

March 22, 1932.

R. E. THOMPSON

1,850,902

SAFETY RAZOR BLADE

Filed Nov. 27, 1929

Fig. 1.

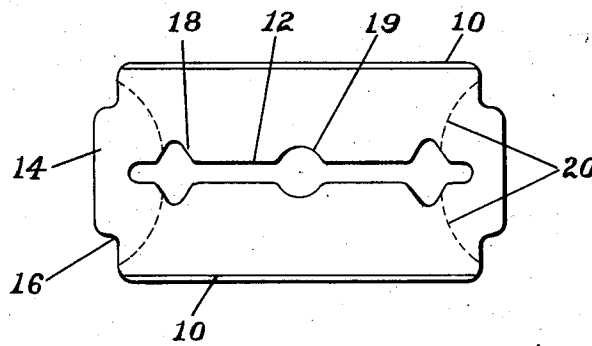
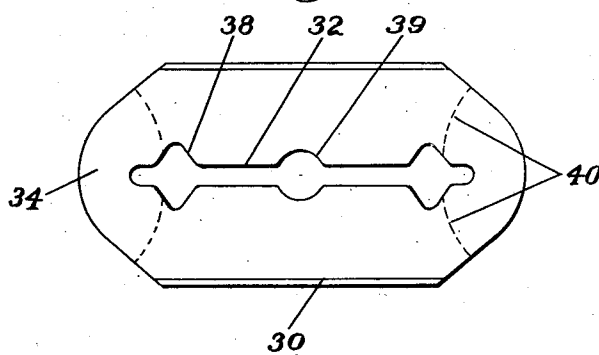


Fig. 2.



INVENTOR

Ralph E. Thompson.

by M. H. Conway, atty.

UNITED STATES PATENT OFFICE

RALPH E. THOMPSON, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO GILLETTE SAFETY RAZOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF DELAWARE

SAFETY RAZOR BLADE

Application filed November 27, 1929. Serial No. 410,220.

This invention relates to safety razor blades of the thin, flexible type which are bent transversely and maintained in a condition of pronounced curvature when clamped in the holders in which they are used. Such blades as heretofore constructed have been subject to an objectionable amount of breakage, and the object of my invention is to provide a blade of this type which will not break or crack under the normal conditions of use.

More specifically, my invention is intended to overcome the danger of blade breakage due to stresses of abnormal amount or concentration such as may result from an incipient crack or other imperfection in the blade itself, and is characterized by the provision of a slot which extends lengthwise of the blade behind its cutting edge and by having its end portions of softer temper than its cutting edge portion throughout areas which include the ends of the slot but do not extend to the cutting edge itself. The slot is of such length that it has the effect of concentrating in the end portions the stresses set up in the blade when the latter is bent transversely, leaving the remainder of the blade largely free from stress, while in the relatively soft end portions in which the stresses are concentrated the elastic limit of the steel is so increased that the blade will yield and change its shape before it will break or crack under any stress to which it is likely to be subjected.

My invention is particularly intended and adapted for double-edged flexible blades, in which case the blade is preferably provided with a single slot located midway between its cutting edges.

Two embodiments of my invention which have been selected for purposes of illustration are shown in the accompanying drawings, whereof,

Fig. 1 is a plan view on an enlarged scale

of one form of double edged blade embodying my invention, and

Fig. 2 is a similar view showing another form of blade.

The preferred form of my blade, shown in Fig. 1, has two opposite cutting edges 10, a central longitudinal slot 12 of substantially the same length as the edges 10, squared end portions 14, and inwardly extending recesses 16 each located at one corner of the blade and forming the end boundaries of the cutting edges and the side boundaries of the squared end portions 14.

When a blade thus shaped is bent transversely the stresses developed are concentrated mainly about the ends of the slot 12 and the inner angles of the recesses 16, where the curvature is the sharpest and where in consequence a crack is most likely to start. Accordingly I provide the ends of the blade with relatively soft areas within which these points of concentrated stress are located and which preferably include the entire end portions of the blade, being bounded by lines extending from the sides of the slot 12 near its ends to those portions of the recesses 16 which form the end boundaries of the cutting edges 10, as indicated by the dotted lines 20. I have found that it is possible to reduce, in the areas thus defined, the degree of hardness to a point which will effectively overcome any danger of starting a crack within the end portions of the blade while still preserving a degree of elasticity which will prevent the blade from taking an appreciable set when bent in its holder, but the end portions may be made still softer if desired. When the blade is flexed transversely the cutting edge portions are largely without stress as above explained, but inasmuch as these portions are necessarily unsoftened it is important to prevent them from being subjected to abnormal stresses by pressure such as may result from deformation of the blade-clamping parts of the razor. For example, a serious amount of

blade breakage has been due to abnormal pressure exerted on the cutting edge portion of a blade of this type by a bent corner of the blade-clamping cap commonly employed in a Gillette razor, and the purpose of the recesses 16 is to eliminate the danger of breakage from this cause by providing each corner portion of the blade with a clearance space adapted to receive the corresponding corner of the blade-clamping cap, if deformed, as explained in my prior application filed April 25, 1929, Serial No. 358,114.

