SAFETY RAZOR AND BLADE

Nicholas Resti, New York, N. Y., assignor to Gillette Safety Razor Company, Boston, Mass., a corporation of Delaware

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This invention relates to safety razors of the type in which a thin flexible blade is clamped in position for shaving between two blade clamping members such as a cap and a guard.

5 The invention consists in a novel razor of this type constructed and arranged to receive a blade presented transversely or in position cross-wise of the cap and guard and having means by which the blade may be swung into longitudinal or shaving position by the usual operation of clamping the cap and guard therein. In one aspect the invention consists in an improvement upon the safety razor disclosed in my prior application Ser. No. 696,054 filed October 31, 1933. In another aspect it consists in improvements which may be embodied with advantage in safety razors of other constructions.

Razors of the type contemplated by this invention eliminate the necessity for loose parts which may be lost or mislaid in taking a razor apart to remove or replace a blade, and permit the cap and guard to be permanently secured together so long as a limited separation is allowed sufficient to receive a blade in flat condition. Further, the user is relieved of the necessity of locating the blade in shaving position since he has only to insert it between the cap and guard and then rely upon a mechanical positioning of the blade through the normal operation of the clamping mechanism.

The present invention includes within its scope also a blade of novel characteristics and a new combination of safety razor and blade not heretofore known and presents certain advantages in respect to accuracy of blade location, not hitherto achieved in safety razors of this general type. These desirable results are secured by providing the blade with a blade-locating shoulder arranged to co-operate with a blade stop in the razor by being brought into positive engagement therewith as in a swinging movement. It will be appreciated that the accuracy of positioning this secured may be refined to a higher degree than is the case in razors wherein the blade is positioned by the engagement of apertures with co-operating projections, for in the latter case it is necessary always to allow an appreciable manufacturing tolerance and clearance in the fitting parts which often results in a slight looseness of the blade, and variation in the amount of its edge exposure. On the other hand, where the positioning of the blade is controlled by the engagement of an external shoulder or blade-locating edge with a fixed stop, no clearance for fit is required and the blade may be located by the positive engagement or contact of plane or curved surfaces.

As herein shown the blade of my invention is internally aperture to provide an edge or edges by which the blade may be turned or located in its own plane and as a novel feature I prefer to form such edges in the outline of resilient sections or tongues within the body of the blade. By so doing the blade may be controlled as to its position continuously from the time it begins to turn toward its shaving position until it is securely clamped ready for shaving. In the safety razor of my invention, moreover, a single actuating device is provided which may be conveniently operated from the handle for both rotating the blade into shaving position and causing the blade clamping members to engage the blade. As herein shown the clamping movement is effected through the medium of the resilient tongues of the blade, these being flexed after the blade has been rotated into shaving position and utilized in turn to move the blade clamping members into engagement.

Important and novel features of the present invention consist in utilizing the blade itself as an element of the clamping mechanism of the razor and in relying upon it to perform a mechanical function in the blade clamping operation, and in so designing the mechanism that the proper functioning of the blade in this respect insures the positive and accurate positioning of the blade for shaving. These results are secured, as herein shown, by employing a clamping device which comprises two parts connected for relative longitudinal movement when rotated with respect to each other and in so connecting the blade to one of these parts that it may limit the turning movement thereof while the user rotates the other without interruption.

As a further and more specific feature of my invention I have disclosed a safety razor having a cap of sectional form in which the cap sections are each pivotally supported as spaced points so that they are swung into open or closed position during the rotative movement of the cap and guard for the clamping of the blade.

These and other features of the invention will be best understood and appreciated from the following description of several preferred embodiments thereof, selected for purposes of illustration and shown in the accompanying drawings in which:

Fig. 1 is a view of the razor in end elevation showing the blade clamped in shaving position;
Fig. 2 is a plan view of one form of blade adapted for use with the illustrated razor.

Fig. 3 is a view of the razor in end elevation, partly in section, showing the blade in position of presentation.

Fig. 4 is a view of the razor in side elevation, showing the cap and guard separated.

Fig. 5 is a plan view of the razor with a portion of the cap broken away.

Fig. 6 is a view in perspective of the cap-carrying yoke and associated mechanism and also the operating sleeve for the yoke in disassembled relation.

Fig. 7 is a plan view of the razor with the cap removed, showing a blade in position of presentation and corresponding in this respect to Fig. 3.

