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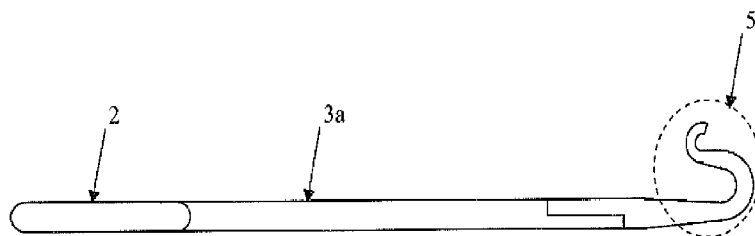


Figure 4

(57) Abstract: An apparatus and method an apparatus and method for suturing, wherein said apparatus is a surgical instrument comprising a pair a cross members having securing means for pivotally securing the cross members to one another creating a first end, wherein the cross members second end comprises a locking device for locking the cross member and the first end comprises a clamping surface at a distal ends having at least two opposed curves forming a S-shaped sections having a outer smooth surface and a serrated inner surface assisting the suture process avoiding proximal slippage of suture material while tying a clamped structure.

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**TITLE OF THE INVENTION**

SURGICAL CLAMP

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH AND  
DEVELOPMENT**

5 N/A

**RELATED APPLICATIONS**

N/A

**BACKGROUND OF THE INVENTION****Field of the Invention**

10 The invention is related to an apparatus and method for suturing, more particularly to surgical instrument and the use of said surgical instrument for suture during surgical operations which avoids the proximal slippage of suture material while tying a clamp structure.

15 **Discussion of the Background**

Surgical clamps, such as hemostatic clamp is a surgical tool which resembles a set of scissors with a locking clamp. A set of hemostats comes in several different sizes and types, for example, Kelly, Crile, and  
20 Halstead; and any given surgery may require the use of a number of hemostats. Commonly is used in both surgery to control bleeding, especially from a torn blood vessel, until the bleeding can be repaired by stitches, suture or other surgical techniques.

Currently several surgical instruments and/or clamping instruments including hermostatic clamps, as mentioned before, are provided with angled distal end with respect to first portion, for example acute angle or right angle at the distal end with respect to the handle, as shown in figure 1 and figure 2, in order to easily access certain body part. However none of the current forceps, tongs, clamps or pliers is provided with a distal end that not just access and holds certain body part but also assists efficiently the suture process of a blood vessel.

For example U.S. Patent 4,226,240 to Walter Jr. discloses a surgical forceps comprising the gripping arms and terminating with a pair of slightly curved mating jaws having aligned notches disposed on their outer surfaces to accommodate a needle for sutures. The pair of mated jaws are disposed in a plane substantially perpendicular to the plane containing the pair of end members. Walter invention's distal end or extremity segment terminates with slightly curved or arcuate mating jaws having notches to accommodate a needle for suture. Even when the structure is provided with a portion or notches to accommodate a needle the distal end does not assist the suture process efficiently.

Another example is U.S. Patent 2,887,111 to Leyro which discloses a surgical forceps that simplifies the movement of the operative process by not requiring, apart from the pincer, any other instrument apart from the cutting scissors and catgut or thread employed in the tying of veins. Leyro's invention seems to shorten the surgical time but the need of an additional instrument is not convenient in several surgical procedures.

Further U.S. Patent 3,364,933 to Bogni discloses a surgical clamp including a distal end with an obtuse angle provided with smooth surface. Even when the obtuse angle smooth surface might help with the suture process it does not assist the suture process efficiently since no holding feature for the suture material is provided.

All the clamping instruments currently known, including the ones mentioned above, fails to provide a surgical instrument that not just provides a clamping action and angled distal end but also assists the suture process efficiently.

#### SUMMARY OF THE INVENTION

The present invention provides an apparatus and method for suturing, wherein said apparatus is a surgical instrument comprising a pair a cross members having

securing means for pivotally securing the cross members to one another creating a first end, wherein the cross members second end comprises a locking device for locking the cross member and the first end comprises a clamping surface at a distal ends having at least two opposed curves forming a S-shaped sections having a outer smooth surface and a serrated inner surface assisting the suture process in such way that overcomes the disadvantages of the Prior Art.

