



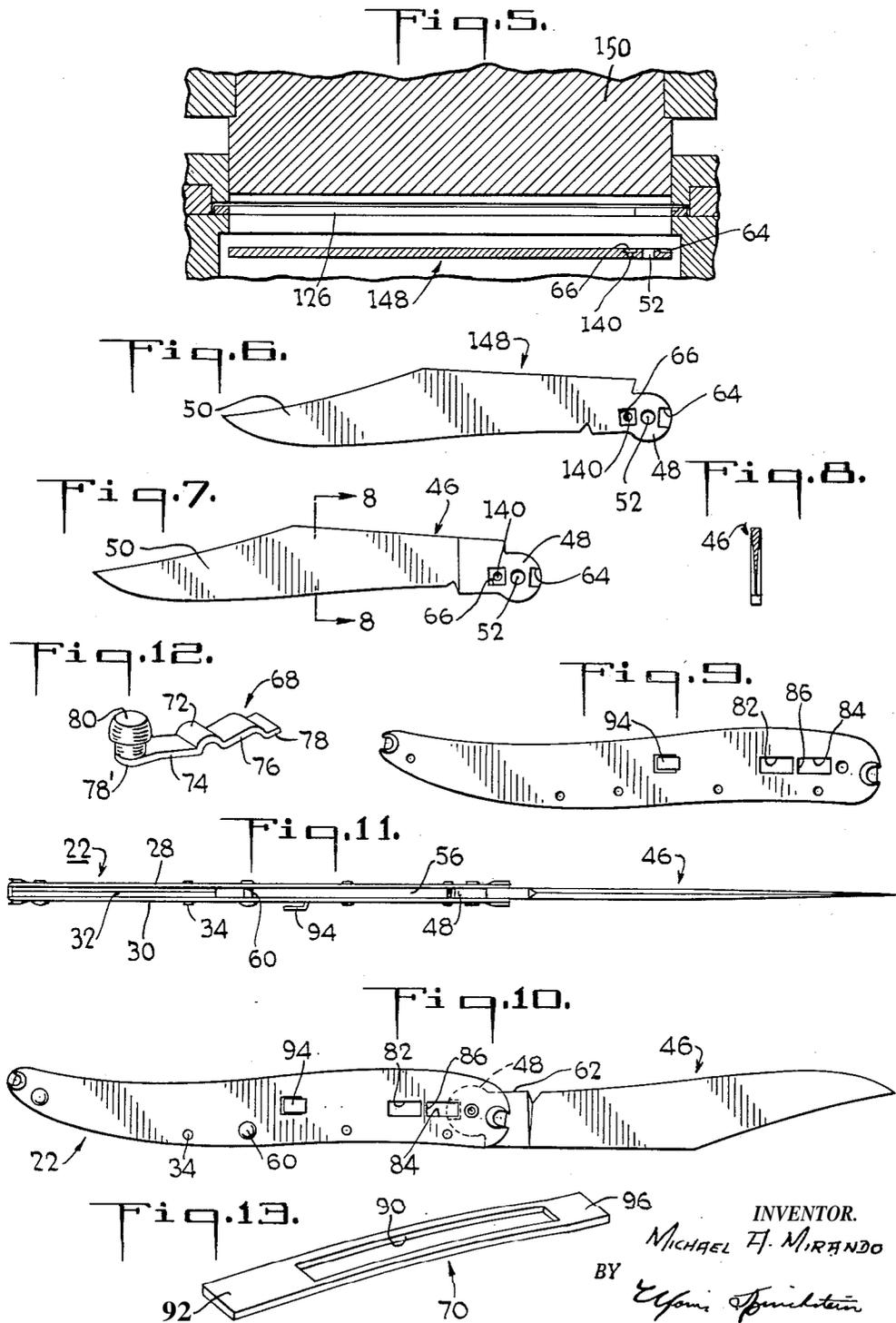
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PUSH-BUTTON FLY-BLADE KNIFE AND  
A METHOD FOR MAKING THE SAME

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**PUSH-BUTTON FLY-BLADE KNIFE AND A METHOD FOR MAKING THE SAME**

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This invention relates to a push-button fly-blade knife and a method for making the same.

