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H. M. CHANCE

SAFETY RAZOR

Filed July 27, 1922

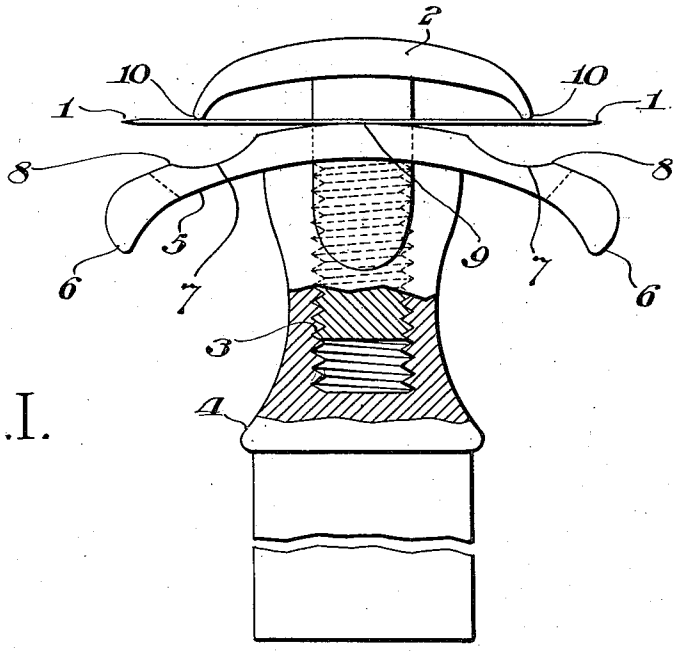


FIG. I.

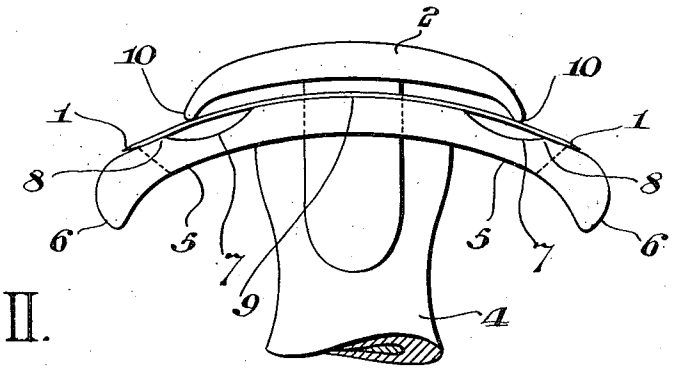


FIG. II.

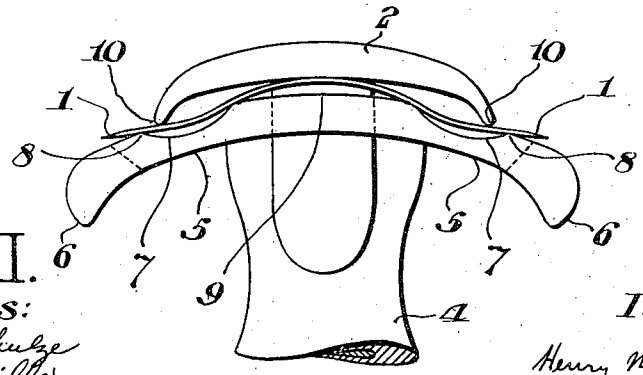


FIG. III.

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UNITED STATES PATENT OFFICE.

HENRY M. CHANCE, OF PHILADELPHIA, PENNSYLVANIA.

SAFETY RAZOR.

Application filed July 27, 1922. Serial No. 577,786.

To all whom it may concern:

Be it known that I, HENRY M. CHANCE, a citizen of the United States, residing at Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Safety Razors, whereof the following is a specification.

My invention relates to means for the application to adjustable safety razors of the well known Gillette type, and to safety razors with a single cutting edge, of an improvement in safety razors which I have described and claimed in an application for patent Serial No. 486,146, filed July 20, 1921, for improvement in safety razors which consists in confining the adjustability of the cutting edge of such razors within a range between two fixed limits, one of which provides little or no exposure of the cutting edges and the other of which provides maximum exposure of the cutting edges consistent with a reasonable degree of safety in use. In carrying out my present invention I also utilize another invention which I have described and claimed in an application for patent Serial No. 491,547, filed August 11, 1921, for improvement in safety razors which consists in flexing the blade to produce longitudinal corrugations in it by means of lines or points contacting with its upper and lower surfaces, said lines or points of contact not being directly opposite to each other, whereby pressure to said blade applied through said points or lines of contact produce longitudinal corrugations in it, thus holding the blade firmly in position and adding to the stiffness or rigidity of its cutting edges. I do not herein claim either of the above inventions except in combination with the improvement herein disclosed.

