



US 20100249803A1

(19) **United States**

(12) **Patent Application Publication**  
**GRIFFITHS**

(10) **Pub. No.: US 2010/0249803 A1**

(43) **Pub. Date: Sep. 30, 2010**

(54) **GASTRIC BAND INSERTION INSTRUMENT**

**Publication Classification**

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(51) **Int. Cl.**  
*A61B 17/128* (2006.01)

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**AKC PATENTS**  
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(52) **U.S. Cl.** ..... **606/139**

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(57) **ABSTRACT**

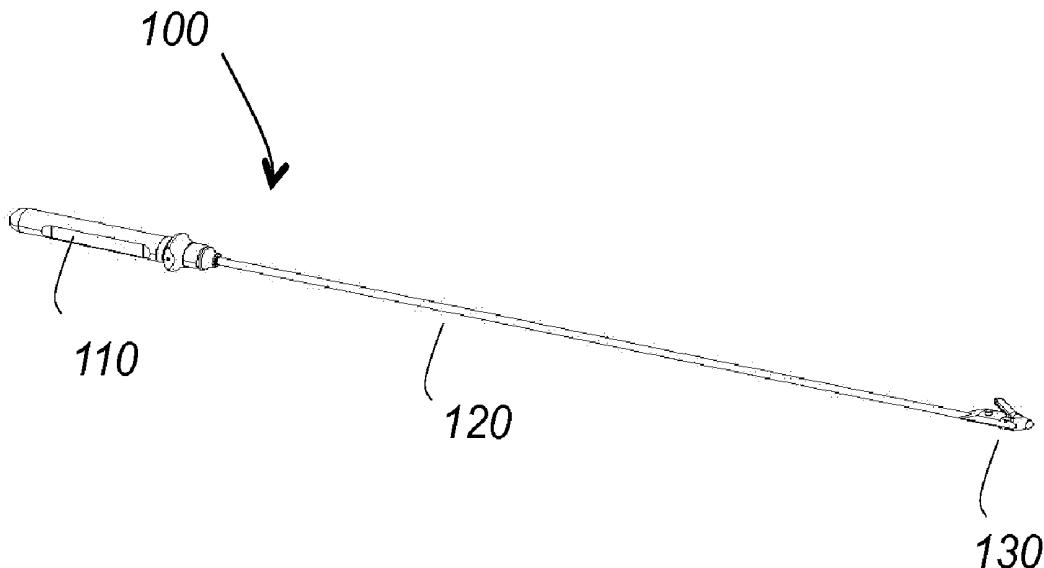
(21) Appl. No.: **12/813,894**

An endoscopic surgical instrument is used in minimally invasive laparoscopic surgery for inserting a gastric band into a patient's abdomen through a laparoscopic port. The gastric band insertion instrument includes a handle, an elongated shaft and a distal end assembly. The elongated shaft includes an actuator rod that opens and closes a movable jaw at the distal end. A pin at the distal end assembly engages a hole in the front of the gastric band, and the movable jaw is closed thereby securely capturing the front end of the gastric band. The shaft and the captured gastric band are inserted through a laparoscopic port into the patient's abdomen.

(22) Filed: **Jun. 11, 2010**

**Related U.S. Application Data**

(62) Division of application No. 11/315,714, filed on Dec. 22, 2005, now Pat. No. 7,771,439.



