United States Patent [19]

Miori

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[54] **FOLDING BLADE KNIFE WITH BLADE LOCK**

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[73] Assignee: **Camillus Cutlery Company,** Camillus, N.Y.

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[52] **U.S. Cl.** **30/161**

[51] **Int. Cl.** **B26b 1/04**

[58] **Field of Search** 30/160, 161, 159, 155, 30/156, 157, 158; 403/92, 93, 94, 96

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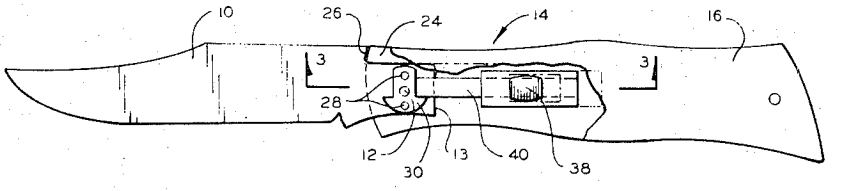
Assistant Examiner—J. C. Peters
Attorney, Agent, or Firm—Charles S. McGuire

[57] **ABSTRACT**

A folding blade knife with a sliding lock for selective movement to a position interfering with movement of the blade from open to closed position. A manually engageable button extends through an opening in the knife handle and is slidable longitudinally along the handle to move a finger in and out of the path of movement of a portion of the blade tang when the blade is open. In one embodiment, the locking finger is moved longitudinally and transversely in and out of a notch in the blade tang. In a second embodiment, a separate element is fixedly attached to the blade tang and the locking finger is moved longitudinally in and out of the path of such element in both the open and closed positions of the blade. A conventional spring along the back of the handle is provided as in common jack knives, to yieldingly retain the blade in both the open and closed positions irrespective of the blade locking means.

