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(54) **MINIATURE SURGICAL SCALPEL WITH INTEGRAL PROTECTION SHIELD**

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(57) **ABSTRACT**

A miniature scalpel comprising a carrier having a front portion rigidly securing a projecting blade and pivotally securing the back portion of a shield that projects alongside and covers one side of the blade. The front portion of the shield can be pivoted **180** degrees away from the blade into lateral alignment with the back portion of the carrier, thereby forming a handle for the exposed blade. Detent formations can be provided on the carrier and shield, for mating as the handle is formed. The carrier shield can easily be separated from the carrier at the detent, for pivoting back to the closed position.

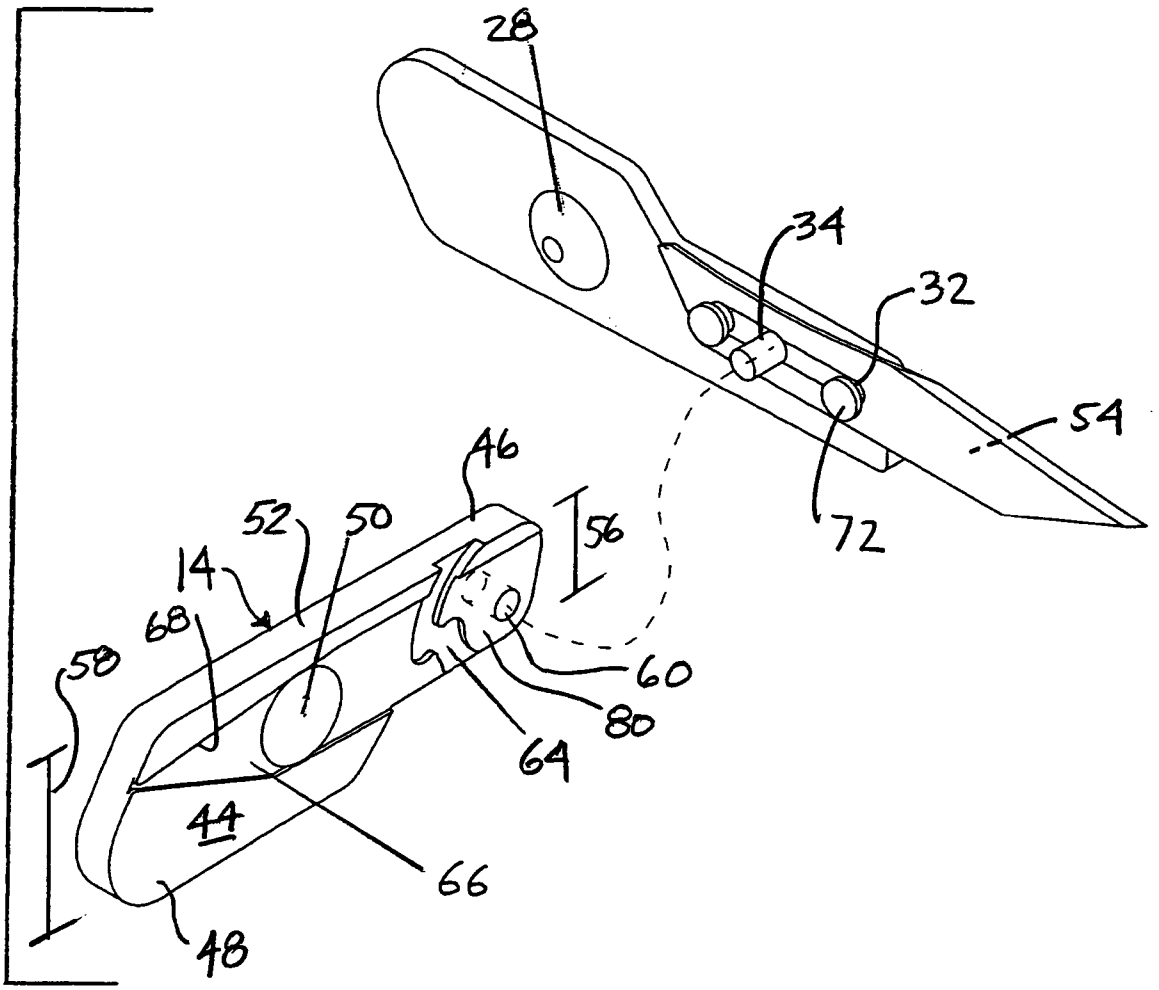

FIG 1A

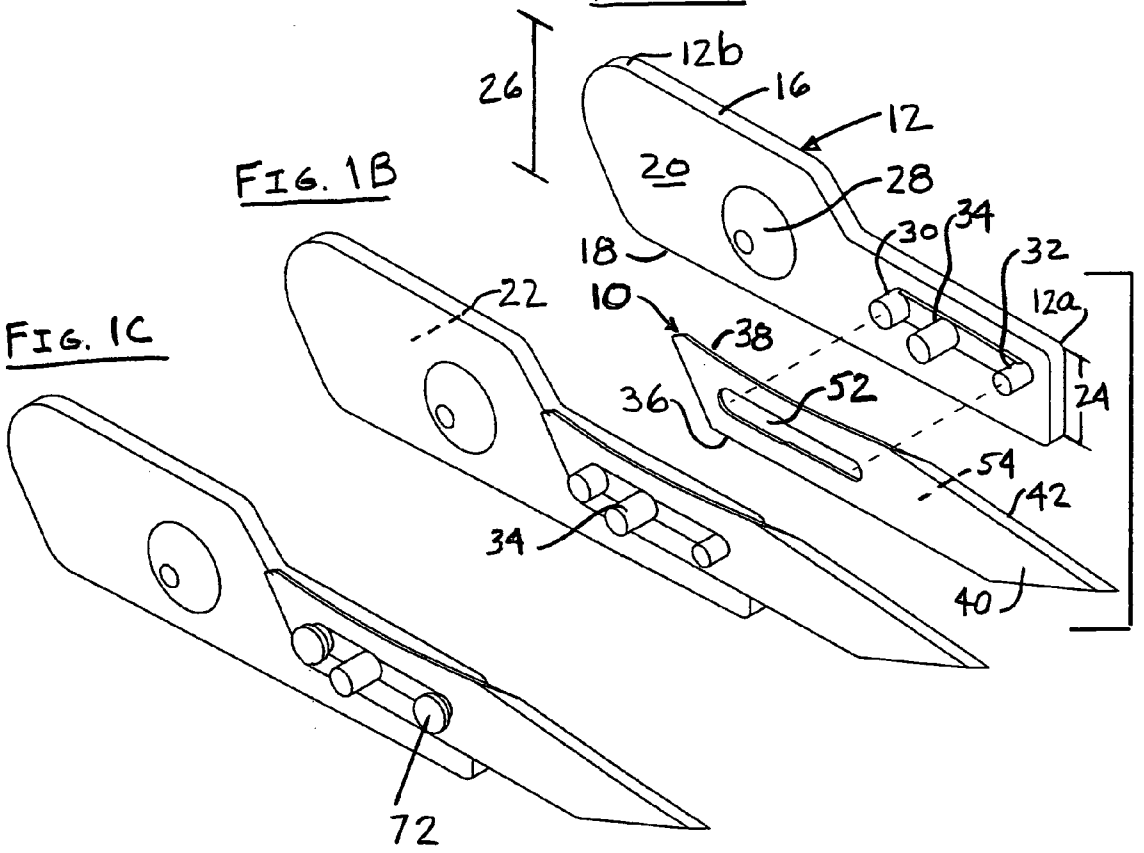

FIG. 1B

FIG. 1C

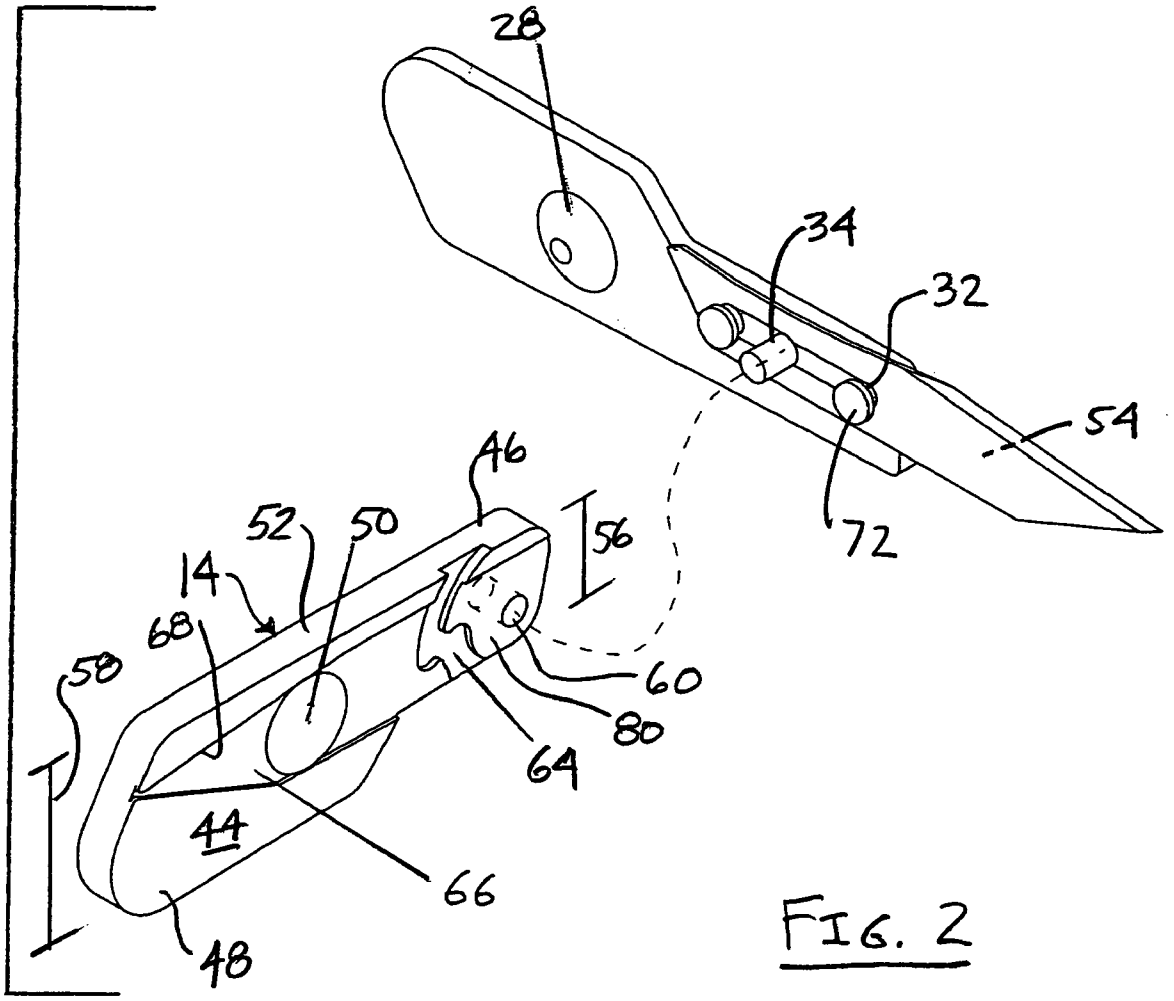

FIG. 2

FIG. 3A

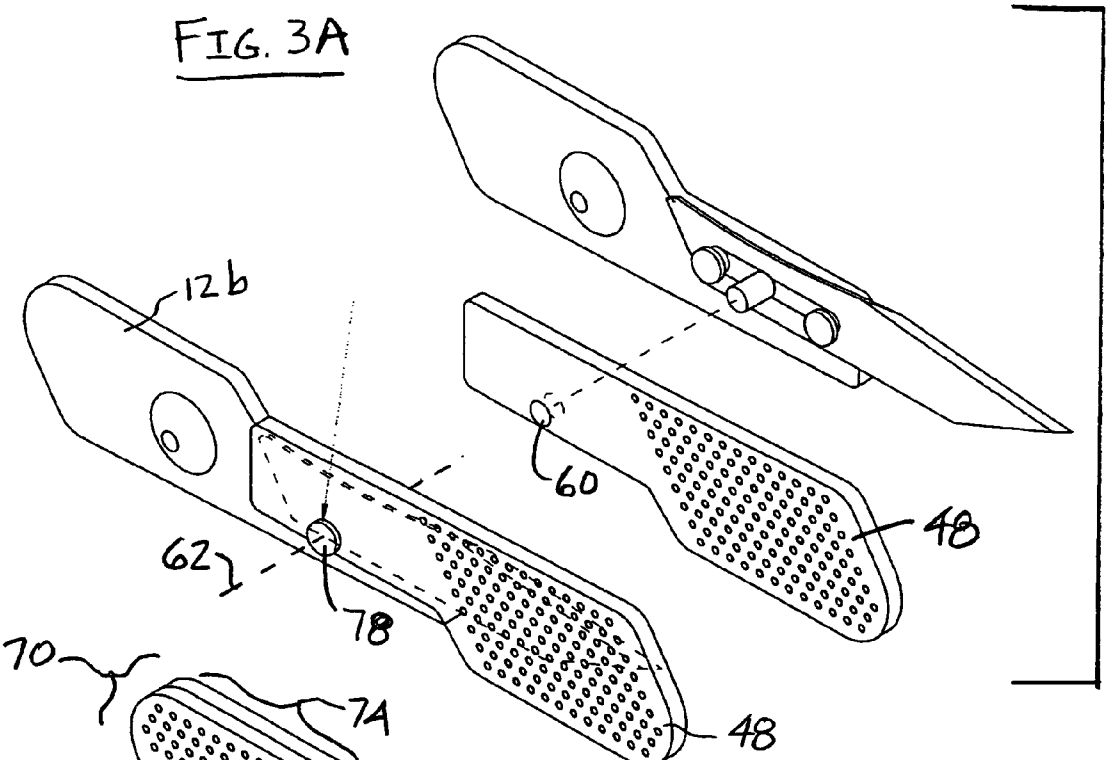

