My invention contemplates the provision of a flexible safety razor blade, offering little resistance to bending, and wherein the stress put upon the blade when it is flexed, intentionally or inadvertently, is minimized by the removal of a large amount of material at the points resistant to such stress, to prevent the blade from cracking and breaking. The adjustment of my blade for fine or coarse shaving in a holder of the Gillette type is readily accomplished without material pressure on the blade, and the blade, when inadvertently clamped in the wrong position, flexes so easily that breaking thereof is avoided.

My invention further contemplates disposing a minimum amount of material between the cutting edges of the blade, whereby not only is the resistance to the flexing of the blade lowered to a minimum, but a minimum amount of material joins the cutting edges and conducts heat so rapidly that the expansion and contraction thereof cannot cause the blade to break under rapid changes in temperature.

My invention further contemplates the provision of a holder so shaped as to readily position my improved blades for proper shaving, and to protect and brace the comparatively narrow ends of the blades against possible damage.

My invention further contemplates the provision of a holder designed to fit into the cut away parts of the blade and to brace the blade intermediate its ends against possible distortion during its assembly into the holder and during the shaving operation.

The various objects of my invention will be clear from the description which follows, and from the drawings, in which Figs. 1 to 10 inclusive are elevational views of various forms of double edged flexible wafer safety razor blades made in accordance with my invention.

Fig. 11 is a cross-section of the blade, taken on the line 11—11 of Fig. 1, and applies substantially to Figs. 2 to 10 inclusive as well as to Fig. 1.

Fig. 12 is a front elevation and partial section of my improved razor or holder adapted to be used in connection with my improved blades.

Fig. 13 is a perspective view of the clamping member of my improved razor, showing a typical form of projection or lug adapted to fit blades slotted in various designs.

Fig. 14 is a similar view of the guard of my improved razor, showing the depression therein for the reception of the lug of the clamping member.

Fig. 15 is a bottom plan view of the clamping member shown in Fig. 13.

Fig. 16 is a vertical section of the same, taken on the line 16—16 of Fig. 15.

Fig. 17 is a top plan view of the guard member illustrated in Fig. 14.

Fig. 18 is a vertical section of the same, taken on the line 18—18 of Fig. 17.

Fig. 19 is a bottom plan view of a modified form of the clamping member, wherein the projecting lug and the blade adapted to fit therein are differently shaped for protecting the blade ends.

Fig. 20 is a similar view of the same but showing a modified form of the blade end, and of the corresponding blade protecting part of the clamping member.

Fig. 21 is a vertical section, taken on the line 21—21 of Fig. 19, showing particularly, how the end of the blade is enclosed and protected.

Fig. 22 is a perspective view of a part of a modified form of the guard member showing a depression therein for the reception of a modified form of lug or projection on the clamping member, and showing an upwardly projecting and comparatively thick lug adapted to pass completely through the blade.

Fig. 23 is a perspective view of a clamping member provided with projections designed to fit a blade having an end shaped as in Fig. 19, and

Fig. 24 is a perspective view of a modified form of guard member adapted to cooperate with the clamping member of Fig. 23 to enclose the end of the blade.

In that practical embodiment of my invention which I have illustrated by way of example, Figs. 1 to 10 inclusive and Figs. 19 and 20 illustrate typical forms of my improved blade. In each case, the blade is provided with two opposed and
parallel shaving edges. The blade is of the usual wafer material, spring tempered throughout and has a substantial area thereof removed to form slots, openings or apertures of various shapes, said removed area being in most cases, at least one third of the remaining area of the blade. In all of said forms, however, the slots or apertures are symmetrical about a longitudinal center line of the blade.

As shown in Fig. 1, the ends of the blade terminate at its ends in straight portions extending from the edges thereof and at right angles thereto inwardly and joined by the arcuate portions. The slot consists of a central portion 15 of sufficient width to remove that area of the blade which would have the greatest curvature and be subjected to the greatest strain when it is inserted into a suitable holder of the Gillette type and flexed into shaving position.