11 Claims, 15 Drawing Figures



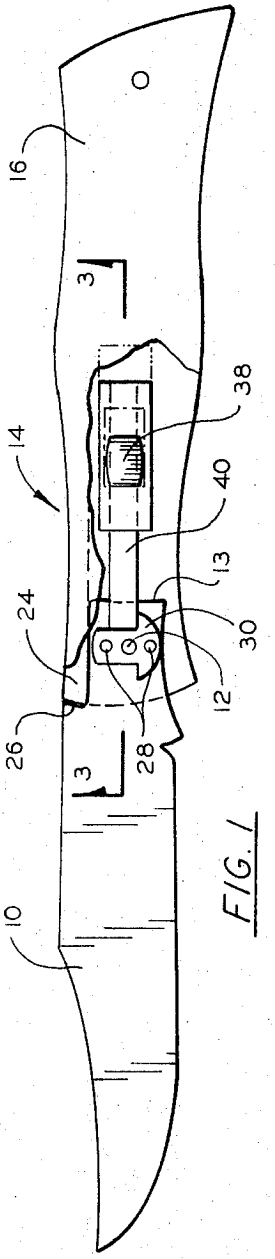


FIG. 1

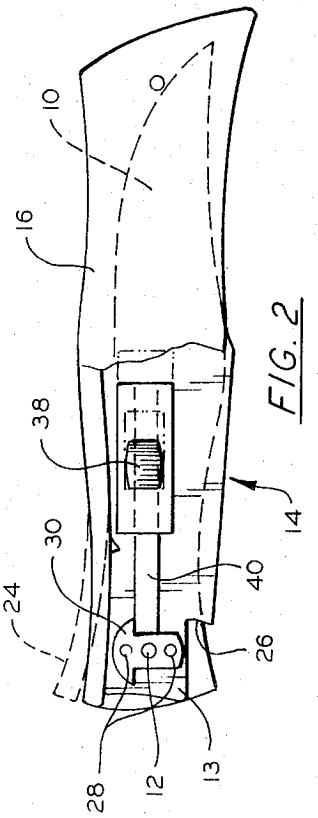


FIG. 2

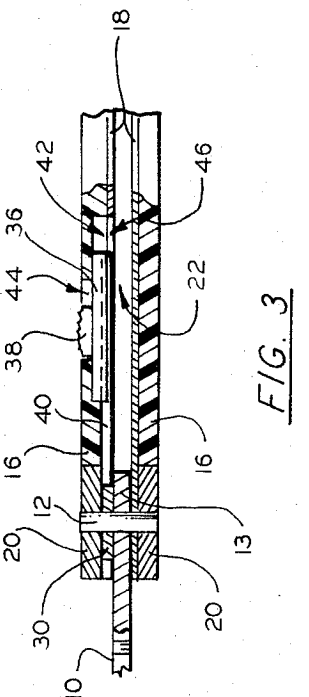


FIG. 3

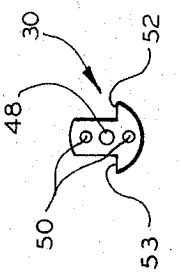


FIG. 4

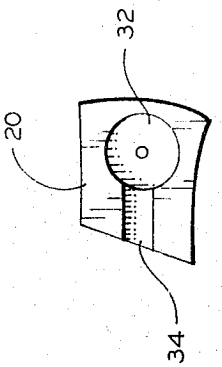


FIG. 5

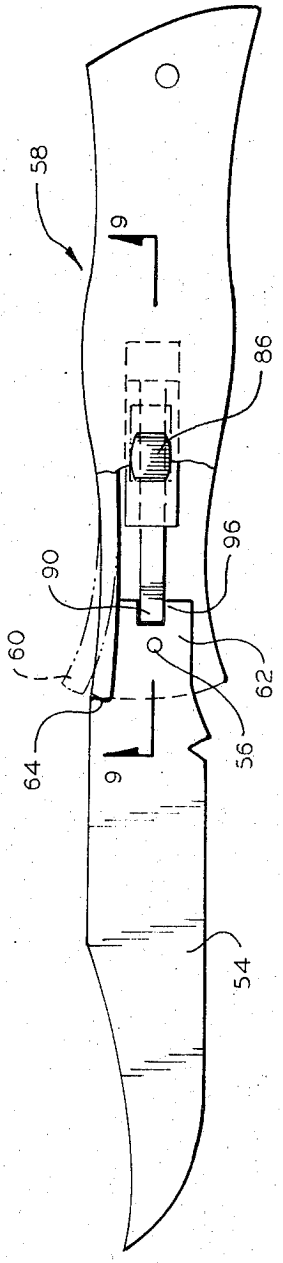


FIG. 6

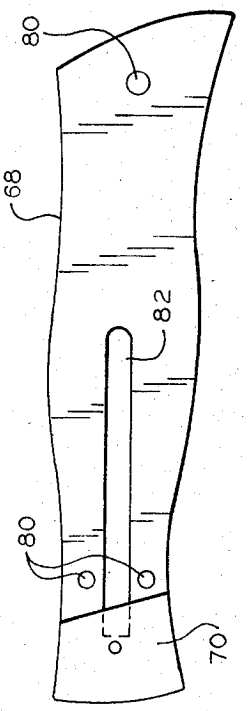


FIG. 8

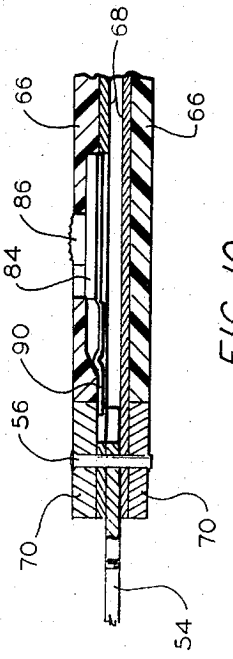


FIG. 10

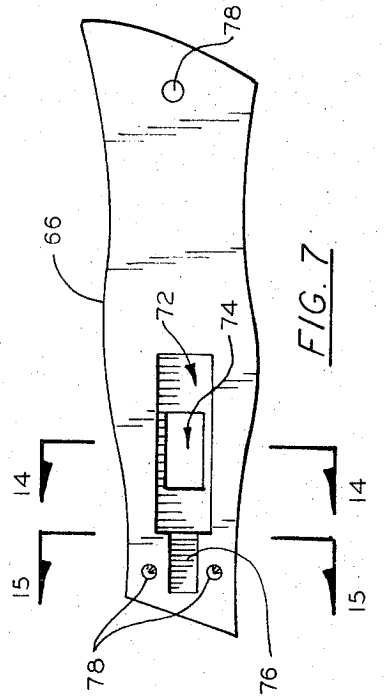


FIG. 7

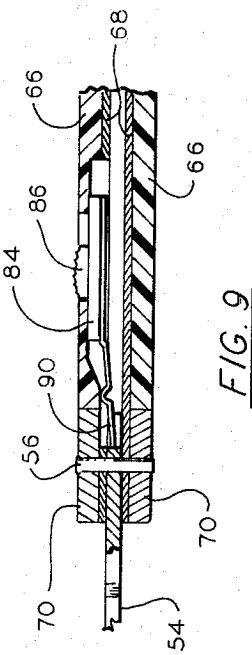


FIG. 9

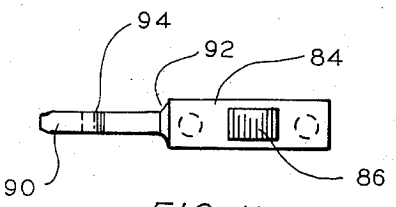


FIG. 11

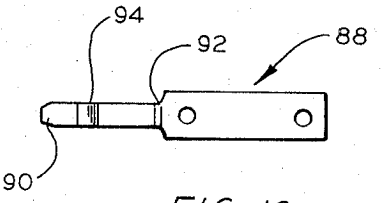


FIG. 12

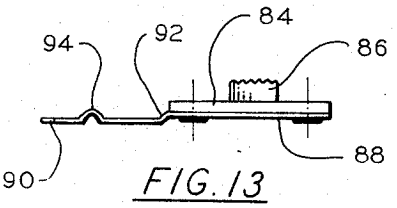


FIG. 13

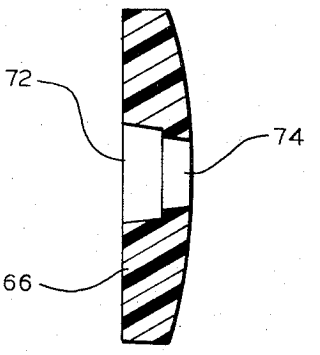


FIG. 14

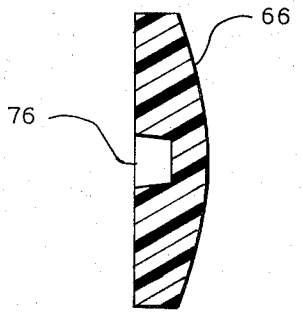


FIG. 15

FOLDING BLADE KNIFE WITH BLADE LOCK

BACKGROUND OF THE INVENTION

The present invention relates to folding blade knives and, more particularly, to locking devices for selectively preventing movement of the blade of such knives away from the open position.

Folding blade knives are provided with means for either biasing or locking the blade in the open position. The more common types of pocket knives have a spring arranged along the back of the handle which must be flexed by the blade tang (the portion of the base of the blade through which the pivot pin extends) in order to move the blade from folded to open position, and vice versa. Blade locking devices include the tab lock, or lock center, type wherein a locking member springs sideward into engagement with the front of the blade tang when the latter is placed in its open position. In the side lever, or switch blade, locking device two slots or holes in the side of the tang are engaged by a pin or lever which is pivoted out of the slots in order to allow movement of the blade, by manual depression of a button on the handle. The blade is moved to the open position by a fly spring when the pin or lever is removed. Other blade locks include those wherein a spring-loaded catch on the back of the handle engages a notch in the back of the blade, manual movement of the catch against the spring bias being necessary in order to close the blade.

