

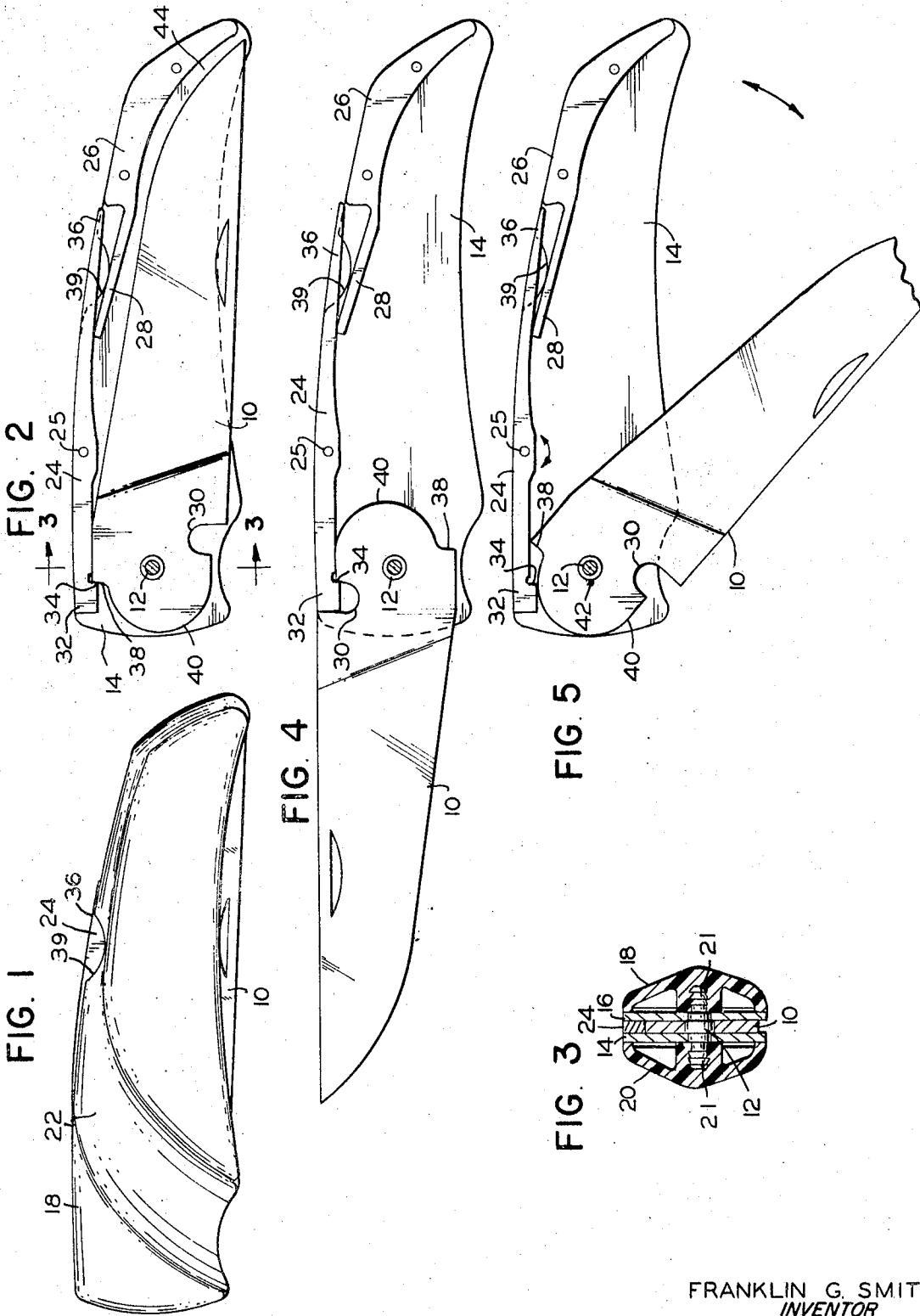
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FOLDING KNIFE HAVING CLOSURE ARRESTING MEANS