The end portions 16 of the slot each consist of an arcuate end 17, substantially parallel to the arcuate end 18 of the blade and of tapered edges 19 converging inwardly towards each other and joining the narrowing or constricted slot portions 19 to the transversely elongated portions 20 of the slots 16. There is left at the end of the blade, a band or ribbon 21, preferably of uniform width, which joins the blade portion 22 (including the shaving edge 23) to the similar blade portion 25 including the opposite shaving edge. It will be seen that the portions 22 and 25 are connected only by the narrow bands 18 at the ends, said bands being integral with the remainder of the blade. It will also be seen that the slot portion 15 may engage the central threaded stud of a Gillette type razor, while the ends of the tapered portions 16 may engage the positioning stud of such a razor, and the constricted portions 19 may engage a narrow lug of a clamping member at at least four points. It will further be seen that the extreme ends of the slot ends 17 extend at least up to or beyond the blade ends 1.

In arranging the blade 10 in a holder therefore, the lugs of any Gillette type razor or suitable lugs of any desired shape, such as will be further described in connection with my improved clamping member, may be passed through the slot 16 to position the blade wherever a suitably shaped guard or any Gillette type guard and handle may be assembled with the clamping member.

Little pressure need be put on the blade to flex it into the proper shaving position since the bands 12 offer little resistance to such flexing.

Similarly, the razor handle may be readily turned for adjusting the holder for fine or coarse shaving with ease, rapidity and accuracy due to the lack of material resistance offered by the blade.

Should the blade be subjected to sudden changes in temperature, the bands 13 being comparatively narrow, thin and long, conduct heat and expand and contract rapidly, without danger of cracking or splitting.

As shown in Fig. 2, the blade 20 is provided with a somewhat differently shaped slot 31 wherein the central portion 32 is arcuate to receive the central stud of a typical Gillette razor. The central portion 32 extends from the blade 20 in a straight end 33 parallel to the similarly shaped end 35 of the blade while the tapered sides 30 join the end 34 of the slot to the constricted slot portions 31. Said portions 37 in turn connect the central portion 33 to the end portion 35.

It will be seen that the blade 20 has a substantial portion thereof cut away to provide the blade portions 22 and 25 joined by the bands 13, as in that form of my improved blade shown in Fig. 1, and that the slot may fit Gillette type razors of the separated stud or bar lug type.

Similarly, the blade 40 of Fig. 3 has ends 42 shaped similarly to the ends of the blade 30 but the slot 41 thereof is of somewhat different shape. The central portion 42 of the slot, instead of being made circular as in the blade 30, is made of substantially square outline but is also adapted to receive a typical central stud of the Gillette type of razor. For the tapered sides 43 and 15 of the blades 30 and 40 respectively, I have substituted the reversely curved edge 42 which allows a larger portion of the material of the blade to be removed, while allowing engagement with separated studs or bar lugs of razors of the Gillette type.

As shown in Fig. 4, the blade 55 is provided with ends having the arcuate portion 46 and the right angle recessed corners 56. While the slot 47 of this blade may have its ends parallel to the arcuate edges 44, but as illustrated the ends 48 of the slot are arranged at substantially right angles to the shaving edges so that the connecting bands 43 which join the blade portions 22 and 25 at bands 23 and 24 are widest along the longitudinal center line of the blade. The intermediate portion of the slot 47 is reversely curved so that a substantially uniform shape may be removed from the center of the blade while nevertheless providing bands of contact for the central stud and other studs of a holder of the Gillette type. The ends 48 of the slot, however, extend beyond the ends of the shaving edges.

In Fig. 5, the blade 58 is provided with the right angle corners 55 but the ends 51 of the blade are straight. The end portions 52 of the 60 slots are so dimensioned that the blade is cut away parallel to the shaving edge 12 for a substantial distance, the end bands 15, however, remaining of substantially uniform width.

The blade 63 shown in Fig. 6 is made of substantially the same outline as the blade 50 but the slot is differently shaped. The end portions 64 of the slot are made parallel to the outline of the blade edges and ends on three sides. The central portion 65 of the slot has substantially parallel sides somewhat similar to the portion 15 of Fig. 1.

In Fig. 7, the blade 68 is of the same outline as the blades 53 and 58 but the shape of the slot 31 is varied so that more of the material of the blade may be removed, while providing the desired points of contact with suitable studs.

In Fig. 8, the central portion 69 of the blade 68 is largely cut away while the bands 60, as in the blades 53 and 66, are of substantially uniform width and extend substantially from one shaving edge to the other, part of the slot being constricted to provide engagement with a central stud and part being arcuate to engage spaced cylindrical studs of the well known type.