Fig. 8 is a plan view of a modified form of blade.

Fig. 9 is plan view showing the blade of Fig. 8 in position upon a guard.

Fig. 10 is a plan view of another modified form of blade.

Fig. 11 is a plan view showing the blade of Fig. 10 in position upon a guard.

Fig. 12 and Fig. 13 are plan views of blades of modified shape, and

Fig. 14 is a view in end elevation of a modified form of razor having a sectional cap.

Referring first to the razor and blade illustrated in Figs. 1 to 7, it will be seen that the cap 10 is of rectangular outline and provided with a concave blade-engaging face and is suspended at its ends between the upstanding arms 11 of a yoke member. The base of the yoke member comprises a rectangular plate 12 to which is rigidly attached a downwardly extending tubular stem 13. The plate 12 is provided at both ends adjacent to the arms 11 with holes 15 for a purpose which will be presently described.

The guard 15 is provided with guard teeth spaced along its longitudinal edges and with a centrally disposed longitudinal channel of a width to receive the plate 12 of the yoke member. The inner walls of this channel meet the upper convex face of the guard to form parallel fulcrum shoulders over which the blade is flexed by the action of the concave face of the cap 10 when clamped in position for shaving. The guard is provided near each end of its channel with upstanding blade-stops 16 which are arranged to engage freely through the holes 15 of the yoke plate 12 and project above its upper face. The guard 15 is formed integrally with a downwardly directed head 16 bored to receive telescopically the tubular stem 13 of the yoke. The bore of the head 16 is extended below the lower end of the stem 13 to form a chamber for a compression spring 23. This is interposed between the stem 13 and a flange at the lower end of the head 16 and tends always to elevate the yoke member and the cap carried thereby.

The head 16 is externally shouldered to receive the upper end of the barrel 17 of the handle. A shaft or spindle 20 is arranged to slide longitudinally in the stem 13 of the yoke and through the lower end of the head 16. The shaft is provided at its upper end with a T-shaped head 21 having longitudinal grooves 22 formed in the sides of its arms, these grooves being of a width to receive an edge portion of the blade, as will presently appear. At its lower end the shaft 20 is provided with a cam pin 24 and this is received within a spiral cam slot formed in an operating sleeve 25 which is journaled within the end of the barrel 17 and provided with a groove to receive an inwardly extending circumferential rib 26. At the lower end the operating sleeve 26 is provided with a knurled head 27 by which it may be conveniently rotated by the user. The cam slot 27 is spiral in shape, being provided with a slight vertical pocket at its upper end and therefore when the operating sleeve 26 is turned in one direction or the other the shaft 20 and its head 21 are raised or lowered.

One form of blade well adapted for use with the razor above described is shown in Fig. 2. It is a double edged blade 30 of thin flexible steel having unsharpened end edges made up of two sections curved about different centers of curvature and united by a blade-locating shoulder 31. The blade is provided with internal apertures 32 so shaped as to provide a circular central opening and U-shaped branches which define flexible resilient tongues 33 extending in opposite directions and each supplying a short straight edge adapted to be engaged by a slot 22 of the head 21 when the blade is presented in cross-wise position between the cap and guard. As shown in Fig. 4 the operating sleeve 26 has been turned in counter-clockwise direction to one limit of its movement and, has accordingly been moved to its uppermost position and permitted the spring 23 to lift the yoke and the cap 10 carried thereby to their uppermost positions in which the cap and guard are spaced apart so that the user may conveniently insert the blade cross-wise between them as suggested in Fig. 3. The blade is thus presented it is engaged in mid-position by the head 21, which corresponds in contour to the central aperture of the blade, and centered for rotary movement about its axis meanwhile resting on the shoulders of the guard, as shown in Fig. 3. When now the user starts to turn the operating sleeve 26 in a clock-wise direction, the arms of the head 21 engage the inner edges of the tongues 33 of the blade and swing it in a clock-wise direction as suggested in Fig. 7. This movement continues without any shifting of the cam pin 24 in the cam slot 27 until the blade-locating shoulders 31 of the blade are arrested by engagement with the stationary blade stop pins 14 in the razor. If, for any reason, the blade is too short to engage the stop pins it is rotated indefinitely and is never arrested in shaving position and, not to exceed clamping force the blade will be in the razor. However, in using a blade 30 of the proper shape, the turning movement of the blade is arrested with the blade accurately positioned by the stop pins and with the slots 22 of the head 21 engaged with the edges of its tongues 33. Continued movement of the operating sleeve in the same direction is effective to hold the shoulders 31 firmly and accurately against the stop pins 14 and, since the shaft 20 can turn no farther, the continued pressure of the user upon the operating sleeve 26 causes the cam pin 24 to begin to move along the spiral cam slot 27 thus pulling the shaft 20 downwardly against the compression of the spring 23 and also against the flexing tension of the tongues 33 of the blade. These are flexed downwardly against engagement with the plate 12 of the yoke, thereby depressing the yoke and clamping the cap 10 downwardly into clamping engagement with the blade which is resting upon the fulcrum shoulders of the guard. The downward movement of the cap and the downward flexing of the tongues 33 continue until the blade 30 is full flexed and firmly clamped between the cap and guard, the blade being meanwhile held continuously against the blade stop pins 14 and accurately positioned thereby.
The pitch of the cam slot 27 decreases towards its lower end, thereby providing convenient means for securing a fine adjustment of the blade-clamping pressure and consequently of the degree of its edge exposure. It will be apparent that the shaft 20 with its pin 24 and the sleeve 26 with its cam slot 27 constitute a clamping device for the parts of the razor, being arranged to rotate idly as a whole without imparting clamping movement to the parts but being effective for clamping whenever the shaft 20 is held and the sleeve 26 rotated.

