Feb. 16, 1937. W. H. BLACK 2,071,105

SAFETY RAZOR

Filed Feb. 1, 1936

Fig. 1.

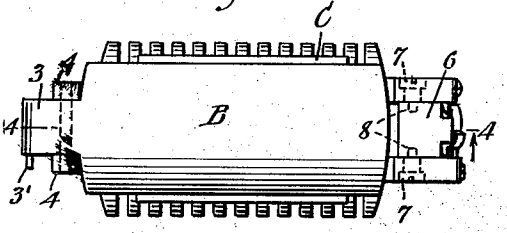


Fig. 2.

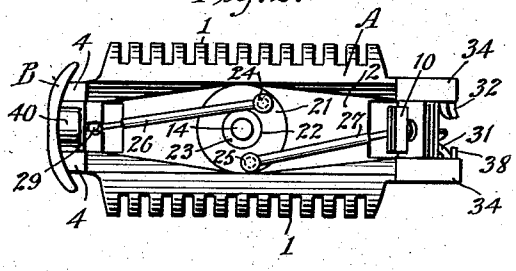


Fig. 3.

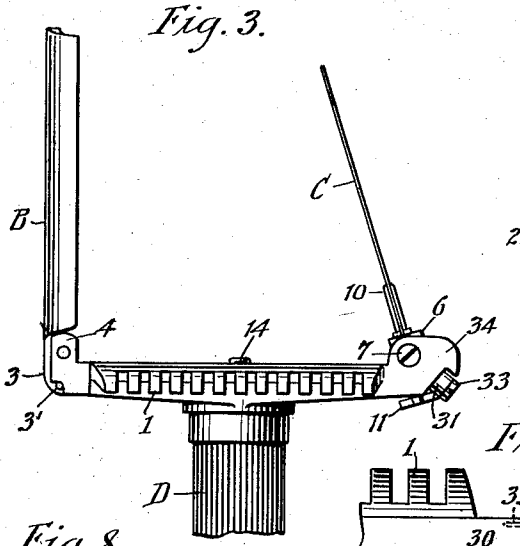


Fig. 4.

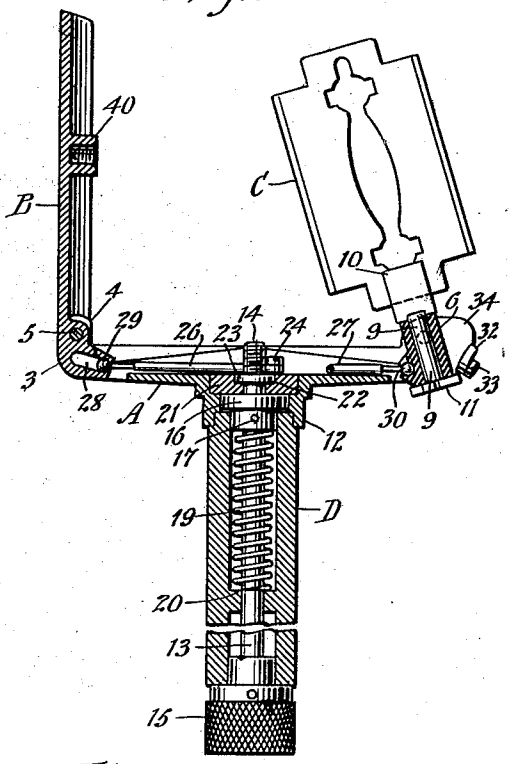


Fig. 5.

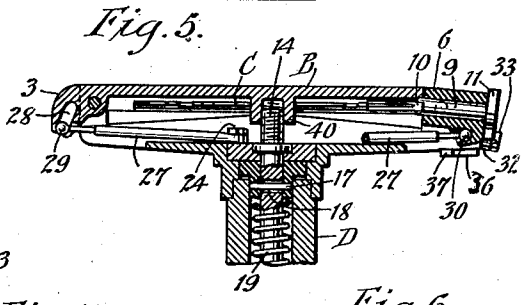


Fig. 7.