FIG. 3B

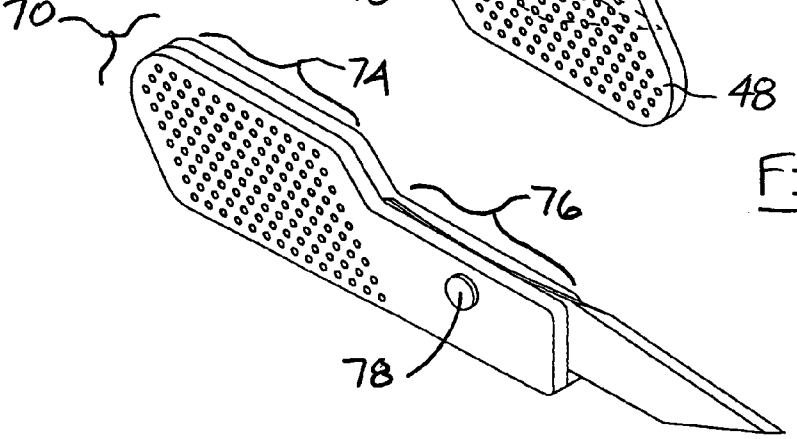

FIG. 4

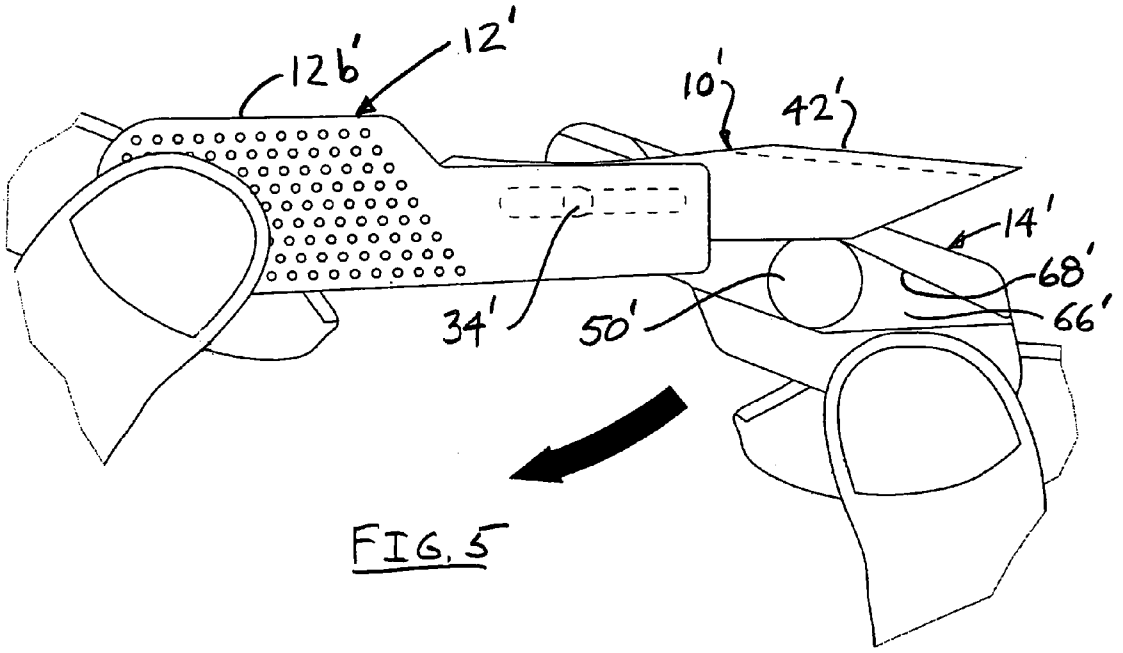

FIG. 5

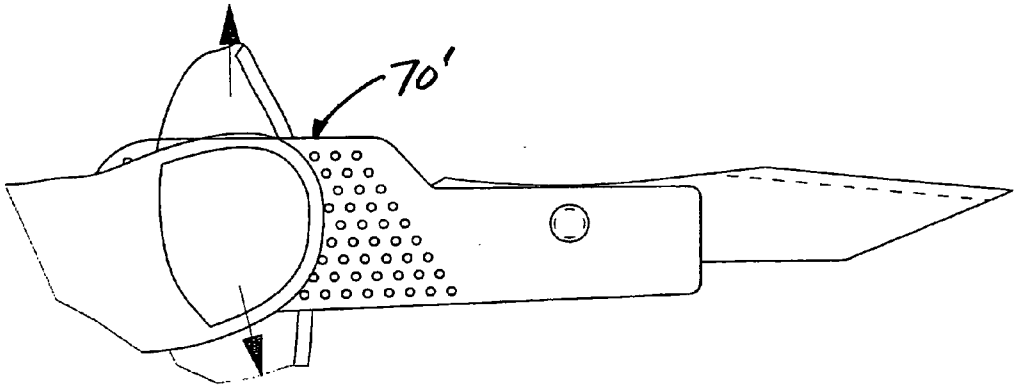

FIG. 6

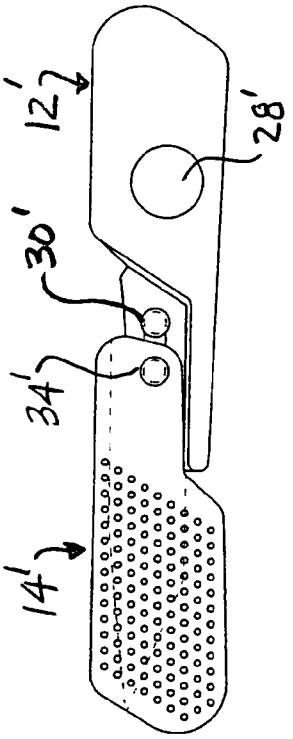

FIG. 7B

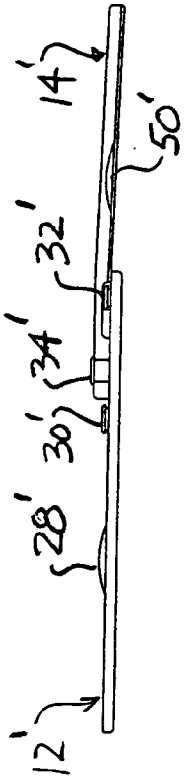

FIG. 7D

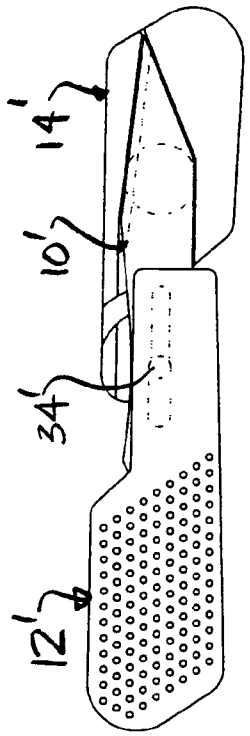

FIG. 7A

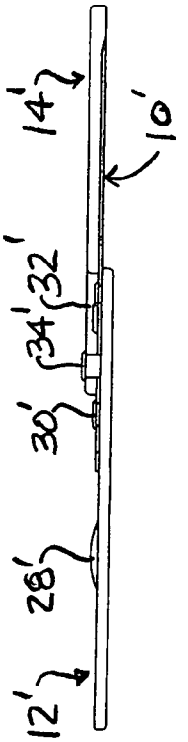

FIG. 7C

MINIATURE SURGICAL SCALPEL WITH INTEGRAL PROTECTION SHIELD

RELATED APPLICATION

[0001] This application claims priority under 35 USC §119(e) from U.S. Application Ser. No. 60/663,376, filed Mar. 18, 2005.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to surgical scalpels, and particularly to miniature scalpels.