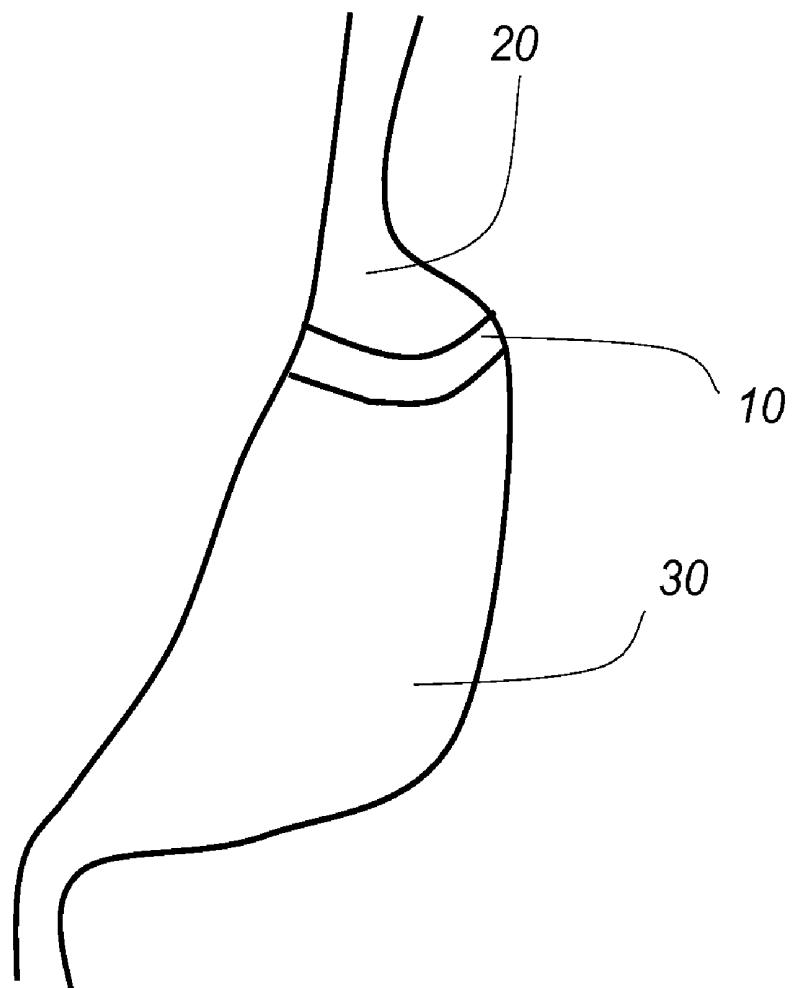


FIG. 1

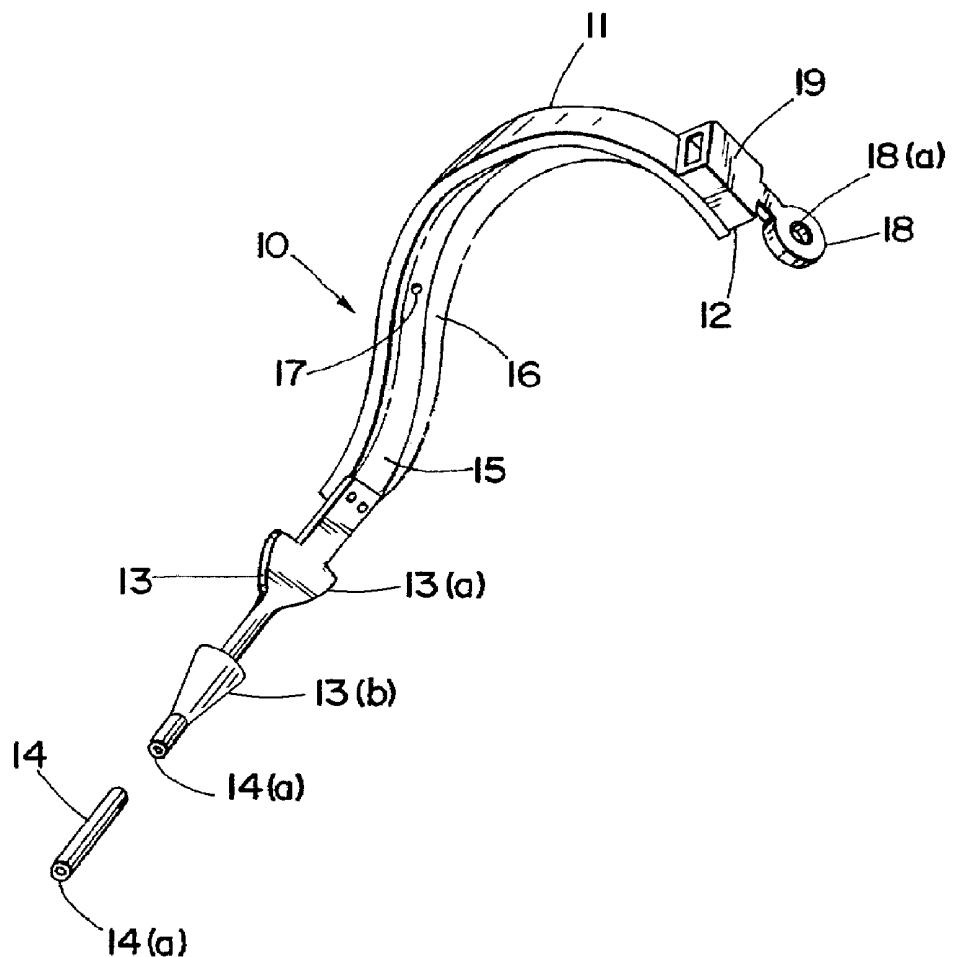


