May 17, 1932. R. E. THOMPSON ET AL 1,858,316

SAFETY RAZOR

Filed July 30, 1930

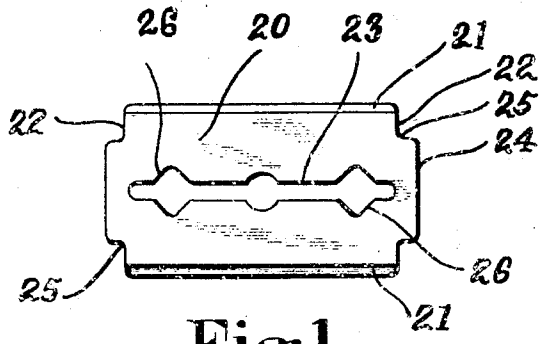


Fig.1.

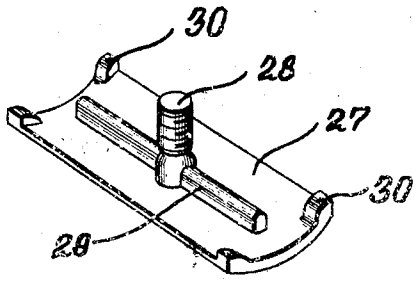


Fig.2.

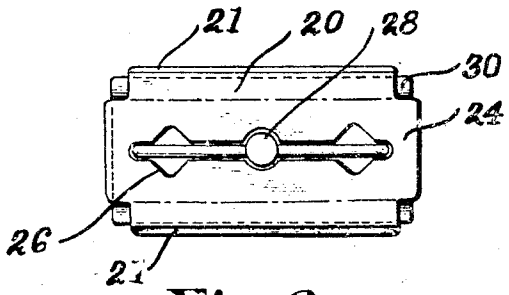


Fig.3.

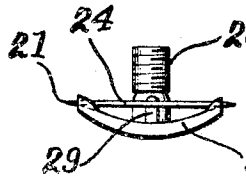


Fig.4.

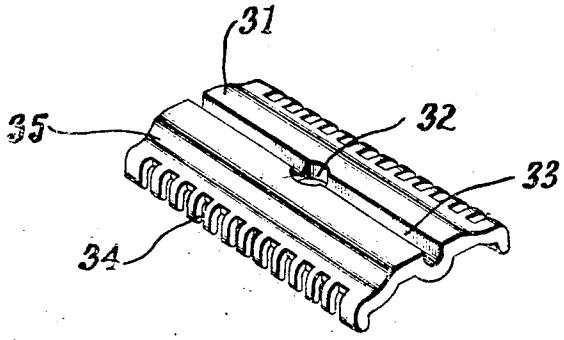


Fig.5.

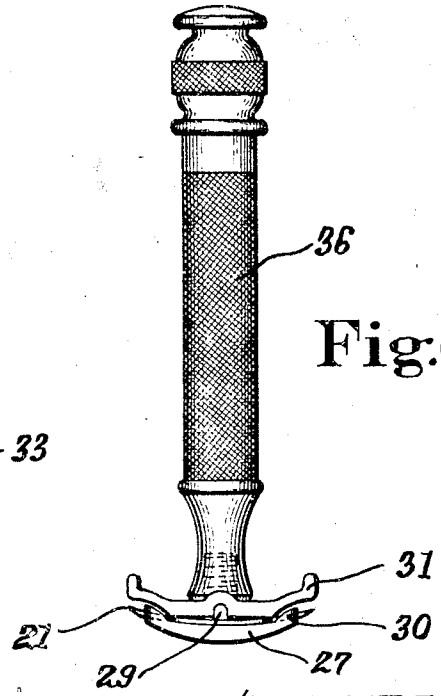


Fig.6.

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Patented May 17, 1932

1,858,316

UNITED STATES PATENT OFFICE

RALPH E. THOMPSON, OF BROOKLINE, AND THEODORE L. SMITH, OF CONCORD, MASSACHUSETTS, ASSIGNORS TO GILLETTE SAFETY RAZOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF DELAWARE

SAFETY RAZOR

Application filed July 30, 1930. Serial No. 471,689.

This invention relates to safety razors in which a thin, flexible blade is removably secured in a holder comprising a transversely-curved cap member provided on opposite sides with parallel straight edges which engage the longitudinal edge portions of the blade and flex it transversely during the process of clamping the blade in the holder.