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**FOLDING KNIFE HAVING CLOSURE
ARRESTING MEANS**

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ABSTRACT OF THE DISCLOSURE

A folding knife is described in which a closure arresting means is provided to prevent the knife blade from snapping shut from an open to a closed position, by abruptly increasing the closing resistance of the blade when it reaches an intermediate position at an acute angle with respect to the handle. The closure arresting means includes a spring biased stop member pivotally mounted intermediate its ends on the knife handle with one end engaging the blade and the other end engaging a leaf spring member. A shoulder portion of the stop engaging surface of such blade engages the stop member close to its pivot to provide the abrupt increase in closing resistance in the intermediate position of the blade. The stop member also forms part of a lock means which locks the blade in its fully open position by engagement of a latch portion on the end of such member within a notch in such blade. Release of the lock means is accomplished by pressing on the other end of the stop member to move such end against the force of a leaf spring member in engagement therewith. In addition the latch portion also engages the shoulder on the blade in its closed position to space the cutting edge of such blade from the spring member to prevent dulling.

BACKGROUND OF THE INVENTION

The subject matter of the present invention relates generally to cutting tools having folding blades, and in particular to a folding knife having a closure arresting means in an intermediate position of the blade for preventing the blade from snapping shut, a locking means for locking the blade in its fully open position, and a spacing means for spacing the cutting edge of the blade from any abutment in its closed position.

The present invention is especially useful in a hunting knife for skinning wild game and the like, but may also be employed in an everyday pocket knife or in other cutting tools employing folding blades such as leather and woodworking tools.

Previous folding knives have employed locking means for locking the blade in its fully open position as shown in U.S. Pat. 584,077 of J. P. Jackson. Usually such previous knives employ a spring for holding the blade closed but which also causes the blade to suddenly close when it reaches an intermediate position by reducing the closing resistance at such intermediate position. This has the disadvantage that a blade may snap closed on the fingers of the person holding the knife and seriously cut his fingers unless it is handled extremely carefully.

The folding knife of the present invention avoids this problem by providing a closure arresting means which abruptly increases the closing resistance force applied to the knife blade when such blade reaches an intermediate position, thereby preventing it from snapping closed. While this intermediate position may be anywhere between the fully open and fully closed positions of the blade, it is preferably at a position where such blade forms an acute angle with the handle which is less than 90° and may be approximately 45°.

The enclosure arresting means in the present knife en-

ables the blade to be moved from its intermediate position to its fully closed position by simply closing the one hand holding such knife when the fingers are on the back edge of the blade and the thumb is on the back edge of the handle, thereby greatly reducing the possibility of cut fingers. Also the knife of the present invention is easier to open so that the blade can be pivoted out of the handle without breaking a fingernail, as so often occurs with spring closure knives.

Another problem with previous folding knives having spring closure means is that the cutting edge of the blade frequently strikes an abutment within the handle when such blade snaps closed, thereby dulling such cutting edge. This problem is also solved in the present knife by the closure arresting means and by a stop which spaces the cutting edge from any abutment in its closed position.

Some previous folding knives having locks to hold the blade in its fully open position have the disadvantage that the lock release is accessible to the palm or other portion of the hand holding the knife so that such release was sometimes accidentally operated by tightening one's grip on the knife handle. If this happened the blade often closed unexpectedly, cutting the fingers severely. This problem is avoided in the knife of the present invention by providing the lock release lever in a position recessed below the surface of the handle and providing access to such release lever only through a small notch across the back of the handle whose length is approximately equal to the width of the thumb.

In addition to the above mentioned safety features, the folding knife of the present invention has other advantages including a handle provided with a thumb receiving groove shaped to conform to the thumb of a hand gripping the handle of such a knife, thereby enabling a much surer slip-free grip. Also, the handle grips may be formed with a check grooved or otherwise roughened outer surface adjacent the thumb receiving groove for better gripping.

It is therefore one object of the present invention to provide an improved folding knife of a simple but safe construction.

Another object of the present invention is to provide an improved folding knife with a closure arresting means for preventing the knife blade from snapping closed on the fingers of the person handling such knife when such blade is moved from an open to a closed position.