In Fig. 9, however, I have shown the blade 61 from which the material is largely cut in from the ends 65 of the blade as by means of the recesses 62. The slot 63 terminates in narrow portions 65 which are effective to remove a substantial amount of material from the central portion 66 of the blade end. In this form of my improved blade, the band 65 remains narrow and substantially follows the outline of the.
blade ends for a substantial distance transversely of the blade. As shown in the blade 70 of Fig. 10, the end portions 67 of the blade slot may be enlarged at 65 to a point quite close to the shaving edge 12. The connecting band 69 between the blade portion 22 and 23 is thereby so formed as to extend through a point intermediate of the ends of one shaving edge around to the end of the other blade to a point opposite and on the other shaving edge. The slot is longer than the shaving edges and the blade is consequently lengthened so that the bands 69 extend beyond the shaving edges.

As shown in Fig. 11 and as has been previously described, the blade is made of a usual wafer material. Said figure applies substantially to Figs. 1 to 10 inclusive.

It will be noted that the blades 10, 39, 40, 45, 50, 53, 56, 58, 61 and 70, illustrated in Figs. 1 to 10 inclusive and above described, are all so shaped that while retaining the advantages of minimum resistance to flexure and of the provision of narrow end bands for the purposes herebefore described, said blades nevertheless are designed to fit the various types of Gillette razors. In the old and well known Gillette type which need not be described, three spaced studs are usually provided. It will be noted that all the various blades shown except the blade 68 which may engage only two studs, are provided with slots, the edges of which may engage the central stud at least at two points.

It will further be seen that the end portions of the various slots are so shaped that each of the other two studs of the old and well known Gillette razor may also be engaged at least two spaced points. Furthermore, each of the slots of the various blades is constructed at least at two points to offer engagement with the projecting bar of the clamping member of the Gillette type razor.

It will be understood, therefore, that in addition to the other advantages previously pointed out, my improved blades are designed to fit into the Gillette type of razor, and such types being well known, it is not being necessary therefore to describe or to show them.

Referring now to Figs. 12 to 24 inclusive, I have there shown various improved forms of razors of the Gillette type which may be used in connection with my improved blade. Referring particularly to Fig. 12, my improved razor there shown consists of the usual handle 80, the guard 81, the handle 82 modified, as will soon be described, and the clamping member 82, also modified to properly cooperate with the guard 81. In this form of my improved razor, the guard 81 and the clamping member 82 cooperate with each other to properly position the blade at all times while at the same time, fitting all of the blades shown in Figs. 1 to 10 inclusive except the blade 61 of Fig. 9, and cooperating with the blade particularly at the extreme ends thereof to prevent undue stress upon the comparatively narrow bands during the shaving operation.

The guard 81, illustrated in perspective in Fig. 14, and further shown in Figs. 17 and 18, is provided with a central opening 85 for the reception of the usual threaded stud 84, which is designed to enter the threaded opening 85 of the handle 80 in the usual manner. On its upper surface 83, the guard 81 is provided with a suitably shaped depression 87 of the same shape as the thin cooperating extension 88 projecting downwardly from the clamping member 82. The extension 88 is provided with tapered ends 89, widest at their extremities and converging toward each other and joined by the rib 90. By widening the extension 88 at its ends, the clamping member is braced and reinforced throughout a large part of its area while at the same time, a suitable blade-positioning means is provided for entering various enlarged end portions of the slots of my improved blades. I prefer to make the extension 88 of such shape that it may, if desired, engage a variety of slots such as those previously described in connection with my improved blades.

By this means, the manufacturer may therefore, from time to time, put out blades having various slots of various shapes, all of which blades will nevertheless fit the same holder whereby the design of the blades may be varied to suit the fancy of the purchaser. At the same time, unauthorized blades, unless in direct imitation of the improved blades, could not fit into the holder.

In assembling any of the blades in my improved holder, the clamping member 82 is preferably first inverted and the stud 84 inserted through the central portion of the opening in the blade, the blade being at the same time shifted with respect to the clamping member so that the ends 89 of the extension 88 enter into and contact with the ends of the slots of the blade. The blade is thereby properly positioned in place for shaving. The guard member is now inverted and the stud 84 passed through the aperture 83 thereof, the guard member being at the same time rotated about the stud 84 until the extension 88 enters the depression 87.

