June 29, 1943. S. H. BENJAMIN 2,322,744

SAFETY RAZOR BLADE

Filed July 12, 1941

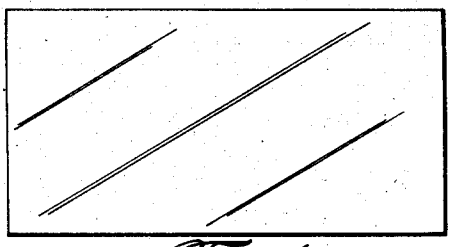


Fig. 1.

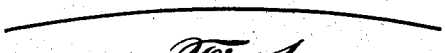


Fig. 1a.

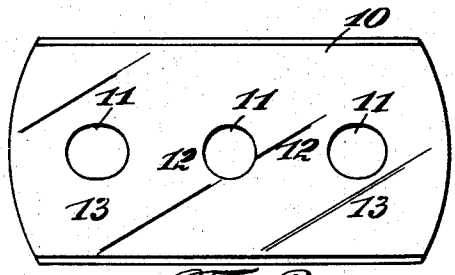


Fig. 2.

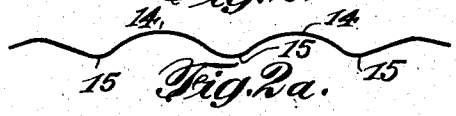


Fig. 2a.

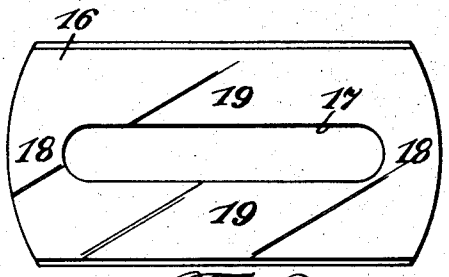


Fig. 3.

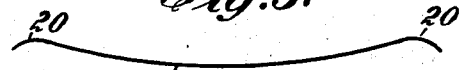


Fig. 3a.

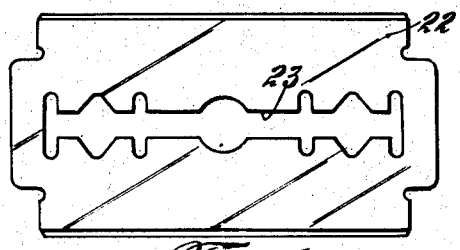


Fig. 4.



Fig. 4a.

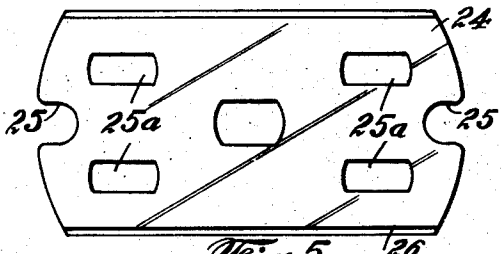


Fig. 5.



Fig. 5a.

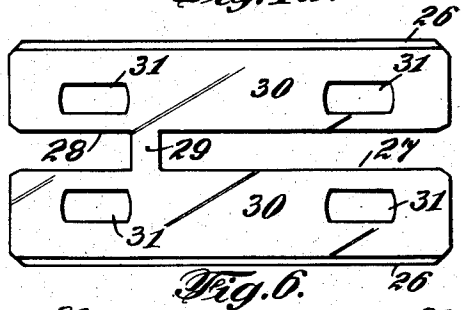


Fig. 6.

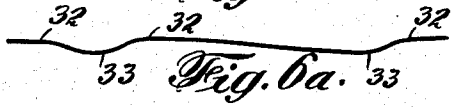


Fig. 6a.

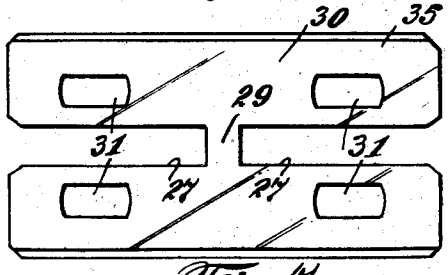


Fig. 7.