These and other blade locking devices for folding blade knives conventionally act to lock the blade in the open position automatically. That is, the locking mechanism operates under a spring bias, or the like, as the blade reaches the open position. It is possible under such circumstances that the user may mistakenly believe the blade is locked in the open position when it is not, in case of malfunction or breakage of the locking mechanism. This could result in serious injury by use of the knife in a manner which causes inadvertent closure of the blade.

It is a principal object of the present invention to provide a folding blade knife having novel and improved mechanism for locking the blade in the open position.

A further object is to provide a folding knife blade locking device operated by a button longitudinally slidable within a slot in the handle.

Still another object is to provide a simple, reliable folding blade knife lock requiring positive movement of an element in order to lock, as well as unlock, the blade in the open position.

Other objects and advantages will in part be obvious and will in part appear hereinafter.

BRIEF SUMMARY

The knife construction of the present invention includes a blade pivoted to a handle and movable with respect thereto between closed and open positions in the usual manner. A sliding lock mechanism is provided which requires a positive action in order to lock and unlock the blade in the open position. That is, the locking device is not spring loaded or otherwise biased to lock the blade automatically when it is moved to the open position.

Open slots are provided in both the handle cover and the liner on one side of the knife to accommodate a locking member. The latter includes a manually engageable button extending into an opening in the cover

and attached to a metal strip extending along the slot in the liner to terminate in a tip or finger which serves as the locking element by being moved into and out of the path of movement of a portion of the blade.

In one embodiment, the blade tang is provided with a slot extending into the end of the tang. When the blade is placed in the open position, the locking finger is laterally disposed with respect to the slot in the tang. The locking finger is flexible and guide means are provided within the handle to cause lateral movement of the locking finger into the blade tang slot as the button on the locking element is slid longitudinally along the slot in the cover. The natural resilience of the locking finger, and/or the guide means therefor, serve to move the finger back to its laterally disposed position, out of the blade tang slot, when the button is slid back to its original position. The blade may then be pivoted back to the folded position within the handle.

In another embodiment the blade tang is provided with a laterally extending portion, in the form of a separate element fixedly attached to the tang. Thus, the laterally extending portion is moved about the blade pivot axis as the blade is moved between open and closed positions. The locking element includes the button and strip extending through the slots in the handle cover and liner, as in the previous mentioned embodiment. The locking finger, or tip of the locking element, is arranged in the same plane as the laterally extending portion of the blade tang and may be moved longitudinally into and out of the path of movement followed by such portion as the blade is moved. That is, the locking finger is moved longitudinally, by manual sliding movement of the locking element button, without lateral movement as in the first-mentioned embodiment. The shape of the laterally extending portion on the blade tang maybe such that the locking finger may be moved into the path of movement thereof in moving the blade both to open and close positions. Thus, the blade may be selectively locked in either position.

In both embodiments, the locking mechanism is operated by longitudinal, sliding movement of a manually engageable button along the knife handle. A positive action is required by the user in order to lock the blade, as well as to unlock it, and a visual indication of the position of the locking mechanism is provided by the position of the button. The usual spring along the back of the handle yieldingly urges the blade into both the open and closed positions and must be flexed in order to move the blade.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view, with portions broken away, of a folding blade knife incorporating a first embodiment of the invention, with the blade in the open position;

FIG. **2** is a plan view of the knife of FIG. **1** locked in the closed position;

FIG. **3** is a fragmentary, side elevational view of the knife of FIG. **1** in section on the line **3—3** thereof;

FIGS. **4** and **5** are elevational views of elements of the knife of FIG. **1**;