The treatment of my blade necessary to produce the relatively hard and soft portions will of course depend upon the composition of the steel of which the blade is made. In the case of a blade made of carbon steel, which is the material commonly used, I prefer to give the entire blade a suitable cutting edge temper throughout and then soften the end portions to the desired extent by confining between cold clamps those portions of the blade which are not to be softened and subjecting the exposed end portions to heat. When this procedure is followed the cold clamps protect the cutting edge portions of the blade from the direct action of the heat employed to soften the end portions and also absorb the small amount of heat transmitted by conduction from the end portions while being heated, so that the temper of the cutting edges and the blade material behind them is not materially affected. In the illustrated blade the softened area is substantially fan shaped but the exact shape of this area is of secondary importance so long as it substantially includes the portions of the blade most subject to stress.

In the form of blade shown in Fig. 2, the end portions 34 of the blade are rounded outwardly in the central portion and the cutting edges 30 are somewhat shorter than the slot 32. In this case the stresses developed when the blade is bent are not so concentrated at the periphery of the blade as in the blade shown in Fig. 1, so that the inner boundaries of the softened portions, indicated by the lines 40, may be considerably varied in position, provided that they lead from the sides of the slot to the periphery of the blade at points beyond the ends of its cutting edges.

The rounded end portions of the blade shown in Fig. 2 may be so proportioned that if the blade is used in a Gillette razor a clearance space will be provided beneath each corner of the blade-clamping cap for the purpose and with the result above explained, and it is an important feature of both of the forms of blade illustrated that the employment of a slot which is substantially as long as the cutting edge makes it practicable to combine the relatively soft and hard areas in the same blade without causing the blade to warp or buckle, inasmuch as the cutting edge portions are substantially isolated from each

other and from the remaining areas of the blade.

The apertures shown at 18 and 19 in Fig. 1 and at 38 and 39 in Fig. 2 are for the reception of the positioning studs and center pin commonly found in safety razors which use flexible double-edged blades, but it will be understood that these apertures are not essential and do not constitute a feature of the present invention. Also the slot may be widely varied in respect to its contour and dimensions provided it is at least substantially as long as the blade edge, which is necessary in order to concentrate the stresses in the end portions of the blade and keep them out of the edge portions.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:—

1. A flexible razor blade adapted to be bent transversely when clamped in its holder and having two longitudinal cutting edges and a longitudinal slot located midway between them and having a length at least substantially as long as said edges, whereby the stresses developed by bending the blade are concentrated in its end portions, the blade being provided at said end portions with relatively soft areas which include the areas of concentrated stress at both sides of the slot substantially as described.

2. A flexible razor blade adapted to be bent transversely when clamped in its holder and having two longitudinal cutting edges, a longitudinal slot substantially as long as said edges and located midway between them, and inwardly extending recesses located respectively at the corner portions of the blade and forming the end boundaries of the cutting edges, the material of the blade being relatively soft throughout areas which include the inner angles of the recesses and the ends of the slot but terminate within the cutting edge portion.

3. A flexible razor blade adapted to be bent transversely when clamped in its holder and having two longitudinal cutting edges, a longitudinal slot substantially as long as said edges and located midway between them, and inwardly extending recesses located at the ends of the cutting edges respectively, the blade being provided at its end portions with relatively soft fan-shaped areas extending from the sides of the slot near its ends to those sides of the recesses which form the end boundaries of the cutting edges.

4. A flexible razor blade adapted to be bent transversely when clamped in its holder, said blade having a longitudinal cutting edge and a longitudinal slot located behind its cutting edge and at least substantially as long as said edge, whereby the stresses developed by bending the blade are concentrated in the end portions thereof, said end portions being provided with relatively soft areas which include

the areas of concentrated stress substantially as described.

5 5. A flexible razor blade, resilient as a whole and adapted to be maintained in a position of pronounced curvature when clamped in its holder, said blade having a longitudinal cutting edge and a longitudinal slot substantially coextensive in length with said cutting edge and serving to concentrate
10 in areas beyond the cutting edge portions of the blade the temporary stresses due to bending, said areas of concentrated stress being resilient but relatively softer than the unstressed portions of the blade.

15 Signed at Boston, Massachusetts, this twenty-sixth day of November, 1929.

RALPH E. THOMPSON.

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