Another object of the invention is to provide a method for suturing during operation without the need of several instruments.

Another object of the invention is to provide a surgical instrument that avoids proximal slippage of suture material while tying a clamped structure.

Yet another object of the present invention is to provide a surgical instrument with grasping structure.

The invention itself, both as to its configuration and its mode of operation will be best understood, and additional objects and advantages thereof will become apparent, by the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawing.

The Applicant hereby asserts, that the disclosure of the present application may include more than one

invention, and, in the event that there is more than one invention, that these inventions may be patentable and non-obvious one with respect to the other.

Further, the purpose of the accompanying abstract is  
5 to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers, and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the  
10 technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

15

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings which are incorporated herein constitute part of the specifications and illustrate the preferred embodiment of the invention.

20

FIG.1 is a top view of related art.

FIG.2 is a side view of related art.

FIG.3 is a top view of the present invention.

FIG.4 is a side view of the present invention.

FIG.5 is an exploded top view of present invention

scissors ends.

FIG.6 is an exploded side view of present invention scissors ends.

FIG.7 is an exploded side view of present invention scissors ends holding teeth.

FIG.8 is an exploded top view of present invention scissors ends with holding teeth.

FIG.9 shows the slippage process of the suture material while trying using the present invention.

10

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention, as shown in figure 3, discloses a surgical instrument **1** comprising a pair a cross members **3a,3b** having securing means **S** for pivotally securing the cross members **3a,3b** to one another dividing the surgical instrument **1** in a first end **5** and second end **3**, wherein the second end **3** comprises a locking device **4** for locking the cross member **3a,3b** and is terminated by finger receiving rings **2**; and the first end **5** comprises a clamping surface at a distal end.

The first end **5** clamping surface extends perpendicular to the surgical instrument **1** main body, as shown in figure 4, forming an S-shaped distal end. The S-shaped distal end comprises two opposed curves, one on top of the other,

wherein the first curve **5a** is dimensionally bigger than the second curve. The dimensions of the curves, as show in figure 5, may vary depending on the use, for example in order to reach a body part the first curve's length **x1** may  
5 be extended. However the second curve's length **x3** is smaller than the first curve's length **x1** at all time. The preferred invention discloses distance difference **x2** between the first curve's length **x1** and the second curve's length **x3**, said distance **x2** is larger than the second  
10 curve's length **x3**. It is important to understand that the second curve **5b** is formed to provide a recess **R** which main purpose is to hold the suture material **7** in position avoiding the displacement of the suture material **7** in the direction opposed to the clamped structure. The dimensions  
15 of said second curve **5b** affect the area cover by the surgical instrument **1**, therefore the smaller the curve or recess **R** the easier is to handle the surgical instrument **1** during the surgical procedure. The recess is not intended to be in contact with the clamped surface because this will  
20 avoids the access of the suture material **7** to said recess **R**.

Figure 6, discloses the inner surface of the clamping surface wherein said inner surface is serrated, either longitudinally or transversely. Further each curve **5a,5b** is



angled for several reasons. The first curve **5a** is angled, more particularly at the segment of the first curve **5a** that connect with the second curve **5b**, in order to provide a slope between the curves in such way that the suture  
5 material travels over the inclined smooth surface **S** from the distal end or recess **R** toward the clamped structure. The first angle **θ1** for the first curve **5a** is preferred to be equal to or greater than 60 degrees. The second curve **5b** or recess **R** which main purpose is to avoids the slippage of  
10 the suture material **7** in the direction opposed to the clamped structure has an preferable second angle **θ2**, more particularly to the second curve part that avoids the suture material displacement in the direction opposed to the clamped structure which is relative smaller than the  
15 first angle **θ1**. It is important to understand that the segment connecting the first **5a** and second curve **5b** extends Further, as shown in figure 7 and figure 8, the first curve which is the curve that contact the clamped structure includes a gripping structure comprising several protrusion  
20 or tooth **5c** extended from the first curve **5a** surface.