FIG. **6** is a plan view of a folding knife incorporating a second embodiment of the invention, with the blade in the open position;

FIG. **7** is a plan view of the inside of the handle cover of the knife of FIG. **6**;

FIG. **8** is a plan view of the handle line of the knife of FIG. **6**;

FIGS. 9 and 10 are fragmentary elevational views in section on the line 9—9 of FIG. 6, showing the elements of the locking mechanism in locked and unlocked positions, respectively:

FIGS. 11 and 12 are top and bottom plan views respectively of the locking mechanism;

FIG. 13 is a side elevational view of the locking mechanism; and

FIGS. 14 and 15 are sectional views of the handle cover, taken on the lines 14—14, and 15—15 respectively, of FIG. 7.

DESCRIPTION OF PREFEERRED EMBODIMENTS

Referring now to the drawings, in FIGS. 1-5 are shown a first embodiment of a knife incorporating the longitudinally sliding blade lock mechanism of the present invention. The mechanism is illustrated in the context of an otherwise conventional folding-blade knife construction wherein the blade is yieldingly retained in both the open and closed position by a spring arranged in the back of the knife handle. The knife is shown in the open and closed positions in FIGS. 1 and 2, respectively.

Blade 10 is pivotally mounted by pin 12, which passes through blade tang 13 and is anchored in handle 14, for movement between the open and closed positions with respect thereto. Although two or more blades may be provided, all folding into the handle in usual jack knife fashion, only one blade is shown herein, being sufficient for purposes of illustrating the structure and operation of the invention. Handle 14 is identically formed on each side, except that the blade locking mechanism is incorporated in one side, having covers 16, liners 18, and bolsters 20 on each side (see FIG. 3). Covers 16 are commonly formed of a suitable plastic, such as nylon or Delrin, liners 18 of brass and bolsters 20 of a hardened alloy. The two sides of the handle are pinned together with the liners in facing, spaced relation to form a cavity 22 therebetween suitable for receiving blade 10 in the folded position. The blade is folded into and out of what is termed the front side of the handle, leaf spring element 24 (FIG. 2) being arranged along the back of the handle, between liners 18. Spring 24 is anchored at or near the center of the handle and is unattached at the end adjacent tang 13. The pivotal axis of the blade and the dimensions of the tang are such that spring 24 is flexed from its normal position along the back of the handle to the position shown in dotted lines when the blade is moved from one position to the other. When the blade is in either position, spring 24 engages the side of tang 13, resiliently preventing movement away from such position. Also, blade 10 is formed with shoulder 26 along th back edge to engage the end of spring 24 when the blade is fully opened, thus defining the open position of the blade. The construction thus far described is conventional in folding blade knives.

On one side of handle 14 (hereinafter termed the locking side) appropriate openings and recesses are formed in cover 16, liner 18 and bolster 20 to accommodae the elements of the locking mechanism. Secured to one side of tang 13 by rivets 28, or other convenient means, is element 30. As blade 10 is moved between the open and closed positions, element 30 is rotated therewith. A circular recess of diameter slightly greater than the longest dimension of element 30 is provided in bolster 20 on the locking side, the recess being shown in FIG. 5 and designated by reference numeral 32. A longitudinal recess 34 is provided in the same surface of bolster 20, communicating with recess 32 and the edge of the bolster adjacent cover 16. The surface of bolster 20 in which recesses 32 and 34 are provided is, of course, the surface facing tang 13, whereby the recesses are not apparent when the knife is assembled.

The slidable locking element is made of two pieces one preferably of plastic, the other of metal. The plastic piece includes a base portion in the form of a rectangular block 36 and manually engageable button 38 extending therefrom. Metal locking finger 40 is secured to the side of block 36 opposite button 38 by any convenient means, such as studs formed integrally with the block extending through openings in the finger and thermally and/or mechanically upset on the opposite side thereof.