A further object of the present invention is to provide an improved folding knife having a lock for locking the blade in its fully open position which may be released quickly and easily, but which cannot be released accidentally.

An additional object of the present invention is to provide an improved folding knife in which the cutting blade of such knife is held spaced away from any abutting surface within its handle in the closed position of such knife to maintain such cutting edge sharp for a longer time.

Still another object of the invention is to provide a folding knife whose blade is held closed but which can be easily opened with little force.

Other objects and advantages of the present invention will be apparent from the following detailed description of a preferred embodiment thereof, and from the attached drawings of which:

FIG. 1 is a perspective view of the folding knife of the present invention with its blade closed;

FIG. 2 is an elevation view of the knife of FIG. 1 with a portion of the handle broken away for purposes of clarity;

FIG. 3 is a vertical section view taken along the line 3—3 of FIG. 2;

FIG. 4 is an elevation view similar to FIG. 2 but with the knife blade shown in its fully open position; and

FIG. 5 is an elevation view similar to FIG. 2 with the knife blade shown in its intermediate position of maximum closure resistance.

DESCRIPTION OF PREFERRED EMBODIMENT

The folding knife of the present invention includes a blade 10 of stainless steel or high speed tool steel which is pivotally mounted at one end on a pivot pin 12 of brass attached between a pair of side plates 14 and 16 of brass forming the handle of such knife, as shown in FIGS. 1 to 3. The handle also includes a pair of gripping members 18 and 20 which may be made of molded plastic material such as the acetyl resin known as "Delrin" or of wood, such as black walnut. The gripping members 18 and 20 are attached to the side plates 14 and 16 by pressing blind holes on the inside of such gripping members over rivets attached to such side plates. Two of such rivets may be provided by the opposite ends 21 of pivot pin 12 which have holding ridges thereon. In order to insure a water-tight seal the gripping members may be secured to the side plates by an epoxy resin glue. Each gripping member is provided with a thumb receiving groove 22 in its outer surface which curves in the manner of the thumb on a hand gripping the knife handle. In addition, the surface area of the handle surrounding the groove may be roughened by cross check notching or the like to provide a sure, slip-free grip.

A spring biased stop member 24 of stainless steel is pivotally attached by a pivot pin 25 between the side plates 14 and 16 at the back of the handle adjacent one end in position for engagement with the blade to serve as a closure arresting means and as a lock means for such blade as hereafter described. A spring member 26 of stainless steel or other spring metal is rigidly attached between the side plates 14 and 16 by rivets at the back of the handle near its other end and is provided with a leaf spring finger portion 28 extending therefrom. The spring finger 28 engages one end of the pivoted stop member 24 for resiliently urging such stop member in a counterclockwise direction about pivot 25 in FIG. 3. This causes the other end of the stop member 24 to engage the pivoted end of the knife blade 10 and apply a force thereto which aids closure in the blade position of FIG. 2 and opposes closure in the blade position of FIG. 5.

As shown in FIG. 4, the knife blade 10 is provided with a notch 30 in its back edge into which is inserted a latch portion 32 of the stop member 24 when such knife blade is moved to its fully open position, thereby locking such blade in such open position. The latch portion 32 extends downward at one end of the stop member 24 to form a shoulder 34 which engages the top right hand edge of the blade notch 30 to prevent such blade from pivoting. In order to release the lock, a release portion 36 at the other end of the stop member 24 adjacent the spring finger 28 is depressed in order to pivot such stop member in clockwise direction. This causes the latch portion 32 to be removed from notch 30 and enables the blade 10 to be pivoted closed. The release portion 36 of the stop member 24 is recessed below the surface of the handle but extends through a notch 39 extending laterally across the back of the handle including the gripping members 18 and 20 and the side plates 14 and 16. The notch 39 has a width approximately the same as the width of a thumb in order to enable the release portion to be pressed downward by the thumb to cause such stop member to be pivoted further into the handle.