Figure 9 show several steps of the suturing process. The surgical instrument, as mentioned above, is provided with locking means that are intended to lock the first's cross member ends while said cross member are clamping a

structure **6**. The clamped structure, usually a blood vessel, is in close contact with the distal end **5**, as shown in figure 9a. It is important to point out that the first curve **5a** is the portion in full contact with the clamped structure **6**. The second curve **5b** is not contacting the clamped structure **6** because it will complicate the placement of the suture material at said second curve **5b** recess **R**. After clamping the structure **6**, the suture material **7** is positioned at the second curve **5b** is such way that the recess **R** hold said suture material facing the front part of the surgical instrument **1** while the user pulls the suture material **7** toward the finger receiving rings **2**. The suture material **7** is crossed, in order to make a knot, around and at the back part of the surgical instrument **1** away from the distal end **5**. Further the suture material **7** is push toward the clamped structure **6**, as shown in figure 9c. The inclined smooth surface **S** connecting the first curve **5a** assists the slippage of the suture material **7** toward said clamped surface **6**. Figure 9d shows the final position of the suture material **7**. The knot is tied and fixed in order to control the bleeding at the clamped structure **6**. The surgical clamp **1** of the present invention avoids the proximal slippage of suture material while tying a clamped structure without the need of several instruments

while assisting the suturing process.

While the invention has been described as having a preferred design, it is understood that many changes, modifications, variations and other uses and applications  
5 of the subject invention will, however, become apparent to those skilled in the art without materially departing from the novel teachings and advantages of this invention after considering this specification together with the accompanying drawings. Accordingly, all such changes,  
10 modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by this invention as defined in the following claims and their legal equivalents. In the claims, means-plus-function clauses, if  
15 any, are intended to cover the structures described herein as performing the recited function and not only structural equivalents but also equivalent structures.

All of the patents, patent applications, and publications recited herein, and in the Declaration  
20 attached hereto, if any, are hereby incorporated by reference as if set forth in their entirety herein. All, or substantially all, the components disclosed in such patents may be used in the embodiments of the present invention, as well as equivalents thereof. The details in the patents,

patent applications, and publications incorporated by  
reference herein may be considered to be incorporable at  
applicant's option, into the claims during prosecution as  
further limitations in the claims to patentable distinguish  
5 any amended claims from any applied prior art.

## Claims

1. A surgical clamp instrument comprising;

a pair a cross members having securing means for  
pivotally securing the cross members to one another  
5 creating a first end and a second end,

wherein the cross members second end comprises a  
locking device for locking said pair cross member in a  
steady position and finger receiving rings,

wherein the cross members first end comprises a  
10 clamping surface at a distal ends having at least a  
first curve, second curve and an inclined surface,  
wherein said first curve and second curves opposed  
each other and the first curve's dimensions are larger  
than said second curve's dimensions, and wherein said  
15 second curve is positioned on top of said first curve  
comprising a recess.

2. A surgical clamp instrument as in claim 1 wherein said  
first curve and second curve formed an S-shaped  
section at the distal end.

20 3. A surgical clamp instrument as in claim 1 wherein said  
first curve and second curve comprises a serrated  
inner surface and a smooth outer surface assisting  
slippage of a suturing material.

4. A surgical clamp instrument as in claim 1 wherein said inclined surface and said first curve outer surface are slanted to assist the slippage of a suturing material.

5 5. A surgical clamp instrument as in claim 1 wherein said first curve comprises tooth extended from the first curve surface.

6. A surgical clamp instrument as in claim 1 wherein said first curve is angled to be equal to or greater than  
10 60 degrees.

7. A surgical clamp instrument as in claim 1 wherein said first curve and second curve are angled and said second curve angle is smaller than the first curve angle.