Cover 16 is provided on the locking side with a recess, indicated generally in FIG. 3 by reference numeral 42, of a width slightly greater and a length significantly greater than the corresponding dimensions of block 36. Also provided in the locking side of cover 16 is rectangular opening 44, communicating with recess 42 substantially centrally thereof. Opening 44 has a width slightly greater and a length significantly greater than the corresponding dimensions of button 38. When the knife is assembled, block 36 is frictionally engaged beween the bottom of recess 42 and liner 18, an appropriate slot 46 (FIG. 3) being provided in the liner on the locking side so that finger 40 may extend into the plane thereof. Thus, the locking mechanism may be longitudinally moved along the handle between engagement of block 36 and button 38 with the two ends of recess 42 and opening 44, respectively. Movement is effected against the aforementioned frictional engagement of block 36, the locking mechanism being retained in the position to which it is moved by such frictional engagement.

Element 30 is shown in FIG. 4 apart from blade tang 13 to which it is normally attached. Opening 48 is provided for the passage of blade pivot pin 12, and openings 50 for rivets 28. Element 30 is provided on opposite sides with extending shoulders 52 and 53. When blade 10 is in the open position, sliding movement of the locking mechanism toward the blade moves the free end of locking finger 40 to a position adjacent shoulder 52, as shown in FIG. 1. When in the fully open position, blade 10 cannot be rotated further in a clockwise direction (as seen in FIG. 1) due to engagement of shoulder 26 on the blade with the end of spring 24. With locking finger 40 moved to the locking position (button 38 at the end of opening 44 nearest blade 10) the blade likewise cannot be rotated in a counterclockwise direction since finger 40 is in the path of shoulder 52 on element 30 which is fixedly attached to blade tang 13. Thus, the blade is securely locked in the open position, a positive movement of the locking mechanism being required in order to lock as well as to unlock the blade position.

Before leaving the present embodiment, it should be noted that the blade may also be locked in the closed position. After movement of button 38 to the end of opening 44 farthest from blade 10 (i..e., sliding movement toward the right as pictured in FIGS. 1 and 2) the blade may be rotated about pin 12 to the closed position, wherein it is enclosed in cavity 22 between the

two sides of handle **14.** Movement of button **38** back to the locking position places the free end of finger **40** adjacent shoulder **53,** the elements of the knife being in the positions shown in FIG. **2.** The blade cannot be opened until the locking mechanism is moved to the unlocking position, removing finger **40** from the path of element **30.** The free end of finger **40** moves within recess **34** of bolster **20** as the locking mechanism is moved between locking and unlocking position.

Although the above described embodiment is effective to accomplish the objects of the invention, it requires an additional element **30** besides the slidable locking mechanism, and the additional fabricating steps associated with attaching element **30** to tang **13** and providing recesses **32** and **34** in bolster **20.** These cost-increasing features are eliminated in the embodiment of the invention shown in FIG. **6–15.** Blade **54** is pivoted by pin **56** to handle **58** in the present as in the previous embodiment. Likewise, spring **60** is provided in the same manner along the back of the handle, cooperating with tang **62** to yieldingly retain blade **54** in either the open or closed position. Shoulder **64** on blade **54** engages the end of spring **60** to define the fully open position of the blade.

Handle **58** again is formed of two spaced sides between which blade **54** is positioned when in the folded position. Each side includes cover **66,** liner **68** and bolster **70,** the two sides being identical except for the slidable locking mechanism provided on the locking side. Locking side cover **66** and liner **68** with bolster **70** attached are shown in FIGS. **7** and **8,** respectively, the surfaces which are superposed when the handle is assembled being shown. Cover **66** includes rectangular recess **72** extending into the surface which faces liner **68,** and opening **74** extending through the cover and substantially centrally disposed with respect to recess **72.** Beveled surface **76** extends from the end of recess **72** adjacent bolster **70,** tapering from the plane of the bottom of recess **72** to the plane of the surface of cover **66** which faces liner **68.** Cover **66** is shown in section in FIGS. **14** and **15** to show clearly and shape and relationship of the recess and opening for the locking mechanism.

