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C. A. GRATIOT

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SAFETY RAZOR

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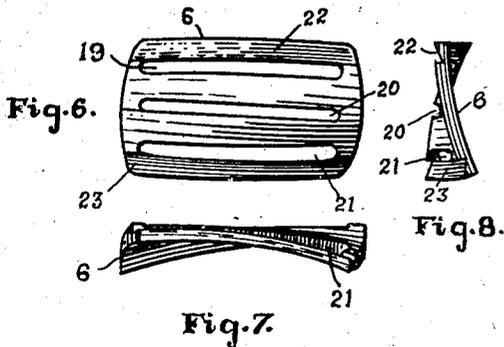
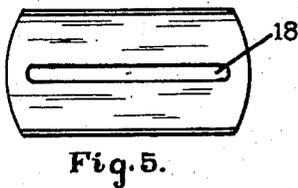
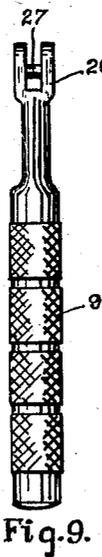
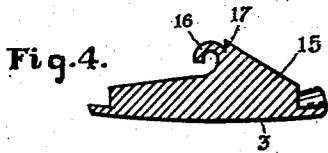
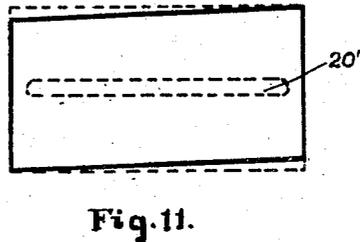
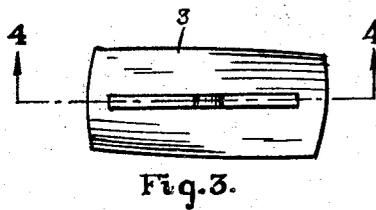
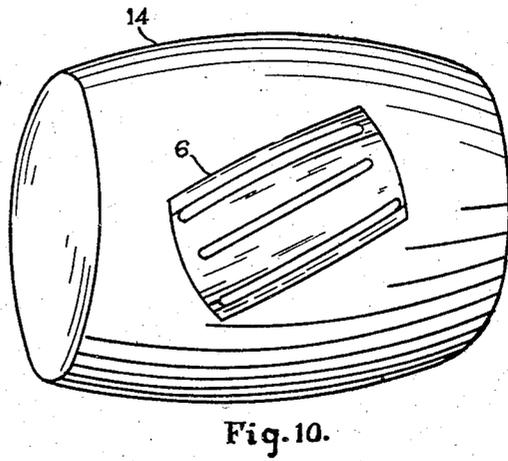
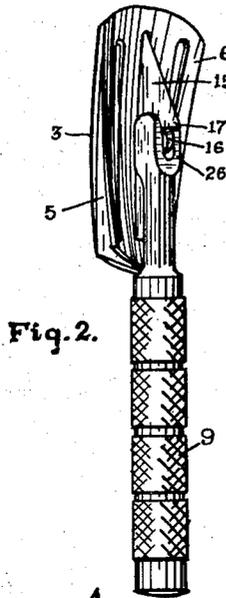
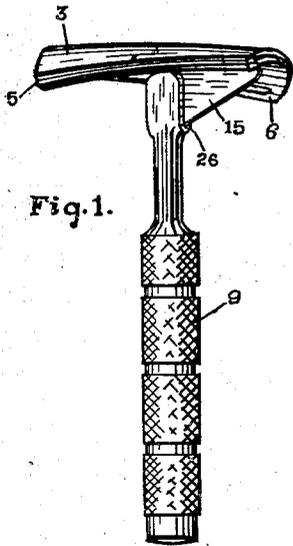


Fig. 8.

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UNITED STATES PATENT OFFICE

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SAFETY-RAZOR

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Application December 15, 1933, Serial No. 702,515

6 Claims. (Cl. 30-49)

My invention relates to safety-razors of the type in which a thin double-edged blade is clamped between a guardpiece and cap constituting forming members by means of which the blade is attached to a handle and strained to alter its normal mechanical properties and adjust the disposition of the cutting edges with reference to the said guard-piece and handle.

The principal object of my invention is the provision of a safety-razor having improved properties relating to facility of use in shaving, efficacy of operation, and endurance of the shaving edges.

A second object is the provision of certain adjustments inherent in the device facilitating cleaning.

A third object is the provision of unique and efficient clamping means facilitating assembly and separation of the several parts for washing, drying, and sterilizing.

Other objects and advantages of my invention will be apparent in the following discourse wherein the significance of the reference characters in the accompanying drawing, details of construction of a typical safety-razor of my invention and the particular advantages thereof are explained.

Figure 1 represents a view in perspective of the entire razor as assembled and adjusted for use.

Figure 2 represents a view in perspective of the entire razor as adjusted for washing, drying and storage.