The handle 80 may now be screwed on to the stud 84. Very little pressure is needed in attaching the handle since the blade is cut away over so much of its area that it readily flexes into the proper shaving position without material resistance. Even if wrongly positioned, the blade flexes so easily that it is not broken. Further, the added pressure necessary warns the user that the blade is not in the proper position. The handle may be screwed up as far as may be desired to obtain the desired adjustment while the parts are firmly held together against relative movement.

The extension 88 at the same time engages the edges of the slot in the blade to a sufficient extent to brace said blade against possible distortion or against shock put thereon, as when the razor is dropped accidentally. It will be understood that if the razor is to be used with the blade 70 of Fig. 10, the guard 81 and clamping member 82 may be both shortened by cutting off the ends thereof flush or even with the extreme ends of the depression 87 and of the lug or extension 88 respectively.

Referring now to Fig. 19, I have there shown a clamping member 100 intended for use in connection with the blade 61 of Fig. 9 or with the blade 101 of Fig. 19. As has been previously explained, the end of the blade may be cut away instead of or in addition to the central portion thereof. In such cases, I prefer to make the clamping member 100 longer than the blade and to form additional end extensions or projections 102 on the clamping member, which projections extending continuously across the face of the member 100 and have their inner edges 103 so shaped as to fit and to receive therebetween, the ends of the blade. The blade ends are thereby fully protected so that should the blade be dropped, the comparatively narrow end 104 of the blade is protected by the extension 102 of
the clamping member and cannot therefore be injured.

By shaping the edges 103 of the projections 102 to fit and receive the ends of the blade, the blade may quickly and easily be inserted on the clamping member in proper position for the assembly of the remaining parts of the razor such as the guard and handle. Furthermore, the user need not touch the ends of the blade during the process of assembling the razor parts and the blade in place since said ends are in contact with the edges 103. The blade 101, as illustrated, consists substantially of a comparatively narrow band of metal, two parallel edges of which have been sharpened while the greater portion of the interior of the blade is removed for the purposes hereinbefore mentioned. As shown in Fig. 21, the guard member 105, intended to cooperate with the clamping member 108, is provided with a suitable aperture 106 for the reception of the clamping member stud 107, but the ends 108 of said guard are shaped similarly to the edges 103 of the projection 102 so that said ends 106 contact with the edges 103 of the clamping member as clearly shown in Fig. 21. A lug as 108, shaped to correspond with the slot 110 of the blade 101, is designed to enter said slot 110 and to enter a correspondingly shaped depression 111 in the guard member 105.

As shown in Fig. 20, the end 115 of the blade 110 is substantially straight and adapted to fit against the edges 111 of the projections 110 on the clamping member 110, which projections are otherwise similar to the projection 103. In this case, the ends of the guard member as 108 are shaped to correspond to the ends 115 of the blade and contact with the edges 111 of the projection 110 when the parts are assembled. It will be understood that the clamping members 100 and 110 are substantially identical excepting for the shapes of the inner edges of the respective projections 102 and 112 and that the guard member 105 has its ends shaped similarly to the ends of the respective blades, as has been above pointed out.

Referring now to Fig. 22, I have there shown a guard member 120 provided with a depression 121 shaped to correspond to the shape of the blade slot, whatever it may be. In order, however, to insure against relative movement of the guard member 120 and its cooperating clamping member, an extension as 122 having its upper surface 123 raised above the remaining surface 124 of the guard member 120 is provided. Said projection 122 is designed to enter a suitable depression of the proper depth in the co-acting clamping member, which in turn, is provided with an extension similar to the extension 80 but shaped to fit the corresponding shaped slot in the blade and into said depression, as will be obvious.

Referring now to Figs. 23 and 24, I have there shown a clamping member 126 and a cooperating guard member 128, both adapted to cooperate for enclosing the ends of the blade such as the blade 81 of Fig. 9 or the blade 101 of Fig. 19. In the clamping member 126, the projections 102 are similar to those previously described in connection with the clamping member 108. I have, however, shown a projection as 121 similar to but smaller than the projection 108 and designed to fit the edges of the slot 83 of the blade 81. Said projection 121, which may be omitted, if desired, after passing through the slot 83, enters the depression 128 of the guard member, the stud 84 at the same time passing through the aperture 82. The ends of the blade contact with the edges 103 of the projections 102 which projections enter the recessed portion 129 of the guard member 126 when the parts are assembled. The blade ends are thereby fully protected and enclosed, as has been previously explained in connection with Figs. 10, 11 and 21. It will be understood, however, that the guard member may be cut off, if desired, to eliminate the depressions 129 and to make it similar to the guard member 105.