At the present time knives of this character are considerably more expensive than knives having conventional, manually-openable blades, the difference in cost arising from the several extra machine operations required and the close tolerances to which the blade locking parts must be held.

For example, it presently is standard practice in the manufacture of fly-blades for push-button knives, to mill indentations on both sides of the pivot opening in the tangs. These indentations are not aligned, yet must be accurately positioned, and it therefore is necessary carefully to set up each blade in a milling machine twice.

It is an object of the present invention to provide a blade construction of the character described which permits of more rapid and economical fabrication.

Milled blades further are subjected to the drawback that the indentations cannot be made deep enough to afford a sufficiently firm lock. A milling cutter inherently forms an arcuate locking indentation whose effectiveness is a function of its maximum depth. If a milling cutter of very small radius is used, the teeth wear out too quickly. However, as the radius of the cutter is increased, the indentation becomes longer and too long an indentation is undesirable, since it is visible when the blade is open. Accordingly, it has been the custom to compromise between the length and depth of the indentation. As a result, locking indentations in present-day knives are insufficiently deep.

It is another object of the invention to provide a knife blade and method for making the same wherein the depth of the indentation has no relationship to its length, so that the indentation may be made sufficiently deep to afford as firm a lock as is desired without having the same visible when the blade is open.

It now is the custom to employ a wedge-shaped locking lever in order (a) to dispose the push button perpendicular to the knife scale, (b) to obtain a substantial depth of engagement between the locking dog and the locking indentation, and (c) to provide sufficient clearance for the safety catch. A locking lever of this shape is relatively expensive to make. To reduce costs, it has been proposed to use sheet metal locking levers. However, this latter type of locking lever has proven unsatisfactory and is not used in quality knives of the character described because it causes the push button to be cocked when idle and secures too shallow an engagement between the locking dog and indentation.

It is a further object of the invention to provide a knife of the character described wherein the locking lever is made of sheet metal, thus reducing the cost of the knife, and wherein said locking lever is of such construction that a satisfactory engagement of the dog and proper location of the push button is effected.

Other objects of the invention will in part be obvious and in part will be pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangements of parts which will be exemplified in the device hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings in which is shown one of the various possible embodiments of the invention,

Fig. 1 is a longitudinal sectional view through an

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apparatus used in manufacturing knife blades in accordance with the invention;

Figs. 2, 3, 4 and 5 are sectional views taken substantially along the lines 2—2, 3—3, 4—4 and 5—5, respectively, of the apparatus shown in Fig. 1;

Fig. 6 is a plan view of a knife blank as it appears upon leaving the apparatus of Fig. 1;

Fig. 7 is a similar view of the knife blade after grinding;

Fig. 8 is a sectional view taken substantially along the line 8—8 of Fig. 7;

Fig. 9 is a plan view of the side plate of a push-button, fly-blade knife frame;

Fig. 10 is a plan view of a push-button fly-blade knife frame as it appears with the locking lever, locking spring, safety catch and scale removed;

Fig. 11 is an edge view of the knife frame shown in Fig. 10;

Figure 12 is a perspective view of a locking lever embodying the invention and adapted to be mounted on the knife frame shown in Figs. 10 and 11;

Fig. 13 is a perspective view of a locking spring adapted to be mounted on the knife frame shown in Figs. 10 and 11;

Fig. 14 is a plan view of a complete push-button fly-blade knife embodying the invention;

Fig. 15 is an edge view of said knife;

Fig. 16 is an enlarged sectional view taken substantially along the line 16—16 of Fig. 14, the safety catch being shown in "on" position;

Fig. 17 is a sectional view taken substantially along the line 17—17 of Fig. 15;

Fig. 18 is a view similar to Fig. 16, but showing the safety catch in "off" position;

Fig. 19 is a view similar to Fig. 14, but with the scale removed better to illustrate the locking lever, locking spring and safety catch.