FIG. 2A

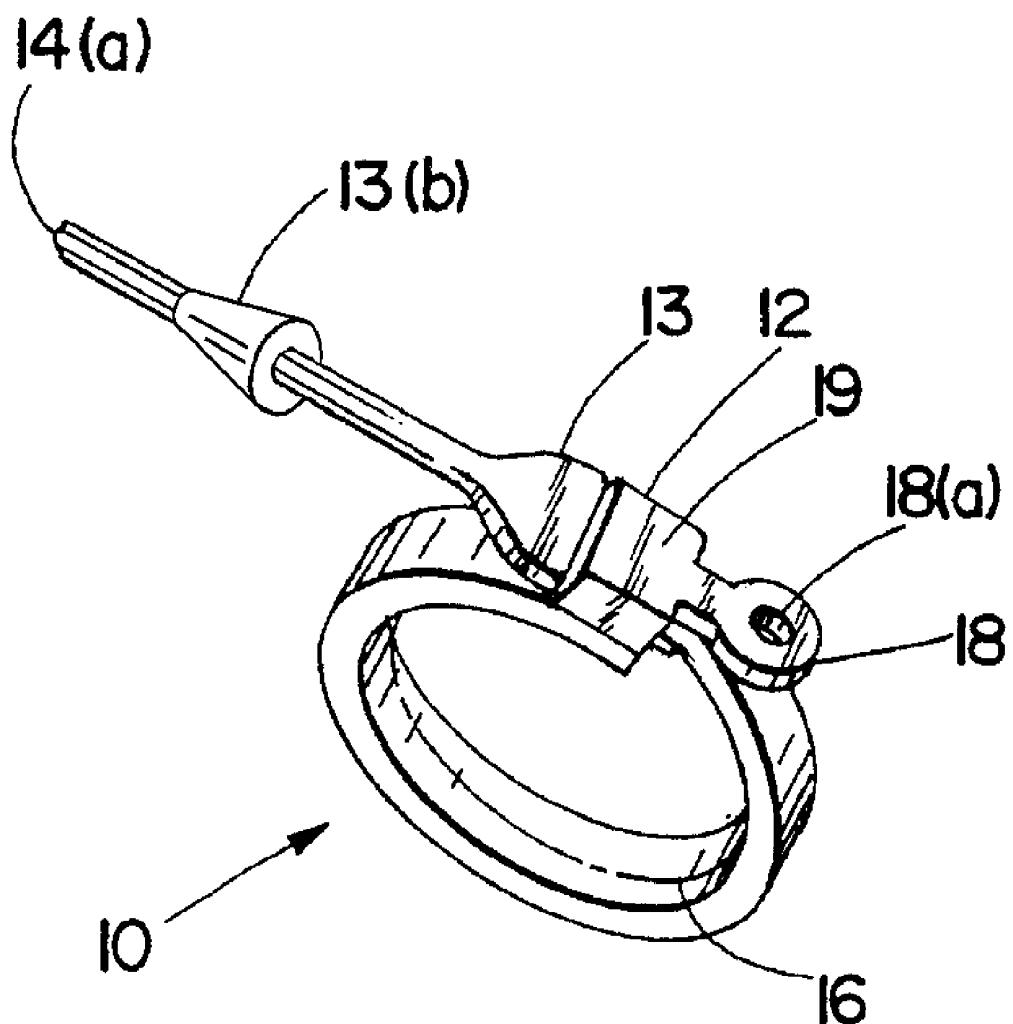