15 8. A method for suturing comprising:  
a surgical clamp,  
a suture material,  
wherein said surgical clamp comprises pair a cross members having securing means for pivotally securing  
20 the cross members to one another creating a first end and a second end,  
wherein the second end comprises a locking device for locking said pair cross member in a steady position and finger receiving rings,

wherein first end comprises a clamping surface at a distal ends having at least a first curve, second curve and an inclined surface, wherein said first curve and second curves opposed each other, wherein

5       said second curve is positioned on top of said first curve comprising a recess,

wherein a suturing process comprises;

said surgical clamp first end clamping a structure at said distal end,

10       placing said suture material at said recess while pulling said suture material toward said finger receiving rings,

moving the suture material around the surgical instrument and away from the distal end,

15       creating a compact intersection of interlaced suture material at the back part of said surgical instrument,

pushing the suture material toward the clamped structure wherein said first curve surface assists the displacement of the suture material,

20       tying the intersection of interlaced suture material to control the bleeding at the clamped structure; and releasing the clamped structure.

9. A method for suturing as in claim 8, wherein said first curve is in close contact of the clamped structure without blocking said recess.



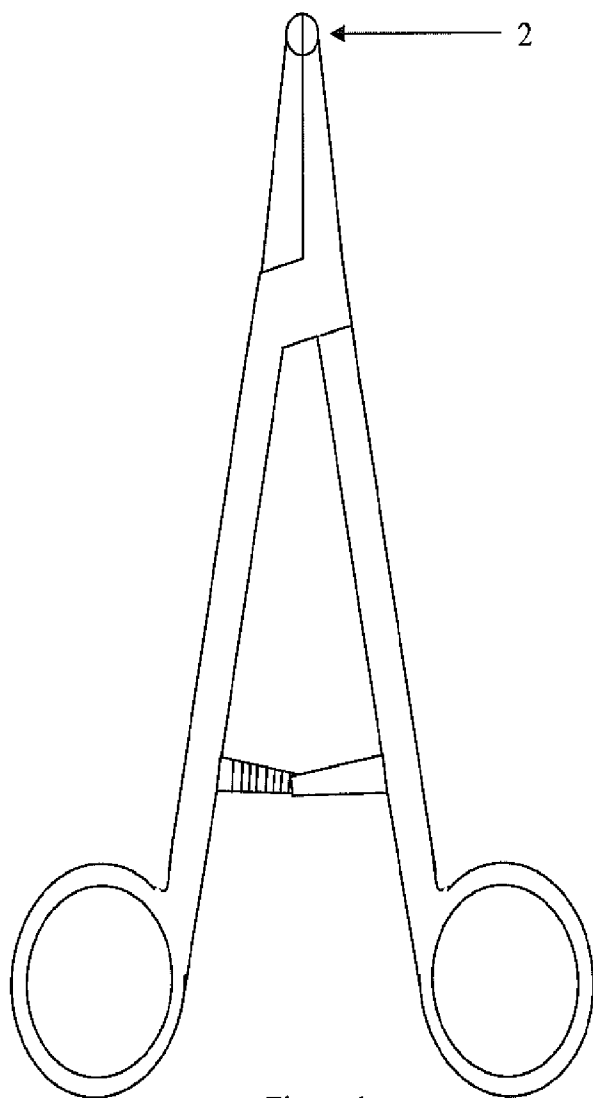
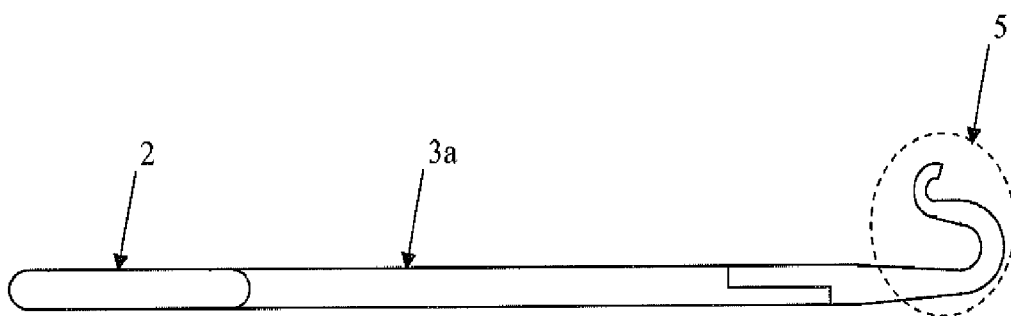
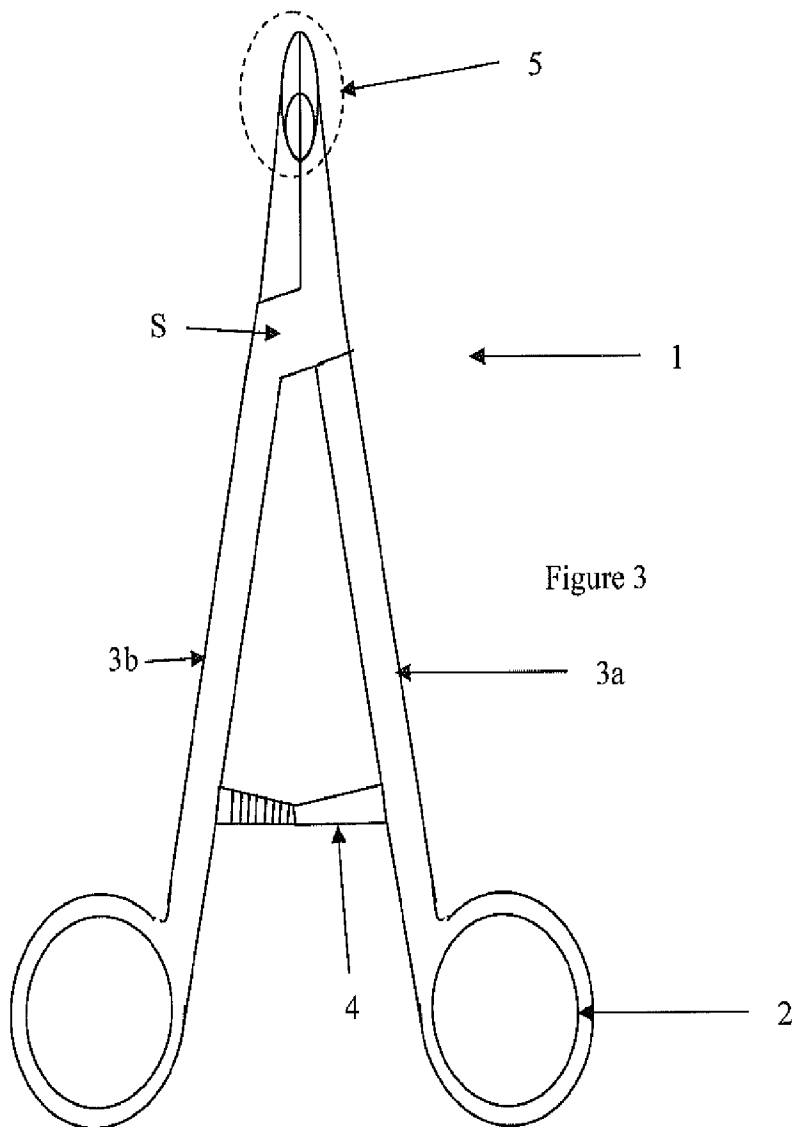