Studs **78** are formed integrally with cover **66** to extend through openings **80** in liner **68.** The cover and liner are retained in close engagement by upsetting studs **78** on the opposite side of liner **68,** preferably in the manner disclosed in U.S. Pat. application Ser. No. 227,519 of the present inventor. Slot **82** is cut or punched through liner **68,** extending longitudinally thereof adjacent recess **72** in cover **66.**

Referring now to FIGS. **11–13,** the slidable locking mechanism is shown in detail. As in the previous embodiment, the mechanism includes two pieces, one preferably of plastic, the other of metal. The plastic piece includes a rectangular base **84** with manually engageable button **86** extending from one side thereof. The exposed surface of button **86** may be formed with parallel ridges, as shown, to aid in manual engagement and sliding movement. Securely fastened to the side **84** opposite button **86** is metal locking finger **88.** The base and finger are preferably attached in the same manner as cover **66** and liner **68.** Finger **88** is of substantially the same width as base **84** in the portion where the two are attached to one another, this dimension being substantially greater than the width of slot **82** in liner **68.** The portion of finger **88** extending from base **84** to free end **90** is only slightly narrower than slot **82.** Finger **88** is formed with bend **92** so that the two portions of different widths lie in spaced, parallel planes. Also, the portion of narrower width is provided with bend **94** near free end **90,** extending out of the plane of the adjacent portions of finger **88.**

When the knife is assembled, the locking mechanism is placed on the under side of cover **66** with base **84** in recess **72** and button **86** extending into opening **74.** Line **68** is then superposed and joined with cover **66.** The wider portion of finger **88** rests on liner **68** on each side of slot **82,** and the narrower portion extends along the slot in the plane of the liner. The other side of the handle is assembled, joining the cover to the liner and bolster, and the two handle sides are joined with blade **54** and spring **60** mounted therebetween.

Notch **96** is formed in the end of tang **62** and is of slightly greater width than free end **90** of finger **88.** The elements of the locking mechanism are shown in FIGS. **9** and **10** in the locking and unlocking positions, respectively, blade **54** being open in both Figures. When in the unlocking position (FIG. **10**), button **86** is at the end of opening **74** furthest from pivot pin **56,** the narrower portion of finger **88** lies within slot **82** of liner **68** and bend **94** extends into recess **72** adjacent to, but preferably spaced slightly from sloping surface **76.** As button **86** is moved from this position toward the other end of opening **74,** base **84** and finger **88** are likewise moved longitudinally of handle **58.** Bend **94** contacts sloping surface **76** and continued sliding movement of the locking mechanism produces lateral movement of free end **90** as bend **94** rides down sloping surface **76.** This places fee end **90** in notch **96** of tang **62,** the elements being in the position shown in FIG. **9.** Blade **54** is thus locked in the open position since free end **90** of finger **88** interferes with movement of the tang, and thereby the blade. Sliding movement of the locking mechanism back to the position of FIG. **9** removes free end **90** from notch **96** due to the natural resilience of finger **88** and its fixed attachment to base **84.**

Thus, there has been disclosed a mechanism for locking the blade of a folding blade knife in the open position by selective, sliding movement of a locking member longitudinally along the handle. A positive movement is required in order to lock, as well as to unlock the mechanism, and visual indication of the locked or unlocked condition of the blade is provided by the position of the manually engageable portion, thereby reducing the possibility of assuming the blade to be locked when in fact it is not due to breakage or malfunction of an automatic locking mechanism. The conventional springs along the back of the handle are provided for biasing the blades into either fully open or fully closed positions, whereby the knife is operative even though the locking mechanism may break, or otherwise fail to operate.