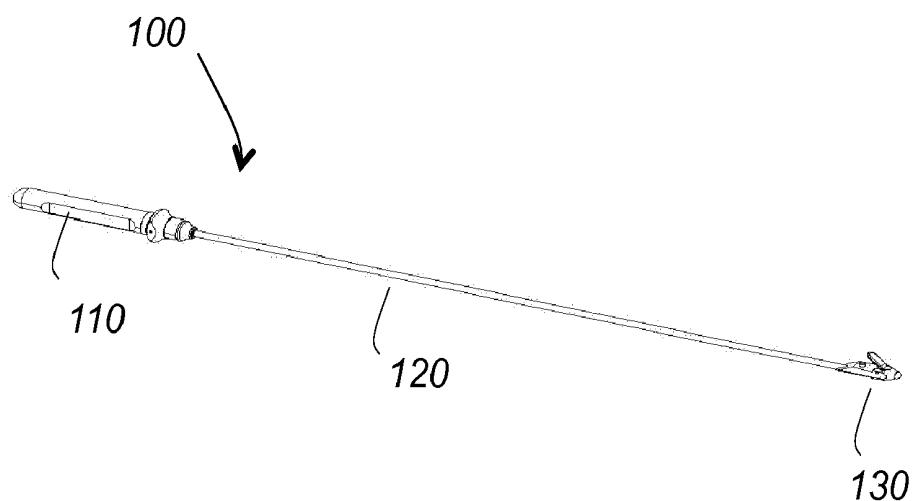
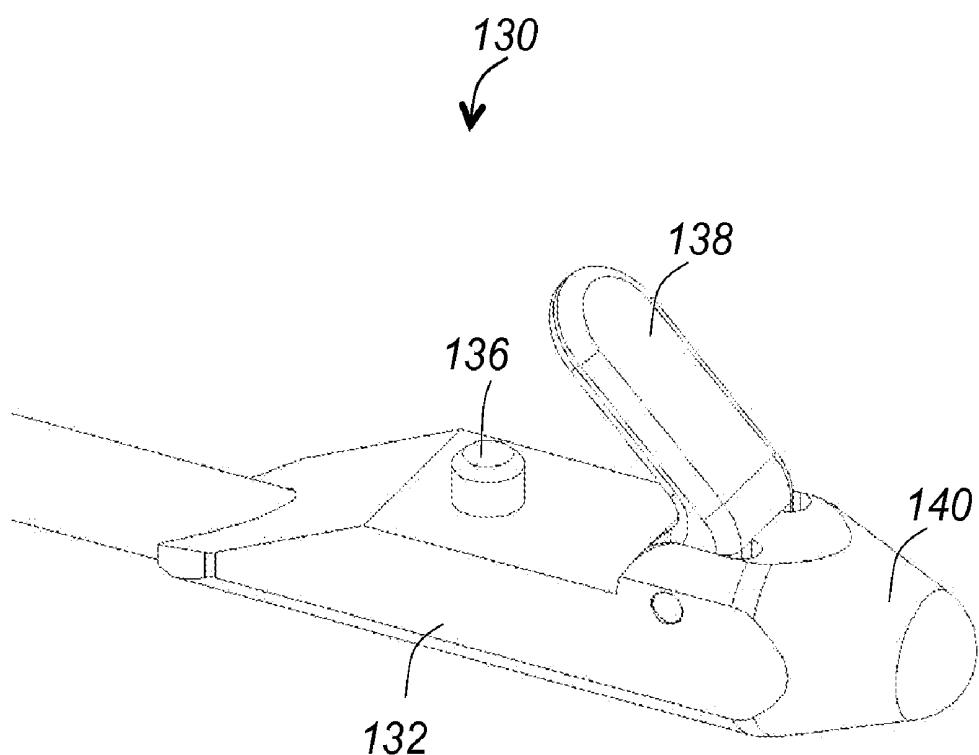