Figure 3 represents a view of the concave side of the razor cap.

Figure 4 represents a view of a section on the line 4-4 of Figure 3.

Figure 5 represents a view of a blade typical of the kind adapted for use in the razor of my invention.

Figure 6 represents a view of the convex side of the guard-piece.

Figure 7 represents a view of the edge of the guardpiece in perspective.

Figure 8 represents a view of the end of the guard-piece in perspective.

Figure 9 represents a view of the handle of the razor.

Figure 10 is a diagram illustrative of the form of the convex surface of the guard-piece.

Figure 11 is a diagram illustrative of certain relationships between the blade and the cap.

Figure 12 represents a view of a typical transverse section through the cap, blade, and guard-

piece particularly showing the relationship therebetween.

Figure 13 is a diagram illustrative of certain effects accruing in the blade by virtue of use in the razor of my invention.

My invention contemplates for the accomplishment of the objects set forth:

An unusually rigid convex cutting edge disposed through its length at a variety of angles to the axis of the handle with respect to any aspect thereof so that a selection of angles between the skin and the blade and between the cutting edge and the direction of motion of the razor may be available upon the shifting of the razor laterally, and, conversely, so that by shifting the razor laterally to effect an oblique stroke the cutting angle of the successively contacting portions of the convex edge may be maintained at a constant value when the motion of the razor is pivotal about the wrist of the user as is natural;

A manner of adjustment of the razor without disconnecting the pieces providing for the separation of the cap, guard, and blade to permit the passage therebetween of water, sterilizing liquids or gases, and air;

Means providing for the rapid assembly of the razor without unnecessary movements; and

Means providing for the straining of the cutting edges in tensile stress to enhance the rigidity thereof.

The razor is composed of a cap 3 one surface of which conforms to an oblique segment of a prolate spheroid to form the concave surface against which the blade 5 is clamped by a convex surface complementary thereto formed on the guard-piece 6. This convex surface of the guard-piece 6 is illustrated in the diagram Figure 10 where the convex surface of the guard-piece is shown as coincident with the surface of the prolate spheroid 14.

The curvatures of the concave surface of the cap 3, the convex surface of the guard-piece 6, and the two faces of the blade 5, will be somewhat different to compensate for the thickness of the blade 5 and the flexure of the cap and guard when the same are clamped together with a concentrated pressure. The cap and guard, however, are so formed as to provide for the disposition of the cutting edges of the blade in coincidence with the surface of a prolate spheroid of the approximate form illustrated in Figure 10.

The cap 3 is formed with a plate 15 perpendicular to a middle tangent of the cap, and approximately in the center thereof. The upper

edge of this plate 15 as illustrated in Figure 4 is formed in further detail with a hook 16 and a stop 17.

The blade is double-edged and formed with a longitudinal slot 18 parallel with the two cutting edges. It is of such material and thickness as will provide for flexure thereof when clamped between the cap and guard, but is normally flat.

The guard 6 is formed with a convex prolate-spheroidal surface as before explained and perforated with three longitudinal slots 19, 20, and 21. The slot 20 is inclined slightly from the true longitudinal axis as illustrated in the diagram Figure 11 at 20' which depicts the approximate aspect of the relationship as developed in a cylindrical projection, the magnitude of this inclination, however, being exaggerated.

The convex surface of the guard 6 conforms to the prolate-spheroidal surface to the outer margins of the slots 19 and 21. Between these outer slot-margins and the edges two inclined curved surfaces 22 and 23 are milled from end to end. The profiles of these edge sections are shown particularly in Figure 12 at 24 and 25, and are also illustrated in the end view of the guard in Figure 8.

The handle 9, illustrated in Figure 9, is formed with a yoke 26 fitted with a pin 27 situated at a distance from the ends of the yoke-halves greater than half the width of the yoke.

To assemble the razor, the cap 3 is placed in the palm of the hand with the plate 15 projecting upwardly, the blade 5 is next placed over the plate 15 and the guard placed over the blade. The plate 15 extends through the slot 18 of the blade and the slot 20 of the guard and projects above the concave surface of the guard 6 when these pieces are thus loosely assembled.

The handle 9 is now grasped in the other hand and the edges of the yoke-halves are brought to bear upon the concave surface of the guard 6 with the handle in that relative position shown in Figure 2. Pressure upon the guard in this manner will cause the flexure of the blade and the further projection of the plate 15. The pin 27 of the handle may now be engaged with the hook 16 of the plate 15 by a slight longitudinal movement of the handle. When this is done the razor will appear as illustrated in Figure 2.

In this adjustment it is to be noticed that the guard, blade and cap are separated by appreciable distances. This relationship of these parts provides for easy washing of the razor which is securely held by the coaction of the strains in the blade and the hook 16 of the plate 15.