[0003] Miniature surgical scalpels for use in constrained space applications, so-called "thumb scalpels", are already available on the market. However, in order to protect the surgeon and other handling personnel from injury, these scalpels are equipped with removable protection sheaths. These protection sheaths can be temporarily lost in the process of surgery and consequently no longer provide the intended protection against injury or contamination if the scalpel is to be reused during the same surgical procedure.

SUMMARY OF THE INVENTION

[0004] The present invention is directed to an improved miniature scalpel with integral protection shield.

[0005] In one embodiment the miniature scalpel comprises a carrier having a forward portion rigidly securing a substantially flat, projecting blade and pivotally securing the back portion of a shield that projects alongside and covers one side of the blade. The forward portion of the shield can be pivoted 180 degrees away from the blade into lateral alignment with the back portion of the carrier, thereby forming a handle for the exposed blade. The shield is preferably biased toward the carrier, such that the forward portion of the shield is urged laterally against the blade when the scalpel is closed, to enhance the covering of the blade, and laterally against the aligned back portion of the carrier when the scalpel is open, to enhance the integrity of the formed handle.

[0006] Another embodiment is directed to a miniature scalpel which in the closed position comprises a carrier having a forward portion rigidly securing a projecting blade and pivotally securing the back portion of a shield that projects alongside the blade. Detent structure or the like are provided on the back portion of the carrier and on the forward portion of the shield, whereby the forward portion of the shield can be pivoted 180 degrees away from the blade into congruent lateral alignment with the back portion of the carrier, thereby forming a handle for the exposed blade. The carrier shield can easily be separated from the carrier at the detent, for pivoting back to the closed position.

BRIEF DESCRIPTION OF THE DRAWING

[0007] The preferred embodiment of the invention will be described with reference to the accompanying drawings, in which:

[0008] **FIGS. 1A, 1B**, and 1C show the steps for the subassembly of the blade and blade carrier, with the blade on the right side of the carrier;

[0009] **FIG. 2** shows the subsequent step of joining the protective shield to the subassembly of blade and carrier;

[0010] **FIGS. 3A and 3B** show the steps for final assembly;

[0011] **FIG. 4** shows the device with the shield pivoted 180 degrees clockwise relative to the shield of the device depicted in **FIG. 3B**, to expose the blade for use during surgery;

[0012] **FIG. 5** shows how the user opens the device to expose the blade;

[0013] **FIG. 6** shows the device of **FIG. 5** in the fully open position, and how the user closes the device; and

[0014] **FIGS. 7A** and B show the device of **FIG. 5** in the closed condition, from the right and left lateral sides and **FIGS. 7C and 7D** are top views of the device shown in **FIG. 7A**, with the blade and with the blade omitted for clarity, respectively.

DETAILED DESCRIPTION

[0015] As shown in **FIGS. 1-3**, the inventive miniature scalpel comprises three main components: a stainless steel blade **10**, a plastic blade carrier **12**, and a plastic blade shield or cover **14**.

[0016] The first two components and their subassembly can be best seen in **FIG. 1**. The carrier **12** is a substantially flat, elongated member having a forward portion **12***a* and a back portion **12***b*, top **16** and bottom **18** edges, and opposed sides **20**, **22**. The bottom edge **18** is substantially straight, whereas the top edge **16** bends in the approximate middle. As a result, the front portion **12***a* of the carrier is substantially rectangular defining a front height **24** between edges and the back portion **12***b* of the carrier is enlarged relative to the front portion with a back height **26** greater than the front height **24**. The back portion **12***b* of the carrier has a first detent formation **28**, and the front portion **12***a* has a mounting island including three longitudinally spaced, laterally projecting pins or studs defining rivets **30**,**32**, and pivot pin **34** between them.

[0017] The blade **10** is rigidly secured to and projects from the forward portion **12***a* of the carrier **12**. Several different shapes and sizes of suitable blades are commercially available. The blade is substantially flat, with a back portion **38** that is affixed to the front portion of the carrier and a front portion **40** with sharpened edge **42** that projects from the carrier. The opposite edge **36** is preferably substantially straight, whereas the top edge **42** can be somewhat concave where attached to the carrier, and straight where sharpened and projecting from the carrier. The blade **12** has one side **54** that closely contacts one side **20** of the carrier. The back (mounting) portion of the blade has a longitudinal through slot **52** through which the rivets **30**, **32** project on either side of the pivot pin **34**. The rivets **30**, **32** have heads formed thereon to complete the subassembly of **FIG. 1C**.

