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The present invention relates to improvements in the circular razor art. The specification provides a detailed description of a novel concept in circular razors including a blade which is extremely thin, yet completely safe to package and handle in and out of the razor. Also disclosed are certain razor constructions which complement the blades herein described and permit of their efficient use and storage.

More specifically, the blades of the present invention comprise a series of arcuate segments, the inner radial edge of which is sharpened to provide the shaving edge, thereby permitting safe handling of the blade by its outer edge without concern for cuts or nicks. The segments are extremely thin and flexible, and are supported by very thin, integrally formed, spans and bridges which hold the segments in proper alignment and maintain them as a coordinated shaving unit. The razors are especially useful with the blades of the present invention in that they permit complete and unencumbered control of the shaving edges to a proper shaving angle for use in the most delicate of areas, and at the same time permit easy storage of the blade by moving the sharpened surface to a safe position during nonuse. Thus, there is no chance of becoming nicked or cut by the razor either in use or when in storage.

The present invention relates to a new circular razor blade having an inner angular cutting edge adapted especially, although not exclusively, for use by women in shaving delicate areas such as legs and underarms.

This is a continuation-in-part of my copending application Ser. No. 417,988 filed Dec. 14, 1964, now abandoned, for Circular Safety Razor. Circular razors of the type to which the present invention relates are illustrated generally by my previous Patents 2,556,208, 2,598,711 and 2,632,242. Since making the inventions disclosed in these patents, I have discovered a superior blade and circular shaving apparatus. The present invention has as one of its objects the provision of a circular type safety razor having both a blade and a holder portion which is simplified in its manufacture, storage and handling.

It is another object of the present invention to provide an improved circular blade which is completely safe to handle for packaging purposes, as well as from the standpoint of removal from the package and placement in the razor, and subsequent removal from the razor and disposal.

Still another object is to provide a circular blade which may be readily manufactured in a variety of sizes including very small diameters for shaving delicate areas.

It is another, and still further object of the present invention to provide a razor for use in conjunction with the circular blade of the present invention which is adapted to hold the blade securely and to permit its efficient use, ready cleaning and replacement.

These and other objects and advantages will become apparent from the reading of the following detailed description taken in connection with the appended drawings wherein:

FIGURE 1 is a side elevation, shown in section, of a new circular razor embodying the present invention;

FIGURES 2, 3 and 4 are enlarged partial sections of FIGURE 1, showing the blade adjusted between a safety position, and a position of optimum blade angle for heavy duty shaving;

FIGURE 5 is a partial plan view of FIGURE 1 showing the construction of the razor of FIGURE 1;

FIGURE 6 illustrates a ribbon of blade material particularly formed during the manufacture of the improved blade of the present invention;

FIGURE 7 illustrates one form of the blade adapted for use in the razor of FIGURE 1; FIGURE 8 is a modified blade construction embodying the present invention;

FIGURE 9 is a view similar to FIGURES 7 and 8 illustrating still another form of the blade embodying the present invention;

FIGURE 10 is a side elevation similar to that of FIGURE 1, and adapted for use with the blade of FIGURE 9, the blade being illustrated in its storage position;

FIGURE 11 is an enlarged perspective of the blade mounting ring which forms a part of the razor illustrated in FIGURE 10; and

FIGURE 12 is an enlarged and fragmented view of a portion of the sectioned razor of FIGURE 10, illustrating the relationship of blade and razor in the shaving position.

With particular reference now to FIGURE 1, there is illustrated a circular razor indicated generally by the identifying character 15. It will be apparent that the razor is of the type generally used with a wet lather. However, it is an additional feature of the invention that it may be safely used for dry shaving when convenient. It will be understood that at least the blade of the present invention has utility with an electric or power driven shaver of the general type set forth in my Patent 2,556,208. The razor, in the exemplary form illustrated, comprises a holder member 17 having a centrally disposed outwardly projecting handle 19, either formed integrally therewith, or fitted thereto in some suitable fashion. The holder 17 is provided with an upstanding support blade flange 22, the outer peripheral wall 23 of which is provided with threads 24.

A complementary collar member 27 is provided, and is adapted to be screwed onto the flange 22 by means of the threads 29 formed internally on the side wall 28 of the collar. The collar may be formed of plastic, metal, or any other suitable material which lends itself to the use for which it is intended here. The crown of the collar wall is rounded as at 31, and forms a projection 32 extending inwardly from the wall of the collar. The rounded portion 31 is highly finished and smooth so that it will glide smoothly over the surface being shaved.