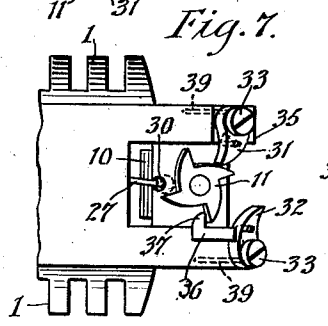


Fig. 6.

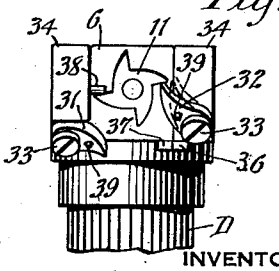


Fig. 8.



WITNESSES

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SAFETY RAZOR

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12 Claims. (Cl. 30—57)

This invention relates to safety razors, and more particularly to that type of safety razor in which a flexible blade is clamped and flexed between a guard and cap.

An object is to provide this type of razor in which the cap is pivotally connected at one end to the guard and a blade clamp pivotally connected to the other end of the guard, and means provided to cause the cap to swing from normal position clamping the blade to a position at substantial right angles to the guard and also cause the blade clamp to swing to a position substantially at right angles to the guard. For convenience of description, the normal position of the parts where the blade is clamped between the cap and the guard will be hereinafter referred to as the closed position of the razor and the position of the cap and blade holder at substantial right angles to the guard will be hereinafter referred to as the open position of the razor.

A further object is to provide a razor of this character in which means movable within the handle of the razor function to move the cap, the blade holder and blade from closed to open position and back to closed position.

A further object is to mount the blade clamp and provide operative means for engagement therewith which permits the blade to be turned over, that is, given a rotary or turning movement of 180° so that the blade is reversed as the blade is raised and lowered after the cap is moved out of the way. I have discovered that a blade rests if its position is changed from side to side every time after a shave, and the razor of this particular application accomplishes this movement by mechanical means which permits the operation without the necessity of touching the blade or its clamp with the fingers of the hand.

A further object is to provide a razor of this character in which the entire operation of opening and closing the razor and reversing the blade when in partially or completely open position is accomplished through mechanical means manually operated.

With these and other objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts, all of which will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawing—

Figure 1 is a top plan view of the razor with the parts in closed position;

Fig. 2 is a similar view showing the parts of the razor in open position, the blade being removed for clearness;

Fig. 3 is a view in side elevation of the head of the razor showing the parts in open position;

Fig. 4 is a view in lonigtudinal section through the razor with the parts in open position;

Fig. 5 is a view in longitudinal section through the head of the razor with the parts in closed position;

Fig. 6 is an enlarged or exaggerated fragmentary end view of the razor in closed position. This view is looking at the right-hand end of Fig. 5;

Fig. 7 is an enlarged fragmentary detail view looking at the under side of the guard at the right-hand end thereof;

Fig. 8 is a detail perspective view of one of the pawl springs.

My improved razor includes a guard A, and a cap B adapted to be clamped over the guard A and secure and flex a flexible blade C. A non-flexible blade may of course be employed if desired. The guard A is provided, preferably at its edges, with the usual arrangement of teeth 1, and at both ends is reduced in width and bifurcated for a purpose which will hereinafter appear. The upper face of the guard is recessed or chambered, as shown at 2, for the accommodation of movable parts. The cap B is formed at one end with an extension 3 of a width appreciably less than the width of the cap and adapted to be positioned in the left-hand bifurcated end of the guard. A pin 3' on the extension 3 engages the end of the guard to limit the opening movement of the cap B. It is to be understood that in describing the razor the use of the terms upper and lower and right and left hand ends have reference to the location of the parts as illustrated in the drawing.

The left-hand bifurcated end of the guard is provided with upstanding lugs 4 and a pivot pin 5 is projected through these lugs and through the extension 3 of the cap B, so that the cap pivots or hinges on this pin 5. In the bifurcated right-hand end of the guard A, a bearing block 6 is pivotally mounted between its ends, and as pivots for this block 6 I have shown a pair of screws 7 projecting through the furcations at the end of the guard and having pivot pins 8 at their inner ends projecting into sockets of a corresponding size and shape in the bearing block 8. This bearing block 6 has a longitudinal bore for the reception of a short shaft 9, which carries at its inner end a blade clamp 10 in which one end of the blade C is removably held. On the outer end of the shaft 9 a four-tooth ratchet wheel 11 is secured.