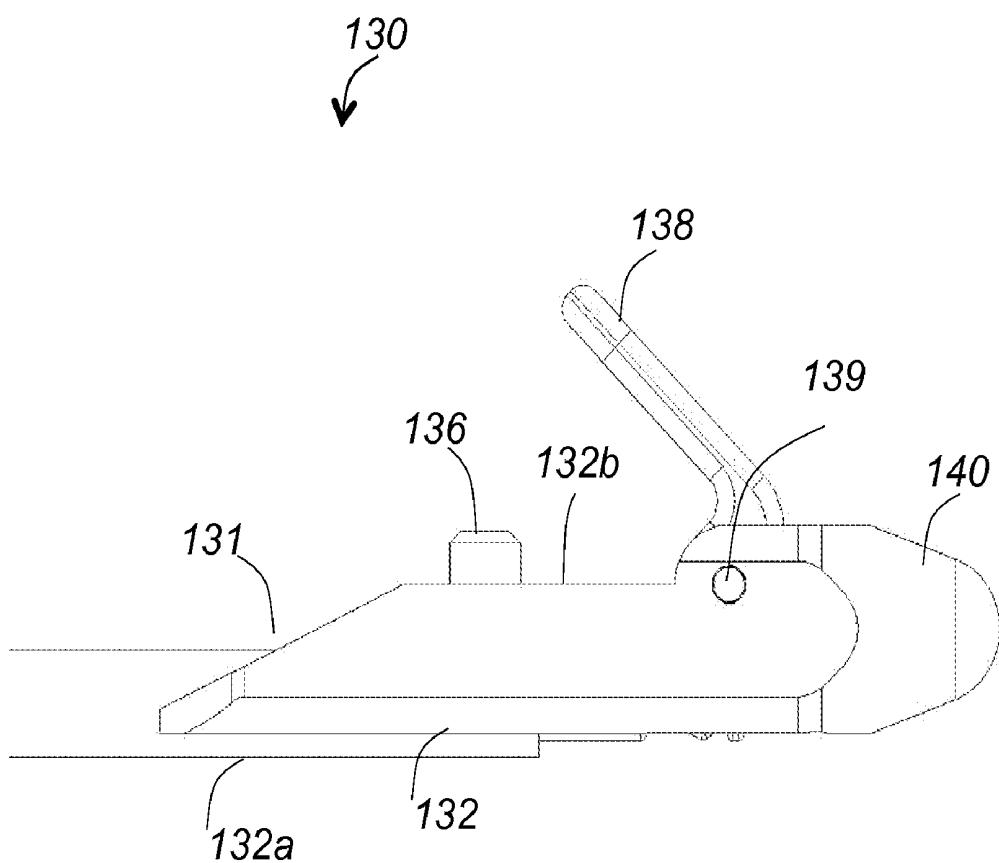
FIG. 2B



*FIG. 3*



*FIG. 4*