In keeping with the invention, a generally planar, highly flexible circular blade is provided for use with the razor 15. Such a blade is illustrated in FIGURE 7 where it is
identified generally by the character 40. As will be seen, the blade 40 is susceptible of manufacture in mass from a ribbon of material, preferably thin, flexible stainless steel, and such a ribbon is shown in FIGURE 6 indicated generally at 45.

In accordance with another aspect of the invention, the blade 40, that is adapted to be fitted snugly into the collar 27 which is provided with a short inwardly turned surface 50 defined by the projection 32. The surface 50 terminates in a sharp corner at 52 where the surface 50 engages the internal face of the wall 28 of the collar.

It is contemplated that the blade will be secured on the surface 50 by the manufacturer, and the collar and blade sold as a unit. It will be appreciated that the blade is susceptible of manufacture and sale exclusive of the collar which may, itself, be a permanent part of the razor per se.

In order that there may be optimum safety in handling the razor with a blade in it, when not intended for immediate shaving use, a guard pillar, indicated generally by the numeral 55 is provided, centrally disposed within the holder 17 and concentric with the blade. Referring to FIGURES 1 and 5 in particular, the guard pillar is provided with a central locating pin 57 which may be fastened within the handle 19 of the holder in any convenient manner. The pin is suitably formed with supports and a generally transverse flat web or disc 59 which terminates in an upstanding flange portion 61. The external peripheral face of the flange portion is serrated as at 63 for the purposes of providing a plurality of flow holes.

The height of the guard pillar is such that with the blade inserted in the collar, and the collar and holder screwed together, the guard pillar initially projects slightly above the cutting edge of the blade. To this end, also, the serrated portion 63 by which the upstanding flange 61 is chamfered, so that the sharpened edge of the blade will reside below, and spaced slightly from the top of the guard so as not to damage the edge.

Referring now more specifically to the blade, in order to permit its manufacture and handling in a relatively flat form, while at the same time being able to provide a blade with an adjustable angle for varying shaving conditions, the blade 40 is provided with an internal highly sharpened edge 70 which is divided into a plurality of arcuate segments 73. Each segment is supported by an external, flat ring portion 75 by means of, in the instance of the blade of FIGURE 7, two suitably spaced spanner portions 77 and 78. In the case of the blade 80 of FIGURE 8, there is provided an internal sharpened edge 82, and the blade is divided into arcuate segments 84, each of which is supported on an external ring 86 by means of a single span 88. The number of segments, of course, may be varied, but it has been found that 8 or 16 segments works quite well. Also, the width of the span, as well as the thickness of the arcuate segment may be varied depending upon the size of the razor and its intended use. It has been found that by employing the blade construction of the present invention, any convenient blade size may be readily manufactured. It will be remembered that because the blade is manufactured from resilient stainless steel, the spanners are highly resilient, and act as biasing members for the arcuate segments as will be described.

Referring now specifically to FIGURES 2, 3 and 4, the cooperation between the blade of the invention and the razor is illustrated. In order to provide a suitable guide for fine adjustment of the blade angle, the flange portion 22 of the holder is provided with a chamfered portion 24 which forms a guide surface 91 which serves as a guide and support for the blade in use. Referring specifically to FIGURE 2, the safety position of the razor is indicated, and there it will be seen that the sharpened edge of the blade, which will be presumed to be that of the configuration of FIGURE 7, is at rest on the chamfered portion of the serrated edge 63 of the guard pillar 55. The blade is supported on its underside by the apex 93 of the chamfered support surface 91. It will be noted that the apex 93 bears against the underside of one of the segmented sections 73, and will remain in contact with the segmented section. The outer ring 75 of the blade is supported, as previously noted, in a socket provided between the surface 50 of the collar and the inner section of the internal wall of the collar 27.

In keeping with the invention, adjustment of the blade angle is accomplished as the collar 27 is rotated relative to the holder 17. Referring to FIGURE 3, and presuming the normal right-hand thread, clockwise rotation of the collar 27 and the blade attached to it relative to the holder will result in the advancement of the collar onto the holder in the direction indicated by the arrow A (FIG. 3). As a result, the apex 93 of the flange 22 will be brought to bear heavily on the underside of the segment 73 of the blade 40. Because the spans 77 and 78 are relatively narrow, and because the material is resilient, the segment will be biased in a curved fashion indicated in FIGURE 3, upwardly and away from the serration 63 of the guard, thereby exposing the sharpened portion 70 of the blade to the surface to be shaved. Further advancement of the collar 27 will result in increasing the blade angle to a position indicated generally in FIGURE 4 which represents a blade angle of approximately 30 degrees. Because of the action of the biasing spanners which urge the segments against the guide at all times, a uniform blade angle is achieved all the way around even though the blade segments are otherwise independent of one another. Thus, the blade angle may be adjusted to taste, and with an absolute minimum of effort and handling of the razor or the blade. The close, converging and extremely thin blades may be manufactured or whichever it is proper, and the holder, are capable of functioning as extremely fine shaving instruments.