In adjustable safety razors as usually constructed, when the parts are assembled in position but before the blade is flexed by tightening the clamp, the cutting edges of the blade project beyond lines tangent to the outside faces of the clamp and guard and are about $\frac{1}{16}$ of an inch above the guard, presenting an exposure of the cutting edges much exceeding that possible for safe use; but when the blade is flexed by progressive tightening of the clamp, the cutting edges move towards the guard with constantly and nearly uniform increase in the resistance to flexing until they reach a position at the limit of movement in which they project very slightly beyond a line tangent to the outside faces of the clamp and guard, presenting a very small exposure of the cutting edges of the blade and a high degree of safety in use. This change in the position of the cutting edges of the blade is accompanied by a regular and gradual increase in the resistance to flexing and in the force necessary to effect flexing from a position in which the cutting edge is dangerously exposed to one in which there is very small, if any, exposure. After clamping tightly, with the cutting edges occupying a position with minimum exposure, a very slight reduction in the clamping pressure by a movement of the clamp or cover a few thousandths of an inch is sufficient to increase the exposure of the cutting edges to the maximum exposure consistent with safety, further reduction in the clamping pressure with but slight movement of the clamp or cover increasing this exposure to one inconsistent with safety in use.

My invention consists in constructing the blade holder and clamp with lines or points of contact adapted to contact with the blade and to produce flexing of the blade with gradual increase in the resistance of the blade to flexing, and with gradual and corresponding increase in the force necessary to produce flexing, until the blade is clamped firmly in place, with little or no exposure of the cutting edge, in a position with reference to the guard providing a maximum degree of safety in use, such position being indicated by an abrupt and large increase in the resistance of the blade to further flexing, and the necessity of applying a much greater force to effect any further change in the position of the cutting edge, the application of such additional force producing a flattening of curvature, or flexing of the blade adjacent to the cutting edge in a reverse direction from the direction of the initial flexing, such counter-flexing increasing the exposure of the cutting edge and thus providing adjustable positions of the cutting edge with reference to its protective guard suitable for close shaving, the movement in this direction being limited to within the range determined as providing a satisfactory degree of safety in use.

Fig. I is an end view of a razor of the well known Gillette type showing modification in the construction of the holder and

clamp to confine the adjustability of the exposure of the cutting edges, after the razor is assembled for use, to within safe limits, the drawing showing the parts assembled before clamping of the blade in place for use.

Fig. II is a similar view showing the position of the holder and the flexing of the blade when the blade has been flexed by turning the handle until an abrupt increase in the resistance to further turning of the handle notifies the user that the blade is securely clamped ready for use, and with the cutting edges of the blade in position with reference to the protective guards giving minimum exposure to the cutting edge consistent with efficiency in use.

Fig. III is a similar view showing diagrammatically extreme curvature that may be produced in a blade when complete reverse flexing is caused by continued turning of the handle and indicating on an exaggerated scale the relative position of the cutting edges and protective guards when the cutting edges present a maximum exposure consistent with safety in use.

It will be evident that the range in adjustment is thus confined to the positions illustrated by Figs. II and III and that any desired intermediate adjustment may be made by turning the handle.

The operation of this device is dependent upon the change in leverage produced by applying the flexing force to different parts of the blade.

In the drawings 1 is the razor blade of thin flexible type with two cutting edges, 2 is a cap or clamp with threaded pin 3 adapted to engage with a threaded socket in the handle 4, 5 is the holder carrying guards 6, 6, of either the bar or comb type, on each side, and having two grooves or depressions 7, 7, extending longitudinally and parallel to the guards. The upper surface of the holder 5 is curved with a curvature preferably slightly more convex than the under side of the clamp 2. One side of the depressions 7, 7, preferably form edges or corners 8, 8, with the top surface of the holder 5 or with the guards 6, 6, which edges may be slightly rounded to reduce the bending stress on the blade.

The drawing Fig. I shows the holder, blade, clamp and handle assembled loosely, the blade not being clamped for use, in which position the blade rests upon the center 9 of the holder 5 and is prevented from tilting by contact with the edges 10, 10, of the clamp 2. Upon turning the handle 4 in a direction to tighten the clamp 2, downward pressure is exerted upon the blade 1 along the lines of contact 10, 10, and upward pressure is exerted upon it along its line of contact 9 with the holder 5. Under these conditions, i. e., the application of flexing pressure along the center line of the blade far from the fulcrums 10, 10, the blade yields easily to slight pressure, and the force necessary to apply in turning the handle 4 is relatively small but increases steadily as the blade is flexed. This condition continues until the blade is flexed to the position shown by Fig. II, beyond which no further movement is possible unless a force be applied to the blade by the edges 10, 10, sufficient to flatten the existing curvature or to reverse the curvature of the blade by depressing it into the depressions 7, 7. As the spans to be flexed by application of a flexing force at 10, 10, are equal to the width of the depressions 7, 7, as compared with the single span, from 10 to 10 flexed in the preliminary flexing by application of a force at 9, and as these smaller spans are each about one-fourth the length of the larger span the force required to reverse the flexure in the blade 1, or to produce equal angular flexure in the blade by application of the flexing force at 10, 10, may therefore theoretically approximate to 16 times that necessary to effect the initial flexing of the blade. This abrupt change in the force required to turn the handle 4 is sufficient notice to the user that the blade is firmly clamped and ready for use, and is in a position giving the minimum exposure of the cutting edges consistent with efficiency in use. The cutting edges may then be adjusted to any greater degree of exposure by turning the handle 4 thus flattening or reversing the curvature of the blade at 10, and increasing the exposure of the blade to one better adapted to close shaving.