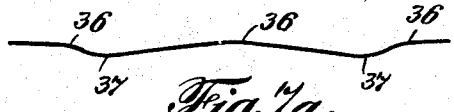


Fig. 7a.

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SAFETY RAZOR BLADE

Sidney H. Benjamin, Milwaukee, Wis.

Application July 12, 1941, Serial No. 402,071

2 Claims. (Cl. 30—351)

My invention relates to safety razor blades and refers particularly to safety razor blades adapted for flexing within a safety razor.

The efficiency of safety razor blades depends largely upon highly specialized physical conditions and attributes from among which the following are particularized: they must be of steel of sufficient hardness in order that the cutting edges may not be affected too readily by the operations to which they are subjected; they must be thin enough to be curved within a razor head element; they must be so hardened and tempered as to obtain sufficient edge hardness and to resist breaking, or cracking, at the apex of the curve formed by the razor blade head elements, or elsewhere; they must be of such construction as to possess a practically straight line cutting edge when clamped into shaving position; they must have sufficient resiliency to cause them to return to their original plane positions when released from their positions in the razor heads; they must be as rustproof as possible, and they must be readily and cheaply manufactured.

It is evident, therefore, that the production of a superior safety razor blade is a subject for thorough scientific study in order that the composition of the steel, its hardening and tempering, its thickness, its resiliency and its contour may be of such characters as to obtain the desirable results in its shaving operations.

The ordinary safety razor broadly comprises a guard member, a cap member, and a handle carried by the guard member.

In the placement of a razor blade in a razor head for purposes of shaving, the blade is positioned upon the guard member, means carried by the guard member, or the cap member or both, for positioning the cutting edge of the blade a desired distance from the edge of the guard edge and an absolute parallel line therewith, and means whereby the blade may be removable retained in such position by means of the guard member and the cap member.

The positioning of the blade upon the guard member is usually accomplished with blades having one or more openings therein by extended means, carried by either the guard member, or the top member, fitting within means of the other member adapted to receive such extended means, said extending means passing through said openings within the blade.

Positioning means other than those just explained may be employed for razors not having openings therein, but the object in all cases is to have the blade edge in exact parallel position with respect to the guard edge and in a predetermined distance therefrom, when the razor is in shaving position.

The blade clamping means is accomplished by a cooperative action between the guard member and the top member, these members abutting forcibly upon opposite sides of the blade.

During this clamping operation, the blade is bent, or flexed, into an arc shape, the convex portion being directed upwardly from the guard member.

A consideration of the above-mentioned conditions is necessary in order to understand and appreciate the razor blades of my invention.

In order that the novelty and advantages of the blades of my invention may be clearly understood, reference is made to the accompanying drawing, illustrating some of the previously known razor blades, as well as the blades of my invention, in which drawing similar parts are designated by similar numerals.

Figure 1 is a top plan view of a rectangular sheet of blade steel.

Figure 1*a* is a side view of Figure 1.

Figure 2 is a top plan view of a rectangular sheet steel, with a centrally positioned plurality of openings therethrough.

Figure 2*a* is a side view of Figure 2.

Figure 3 is a top plan view of a sheet of razor steel with a centrally positioned elongated opening therein.

Figure 3*a* is a side view of Figure 3.

Figure 4 is a top plan view of a rectangular sheet of blade steel with an irregular elongated centrally positioned opening therethrough.

Figure 4*a* is a side view of Figure 4.

Figure 5 is a top plan view of a rectangular sheet of blade steel with two short opposed recesses in the end portions thereof.

Figure 5*a* is a side view of Figure 5.

Figure 6 is a top plan view of one form of a sheet of blade steel of my invention with two elongated opposed recesses in the end portions thereof and with a plurality of openings therethrough on opposite sides of said recesses.

Figure 6*a* is a side view of Figure 6.

Figure 7 is a modified form of the blade of Figure 6.