The closure arresting operation of the stop member 24 is shown in FIG. 5. As the blade 10 is pivoted from the fully open position of FIG. 4 to the closed position of FIG. 2, the stop member 24 acts as a force applicator member for continuously applying a closure resistance force to the blade at a blade contact area. When the blade reaches an intermediate position, a shoulder 38 on the pivoted end of the blade engages the stop member 24 and causes the blade contact area on the member 24 to

transfer from point 34 to point 38, as shown in FIG. 5. This causes the spring biased stop member to apply a greater force to the blade which opposes further closing, thereby abruptly increasing the closure resisting force applied to the blade, as hereafter described. In this intermediate position the blade 10 forms an acute angle of approximately 45° with the longitudinal axis of the handle, so that the cutting edge of such blade is spaced from the handle in order to prevent the fingers gripping such handle from being cut accidentally during closure.

In addition to the shoulder 38, the blade is also provided with an arcuate stop engaging surface 40 which extends between the notch 30 and the shoulder 38 about a center of curvature 42, which is eccentric to the axis of the pivot pin 12. As the blade 10 is pivoted closed from the fully open position of FIG. 4, the arcuate surface 40 first engages the stop member 24 at a position slightly to the right of the shoulder 34 on such stop member. When the blade reaches an angle of approximately 135° with respect to the handle, the point of contact of the blade surface 40 moves slightly to the left onto the outer corner of shoulder 34 of the stop member and continues in engagement therewith until the blade reaches the intermediate position of FIG. 5. At the intermediate position the point of contact moves far to the right when the blade shoulder 38 contacts the stop member. This results in a force being applied by the stop member to the blade which tends to pivot the blade in a clockwise direction and opposes closing of the blade to abruptly increase the closing resistance force including friction applied to such blade. The distance between the contacting edge of the shoulder 38 and the pivot pin 25 of the stop member is extremely short in the intermediate position and is less than any similar distance between any other portion of the stop engaging surface and such pivot pin 25 in other blade positions. This is significant because it means that the moment arm for the force applied by the stop member 24 to the knife blade 10 is shortest in the intermediate position of FIG. 5. As a result of this short moment arm, the force applied to such blade is maximum at this intermediate position and is in a direction to oppose closure of the blade. As the blade moves from the intermediate position shown in FIG. 5 to the fully closed position of FIG. 2, the outer edge of the blade shoulder 38 moves along the surface of the stop member 24 to the left away from the pivot 25, thereby increasing the moment arm, and decreasing the closing resistance force. Finally when the blade reaches the fully closed position of FIG. 2 the force applied to the blade by the stop member 24 acts to pivot the blade counterclockwise and aids closing or tends to hold the blade closed.

In addition, it should be noted that in the fully closed position of FIG. 3, the blade shoulder 38 engages the stop member shoulder 34 which acts as a rigid fixed stop to space the cutting edge of the knife blade 10 away from any abutting surface within the handle, including the spring member 26, by the gap 44 between such members. This prevents dulling of the cutting edge, which would otherwise occur if such cutting edge were to strike the spring member 26 in its closed position.

It will be obvious to those having ordinary skill in the art that many changes may be made in the details of the above described preferred embodiment of the present invention without departing from the spirit of the invention. Therefore the scope of the present invention should only be determined by the following claims.

I claim:

1. A cutting tool comprising:
 - a handle member;
 - a blade pivotally mounted on said handle member for pivoting between an open position in which the blade is fully extended and a closed position in which the blade is retracted and contained within said handle member; and

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closure arresting means including a force applicator member contacting the blade at a blade contact area for applying a closing resistance force to said blade continuously as it is being pivoted closed from said open position to said closed position and for abruptly increasing said closing resistance force by transferring the blade contact area to a different area on said applicator member when said blade reaches an intermediate position between said open position and said closed position to prevent the blade from snapping shut.

2. A folding knife in accordance with claim 1 in which the applicator member resiliently engages the blade and said blade extends from said handle member at an acute angle in said intermediate position.

3. A knife in accordance with claim 2 in which the applicator member is spring biased.

4. A knife in accordance with claim 3 in which the applicator member also acts as a stop member to limit opening and closing of the blade, and said stop member is pivotally attached to the handle member and is engaged at one end by a leaf spring means fixedly attached to said handle member for urging the other end of said stop member into contact with said blade to apply the closing resistance force to said blade.