It will be observed that the drawing Fig. II shows a space about one-eighth of an inch wide between the top of the blade 1 and the under side of the clamp 2 along the central portion of the clamp opposite the central region of the holder 5 designated by the numeral 9. This space has been exaggerated in order to make the drawing more legible. The holder 5 preferably should be made with its top surface slightly more convex than shown so that the distance between the top of the blade 1 and the under side of the central part of the clamp 2 will be equal to the further proposed downward movement of the clamp 2, this movement providing for and limiting the adjustable range of the position of the cutting edges of the blade, so that when the blade 1 has been depressed into the depression 7, 7, by the downward movement of edges 10, 10, of the clamp 2, a sufficient distance to produce the maximum flattening or reversal of flexure required to give maximum exposure to the cutting edges consistent with safety in use, further movement and flexing will be prevented by the under surface of the clamp 2 coming into contact at central region with

the top of the blade 1, which in turn is in contact with the holder 5 at the region designated by 9. When the razor blade is of a thickness not readily flexed, the increase in pressure required to effect adjustable counterflexing of the blade after the blade has been flexed to the position shown by Fig. II may, if desired, be used to limit the range of adjustment to prevent over exposure of the cutting edges, without reference to the contact of the blade with the under side of the clamp 2. This can readily be done by making the width of the depressions 7, 7, such that the unsupported span of the blade is so small that excessive counterflexure cannot be produced by any force that can be applied by the means provided for that purpose, or, that such force, if applied, will be sufficient to break the blade. I find in practice that a very slight flattening of the curvature at 10, such as is difficult to detect with the naked eye constitutes sufficient reversal in the flexing to produce an appreciable greater exposure of the cutting edge.

Fig. III has been drawn with exaggerated curvature of the blade to better illustrate an extreme case of reverse flexing of a blade, such as is only possible with an extremely thin blade made of especially tough and flexible metal, without danger of breaking or deforming the blade. Extreme counterflexing tends to cause the central part of the blade to rise in an arc away from the top of the holder 5, towards the under side of the clamp 2, but in many cases friction at the points of contact 8 and 10 is sufficient to restrain this movement so that the under surface of the blade remains in contact with the holder 5 at or near its center designated by 9.

It will be understood that my above described invention may be used in connection with the construction and operation of safety razors of types differing materially from the Gillette type illustrated by the drawings, and that this type may be modified without departure from the spirit of my invention, e. g., the lines of contact 8, 8, 10, 10, and 7, 7 are not necessarily continuous lines, but may be broken at intervals or may consist of a number of points making contact with the blade at any desired distances apart.

I do not confine myself to the particular dimensions or shapes of the different parts shown by the drawings as these may be widely varied without departure from the essential elements of my invention. The groove or depression 7, 7, may, if desired, be made of any desired width, their inner edges being however limited by the necessity of preserving intact a small part of the central part of the holder 5, the position of which is indicated by the numeral 9.

The terms "counter-flex," "counter-flexing" and "counter-flexure" in this specification and in the claims hereof are intended to mean and to include the effects produced by the application of a force that tends to reverse the curvature of the blade produced by preliminary flexing, whether such force actually produces a reversal of curvature or merely flattens in greater or lesser degree the curvature produced by said preliminary flexing, hence these terms are used to mean and include either flattening or reversal of the curvature produced by preliminary flexing.

Having described my invention, I claim:

1. A safety razor including a holder having a guard, a flexible razor blade, a clamp securing the blade and the holder together, means for preliminarily flexing said blade longitudinally, and means permitting counter-flexing of said blade, said first mentioned means including a depending edge of said clamp engaging the blade in a substantial line, said second mentioned means including a longitudinal groove in said holder directly under the depending edge of the clamp.

2. A safety razor including a holder having a guard, a flexible razor blade, a clamp securing blade and holder together, means for preliminarily flexing said blade longitudinally, means for counter-flexing said blade, said last named means engaging said blade in a substantial line, longitudinally of the same.

In witness whereof I have hereunto set my hand this 25th day of July, 1922.

HENRY M. CHANCE.

Witnesses:
CARL K. SCHULZE,
FRANK H. MILLS.