**FIG. 5**

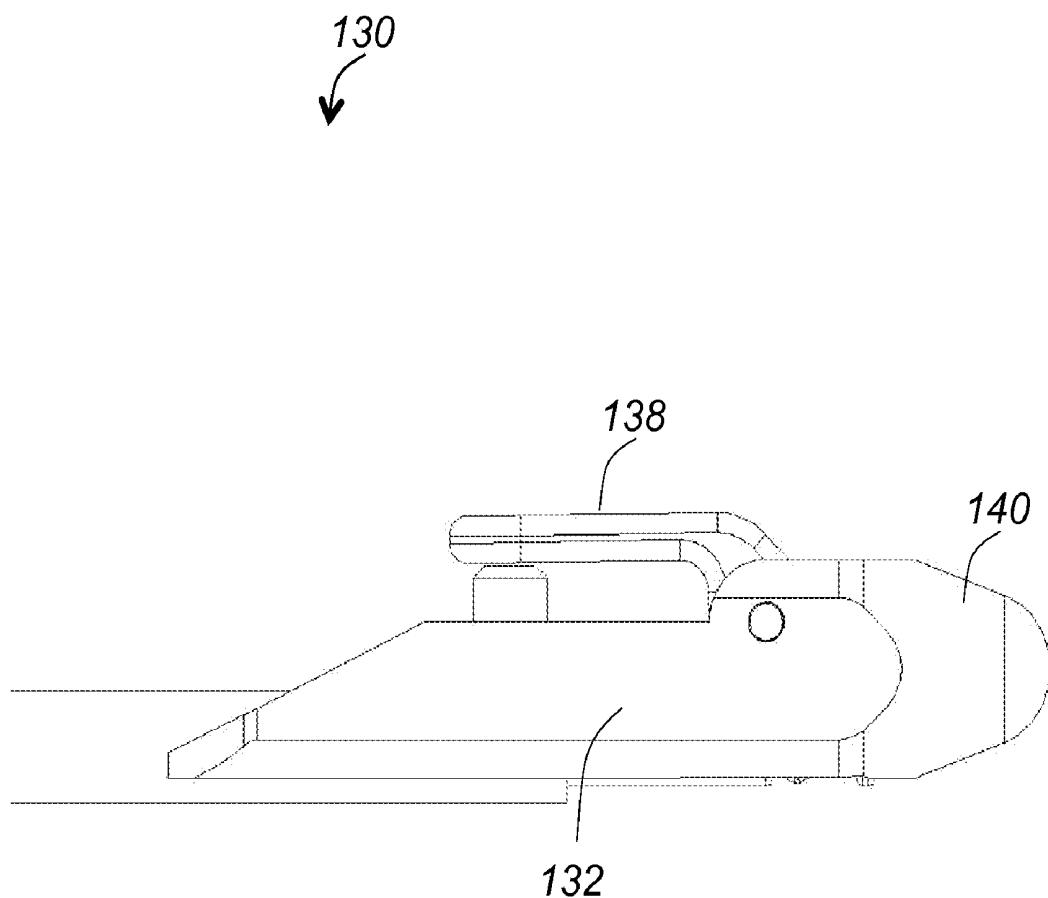


FIG. 6