At the conclusion of the shaving operation the user has only to turn the operating sleeve 26 in a counter clock-wise direction, thereupon the cam pin 24 will traverse the cam slot 27 in the opposite direction, lifting the head 21, permitting the tongues 33 to reassume their normal flat condition and finally allowing the spring 28 to lift the yoke and release the cap from the blade. When this occurs the blade is free to turn reversely and further movement of the head 20 restores it to its straightforward position from which it may be removed for cleaning or replacement. The cap 10 shown in Figs. 1 to 6 is of integral, one-piece construction but my invention may be equally well embodied in a razor having a sectional cap such as that shown in Fig. 14. In that construction the guard member 62 is provided with an upstanding arm 63 at each end and the yoke is provided with two upstanding arms 81 at each end spaced so as to straddle the arms 83 of the guard. The cap comprises a pair of complementary sections 80 and each of these sections is pivotally supported to rock about a longitudinal axis between one pair of arms 81 of the yoke. Each cap section 80 is also pivotally connected at its inner edge to the arms 83 of the guard member. The design of the parts and location of clamping devices on the sections such that when the yoke is lifted in releasing the blade the section arms are swung upwardly at their outer edges with the result that the separating movement of the section and its guard is effected with an increased differential movement. When the user turns the operating sleeve 26 in a direction to lower the yoke the cap sections are swung rapidly into the blade-engaging position shown in Fig. 14, wherein they engage and flex the blade 46 over the fulcrum shoulders of the guard.

In Fig. 8 is shown a blade 40 of a somewhat modified form adapted for use in the razor of Figs. 2 and 14 or other razors of a similar construction. The blade 40 is provided with unsharpened ends each having a centrally disposed projection which supplies a blade-locating shoulder 41. The internal aperture 42 of the blade is in this case symmetrical in design and of such configuration as to supply a central circular opening having at each side oppositely directed flexible tongues 43. The blade 40 is shown in Fig. 9 as located in position upon the guard member 48 of a razor and it will be noted that the shav ing position of the blade in the guard is positively and accurately determined by the engagement of the blade-locating shoulders 41 with the stationary blade stop pins 45 which may be set in the guard itself or in the yoke member. To Fig. 8 is shown a blade 50 similar to that of Fig. 8 except that the end projections are not symmetrically located but are spaced unequally from the respective edges of the blade, that is, the blade locating shoulder 51 is located a distance B from one cutting edge while the blade-locating shoulder 54 is located a shorter distance A from the other cutting edge of the blade. The internal aperture 52 provides flexible tongues 53 extending in opposite directions in the blade. In Fig. 11, the blade 50 is shown located in shaving position upon the edge of the safety razor. It will be noted that the position of the blade is slightly inclined with respect to the guard teeth. The edge exposure of the blade is, therefore, greater at one end than at the other. This condition is desired by some users in that it affords a range of different edge exposure throughout the length of the blade permitting the user to select that portion for shaving which is best suited for his own requirements. The location of the shoulders 51 is such that, when the blade 50 is reversed face for face from the position shown in Fig. 11, the blade will be positioned in parallel relation to the axis of the guard and with uniform edge exposure on both sides.