Figure 7*a* is a side view of Figure 7.

In the above figures the undulations of the blade are considerably exaggerated for purposes of clear explanation.

It is a well-known scientific fact that a wider, or longer, piece of thin metal possesses greater vibrating properties than a narrower, or shorter,

piece of the same metal, and as the vibration of razor blades during the shaving operation will interfere with the proper shaving effect, it is evident that the shaving edge of the blade must be prevented, as far as possible, from vibration during its application.

In order to reduce this vibrating effect, the clamping portions of the guard member and of the cap member are positioned upon the blade a short distance behind the cutting edge of the blade, thus overcoming, in large part, the vibrating incident to the entire width of the blade.

It is to be further noted that the cutting edge of a blade should be in an absolutely straight line without undulations, or curves, in order to obtain perfect shaving effects, as in the presence of any undulations, or curves, the cutting edge will not be evenly abuttable upon the face, portions of it being spaced therefrom, thus producing uneven results.

The results incident to the longitudinal flexing, or curving, of razor blades of different contours is illustrated in the accompanying drawing.

If a safety razor of the shape shown in Figure 1 be flexed longitudinally, the free ends will flex more than the central portions as shown in Figure 1*a*, and the shaving effect will be uneven, as the distance of the cutting edge from the face varies in the form of an arc.

Figure 2 illustrates a blade 10, having a plurality of centrally positioned openings 11, 11. If this blade be flexed longitudinally, the wide portions 12, 12 of the blade between the edges will not flex as far as the portions 13, 13 between the openings 11, 11, and the edges and the resulting edges will have the crests 14, 14 and the troughs 15, 15 of the undulations.

Figure 3 illustrates a blade 16 having a regular shaped, centrally positioned elongated opening 17. If this blade is flexed longitudinally, the wide portions 18, 18 of the blade between the edges will not flex as far as the portions 19, 19 between the opening 17 and the edges and the resulting edges will have the crests 20, 20 and the trough 21.

Figure 4 illustrates a blade 22 having irregular, elongated, centrally positioned opening 23, and if this blade is longitudinally flexed, the edges will have irregular undulations corresponding in number and depth to the distances between the edges of the blade and the distances between the various portions of the opening and the edges of the blade as shown in Figure 4*a*.

Figure 5 illustrates a blade 24 having the two short recesses 25, 25 and the openings 25*a*, 25*a*, the edges of which when longitudinally flexed will have the crest 26, 26 and the troughs 27, 27 of the undulations.

It will thus be seen that the number of undulations depends upon the number and shapes of the openings and that the depth of the undulations from their crests to their troughs depends upon the width of the flexed portions of the blades.

The above examples are given in order to show the results incident to the longitudinal flexing of razor blades of different formations and in order to clearly explain the razor blades of my invention.

It is evident that in double edge razor blades, it is necessary that the two portions carrying the edges must be connected to each other in order to form a unitary device.

It is further evident from the above examples, that the height and width of the crests of the undulated edges are dependent upon the width of this connecting portion, the wider the connecting portion, the higher and wider are the crests produced thereby.

It is further evident that the greater the number of such connecting means, the greater the number of crests produced thereby, from which it is evident that the most effective blade is one with the fewest and narrowest connecting means.

The accomplishment of this desirable result, however, presents other essential considerations which must be successfully met.

Not only must the number of connecting bridges be reduced to the minimum, that is, to one connecting bridge, but its width must be reduced to the minimum for the accomplishment of the desired result, and as the reduction in the width of this connecting bridge results in the formation of two elongated blades connected only by the narrow bridge, it is necessary to provide means for the proper positioning of the blade within the razor head.

Further, the narrower these two blade elements are, the less will be their edge undulations when flexed.

A further consideration is the position of these two blade elements with respect to the connecting bridge in order that there may be no possibility of their being unduly separated from each other.

The above-mentioned, and other desirable attributes, are possessed by the blades of my invention, as will be evident upon a consideration of the accompanying drawing illustrating modified forms of my devices.