In such razors it has been the usual practice to employ blades having two parallel cutting edges of the same length as the parallel side edges of the blade-clamping cap, and the parts have been so proportioned that the blade when clamped is held in a position of pronounced transverse curvature, whereby it is subjected to fibre stresses of such amount that the blade has had a very small factor of safety. In consequence, it is very desirable that the parts which determine the clamped position of the blade shall retain permanently the precise shapes and dimensions imparted to them when manufactured, because if these parts are deformed and the pressure thereby applied to the blade tends to flex it locally in a different direction from that in which it has already been flexed by the cap as a whole, the resulting distortion of the blade subjects it to an increased stress which is liable to exceed the elastic limit of the steel.

For example, the mere dropping of the razor, or of the cap alone, has frequently resulted in bending over a corner of the cap to such an extent that when the clamping pressure is applied it will crack or break the blade, even though the bending of the cap corner is so slight that it is not likely to be noticed by the user; and in case the blade is not cracked or broken, its cutting edge is so distorted as to result in an uneven exposure, so that in either case the operation of the razor is unsatisfactory.

In order to overcome the difficulty above described, blades of this type have been provided at each of their corner portions with a recess constituting a clearance space of sufficient area to receive the corresponding cap corner if bent, so that the bent corner cannot apply an increased or distorting pressure to the blade, but although the provision of these recesses is effective for the purpose described it involves the removal of a portion of the metal of the blade at each corner and thereby weakens the blade and changes the distribution of the stresses to which it is subjected when flexed, with the result that the maximum stress per unit area is increased and the factor of safety, already small, is correspondingly reduced.

Accordingly, one of the objects of the present invention is to provide a safety razor blade of the type above described which will have recesses at its corner portions but in which the factor of safety will not be less than in prior blades of this type.

A further object of the invention is to provide a holder for such a blade which will facilitate the cleansing of the blade and holder after use without disassembling the parts, and will also have certain other advantages hereinafter described.

The invention will now be explained with reference to the accompanying drawings, of which—

Fig. 1 is a plan view of one embodiment of a flexible razor blade according to this invention;

Fig. 2 is a perspective view of one embodiment of a clamping cap member of a holder suitable for use with the blade of Fig. 1;

Fig. 3 is a view of the blade of Fig. 1 inserted on the cap member of Fig. 2;

Fig. 4 is an end view of Fig. 3;

Fig. 5 is a perspective view of a guard member suitable for use with the cap member of Fig. 2;

Fig. 6 is an end view of an assembled razor having a cap member similar to that of Fig. 2, a blade similar to that of Fig. 1, and a guard member similar to that of Fig. 5.

A blade made in accordance with this invention is a thin, transversely-flexible blade characterized by having a recess at each of its corner portions and a central longitudinally-extending slot which is substantially as long as the longitudinal edge portions of the blade between the corresponding recesses, so that the blade may be said to consist of two equal and symmetrical halves connected only by end portions which are located beyond the

longitudinal edge portions of the blade and its central slot. The result of this formation is that when the blade is flexed transversely the stresses developed are concentrated in and substantially restricted to the end portions of the blade, the areas between the slot and the longitudinal edge portions being largely free from stress.

In Fig. 1, which illustrates one specific blade having the features above described, the blade 20 is shown as provided with a cutting edge 21 on each of its longitudinal edges, a reentrant recess 22 at each of its four corner portions and a central longitudinal slot 23 which is parallel with and of substantially the same length as the cutting edges 21. Hence the two cutting edge portions of the blade, being separated by the slot 23, are connected only by the unsharpened end portions 24 constituting flexing hinges which permit the cutting edge portions to be adjustably deflected by the blade-clamping parts of the holder. At their inner angles the recesses 22 are rounded as shown at 25 to avoid stress concentration at these points, and for the same reason the ends of the slot 23 are rounded.

In order to enable the blade to be used in existing holders of the Gillette type, in which two blade-positioning studs are employed, it may be provided with two symmetrically-arranged positioning apertures 26 which are adapted to receive and engage such studs. In the blade illustrated these apertures are made substantially diamond-shaped for the purpose of adapting the blade to be adjusted laterally to a slight extent on positioning studs of suitable shape, but the presence or absence of these apertures, as well as their specific configuration, is immaterial so far as the present invention is concerned.