5. A knife in accordance with claim 4 in which the stop member engages the blade in all positions to resist opening and closure thereof and the stop engaging surface of the blade is provided with a shoulder portion which in said intermediate position engages said stop member at a point closer to the pivot axis of said stop member than does any other portion of said stop engaging surface to provide the greatest closing resistance force on said blade, and continues in engagement with said stop member while sliding along said stop member away from said pivot axis to reduce the closing resistance force as the blade is moved from said intermediate position to said closed position.

6. A knife in accordance with claim 1 in which the applicator member also includes a lock means for locking the blade in said open position and to prevent said blade from being closed until release of said lock means.

7. A knife in accordance with claim 6 in which the lock means includes a spring biased lock member which engages said blade and also forms said applicator member.

8. A knife in accordance with claim 4 in which the stop member has a latch portion at the other end thereof which engages a notch in the blade to lock said blade in the open position, and having a release portion at said one end of said stop member which extends into a recess in the back of the handle member to enable manual engagement of said release portion for pivoting said stop member to move said catch portion out of said notch and thereby release the lock.

9. A knife in accordance with claim 7 in which the lock member has a latch portion which engages a notch in the blade to lock such blade in said open position and also engages the shoulder portion of the blade in said closed position to space the cutting edge of the blade from any abutment within the handle.

10. A knife in accordance with claim 7 in which the blade is provided with an arcuate stop engaging surface extending between said notch and a shoulder portion which contacts the stop member in said intermediate position.

11. A knife in accordance with claim 10 in which the center of curvature of said arcuate surface is displaced from the pivot axis of the blade in a direction away from its cutting edge.

12. A knife in accordance with claim 11 in which the outer edge of the blade shoulder and the stop engaging surface at the entrance of the blade notch are approxi-

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mately the same distance from the pivot axis of said blade.

13. A knife in accordance with claim 1 in which the handle member includes a pair of metal side plates secured together in spaced relationship by a blade pivot pin to provide a blade receiving chamber therebetween, and between which the blade is pivotally attached on such pivot pin and a pair of gripping elements secured to the outside of each of said plates by ridges on the opposite ends of said blade pivot pin which are inserted into blind holes on the inside of said gripping elements.

14. A knife in accordance with claim 13 in which at least one of said gripping elements has a curved thumb receiving groove in its outer surface.

15. A cutting tool comprising:
a handle member;
a blade pivotally mounted on said handle member for pivoting between an open position in which the blade is fully extended and a closed position in which the blade is retracted and contained within said handle member; and

closure arresting means for applying a closing resistance force to said blade as it is being pivoted closed and for abruptly increasing said closing resistance force when said blade reaches an intermediate position between said open position and said closed position to prevent the blade from snapping shut;

said arresting means including a stop member engaging the blade in all positions to resist opening and closure thereof and the stop engaging surface of the blade is provided with a shoulder portion which in said intermediate position engages said stop member at a point closer to the pivot axis of said stop member than does any other portion of said stop engaging surface to provide the greatest closing resistance force on said blade, and continues in engagement with said stop member while sliding along said stop member away from said pivot axis to reduce the closing resistance force as the blade is moved from said intermediate position to said closed position.

16. A cutting tool comprising:
a handle member;
a blade pivotally mounted on said handle member for pivoting between an open position in which the blade is fully extended and a closed position in which the blade is retracted and contained within said handle member; and

closure arresting means for applying a closing resistance force to said blade as it is being pivoted closed and for abruptly increasing said closing resistance force when said blade reaches an intermediate position between said open position and said closed position to prevent the blade from snapping shut;

said handle member including a pair of metal side plates secured together in spaced relationship by a blade pivot pin to provide a blade receiving chamber therebetween, and between which the blade is pivotally attached on such pivot pin and a pair of gripping elements secured to the outside of each of said plates by ridges on the opposite ends of said blade pivot pin which are inserted into blind holes on the inside of said gripping elements.

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