To adjust the razor for shaving the handle is raised to the perpendicular position as illustrated in Figure 1 when the cap 3 and guard 6 will be firmly pressed together by the toggle action inherent in this movement, and the blade will be formed as described.

In addition to those advantages and special properties of a razor of the general form of the oblique cylindrical segment as described in my application for Letters Patent of the United States for Safety-razors, filed January 17, 1933, Serial No. 652,133, the present invention provides these further unique advantages and properties:

My present invention provides for the critical equality and uniformity of relationship of the cutting edges of the blade with the edges of the guard. It will be apparent from a study of the form of the blade which is characterized by a

longitudinal slot parallel with parallel cutting edges, and a study of the disposition of the plate 15 upon the cap 3 and the disposition of the slot 20 of the guard 6 slightly inclined from the true center lines of these parts as shown at 20' in Figure 11, that the cutting edges of the blade will be brought into parallelism with the edges of the guard 6 when the assembly is clamped together and the various portions of the blade are bent over curves of varying radii. That is to say that the foreshortening of the blade will be greatest where the radius of the curve is the least, and vice versa. Thus, if a blade so characterized is to be used in a razor of the form described, compensations for the foreshortening of the blade due to varying degrees of curvature of the blade, must be provided in the relative dispositions of the plate 15 and the slot 20 with reference to the edges of the cap and guard respectively.

Figure 11 illustrates this provision. The broken lines represent the form of the blade and the solid lines represent the form of the guard with reference thereto, the slot 20 being coincident with the blade slot 20' shown in broken lines. If the upper left hand and the lower right hand corners of the guard with blade superimposed thereupon as illustrated in this figure are bent backwardly the outlines of the blade and the guard will at some point of flexure become parallel, or nearly so. Hence in the present invention I have disposed the plate 15 and slot 20 of the cap and guard respectively at slight inclination from the true center lines of these parts.

The inclined surfaces 22 and 23 of the guard 6 provide for a definite and fixed clearance below the entire length of the cutting edges of the blade without interruption and as well provide for the disposition of the cutting edges well down into the channels formed by this milling so that if a straight-edge be laid across the edges of the cap and guard the cutting edge at any point will appear below the straight-edge.

Reference to my previous invention before referred to will disclose that reliance was had solely upon bending stresses in the blade to dispose the cutting edges thereof at the proper position. This is in contrast to the present invention wherein another force is provided for which effects the disposition of the cutting edges as just described. In the present invention I have provided that the cutting edges of the blade shall also be subject to a tensile stress to improve the rigidity of the edges as well as the positioning thereof with reference to the guard edges.

Tensioning of cutting edges is a practice acknowledged by saw-makers to improve the rigidity of the armed edges and applies with equal propriety and effect in razors. The means I have chosen to produce this effect reside in the prolate spheroidal forms described to which a normally flat blade is strained. The effects of such straining are illustrated in the diagram Figure 13.

Each half of the blade assumes a position tending toward those illustrated in this figure. The slot becomes wider in the middle and the blade at the slot-margin is compressed and the cutting edges proportionately strained in tension. The cutting edges are thus used with the utmost advantage.

Other advantages of great practical utility are obvious from a study of the drawing.

Having described my invention what I claim is:

5 1. A safety-razor in which a normally flat flexible blade having parallel cutting edges and a central longitudinal slot parallel therewith is clamped between a cap and a guard having blade-contacting surfaces conforming to an oblique segment of the surface of a prolate spheroid, wherein blade-holding means engaging
10 said longitudinal slot in said blade incline toward corners of said cap and guard characterized by curvatures of least radii.

15 2. A safety-razor having a cap and guard with blade clamping surfaces conforming to a segment of the surface of a prolate spheroid, a hook attached to said cap and extending through said guard, and a handle attachable to said hook to secure the whole together.

20 3. A safety-razor having a cap and guard with blade-clamping surfaces conforming to an oblique segment of the surface of a prolate spheroid, a hook attached to said cap and extending through said guard, and a handle attachable to said hook to secure the whole together.

4. A safety-razor having a cap and guard with blade clamping surfaces conforming substantially to oblique segments of the surfaces of prolate spheroids, a normally flat flexible blade clamped between said cap and guard, a hook
5 attached to said cap and extending through said guard and said blade, and a handle attachable to said hook to secure the whole together.

5. A safety-razor comprising, a normally flat flexible blade and a cap and a guard between
10 which said blade is clamped, said guard and said cap having blade-contacting surfaces conforming substantially to complementary oblique surface-segments of prolate spheroids.

6. A safety-razor comprising, a normally flat
15 flexible blade having parallel cutting edges and a longitudinal slot therebetween, a cap and a guard between which said blade is clamped fitted with means to engage said slot and align said blade, said cap and said guard having blade-
20 contacting surfaces conforming substantially to complementary oblique surface-segments of prolate spheroids.

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