Figure 1  
Related Art



Figure 2  
Related Art



3/5

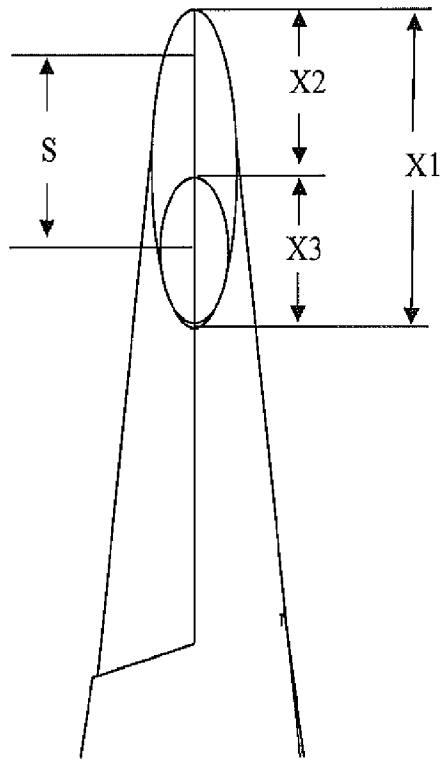


Figure 5

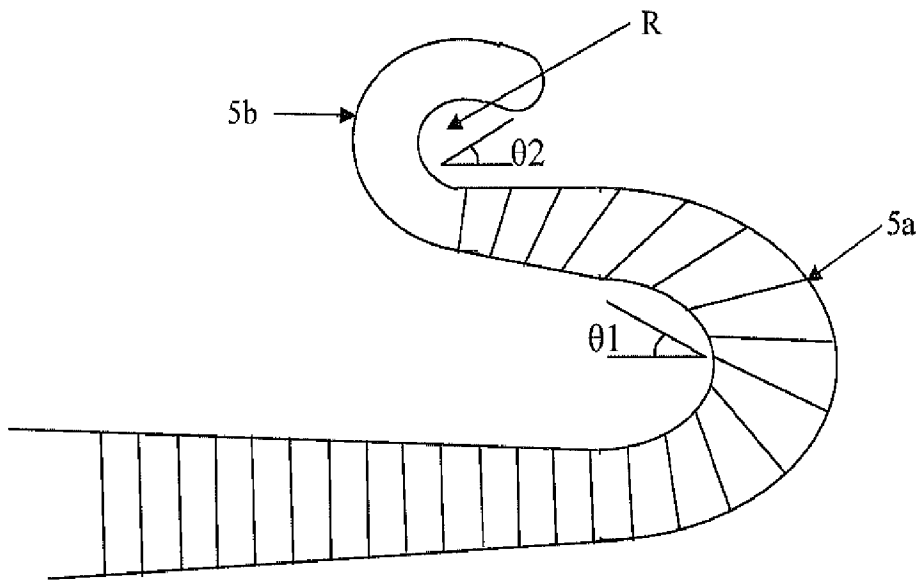


Figure 6

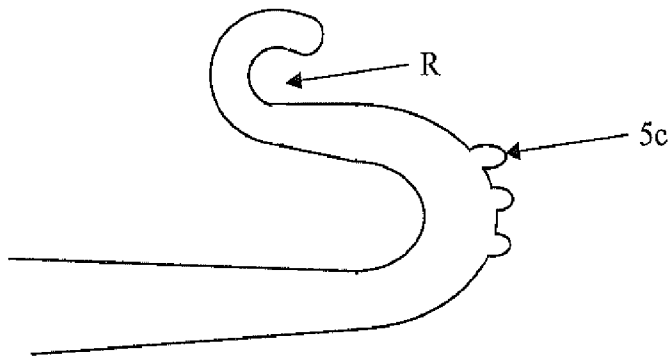


Figure 7

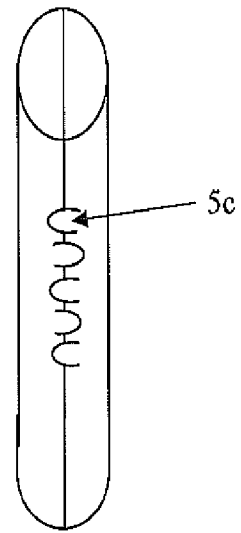


Figure 8

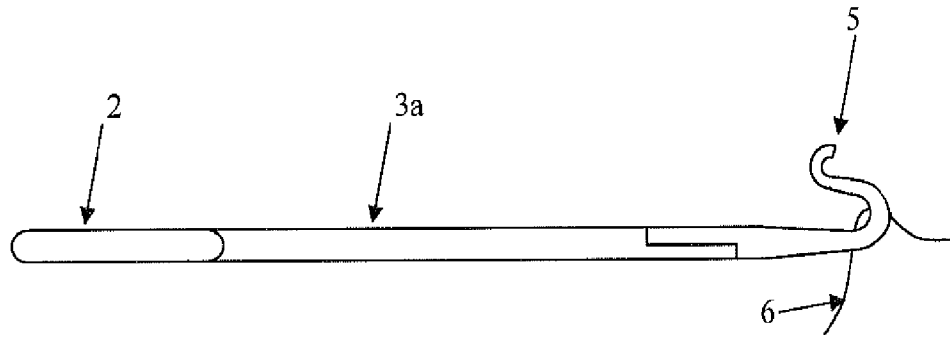


Figure 9a

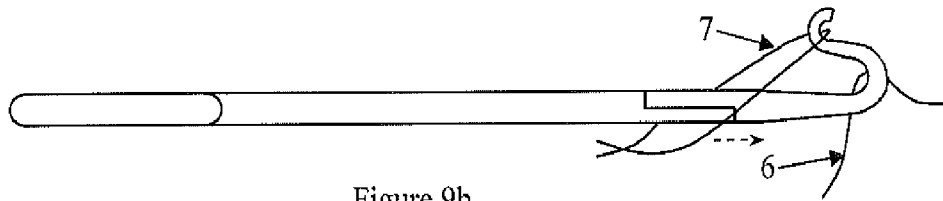


Figure 9b

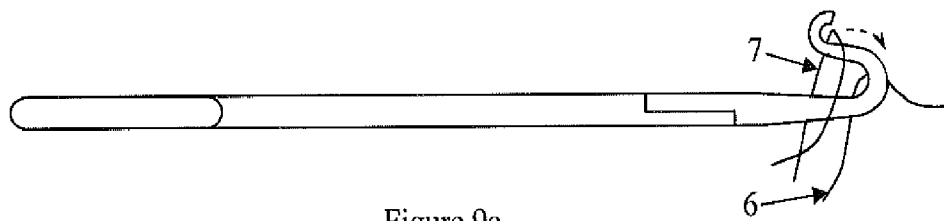


Figure 9c

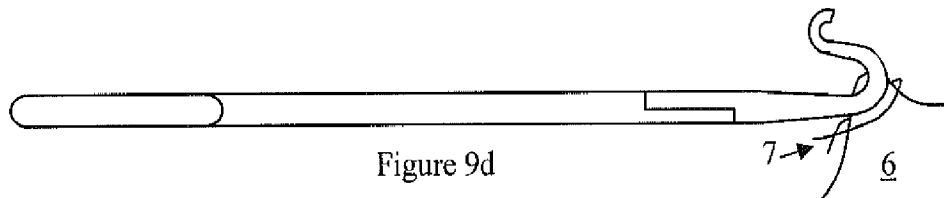


Figure 9d

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2010/031877

|  |  |                        |  |  |
|--|--|------------------------|--|--|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC(8) - A61B17/28 (2010.01)<br>USPC - 606/207<br>According to International Patent Classification (IPC) or to both national classification and IPC  |  |                        |  |  |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC(8) - A61B17/28 (2010.01)<br>USPC - 606/205, 207, 208, D24/143<br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>Minesoft, PatBase  |  |                        |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |  |                        |  |  |
| Category*  | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.  |  |  |
| X<br>—<br>Y  | US 2,842,132 A (SOLTERO et al) 15 October 1956 (15.10.1956) entire document  | 1-2, 4-7<br>-----<br>3 |  |  |
| Y  | US 2008/0300622 A1 (XU) 04 December 2008 (04.12.2008) entire document  | 3                      |  |  |
| A  | US 5,133,724 A (WILSON, JR et al) 28 July 1992 (28.07.1992) entire document  | 1-9                    |  |  |
| A  | US 4,611,592 A (TALBOY) 16 September 1986 (16.09.1986) entire document   | 1-9                    |  |  |
| A  | US 3,364,933 A (LEOPOLD) 23 January 1968 (23.01.1968) entire document  | 1-9                    |  |  |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>   |  |                        |  |  |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">           * Special categories of cited documents:<br/>           "A" document defining the general state of the art which is not considered to be of particular relevance<br/>           "E" earlier application or patent but published on or after the international filing date<br/>           "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br/>           "O" document referring to an oral disclosure, use, exhibition or other means<br/>           "P" document published prior to the international filing date but later than the priority date claimed         </td> <td style="width: 50%; vertical-align: top;">           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br/>           "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br/>           "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br/>           "&amp;" document member of the same patent family         </td> </tr> </table> |  |                        | * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |
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| Date of the actual completion of the international search<br>03 June 2010  | Date of mailing of the international search report<br><div style="text-align: center; font-size: 1.2em; font-weight: bold;">18 JUN 2010</div>  |                        |  |  |
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