Referring now in detail to the drawings, and more particularly to Figs. 7—19, the reference numeral 20 denotes a push-button fly-blade knife constructed in accordance with the invention. As is conventional, said knife comprises a frame 22 and a pair of covering scales 24, 26.

The frame includes two side plates 28, 30 which may, as is standard, have identical registering peripheries. Said plates are disposed on opposite sides of a spacer black 32 at the back of the frame and are held in this position by several rivets 34 whose shanks pass through registered openings in the side plates and spacer and whose ends are headed.

The scales are of any suitable construction and configuration. By way of example, said scales may be of the type shown and described in United States Letters Patent No. 2,170,537 issued to Felix A. Mirando and Henry Vossler on August 22, 1939, and owned by the assignee of the present application. As thus constructed, each scale includes a pair of hollow sheet metal bolsters 36, 36 interconnected by an arched elongated inset strip 38 in one piece with the bolsters. The strip supports an ornamental flexible plastic covering 40 whose longitudinal edges are tucked under the strip. Projecting from opposite ends of the bolsters are tabs 40, 42 which are folded into pockets 44 provided on the tips of the knife frame. The edges of the scales desirably are in registry with the underlying edges of the knife frame.

The knife includes a blade 46 having a tang 48 and a cutting portion 50. The tang is fashioned with a through opening 52 through which a pivot rivet 54 passes. Said rivet also extends through registered apertures in the side plates 28, 30, the ends of the rivet being headed so that the blade is captively and pivotally secured to the knife frame.

Means is provided to bias the blade from closed to open position. Said means comprises a conventional fly spring 56 constituting a strip of flat spring steel having an end formed with a depression 58 which is caught between the block 32 and a rivet 60, the latter being secured to the two side plates 28, 30. The other and free end of the fly spring is located near the blade tang 48. In its unstressed position said free end is remote

from the spacer **32**, as shown in Fig. 19. This end normally is forced against the spacer by the edge **62** of the blade tang which is concealed when the blade is closed (see Fig. 17) so that the fly spring is flexed upon closing of the blade and the energy stored thereby serves to flip the blade to open position when the blade is released.

The knife further includes means to lock the blade in closed or open position. Said means comprises two locking indentations **64, 66** in the tang of the blade, a locking lever **68** and a locking spring **70**.

The locking lever is fabricated from a flat strip of metal which is formed into a shape best shown in Figs. 12, 16 and 18. In its finished contour said locking lever includes an arch **72** from both sides of which straight reaches **74, 76** extend. To distinguish therebetween, the reach **76** which extends toward the pivot rivet **54** hereinafter will be referred to as the "front" reach and the other reach **74** as the "rear" reach. The front reach terminates in a locking dog **78** which is offset so as to be disposed at a level more inwardly of the knife frame than said reach **76**. The rear reach is oriented at a slight angle with respect to the front reach, being so arranged as to slope outwardly with respect to the knife frame. Said rear reach terminates in a platform **78'** parallel to and offset outwardly from the front reach. Said platform carries a push button **80**.

The side plate **30** on which the locking means is disposed is formed with two colinear, elongated rectangular openings **82, 84** separated by a bridge **86** lying in the plane of said plate. The locking lever is mounted on the outer face of the side plate with its arch **72** resting on the bridge **86** and with the reaches **74, 76** located in the openings **82, 84** respectively. When the blade is locked in either closed or open position, the front reach **76** is substantially coplanar with the side plate **30**. At such time the rear reach **74** extends away from the side plate at a slight angle, thus elevating the button **80** and providing a space for the latter's depression. Said button protrudes through an opening **88** in the knife scale **26** so that it can be depressed manually to elevate the front reach on which the locking dog is carried.

When the blade is locked, the locking dog projects inwardly from the side plate **30** and the locking spring **70** normally biases the dog to such position. Said spring is in the form of a substantially flat strip of spring steel having an elongated oblong central aperture **90** running over substantially its full length. The rear end **92** of the spring is caught beneath an L-shaped tang **94** struck from the side plate, said tang extending through the aperture **90**. The spring is of such length that, with its rear end **92** thus held, its forward end is adjacent the side plate **30** and bridges the aperture **84**. With this arrangement said end **96** rests on and presses the reach **76** of the locking lever toward the space between the side plates.