[0018] The shield **14** has a back portion **46** pivotally secured to the front portion **12***a* of the carrier and a front portion **48** projecting from the carrier alongside the blade. The forward portion **48** of the shield has a second detent formation **50** matable with the first detent formation **28** on the carrier. The back portion of the shield is substantially rectangular defining a back height **56** between edges and the front portion of the shield is enlarged relative to the back portion of the shield with a front height **58** greater than the back height.

[0019] The pivot pin **34** of the carrier **12** projects rigidly from the back portion of the blade, through a hole **60** in the shield, for defining the pivot axis **62** of the shield relative to the carrier. The pivot pin **34** receives a rivet head **78** after the shield has been installed, as shown in **FIG. 3B**. The head **72** of the forward rivet **32** rides in an arcuate channel **64** in the shield. The channel provides a free space for the rivet during closing and opening of the device. As shown in **FIG. 7B** and C, the other rivet **30** is never confronted by the shield, so no structural accommodation for pivoting is required.

[0020] The shield has a recess **66** on the side **44** facing the carrier and extending from the back to the front of the shield, in which the second detent formation **50** is located and the blade is nested, such that at least the sharp edge **42** of the blade is covered by the upper rim **68** of the pocket when the device is in the closed condition shown in **FIG. 3B**.

[0021] The closed scalpel can be opened to expose the blade, as shown in **FIG. 4**, by pivoting the forward portion **48** of the shield 180 degrees clockwise away from the blade into lateral alignment with the back portion **12***b* of the carrier, thereby mating the detent formations **28**,**50** such that the back portion of the carrier and the front portion of the shield connect via the detent structure **28**,**50** and together form a handle **70** for the exposed blade.

[0022] In the open condition of the scalpel, the back portion of the carrier and the front portion of the shield are substantially congruent, together forming a wider back portion **74** of the handle, and the front portion of the carrier and the back portion of the shield are substantially congruent, together forming a narrower, front portion **76** of the handle. When opened for use, the handle **70** thickens as shown in **FIG. 4**, and provides a very ergonomically effective combination of substantial height in the back portion **74** for steady holding in the palm and last three fingers, and reduced height in the forward portion **76** for delicate manipulation between the forefinger and thumb.

[0023] It should thus be appreciated that some of the important features depicted in **FIGS. 1-3** are the preferably semi-spherical protrusion **28** forming the detent structure on the carrier, and the blade locating island with three cylindrical protrusions **30**, **32**, **34**. The first sub-assembly is created by placing the blade over the locating island and subsequently riveting both peripheral cylindrical pins **30**, **32** (ultra sound or thermal riveting) in order to firmly and permanently attach the blade to the blade carrier. The shield is then slipped over the mounting pin **34** of the blade carrier and subsequently riveted in such a way, as to retain blade protection by the shield, but at the same time to allow for shield rotation between the two positions (closed, with blade protected and open, with blade exposed). The angle between the axis **62** of the mounting hole **60** and the immediately surrounding surface **80** of the shield is slightly less then 90 degrees, creating a bias for urging the shield toward the carrier. This provides some positive lateral force in both the open and closed positions of the scalpel. This is illustrated in **FIG. 7C**.

[0024] After the final assembly (**FIG. 3B**) the miniature scalpel is sterilized and subsequently packaged in a sealed container.

[0025] **FIGS. 5 and 6** show the device in an opening and closing sequence. After the scalpel is removed from its packaging envelope the user grabs the end **12***b* ' of blade carrier **12'** with one hand and the protection shield **14'** by the other hand (on the side opposite to the cutting edge **42'** of the blade) and by applying slight lateral force allows the blade **10'** to be removed from its protection pocket **66'** in the protection shield (**FIG. 5**). The protection shield is then rotated 180 degrees around the mounting pin **34'**, which allows engagement between spherical protrusion of the blade carrier and the spherical depression **50'** in the protection shield, to provide stabile handle during the surgery. Before the miniature scalpel is temporarily set aside or permanently discarded, the blade has to be protected, by reversing the above procedure. First the halves forming handle **70'** are split by applying opposite forces between the thumb and forefinger (**FIG. 6**) and subsequently the protection shield is rotated by 180 degrees counter clockwise around the axis of the mounting pin, allowing for the blade to hide in its pocket **66'**.

[0026] **FIGS. 7A** and B show the device of **FIG. 5** in the closed position, from right and left lateral sides. In the closed condition, the overall profile or envelope is substantially rectangular. **FIG. 7C** shows a top view of the device of **FIG. 7A**, and **FIG. 7D** shows the same view with the blade omitted for clarity. These figures show that the device maintains a very slim width in the closed position.