When the blade is flexed transversely the principal stresses developed are located mainly within narrow areas extending between the ends of the slot 23 and the inner portions of the recesses 22, and it has been found that the maximum stress per unit area will depend in part upon the width of the slot at its end portions, as compared with the other dimensions of the blade, and that in a blade of given external dimensions there is a particular slot width which reduces the stress to a minimum. For example, the specific blade illustrated will fit any Gillette holder if it has the usual thickness and the usual width between its cutting edges, is one and eleven-sixteenths inches in length along its center line and one-half an inch in width at its projecting end portions, and has a length of approximately one and two-fifths inches along its cutting edges and between the ends of the central slot. If, in such a blade the width of the end portions of the slot is one-twelfth of an inch, the stresses developed when the blade is flexed will be of substantially minimum amount and will be materially less than in prior blades as commonly constructed for use in Gillette holders, so that the factor of safety will be correspondingly greater, but the width of said end portions of the slot may vary within eight and twenty per cent of the distance between the cutting edges without increasing the maximum stress per unit area beyond that developed in the prior blades.

The blade-holding parts of the razor are illustrated in their preferred form in Fig. 6 and include the blade-clamping cap shown in Fig. 2 and the guard member shown in Fig. 5, of which the cap 27 has a central threaded stem 28 and a central longitudinally-extending rib 29 which serves to position the blade on the cap by passing through the slot 23, the end portions of which fit the ends of the rib with sufficient closeness to insure accurate lateral positioning of the cutting edges. In order to reduce liability to deformation of the corners of the cap 27, it is desirable to provide it at each of its four corners with a thickened lug or projection 30 which preferably tapers inwardly from a maximum thickness at the outer edge of the cap, flush with its ends, and is so proportioned that when the blade is positioned on the cap the projections 30 extend freely into the recesses 22, as shown in Figs. 3 and 4.

The guard member 31 has a central opening 32 to receive the threaded stem 28 of the cap and a central groove 33 to receive the positioning rib 29. It is also provided with the usual guard teeth 34 and with channels 35 which extend longitudinally behind the guard teeth and over which the cutting edges of the blade are located when the parts of the razor are assembled, the inner face of the guard member between the channels 35 being preferably flat, or substantially so. The blade 20 is clamped between the cap and the guard member by means of the handle 36, which is internally threaded at one end to receive the stem 28, as is common practice in razors of this type.

It will be seen (Figs. 5 and 6) that the end portions of the blade constituting the flexing hinges overlie the flat central portion of the guard member and do not extend over the channels 35, so that when the parts of the razor are assembled in position for use as shown in Fig. 6 these hinges of the blade are not subjected to any direct bending pressure. Conversely, the parts of the razor which flex the blade engage it only in areas which are largely without stress, even after the blade has been flexed, and the danger of breakage of the cutting edge portions is thus reduced.

Fig. 4 illustrates the blade when placed in position on the cap 27 and lying flat thereon, with the rib 29 extending through the slot 23 and projecting slightly above the top of the blade. With this construction it is pos-

sible, after unscrewing the handle sufficiently to release the blade from the slot but without disconnecting the parts, to turn the guard member on the stem 28 until it extends transversely across the cap and blade and then clamp the parts together, leaving the blade loosely held between the cap and the guard member and rendering all the parts freely accessible to a stream of water. This is an important advantage of the holder because it makes it possible to clean the razor effectively after use without taking it apart, and another advantage is that the employment of a low rib on the cap for positioning the blade enables the cap to be readily formed and given accurate dimensions by a stamping process, thereby avoiding the difficulties involved in accurately assembling the parts of cap members having separately-formed positioning studs.

It will be understood that various modifications may be made in the specific construction illustrated in the drawings without losing the advantages above described or departing from the scope of the invention, which is limited only by the annexed claims.

What is claimed is:

1. A safety razor comprising a flexible blade and a holder having means for positioning the blade and clamping it in a position of transverse curvature, said blade being provided with recesses each located at one of its corner portions and having its cutting-edge portions separated longitudinally by a slot and connected at their ends by flexing hinges which are located beyond the cutting edge portions.

2. A safety razor comprising a flexible blade and a holder having means for positioning the blade and clamping it in a position of transverse curvature, said blade being provided with reentrant recesses each located at one of its corner portions and having its cutting-edge portions separated longitudinally by a slot and connected at their ends by flexing hinges which are located beyond the cutting edge portions, and the inner portions of said recesses and the ends of the slot being rounded.