The locking indentations **64, 66** are disposed on substantially diametrically opposite sides of the pivot aperture **52** in the tang of the knife blade. These apertures are so located that when the knife is closed one of them lies beneath the locking dog **78**, and when the blade is fully opened the other indentation lies beneath the locking dog. Thus, either in closed or open position the locking dog, urged by the locking spring **70** into one or the other of the locking indentations, will hold the blade against rotation.

To prevent the button from being depressed accidentally, a safety catch **98** is included. As shown herein, said safety catch is fashioned from a single piece of resilient strip metal. One branch **100** of the safety catch is narrow and rests flat against the side plate, being located within the aperture **90** of the locking spring. The rear end of the branch **100** is connected by a return bend **102** to a top branch **104** substantially parallel to the branch **100** but about equal in width to the locking spring. Said top branch includes a nub **106** which projects through an opening **108** in the scale **26**. Said opening is elongated to permit the safety catch to be reciprocated lengthwise of the knife by manipulation of the nub. The forward end of the top branch **104** is bifurcated to form a pair of spaced fingers **110** whose tips are fashioned with downward tips **112** which ride on the longitudinal edges of the locking spring **70**. When the safety catch is slid forwardly, it will embrace the

shank of the push button below the enlarged head thereof and said fingers with their downturned tips will prevent the head of the push button from being depressed.

It is pointed out that by imparting to the locking lever the special shape described, it can, despite being made from flat stock, permit the insertion of the safety catch under the head of the push button, dispose the push button perpendicular to the knife frame when the lock is effective and yet secure a substantial depth of engagement between the locking dog and locking indentations. Such construction therefore enables a substantial saving in manufacturing costs to be achieved without in any way interfering with the efficiency and appearance of the knife. It also will be understood that a locking lever of the foregoing construction can be fabricated rapidly in mass production and to close tolerances with the aid of speedy and comparatively simple metal fashioning machinery.

Inspection of the shapes of the locking indentations **64, 66** shows that the same are of substantially uniform overall depth and are bounded by steep sides so that an appreciable degree of engagement between the indentations and the locking dog may be brought about without exposing the locking indentations in either open or closed position of the knife blade.

Pursuant to the invention, the locking indentations are fashioned in the knife blade by stamping. This method permits speedy, inexpensive and accurate formation of the indentations in the blades and enables the depth of the indentations to be independent of their length so that the indentations can be both as deep and as long as desired. This is in contrast to the previous formations of the indentations by milling wherein the length and depth were interrelated. Moreover, by forming the indentations by stamping the number of handling operations is reduced and the accuracy in positioning of said indentations is increased.

In Figs. 1 through 6 there is indicated an apparatus **120** and process for carrying out the latter phase of the invention. Said apparatus comprises an intermittent feed means, such as a pair of intermittently actuated rolls **122, 124**, arranged to advance a flat stock strip **126**. Said strip has a width corresponding either to the width or length of the knife blade to be made, preferably the former. As is conventional, the stock strip is of high carbon steel and usually is very hard, e. g. of an order of hardness 100 Rockwell C. The stock is fed through a guide **128** to a stamping machine **130** whose anvil **132** is at the level of the bed of the guide. The stamping machine is of the progressive operation type having three sets of dies **134, 136** and **138**.

The die **134** punches a through opening **140** in the stock in a region which subsequently will be the center of a locking indentation **66**.

The die **136** includes a punch **142** which forms the pivot opening **52**. It also includes a pair of punches **144, 146** which indent the locking indentations **64, 66**. The punch **146** operates on the stock immediately adjacent a longitudinal edge thereof so that, despite the extreme hardness of the stock, the metal thereof can flow outwardly a short distance sufficient to permit formation of the indentation **64**. Flow of metal during formation of the indentation **66**, which is well within the boundaries of the stock, is accommodated by the opening **140**.

The die **138** constitutes a blanking punch in the shape of the knife blade. This punch separates from the strip a blank blade **148** having formed therein the pivot opening **52** and indentations **64, 66**. The blade subsequently is ground to its finished shape.