A tubular handle D is fixedly secured to a tubular extension 12 centrally of the guard and a spindle 13 is mounted in the handle so that its upper end projects above the upper face of the guard 8 and is screw-threaded as shown at 14. A milled head 15 is secured to the lower end of the spindle 13 and bears against the lower end of the tubular handle D. A flanged collar 16 is mounted on the spindle 13 near its upper end, and a pin 17 is projected through this collar and through a slot 18 in the spindle so that the collar has a certain amount of longitudinal movement on the spindle. A coil spring 19 is positioned around the spindle between the collar 17 and an inturned annular shoulder 20 in the handle, tending to press the collar 16 upwardly against a disk 21 which is provided with a central opening 22 receiving the spindle. The wall of this opening 22 is recessed to receive an annular flange 23 integral with the spindle 13 and limiting the upward movement of the disk 21. This disk 21 constitutes a crank disk and is provided with a pair of crank pins 24 and 25. A link 26 connects the crank pin 24 with the extension 3 of the cap B and a link 27 connects the crank pin 25 with the bearing block 6. Attention is called to the fact that the extension 3 of the cap B is at an angle to the longitudinal plane of the cap, and has an elongated socket 28 receiving a ball 29 on the end of the link 26, and permitting a certain amount of independent movement of the ball in the socket, but it is of course to be understood that the ball 29 cannot escape from the socket as the outer end of the socket is reduced in diameter less than the diameter of the ball. The link 27 also preferably has a ball and socket connection 30 with the bearing block 6 so that when a partial rotary or turning movement is imparted to the disk 21, the cap B and the bearing block 6 will be caused to pivot.

In order to impart a rotary or turning movement to the shaft 9, blade clamp 10 and blade C, the shaft 9, as above described, is provided at its outer end with a four-tooth ratchet wheel 11, and as the bearing block 6 is rocked on its pivots this ratchet wheel will be brought into engagement with spaced spring-pressed pawls 31 and 32 pivotally connected as shown at 33 to the ends of enlargements 34 on the bifurcated right-hand end of the guard. These pawls 31 and 32 are out of alignment and oppositely positioned. The pawl 31 is limited in its movement in one direction by a shoulder or stop 35, and the pawl 32 is limited in its movement in the opposite direction by a stop 36 which constitutes a portion of a small angular plate secured to the guard and having an inwardly projecting finger 37 in the path of movement of the teeth of the ratchet wheel. This finger 37 is at one side of the path of movement of the ratchet wheel and located at one extreme of the movement of said wheel, while a second finger or stop pin 38 is located on the opposite side of the guard in the path of movement of the ratchet wheel at its other extreme of movement. The pawls 31 and 32 are above described as spring pressed, and a simple form of spring 39 is illustrated in Fig. 8, which springs may be utilized to control the movement of the pawls in one direction.

The cap B is provided intermediate its ends and on its under face with a preferably internally screw-threaded nipple 40 adapted to receive the screw-threaded end 14 of the spindle 13 so as to clamp the cap upon the blade C and securely hold the blade suitably flexed and against the guard A when the razor is in its normal closed position, such as shown in Figs. 1 and 5 of the drawing.

When it is desired to open the razor and turn over or reverse the blade, the operator grasps the tubular handle D with one hand and with the thumb and finger of the other hand he turns the milled knob or enlargement 15 to the right or in a clockwise direction causing the screw-threaded end 14 of the spindle 13 to unscrew from the nipple 40. When the nipple 40 is released a continued turning movement of the knob 15 and spindle 13 in the same clockwise direction will, due to the frictional engagement of the collar 16 against the disk 21, cause the links 26 and 27 to be drawn inwardly, swinging the cap B upwardly to the position shown in Figs. 3 and 4 and swinging the bearing block 6, blade holder, and the blade C to the position shown in Figs. 3 and 4.