Accordingly, and in keeping with the objective of making an extremely flexible, yet strong blade, capable of a high degree of control in terms of the position of the shaving edge, a blade is provided which is illustrated in FIGURE 9 wherein the sharpened surface has a minimum of support and a high degree of flexibility.

More specifically, a blade 125 is provided having a series of closely spaced sharpened arcuate segments 127. The inner peripheral surface 129 of each second segment is sharpened to a fine cutting edge and the surfaces together define the inner diameter of the blade as seen in FIGURE 9. It will be appreciated that while 8 segments are shown, any number of appropriate segments might be used without departure from the invention.

Each segment is maintained in proper alignment by means of spans 132, preferably formed integrally with and extending outwardly from each segment near the terminal end thereof. Spans 132 extend radially outwardly, and adjacent spans on adjacent segments are joined by an integrally formed bridge 134. In the illustrated case, two spans extend from each sharpened segment and are joined by a bridge 134, thereby holding all of the segments in proper alignment while at the same time providing strength and rigidity as well as uniformity of control between the segments.
Referring now to the razor construction, the circular holder illustrated in FIGURE 1 is similar in construction to that of FIGURE 10. Thus, a handle 136 is provided with a finger gripping area 138 which terminates in a support blade 125, and thereby position the cutting edge 169 of the blade at the proper cutting angle, the ring or collar 146 is formed with an inturned flange portion 171 which overlays the bridges 134 of the blade 125, and a portion of the spans 132. As will be seen in FIGURE 12, downward movement of the ring 146 causes pressure to be applied against the bridges 134, distorting the supporting portion of the blade, and causing an upward tipping movement of the arcuate segments 127. The outer diametral edge 173 of the arcuate segments, when the same are in a proper shaving position abuts the inner surface of the wall 155 at a point 175 illustrated in FIGURE 12. In this manner, the blade is securely clamped between the inturned flange 171 and the teeth 157 on the holder element of FIGURE 11. The sidewalk 155, and the depths of the notches defined between the teeth 157 on the element 153 are such that the shaving edge 169 will reside at the proper shaving angle with respect to the pillar guard 148 as illustrated in FIGURE 12. In this illustrated position, the razor is ready for use. The upper surfaces of the teeth are polished so as to ride smoothly over the skin surface.

On completion of the shaving, the razor is simply reversed under a faucet where water, for cleaning purposes, may be forced through suitable openings 100 provided in the saddle 167. As will be seen, the ring is provided with an inturned flange portion 171 which overlays the bridges 134 of the blade 125, and a portion of the spans extending between said segments and said support ring for holding the former with respect to the latter.

I claim as my invention:

1. A safety razor comprising, in combination, a generally circular holder member having a handle protruding therefrom, an upward support flange on said holder member, said flange being formed with external threads, a collar adapted to screw onto said flange, a centrally disposed guard pillar having a chamfered surface located radially inwardly from said collar, a generally planar blade member comprising a series of spaced arcuate segments, adapted to be positioned between said collar and said flange, the inner peripheral edge of each said segment being sharpened, and such sharpened edges defining a substantially continuous outline, means outwardly of said segment for interconnecting said segments whereby to hold such segments together relative to one another and define a unitary circular blade formed from a unitary blank, a series of spaced slots, surrounding said segments, formed by said segments and interconnecting means, a circular means mounted in said holder for supporting and holding said blade in position between said collar and said guard pillar, said last-mentioned means having teeth adapted to engage in said slots, said collar means adapted to bear against said segment interconnecting means so that when said collar is screwed on said flange, each segment is urged upwardly to a predetermined shaving angle.
4. The blade as set forth in claim 2 wherein said interconnecting means comprises a series of spans extending radially outwardly from said segments, spans of adjacent segments being interconnected by a bridge integrally formed therewith.

5. The blade as set forth in claim 2 wherein said spans and bridges together define a series of slots.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,465,436
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It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, between lines 36 and 37, insert

While the invention is susceptible of various modifications and alternative constructions, certain illustrative embodiments are shown in the drawings and will be described below in considerable detail.

Signed and sealed this 26th day of May 1970.

(SEAL)
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