The anvil **132** is provided with suitable openings matching the die **134**, the punch **146** and the die **138**.

In addition to the advantages mentioned above concerning the fabrication of the locking indentations by stamping, i. e. obtaining any desired depth of locking indentation without a concomitant increase in length, stamping of the indentations has the additional advantage that it enables the indentations to be made without several handling operations. Thus, if the indentations are milled, it is necessary to set the blades up in a milling machine twice. Each of these set-ups must be very accurate because the locking indentations are quite close to the pivot opening and yet must control with reasonable accuracy the position of the tip of the blade which is many times farther away from the pivot opening. When the locking indentations are made by stamping, the same can be

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located with the desired degree of accuracy in the same machine that the blades are blanked and without any additional handling operations or set-ups. This has resulted in a very large reduction of manufacturing costs and has speeded up fabrication of blades of the type under consideration.

It may be mentioned that the intermittent feed imparted to the strip by the rolls 122, 124 is slightly in excess of the overall width of a blade, as is conventional. All of the punches are carried by the same reciprocating head 150. A stripper 152 aids in disengaging the several dies from the stock.

It thus will be seen that there is provided a device which achieves all the objects of the invention and is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein described, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, there is claimed as new and desired to be secured by Letters Patent:

1. A push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate, means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position, and means to lock said blade in either closed or open position, said last-named means comprising a pair of stamped locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a sheet metal locking lever, a pair of apertures in the side plate spaced apart by a bridging portion of said plate, one of said apertures being disposed above one of the locking indentations when the blade is in closed position, said locking lever including an arched portion which is seated on the bridge portion of the side plate and a pair of reaches extending away from said arched portion and extending toward and away from the pivotal securing means, the reach which extends toward the pivotal securing means being disposed at an angle to the reach portion which extends away from the pivotal securing means, said last-named reach portion being inclined away from the surface of the side plate that is remote from the knife blade compartment when the locking means is effective and terminating in a platform parallel to the first-named reach portion, said first-named reach portion terminating in a locking dog which is disposed at a level more inwardly of the knife frame than said first-named reach portion, said dog being disposed in one or the other of the locking indentations when the locking means is effective, means to bias said first-named reach portion toward said knife compartment, and a push button mounted on said platform, said push button extending perpendicularly outwardly away from said platform.

2. A push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate, means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position, and means to lock said blade in either closed or open position, said last-named means comprising a pair of locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a sheet metal locking lever, a pair of apertures in the side plate spaced apart by a bridging portion of said plate, one of said apertures being disposed above one of the locking indentations when the blade is in closed position, said locking lever including an arched portion which is seated on the bridge portion of the side plate and a pair of reaches extending away from said arched portion and extending toward and away from the pivotal securing means, the reach which extends toward the pivotal securing means being disposed at an angle to the reach portion which extends away from the pivotal securing means, said last-named reach portion being inclined away from the surface of the side plate that is remote from the knife blade compartment when the locking means is effective and terminating in a platform parallel to the first-named reach portion, said first-named reach portion terminating in a locking dog

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which is disposed at a level more inwardly of the knife frame than said first-named reach portion, said dog being disposed in one or the other of the locking indentations when the locking means is effective, means to bias said first-named reach portion toward said knife compartment, and a push button mounted on said platform, said push button extending perpendicularly outwardly away from said platform.

3. For use in a push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate and means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position: means to lock said blade in either closed or open position, said last-named means comprising a pair of stamped locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a sheet metal locking lever, a pair of apertures in the side plate spaced apart by a bridging portion of said plate, one of said apertures being disposed above one of the locking indentations when the blade is in closed position, said locking lever including an arched portion which is seated on the bridge portion of the side plate and a pair of reaches extending away from said arched portion and extending toward and away from the pivotal securing means, the reach which extends toward the pivotal securing means being disposed at an angle to the reach portion which extends away from the pivotal securing means, said last-named reach portion being inclined away from the surface of the side plate that is remote from the knife blade compartment when the locking means is effective and terminating in a platform parallel to the first-named reach portion, said first-named reach portion terminating in a locking dog which is disposed at a level more inwardly of the knife frame than said first-named reach portion, said dog being disposed in one or the other of the locking indentations when the locking means is effective, means to bias said first-named reach portion toward said knife compartment, and a push button mounted on said platform, said push button extending perpendicularly outwardly away from said platform.