It will be seen that I have provided a blade designed to fit various forms of razors of the Gillette type, but so shaped and proportioned as to offer a minimum resistance to flexing and not likely to be split, cracked or broken under the various conditions of use. It will further be seen that I have provided a holder wherein the blades are suitably braced, which may be clamped together with a minimum amount of effort and readily adjusted. While I have shown and described certain preferred embodiments of my invention, it will be apparent that modifications and changes may be made therein without departing from the spirit and principles of my invention. I therefore intend to claim my invention as broadly as may be permitted by the state of the prior art and the terms of the appended claims.

I claim:

1. A double edged wafer safety razor blade spring tempered throughout and having a slot therein extending from a point close to one end of the blade to a point close to the other end, said slot being transversely interrupted at least four points to receive a comparatively elongated narrowed member of substantially the length of the slot, the slot being enlarged transversely at the middle thereof to receive a substantially circular stud and said slot being shaped at its ends and the ends of the blade being similarly shaped to form a narrow band at each end of the blade integral with the remainder of the blade, said band being of greater length transversely of the blade than its width and than the greatest width of the slot, and being located substantially within the limits defined by the length of said slot, and the end portions of the slot being shaped and dimensioned so that the length thereof measured longitudinally of the blade is greater than the least width thereof.

2. A safety razor blade spring tempered throughout and comprising a pair of identical portions separated by a slot, each of said portions terminating in a sharpened cutting edge, said portion being narrower at and near their ends than at any intermediate points, and said slot terminating near, and being substantially parallel at its ends to, the ends of the blade to provide at each end of the blade a comparatively long narrow spring band integral with and joining said portions and of greater length measured transversely of the blade than the greatest width of said band and of said portions, said portions being separated and in spaced relation to each other and located within the limits defined by the length of said slot.

3. In a safety razor, a clamping member, a blade having recessed ends and having a longitudinal slot throughout substantially the length thereof, projections extending entirely across the ends of said clamping member and having the inner edges thereof shaped to fit the recessed ends of the blade, an intermediate projection on the clamping member spaced from the end projections and shaped to enter the slot of the blade, a clamping stud projecting from said clamping member.
member and adapted to pass through the slot of the blade, a guard member having an aperture therein for the passage of said clamping stud and having a depression therein for receiving the intermediate projection of said clamping member and having end depressions therein for the reception of the end projections of said clamping member whereby the ends of said blade are enclosed and protected, and the blade is positioned and braced against distortion.

4. The combination with a blade having a slot therein of greater width than half the width of the blade, a clamping member of greater length than that of the blade, end projections on said clamping member extending transversely across the member and shaped to fit the ends of the blade whereby, said blade is arranged entirely within the clamping member except at the edges thereof, a guard member cooperating with said clamping member to clamp the blade therebetween, and a handle for operatively connecting the clamping member and the guard with the blade therebetween.

5. The combination with a wafer safety razor blade spring tempered throughout and having a slot therein of greater area than a third of the remaining area of the blade, said slot terminating near the ends of the blade, and said ends being shaped to follow and to conform to the ends of the slot to provide narrow but comparatively long end bands on the blade offering little resistance to the flexing of the blade and being located within the limits defined by the length of the slot, of a clamping member, a projection thereon shaped to engage the edges of the slot at spaced points and to engage the ends of the slots, said projection being of different widths at different points thereof, a guard member having a depression therein shaped to fit and adapted to receive said projection, the clamping member being of sufficient length to cover and to protect said bands.

6. A safety razor blade having a central longitudinal slot, parallel cutting edges on the blade portions spaced by said slot, end portions of a width less than that of the main body of the blade, and transverse necks flexibly connecting said end portions and said spaced blade portions within the limits defined by the length of said slot, said necks forming narrow bands directed at right angles to said cutting edges.

7. A safety razor comprising cooperating blade-clamping members, and a double edged blade having the interior of its body cut away in a single aperture defining separate edge-carrying portions connected by thin flexible transverse end portions of the blade, one of said blade-clamping members being provided with an integral elevated area shaped to fill the aperture of the blade and support its thin flexible end portions by contact therewith.

JOHN HOLTZMAN.