3. A safety razor comprising a flexible blade of oblong contour and provided at each of its corner portions with a recess, a guard member adapted to support the blade, a transversely-concave blade-clamping cap having parallel side edges, means for positioning the blade between the cap and the guard member with the recesses at the corner portions of the blade located in position to receive the corresponding cap corners if bent toward the guard member, and means for clamping said parts together and simultaneously flexing the blade transversely on the guard member as a fulcrum, the blade being provided with unsharpened ends and with a central longitudinal slot of substantially the same length as the cutting-edge portions of the blade, whereby said cutting-edge portions are separated by the slot and connected only by flexing hinges at the ends of the blade.

4. A safety razor comprising a flexible blade, cap and guard members adapted to receive the blade between them and flex it transversely, said blade being provided at its corner portions with recesses limiting its cutting-edge portions to a length less than that of the cap member and being also provided with a central longitudinal slot of substantially the same length as said cutting-edge portions, means cooperating with the slot in the blade to position the latter with the recesses at its corner portions located beneath the corresponding corners of the cap, and means for clamping the parts together.

5. A safety razor comprising a transversely-flexible blade provided at each of its corner portions with a recess and having a central longitudinal slot of substantially the same length as its cutting-edge portions, a blade-clamping cap provided with a central longitudinal rib adapted to enter the slot in the blade to position the latter, a guard member having a recess to receive said rib, and means for clamping the parts together.

6. A safety razor comprising a transversely-flexible blade comprising two cutting-edge portions separated longitudinally by a slot and connected at their ends by flexing hinges which are located wholly beyond the cutting edges, said hinges being located between reentrant recesses provided at the corner portions of the blade and determining the length of the cutting-edge portions, a guard member provided on its inner face with a flat central portion having a width not less than that of said flexing hinges, a blade-clamping cap shaped to engage the cutting-edge portions of the blade and flex it transversely over the guard member, means for positioning the blade between the cap and the guard member, and means for clamping the parts together.

7. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and comprising two cutting-edge portions separated longitudinally by a slot and connected at their ends by flexing hinges which are located beyond the cutting-edge portions, the latter being bounded at their ends by transversely-extending recesses which limit the cutting-edges to a length not exceeding that of the slot.

8. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and comprising two cutting-edge portions separated longitudinally by a slot having rounded ends, and connected at their ends by flexing hinges which are located beyond the cutting-edge portions, the latter being bounded at their ends by transversely-extending recesses which are rounded at their

inner corners and limit the cutting-edges to a length not exceeding that of the slot.

9. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and provided with reentrant recesses each located at one of its corner portions and bounded on one side by the adjacent cutting-edge portion and on the other side by the adjacent end portion of the blade, said blade being provided with a longitudinal slot of substantially the same length as the cutting-edge portions, so that the latter are connected only by end portions of the blade constituting flexing hinges therefor.

10. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and provided with reentrant recesses each located at one of its corner portions and bounded on one side by the adjacent cutting-edge portion and on the other side by the adjacent end portion of the blade, said blade being provided with a longitudinal slot of substantially the same length as the cutting-edge portions, so that the latter are connected only by end portions of the blade constituting flexing hinges therefor, and the inner portions of said recesses and the ends of the slot being curved.

11. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and having at each corner portion a recess extending transversely across one end of the adjacent cutting-edge portion, the central portion of the blade being longer than the cutting edge portions and being provided with a longitudinal slot of substantially the same length as the cutting-edge portions, leaving the latter connected only by end portions located beyond the ends of the cutting-edge portions and constituting flexing hinges therefor.

12. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and having at each corner portion a reentrant recess extending transversely across one end of the adjacent cutting-edge portion and having a rounded inner portion, the central portion of the blade being longer than the cutting-edge portions and being provided with a longitudinal slot of substantially the same length as the cutting-edge portions, leaving the latter connected only by end portions located beyond the ends of the cutting-edge portions and constituting flexing hinges therefor.

13. A safety razor blade adapted to be flexed transversely by the clamping action of a holder and having recesses each located at one of its corner portions and bounded on one side by the adjacent cutting-edge portion and on the other side by the adjacent end portion of the blade, said blade being provided with a longitudinal slot of substantially the same length as the cutting edge portions, so that the latter are connected only by end portions of the blade constituting flexing hinges therefor, the inner portions of said recesses and the ends of the slot being substantially curved and the end portions of the slot being of such width as to minimize the stresses developed in said hinges by the flexing of the blade.

Signed at Boston, Massachusetts, this 29th day of July, 1930.

RALPH E. THOMPSON.
THEODORE L. SMITH.