4. For use in a push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate and means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position: means to lock said blade in either closed or open position, said last-named means comprising a pair of locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a sheet metal locking lever, an aperture in the side plate above a position occupied by one of the locking indentations when the blade is in closed position, means to pivotally mount said lever on said plate adjacent said aperture, said lever including a pair of reaches extending away from said pivotal mounting means and extending toward and away from the pivotal securing means, the reach which extends toward the pivotal securing means being disposed at an angle to the reach portion which extends away from the pivotal securing means, said last-named reach portion being inclined away from the surface of the side plate that is remote from the knife blade compartment when the locking means is effective and terminating in a platform parallel to the first-named reach portion, said first-named reach portion terminating in a locking dog which is disposed at a level more inwardly of the knife frame than said first-named reach portion, said dog being disposed in one or the other of the locking indentations when the locking means is effective, means to bias said first-named reach portion toward said knife compartment, and a push button mounted on said platform, said push button extending perpendicularly outwardly away from said platform.

5. For use in a push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate and means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position: means to lock said blade in either closed or open position, said last-

named means comprising a pair of locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a sheet metal locking lever, a pair of apertures in the side plate spaced apart by a bridging portion of said plate, one of said apertures being disposed above one of the locking indentations when the blade is in closed position, said locking lever including an arched portion which is seated on the bridge portion of the side plate and a pair of reaches extending away from said arched portion and extending toward and away from the pivotal securing means, the reach which extends toward the pivotal securing means being disposed at an angle to the reach portion which extends away from the pivotal securing means, said first-named reach portion terminating in a locking dog which is disposed at a level more inwardly of the knife frame than said first-named reach portion, said dog being disposed in one or the other of the locking indentations when the locking means is effective, means to bias said first-named reach portion toward said knife compartment, and a push button mounted on the free end of said second-named reach portion.

6. For use in a push-button fly-blade knife comprising a knife frame including a side plate constituting a wall of a knife blade compartment, a knife blade, means to pivotally secure an end of said blade to the side plate and means to resiliently urge said blade from closed to open position, said blade being swingable substantially 180° between open and closed position: means to lock said blade in either closed or open position, said last-named means comprising a pair of stamped locking indentations on said blade on opposite sides of the pivotal securing means and equidistant therefrom, a locking lever including a locking dog, means to pivot said lever on said side plate, an aperture in said side plate through which said dog passes, said aperture being disposed above one of the locking indentations when the blade is in closed position, means to pivotally attach said locking lever to said side plate, a push button carried by said locking lever, and means to urge said locking lever in a direc-

tion for said dog to engage one or the other of said indentations.

7. For use in a push-button fly-blade knife having a locking dog, means mounting the dog for movement between two positions, and means to urge the dog to one of said positions: a knife blade, means to mount said knife blade pivotally for movement between two positions, means to urge the blade to one of said positions, said blade having a pair of stamped locking indentations on opposite sides of the pivotal mounting means and equidistant therefrom, one of said indentations when the knife blade is in one of its positions being in the position to which the dog is urged and the other of said indentations when the knife blade is in the other of its positions being in the position to which the dog is urged.

8. In a method of making a push-button fly-blade for a knife: that improvement constituting the steps of forming a pair of indentations in a metal strip by stamping, and subsequently stamping a blade out of said strip with said indentations located in the tang of the blade in position for use as locking indentations.

9. In a method of making a push-button high-carbon fly-blade for a knife: that improvement constituting the steps of forming a through opening in a metal strip, thereafter stamping a locking indentation adjacent said opening, and subsequently stamping a blade out of said strip with said indentation located in the tang of the blade in position for use as a locking indentation.

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