1. A miniature scalpel comprising:

a carrier having front and back portions;

a substantially flat blade projecting from the front portion of the carrier;

a shield having a back portion pivotally secured to the carrier and a front portion projecting from the carrier along and covering one flat side of the blade;

whereby the front portion of the shield can be pivoted 180 degrees away from the blade into alignment with the back portion of the carrier, exposing the blade and forming a handle for the exposed blade.

2. The miniature scalpel of claim 1 wherein the carrier and the shield have substantially identical shapes such that when forming said handle, the back portion of the carrier and the front portion of the shield are substantially congruent, together forming a wider back portion of the handle, and the front portion of the carrier and the back portion of the shield are substantially congruent, together forming a narrower, front portion of the handle.

3. The miniature scalpel of claim 1, wherein a pivot pin projects laterally from the front portion of the carrier, through a back portion of the blade, into engagement with the shield, for defining a pivot axis of the shield relative to the carrier.

4. The miniature scalpel of claim 1, wherein the back portion of the carrier has a first detent formation and the front portion of the shield has a second detent formation matable with the first detent formation as the handle is formed.

5. The miniature scalpel of claim 1, wherein the front portion of the shield has a recess for covering said one side and the cutting edge of the blade when the shield is aligned with the blade.

6. The miniature scalpel of claim 1, wherein the shield is secured to the carrier with a bias that urges the shield toward the carrier.

7. A miniature scalpel which in the closed position comprises:

a carrier having a front portion and a back portion;

a blade rigidly secured to and projecting from the front portion of the carrier;

a shield having a back portion pivotally secured to the front portion of the carrier and having a front portion projecting from the carrier alongside the blade;

said back portion of the carrier having a first detent formation and said front portion of the shield having a second detent formation matable with the first detent formation;

whereby the closed scalpel can be opened to expose the blade, by pivoting the front portion of the shield 180 degrees away from the blade into lateral alignment with the back portion of the carrier, thereby mating the detent formations such that the back portion of the carrier and the front portion of the shield together form a handle for the exposed blade.

8. The miniature scalpel of claim 7, wherein,

the carrier is a substantially flat, elongated member having top and bottom edges and opposed sides;

the blade is affixed to one side of the carrier; and

the first detent formation is on said one side of the carrier.

9. The miniature scalpel of claim 8, wherein the shield is attached to said one side of the carrier and covers one side of the blade which faces the shield, while the front portion of the other side of the blade is exposed.

10. The miniature scalpel of claim 9, wherein,

the front portion of the carrier is substantially rectangular defining a front height between edges and the back portion of the carrier is enlarged relative to the front portion with a back height greater than the front height; and

the back portion of the shield is substantially rectangular defining a front height between edges and the front portion of the shield is enlarged relative to the back portion of the shield with a back height greater than the front height.

11. The miniature scalpel of claim 7, wherein,

the blade is substantially flat, with a back portion that is affixed to the front portion of the carrier and a front portion with sharpened edge that projects from the carrier; and

a pivot pin projects rigidly from the back portion of the blade, into engagement with the shield, for defining the pivot axis of the shield relative to the carrier.

12. The miniature scalpel of claim 11, wherein the pivot pin is a rivet that extends from the carrier through the shield and connects the shield to the carrier.

13. The miniature scalpel of claim 12, wherein,

the blade is affixed to the carrier by two longitudinally spaced rivets, each having a head facing the shield; and

the head of one rivet rides in an arcuate channel in the shield.

14. The miniature scalpel of claim 13, wherein the blade has a longitudinal through slot in which said rivets are situated on either side of the pivot pin.

15. The miniature scalpel of claim 7, wherein the shield has a recess facing the carrier and extending from the back to the front of the shield, in which said second detent formation is located and said blade is nested, such that at least the sharp edge of the blade is covered.

16. The miniature scalpel of claim 7, wherein the carrier and the shield have substantially identical shapes, such that in the open condition of the scalpel, the back portion of the carrier and the front portion of the shield are substantially congruent, together forming a wider back portion of the handle, across the edges, and the front portion of the carrier and the back portion of the shield are substantially congruent, together forming a narrower, front portion of the handle, across the edges.

17. The miniature scalpel of claim 7, wherein the carrier and the shield are connected at an angled mating surface whereby the front portion of the shield is biased against the blade.

* * * * *