When the razor is thus in what is termed its open position, a rocking or oscillating movement of the spindle 17 will cause the disk 21 to oscillate. This movement is not a very great movement but only such as is permitted by the movement of the ball 29 in the socket 28, but it is sufficient to cause the bearing block 6 to rock on its pivots and in doing so the ratchet wheel 11 is brought into contact with the pawls 31 and 32 which causes the ratchet wheel to turn and thus impart motion to the shaft 9 to turn the clamp 10 and blade C.

The fixed fingers or pins 37 and 38 in the path of the teeth of the ratchet wheel merely insure a completeness of movement; that is, each movement or engagement of a pawl turns the ratchet wheel a distance of one tooth which is one-quarter of a revolution, and if this movement is not completed by the action of the pawl it will be completed when the tooth of the ratchet wheel engages the stop pins.

A complete oscillation of the blade clamp is sufficient to turn the blade completely over, that is, through an arc of 180°.

The operation of closing the razor is as follows: While the movement of the spindle 13 and the disk 21 has been heretofore referred to with respect to the movement of the spindle by the thumb and fingers of the hand, for convenience of description the movement of the disk 21 will be hereinafter described with relation to the plan view shown in Fig. 2. In considering the operation of opening and closing the razor, attention is called to the fact that the longitudinal axis of the socket 28 is at an obtuse angle to the plane of the cap B, and attention is called also to the location of the crank pins 24 and 25 on the disk 21. These crank pins are not diametrically opposed to each other but are so positioned on the disk as to give the desired movements to the links 26 and 27. When the razor is in open position as shown in Fig. 4 of the drawing, it will be noted that the link 26 has a certain amount of movement longitudinally in the socket 28 without imparting any movement to the cap B, but the connection between the link 27 and the bearing block 6 is such that any movement of the link 27 imparts a pivotal movement to the bearing block. Assuming the razor to be in open position as shown in Fig. 4 of the drawing, the disk 21 is given a counterclockwise movement, referring to Fig. 2 of the drawing. The link 27 immediately causes the bearing block 6 to pivot and move

the blade C downwardly and after this movement is well started the ball 29 on the link 26 reaches the end of the socket 28 and causes the cap B to be moved downwardly, but before the cap B starts its downward movement the blade has moved downwardly far enough so as not to interfere with the downward movement of the cap. Both the blade and the cap of course then move downwardly together but the blade is moving downwardly in advance of the cap and reaches the guard before the cap comes down on top of the blade. When the cap does come down on top of the blade its nipple 40 will be positioned over the threaded stud 14 and a turning movement of the spindle in the same direction which has caused the disk 21 to move as above explained, causes the stud to screw into the nipple and clamp the cap tightly down upon the blade and the latter upon the guard as shown in Fig. 5 of the drawing.

To open the blade the spindle 13 is turned in the opposite direction from that above described to cause the stud 14 to disengage from the nipple 40, and during this turning movement no motion is imparted to the disk 21 as the connection between the spindle and the disk is merely a frictional engagement and the disk cannot move until the cap is freed. When the cap is freed the disk 21 is caused to turn in a clockwise direction, reference still being made to the position of the parts shown in Fig. 2. When the cap is in the closed position shown in Fig. 5, it will be noted that a movement of the link 27 will immediately cause the cap to rise due to the angularity of the socket 28 and the position of the ball 29 therein, and also while a movement is imparted by the link 27 to the bearing block 6, the cap will be caused to move upwardly or pivot ahead of the bearing block so that it moves upwardly out of the way of the blade as the latter is moved to open position with the parts as shown in Fig. 4 of the drawing. When in this open position a complete oscillation of the bearing block will cause the blade to be turned a distance of 180°, as above pointed out, and this movement is permitted the bearing block without moving the cap B because of the fact that the link 26 can move a limited distance in the socket 28 without imparting any movement to the cap.

While I have illustrated and described what I believe to be the preferred embodiment of my invention, it is to be distinctly understood that various slight changes may be made with regard to the form and arrangement of parts without departing from my invention, and hence I do not limit mystelf to the precise details set forth but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the claims.