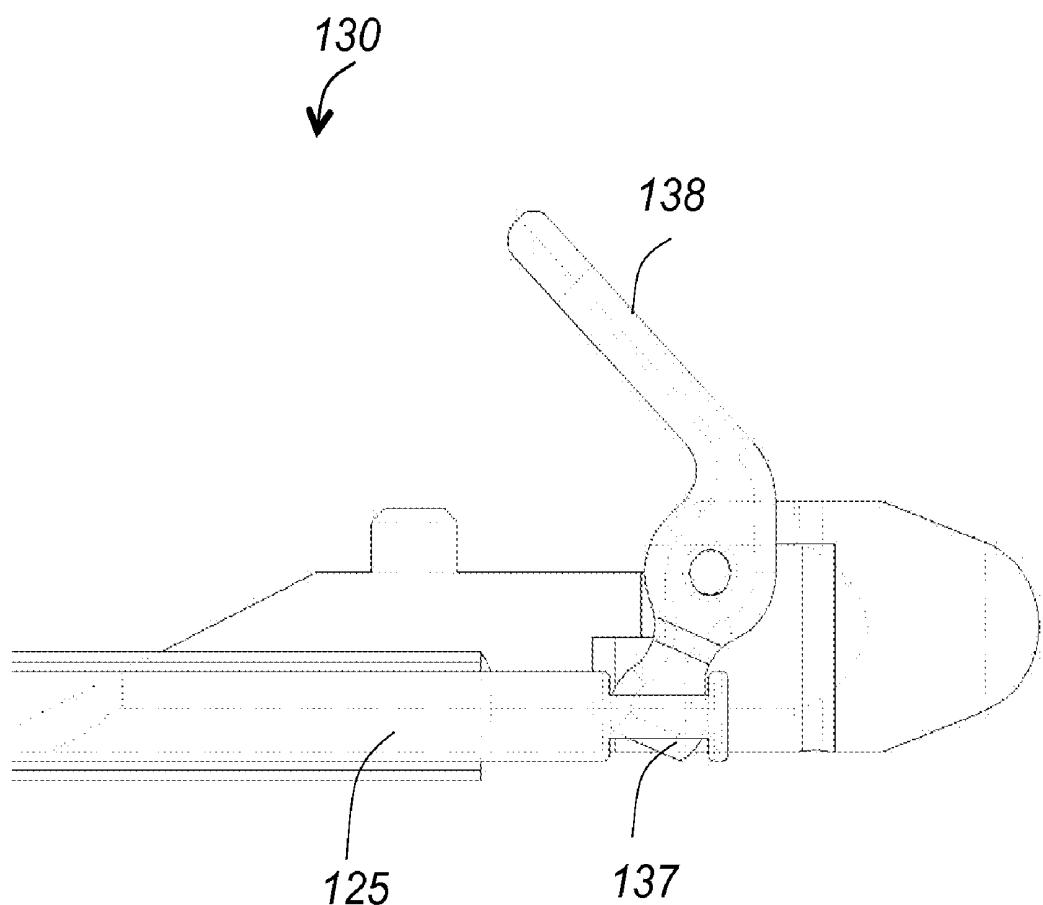
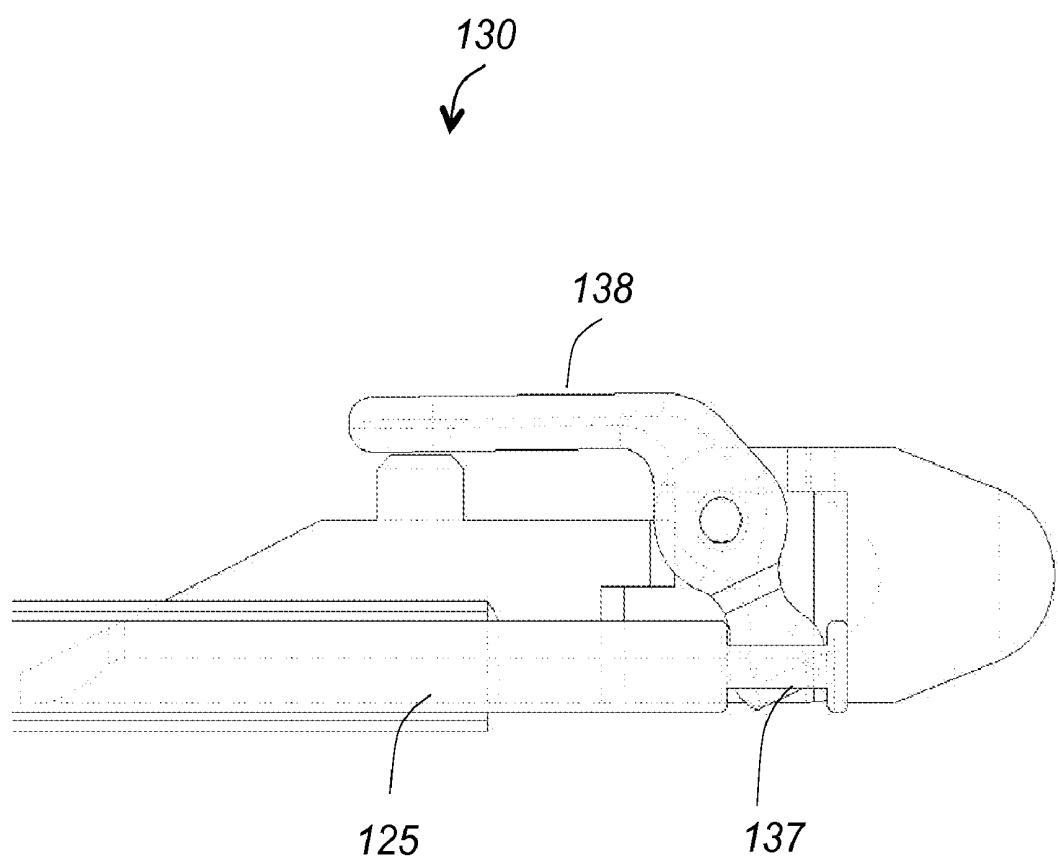