Figure 6 illustrates one form of a device of my invention comprising a sheet of steel suitable for the production of razor blades having the two cutting edges 26, 26 and having the two opposed end recesses 27 and 28 of unequal depth, the connecting bridge 29 being of considerable less width than the depth of either recess 27 and 28, the width of the bridge 29 depending upon the character and thickness of the steel composing the blade, but being sufficient as not to break, or crack, when the razor is flexed within the razor head. Each blade portion 30 has two openings 31, 31 positioned in alignment with the inner end of the recesses 27 and 28, but it is evident that additional openings may be employed. These openings are for the reception of blade positioning members carried by a guard member, or a top member, of a razor head.

When the blade of Figure 6 is flexed, its edges assume the position shown in Figure 6*a* with the crest 32, 32 and the two troughs 33, 33.

All of the drawings illustrating the edge formations refer to the devices when they are freely bent, or flexed, and do not necessarily illustrate the edges when flexed and fixed within a razor head.

It is to be noted that the heights of the undulations of the blade shown in Figure 6, that is the vertical distance between the crests and the troughs of the undulations, are very much less than those of the previously illustrated blades; this distance being caused by the peculiar form of my blade.

As the top member and the guard member are moved toward each other in order to abut upon the two faces of a blade to maintain it in position, the blade is first flexed into the edge formations shown, and during the further movement of these two razor head elements toward each other, they first contact the crests of the undulations, a further movement having a tendency to move the edge portions longitudinally

and thus straighten these edge portions of the blade.

It is evident that in the blades shown in Figures 2, 3, 4, and 5, such a straightening of the edge portions is impossible because the two end portions extend completely across the blades, thus acting as a barrier preventing such side or longitudinal movements.

A consideration of my blades shown in Figure 6 shows that as the end portions of both of the blade elements **30**, **30** are free to move outwardly from the bridge **29**, the continued movement of the razor head elements into fixed position upon the blade will move the blade elements **30**, **30** outwardly from the bridge **29** into a straight edge, which result is further easily accomplished because of the fact that the flexed blade has only a few undulations and that these are exceedingly shallow.

It will thus be seen that the blade shown in Figure 6 is of such construction that the shallow undulations of the edge caused by the flexing of the blade are straightened out by the razor head elements in positioning the blade in shaving position and hence, the blade has a straight edge for shaving purposes.

While I have illustrated safety razor blades with two opposed cutting edges, it is evident that one of the cutting edges may be omitted, thus forming a single edge blade; and it is further evident that the two blade positioning openings **31**, **31** upon each side of the recesses **27**, **28** may be substituted by one elongated blade positioning opening, or by more than two such openings if desired.

The device of my invention shown in Figure 7 is similar to that shown in Figure 6 except that the bridge **29** is placed midway between the ends of the blade **35** and the openings **31**, **31** are placed midway between the inner ends of the recesses **27**, **27** and the ends of the blade, the end view of which when flexed is shown in Figure 7*a*, with the crests **36**, **36** and the troughs **37**, **37**.

It will thus be noted that my invention presents safety razor blades of such construction that when placed in a razor head and clamped therein for shaving purposes, the undulations incident to the flexing of the blade are overcome and a straight undulated edge is presented for shaving purposes.

I do not limit myself to the particular size, shape, number or arrangement of parts as specifically illustrated and described, as these are given solely for the purpose of clearly describing my invention.

What I claim is:

1. A safety-razor blade having at least one cutting edge, said blade having an inwardly extended recess from each end thereof, the distance between the inner ends of said recesses being less than the length of either said recess and at least one blade positioning opening in said blade between each said recess and a said cutting edge.

2. A safety-razor blade having cutting edges upon opposite sides thereof, said blade having an inwardly extended recess from each end thereof, the distance between the inner ends of said recesses being less than the length of either said recess and at least one blade positioning opening in said blade between each said recess and said cutting edges.

SIDNEY H. BENJAMIN.