitudinal channel **42** disposed centrally thereof, so that the blade is symmetrically formed on either side of a theoretical longitudinal center line, giving rise to two separated curvilinear areas of radius R. It will be recognized that curvilinear portions of the blade **40**, adjacent the cutting edges **41** thereof, are maintained at a desired predetermined curvilinear concavo-convex configuration, whereby I accomplish a tangential cutting action with this blade, as described heretofore. The provision of the central downwardly extending longitudinal channel, however, permits the use of a heavy clamping bar **43** to mechanically hold the blade in position on the head of a holder **44**, as illustrated. This blade is likewise adapted for use with a magnetic style holder similar to **21**, as illustrated in Figures 1 and 4, with the heavy clamping bar and central reentrant formation of the blade serving to locate the blade in a fixed position on the holder, between upwardly extending, spaced apart members **45, 45**, which may be magnets, thereby to gain a more positive holding action for the blade. With a blade of this type, the dimension G or distance between the face guard **46** and the cutting edge **41** of the blade may be varied by changing the downward extending dimensions of the b'ade's central channel member **42**, as will be recognized from Figure 5 of the drawings. Tangential cutting action is again gained with this modified form of my blade as described heretofore, with the maximum shaving comfort and ease of shearing or cropping off the protruding whiskers by a transverse shearing action occurring when the tangent line T—L, passing tangentially to the upper surface of the blade and through a lateral cutting edge thereof, coincides with the theoretical face line F—L, as with the blades illustrated in Figures 1 through 4 of the drawings.

Having thus set forth the detailed features and specifications of three forms of blade coming within the teaching's of my invention, it will be recognized that all three of the blades described are commonly characterized by a permanent curvilinear transverse configura-

tion which may be accomplished by the utilization of rolled metal stock, meeting the specifications of curvature I have herein set forth, or may be manufactured into such shape by suitable grinding operations or the like. It further will be recognized that the various specifications and dimensional limits set forth herein are for illustrative purposes only, although such are to be preferred as being satisfactory in use. Also, while I have herein described my invention as being particularly adapted for use with a magnetic style of holder, thereby to prevent interference above the blade between the holder and the face line of the user so that my tangential cutting relation is obtainable, my blades are also adapted for mounting in a conventional mechanical style of holder of the three piece variety, or as modified, as illustrated in Figures 3 and 5. In this latter connection, it should be recognized that ordinarily a mechanical holder of the conventional three piece variety is adapted for use with a flat style of flexible and disposable safety razor blade distinguished by a V-shaped cutting edge. With such a conventional mechanical holder, utilizing the present commercially available safety razor blades, the blades are normally clamped into a curved condition by the tightening of the handle member with the upper clamping plate thereof, thereby to secure the blade in its final mounted position preparatory to shaving. Due to the fact that a variation of the tightening of the clamping means causes a corresponding variation in the temporary curvature imparted to the blade mounted in such a holder, it is immediately recognizable that the dimension G, or that distance between the cutting edge of the blade and the face guard, and consequently the cutting angle at which the blade's edge meets the user's face, is subject to variance in day to day use unless one is extremely careful in mounting the blade. When so used, the usual cutting angle obtained with such a flat blade and mechanical style of holder is in the neighborhood of 25° with the theoretical line of tangency, as defined herein, falling short of a coincident condition with the theoretical face line of the user by as much as 10° to 15°, depending on the amount of clamping action exerted by the holder and the angularity of the V-shaped cutting edge formed on the blade. Also, due to the fact that the clamp plate in this conventional style of holder is required to be of substantial dimensions thereby to firmly clamp and curve the blade to its cutting position, it is generally impossible for one to shave with such a razor so that the cutting edge of the blade lies tangentially to the theoretical face line; this because the clamp plate, which lies between the upper surface of the blade and the face line of the user, normally interferes with the positioning of the blade to reach such a condition. I have found, as a general rule, that the more acute the cutting angle of the blade the more comfortable and efficient is the shaving quality and vice versa. With the blades as I have herein set forth, it will be recognized that the cutting angle, or angle between the lower surface of the cutting edge and the theoretical face line, or the surface to be shaved, when the holder is in its optimum operating position, is exactly equal to the angular acuity of the cutting edge of my blade much as in a straight razor. In contrast, the conventional style of safety razor blade, as used in the familiar three part mechanical holder, permits a cutting angle generally much larger than the blade's cutting edge angle ϕ because of the inability of the user of the conventional razor to bring the upper surface of the blade into tangential relation with the theoretical face line. As stated previously, I prefer that the cutting angle, or the included angle ϕ of the cutting edge of a blade, made in accordance with the teachings of my invention, to lie within the range of 9° to 17° which makes for a very sharp and efficient cutting angle resulting in maximum comfort and lack of scraping in shaving with my blade. By way of contrast, a conventional blade and holder normally gives rise to a cutting angle in the neighborhood of 25°; such being obviously of a greater acuity than that which is possible with my blade which results in a duller cutting edge and a resultingly more painful and less efficient cutting action of the blade in use. Further, because of the permanent inert curved form adjacent the cutting edges of my blade, such preferably being that of a circular ring sector, the tangential cutting relation referred to and described above is guaranteed with my blade, whereby an unobstructed tangential shaving path is presented. Additionally, the preformed static shape of my blade and the several modifications as described herein, permits the establishment of predetermined and definite heights between the cutting edge of the blade and the upper surface of the face guard of the holder to meet various conditions of beard toughness and resiliency, depending on the fixed design and dimensions of the blade with such height being independent of the clamping or holding action of the holder, be such a magnetic or mechanical type.

In light of the above advantages and features of my invention, it readily will be recognized that I have herein taught the features of a new and improved disposable safety razor blade giving rise to a style of shaving heretofore unpractised in the safety razor art. Also, while I have herein described and illustrated various forms and modifications in which the teachings of my invention may appear, it will be appreciated that the detailed specifications and limitations herein presented are for illustrative purposes only and are not intended in any way to limit the spirit and scope of this invention to the specific embodiments herein illustrated since obviously various changes, modifications and substitutions of equivalents may be made therein without departing from the sense of my invention. Consequently, I do not wish to be limited to the specific illustrations herein described other than as may appear in the following appended claims.

I claim:

1. A disposable metal safety razor blade of the class described comprising, a substantially rectangular body section, a pair of laterally spaced longitudinal cutting edges formed along the lateral limits of said body section, said body being formed with a permanent transverse concavo-convex curvilinear portion adjacent each of said cutting edges, and a geometrically central, longitudinally extending, inwardly offset channel section interconnecting said blade's two separated concavo-convex curvilinear portions, said longitudinal channel serving to vertically space said cutting edges from the head of a holder for said blade and providing a recessed space for receiving a clamping means of said holder radially inward of the convex face contacting surfaces of said blade.

2. A safety razor blade as set forth in claim 1 wherein said cutting edges thereof each have one curved surface coinciding with the convex surface of one of said adjacent concave-convex blade portions, and a second planar surface intersecting said curved surface thereof to include an acute cutting edge angle therebetween thereby to afford tangential contact between said edges and a surface to be shaved.

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