In the second disclosed embodiment, elements associated with the locking mechanism and steps in the fabricating process are eliminated. The necessary modifications to an otherwise conventional knife structure are provided merely by making a notch in the blade tang, punching a slot in the liner on one side of the handle and molding suitable recesses and openings in the plastic cover on the same side. Locking is effected by an extremely simple and inexpensive locking mechanism comprising small metal and plastic pieces joined together. The longitudinal sliding movement of the

mechanism in this embodiment produces a lateral movement of the portion which actually engages the blade to effect locking of the position thereof. Transverse movement of the locking mechanism is constrained by the close fit of the locking finger within the slot in the liner.

I claim:

1. A folding blade knife construction with blade locking means, said construction comprising, in combination:

a. a blade including a tang and a shoulder on the back edge;

b. means pivotally mounting said blade for movement between open and closed positions;

c. a handle having an outer cover and a two-piece liner defining a space therebetween for accepting said blade in its folded position;

d. manually engageable button extending through an opening in said handle cover and mounted for sliding movement longitudinally along said handle;

e. a leaf spring mounted between the pieces of said liner and having a deflectable end adjacent said tang for engagement therewith to bias said blade toward either of said open and closed positions, said open position being defined by engagement of said shoulder with said deflectable end;

f. an element affixed to and extending laterally outward from said tang and movable therewith; and

g. a locking member connected to said button and movable therewith between a locking position, wherein a portion of said locking member extends into the path of movement of said element when said blade is in said open position to prevent movement to the closed position, and an unlocking position, wherein said locking member is out of the path of movement of said elements.

2. The invention according to claim **1** wherein said button extends from a base disposed in a recess in said cover and retained in frictional engagement between said cover and liner on one side of said handle, said sliding movement of said button being against said frictional engagement.

3. The invention according to claim **2** wherein said locking member is fixedly attached to said base on the side thereof facing said liner and extends to a free end, the latter being the portion of said member extending into the path of said element.

4. The invention according to claim **2** wherein said liner on said one side is provided with a longitudinal, open slot, of substantially the same width as said locking member and the latter is disposed at least partly within said slot.

5. The invention according to claim **4** and further including a bolster at one end of said handle, adjacent said cover, for retaining the blade pivot pin.

6. The invention according to claim **5** wherein said element extends laterally from said tang into a recess in said bolster, said free end being moved in and out of said bolster recess as said locking member is moved between locking and unlocking positions, respectively.

7. The invention according to claim **1** wherein said element is essentially T-shaped, with the stem of the T extending transversely across the axis of the blade in both the open and closed positions thereof.

8. A folding blade knife construction with blade locking means, said construction comprising, in combination:

a. a blade having a tang and a shoulder on the back edge adjacent said tang;

b. a handle having an outer cover and a two-piece liner defining a longitudinal space for accepting said blade;

c. a pivotal mounting extending through said tang for movement of said blade between open and closed positions with respect to said handle;

d. a leaf spring mounted between the pieces of said liner and having a deflectable end adjacent said tang for engagement therewith to bias said blade either of said open and closed positions, said open position being defined by engagement of said shoulder with said deflectable end;

e. a notch in the end of said tang; and

f. a locking member including a base portion disposed in a recess in said cover and retained in frictional engagement between said cover and liner on one side of said handle, a manually engageable button extending from said base portion through an elongated opening in said cover for sliding movement of said locking member longitudinally of said handle against said frictional engagement, and a free end portion movable into and out of said notch to lock and unlock, respectively, said blade with respect to its open position in response to movement of said button between opposite ends of said elongated opening.

9. The invention according to claim **8** and further including guide means constraining the path of movement of said free end into and out of the plane of said tang as said locking member is moved between locking and unlocking positions.

10. The invention according to claim **9** wherein said guide means comprise a surface of the handle cover disposed in the path of movement of a portion of said locking member and inclined with respect to the plane of said tang.

11. The invention according to claim **10** wherein said locking member is resiliently biased toward movement out of the plane of said tang.

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