In Figs. 12 and 13 are shown two further blades 60 and 70 of suitable design for use in connection with razors of my invention. The blade 60 is provided with unsharpened elongated portions at each end supplying blade-locating shoulders 61 and the internal aperture 62 includes an elongated slot with spaced enlargements and angular projections furnishing oppositely disposed flexible tongues 63. In the blade 70 the end contour of the blade is stepped to provide blade-locating shoulders 71 and its internal aperture 72 includes an elongated slot with segmental branches forming oppositely disposed flexible tongues 73.

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

1. A safety razor having blade clamping members, means for centering therein a blade having a shoulder in its periphery and a flexing tongue, a blade stop in the razor, and means acting first through said edge tongue to swing the blade against said stop and then to move the clamping members while the blade is so held.

2. A safety razor having cap and guard members, a blade having a blade-locating shoulder and a flexing tongue, a blade stop in the razor, and means acting first through said flexible tongue to move the blade angularly against said stop and then to clamp the blade between the cap and guard members while so held.

3. A safety razor having cap and guard members, a blade having an internal aperture providing tongues and a blade-locating shoulder, a blade-stop in the razor, and a head operative first to swing the blade, by engaging the edge of a tongue, into contact with the blade stop and then to move the cap and guard into blade-clamping engagement.

4. A safety razor having cap and guard members, a blade having an internal aperture providing tongues and a blade-locating shoulder, a blade-stop in the razor, and a head operative first to swing the blade, by engaging the edge of a tongue, into contact with the blade stop and then to move the cap and guard into blade-clamping engagement.

5. A safety razor having co-operating cap and guard members initially spaced apart to receive in cross-wise position a blade internally apertured to provide resilient tongues therein, and a head movable first to engage the edges of said tongues and rotate the blade into its shaving position and then to flex the tongues and simultaneously move the cap and guard members into blade-clamping relation.

6. A safety razor having co-operating cap and guard members, means initially spacing said
members for the reception of a blade, a flexible blade internally apertured to provide resilient tongues and having a blade-locating shoulder in its periphery, a blade stop in the razor, and a rotatable head acting to swing the blade against the blade stop and then to deflect the tongues therein downwardly and, while flexing the tongues, to move the cap and guard members into blade-flexing position.

7. A safety razor comprising cap and guard members, a handle, clamping means in the handle including two parts connected for clamping movement in response to relative rotary movement, and a blade acting to hold one part at rest and having a tongue arranged to be flexed while the other is turned to effect the clamping operation.

8. A safety razor comprising blade flexing members, and clamping means therefor including two parts connected for longitudinal movement in response to relative rotation, and a blade arranged to hold one of said parts at rest and having a tongue arranged to be flexed while the other part is turned.

9. A safety razor comprising blade engaging members, and clamping means therefor including a blade-engaging part and an operating part connected for longitudinal movement in response to relative rotation, a blade having a flexible tongue and being rotatable with the blade-engaging part, and a stop in the razor for limiting the turning movement of the blade arranged to permit subsequent flexing of said tongue while the blade is being clamped in shaving position.

10. A safety razor comprising blade flexing members, and clamping means therefor including a freely rotatable operating device comprising two parts connected for lengthwise contraction in response to relative rotation, a blade connected to one of said members and having a shoulder and an internal tongue, and a blade stop in the razor arranged to engage the shoulder of the blade and arrest the rotation of the blade in shaving position, thereby holding said part while the user continues to turn the other part, deflecting said tongue and simultaneously clamping the blade between the flexing members.

11. A double edged safety razor blade having an internal aperture and unsharpened end portions each having an elongated projection which provides two blade-locating shoulders disposed at unequal distances from the respective edges of the blade, the shorter distances being disposed at diagonally opposite corners of the blade and the aperture presenting edges whereby the blade may be engaged and moved into a position determined by the shoulders.

12. A safety razor comprising cap and guard members relatively movable to clamp a blade between them, a plate movable with the cap and spaced therefrom, and an angularly movable blade-positioning bar associated with said plate.

13. A safety razor having cap and guard members, a cam and pin device for moving said members into blade clamping relation mounted for free rotation in the razor, a blade shaped to engage said device, and a stationary stop in the razor for arresting rotary movement of the blade.

NICHOLAS TESTI.