I claim:

1. A safety razor, including a guard, a handle fixed to the guard, a blade clamp and cap pivotally connected respectively to opposite ends of the guard, and means in the handle to move the cap and clamp about their pivots and also adapted to turn the clamp to reverse a blade therein when freed from between the cap and guard.

2. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a blade clamp pivotally connected to the other end of the guard, and a single mechanical means constituting a part of the razor and adapted to positively move both the cap and blade clamp on their pivots and also turn the blade clamp to reverse a blade therein.

3. A safety razor, including a guard, a tubular handle fixed to the guard, a blade clamp pivotally connected to one end of the guard and having rotary mounting, a cap pivotally connected to the other end of the guard, a spindle having rotary mounting in the handle, a crank disk on the spindle, and links connecting the disk with the cap and blade clamp to swing the cap and clamp to positions at angles to the guard when the spindle is turned in the handle.

4. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft mounted in the bearing block, a blade clamp fixed to one end of the shaft, and mechanical means constituting a part of the razor adapted to positively move both the cap and the bearing block on their pivots and impart rotary motion to the shaft when the razor is in open position.

5. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, and means in the razor for rocking the bearing block on its pivot to cause the ratchet wheel to be turned by the pawls and turn over or reverse a blade in the blade clamp.

6. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, means in the razor for rocking the bearing block on its pivot to cause the ratchet wheel to be turned by the pawls and turn over or reverse a blade in the blade clamp, said means including a crank disk, links connecting the crank disk with the cap and bearing block, and means in the handle for oscillating the disk.

7. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, means in the razor for rocking the bearing block on its pivot to cause the ratchet wheel to be turned by the pawls and turn over or reverse a blade in the blade clamp, said means including a crank disk, links connecting the crank disk with the cap and bearing block, and means in the handle for oscillating the disk, one of said links having a limited independent movement at its point of connection with the cap.

8. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, means

in the razor for rocking the bearing block on its pivot to cause the ratchet wheel to be turned by the pawls and turn over or reverse a blade in the blade clamp, said means including a crank disk, links connecting the crank disk with the cap and bearing block, and means in the handle for oscillating the disk, said links having ball-and-socket connection with the cap and bearing block, the socket in the cap being elongated to permit a movement of the links without moving the cap.

9. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, a spindle in the handle, a milled enlargement on the spindle at the end of the handle, a crank disk having frictional engagement with the spindle, and links connecting the crank disk with the cap and bearing block.

10. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a bearing block pivotally connected to the other end of the guard, a shaft in the bearing block, a blade clamp on the inner end of the shaft, a ratchet wheel on the outer end of the shaft, pawls in the path of movement of the ratchet wheel, a spindle in the handle, a milled enlargement on the spindle at the end of the handle, a crank disk having frictional engagement with the spindle, links connecting the crank disk with the cap and bearing block, said spindle having a screw-threaded upper end, and a threaded nipple on the cap to receive the screw.

11. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a rotary spindle in the handle having an annular flange thereon near its upper end, a crank disk free to turn on the spindle and bearing against the under face of the flange, a collar fixed to turn with the spindle but having a limited longitudinal movement on the spindle, said collar frictionally engaging the under side of the disk, a coil spring around the spindle between the collar and a fixed part of the handle, holding the collar in frictional engagement with the disk, and links pivotally connecting the disk with the cap and the blade clamp.

12. A safety razor, including a guard, a tubular handle fixed to the guard, a cap pivotally connected to one end of the guard, a blade clamp pivotally connected to the other end of the guard, a rotary spindle in the handle having an annular flange thereon near its upper end, a crank disk free to turn on the spindle and bearing against the under face of the flange, a collar fixed to turn with the spindle but having a limited longitudinal movement on the spindle, said collar frictionally engaging the under face of the disk, a coil spring around the spindle between the collar and a fixed part of the handle, holding the collar in frictional engagement with the disk, and links pivotally connecting the disk with the cap and the blade clamp, said guard having bifurcated ends in which the blade clamp and the cap are movable, and one of said links having a limited independent movement at its point of connection with the cap.

WILLIAM HARMAN BLACK.