FIG. 7



*FIG. 8*

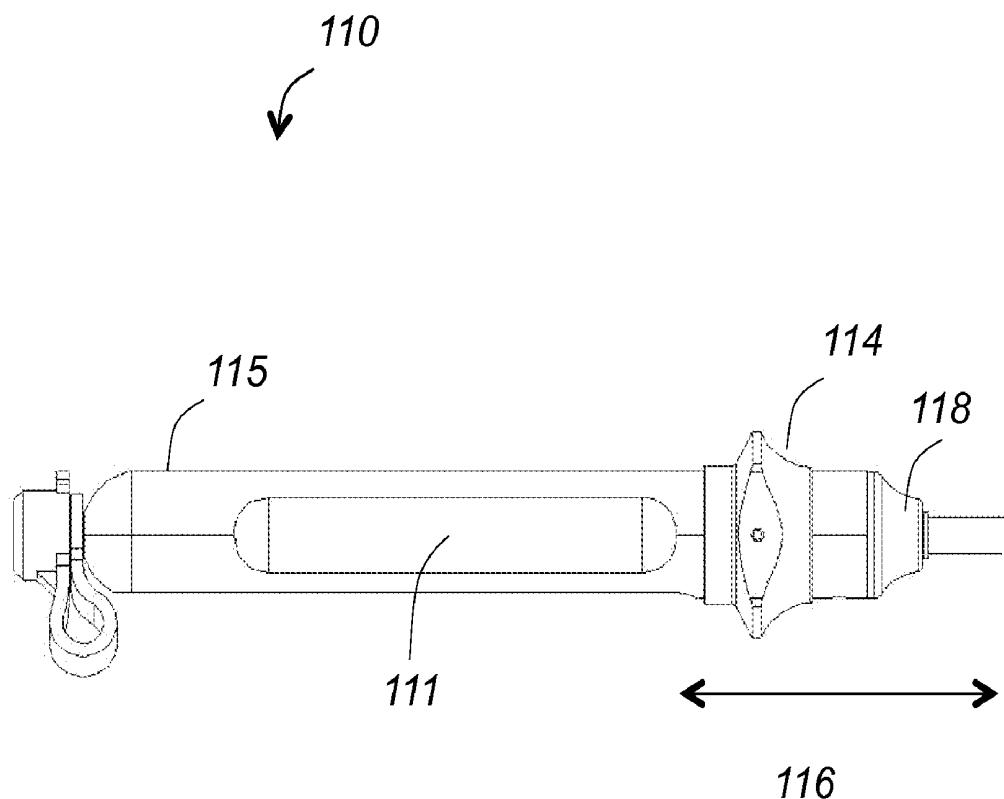


FIG. 9

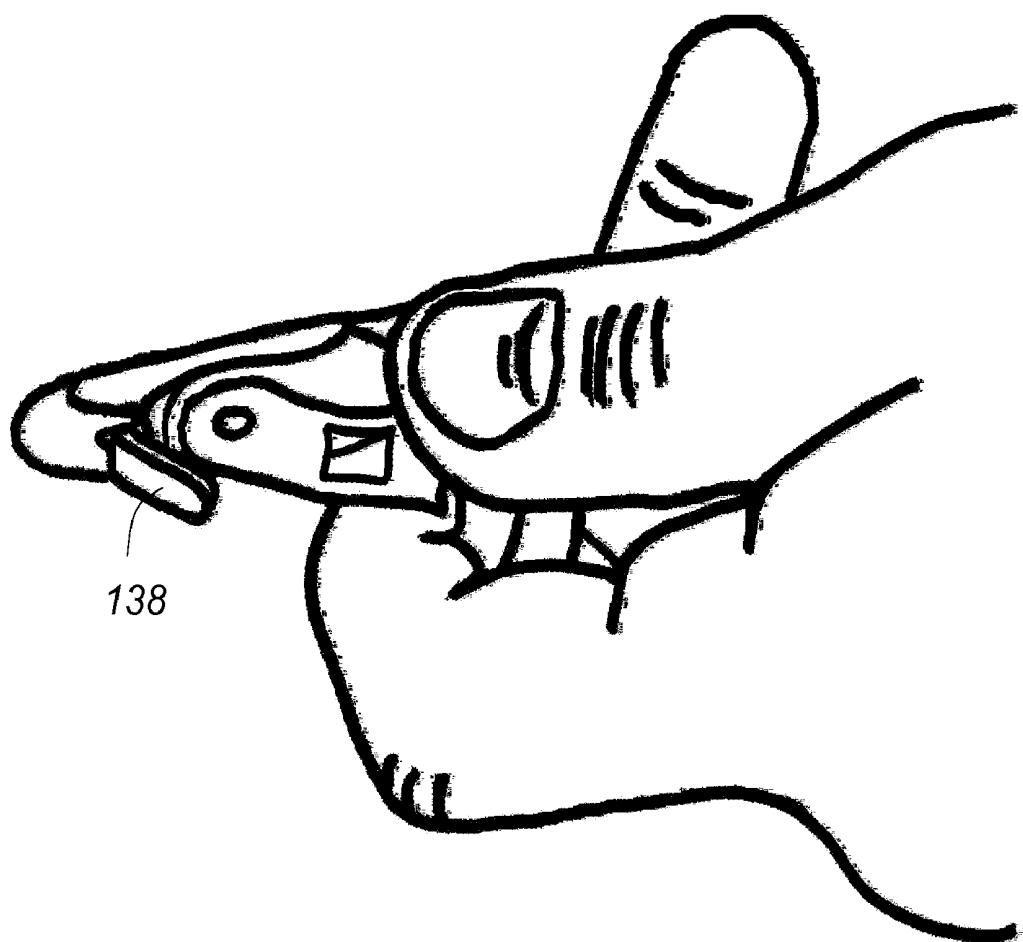


FIG. 10

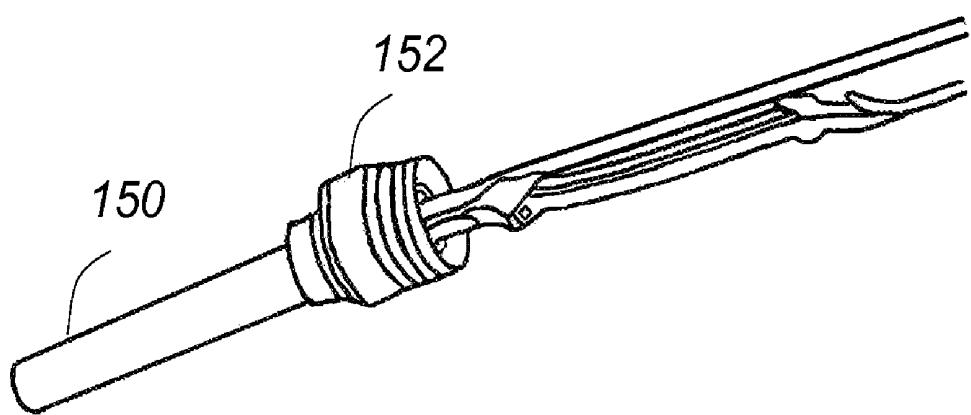


FIG. 11

150

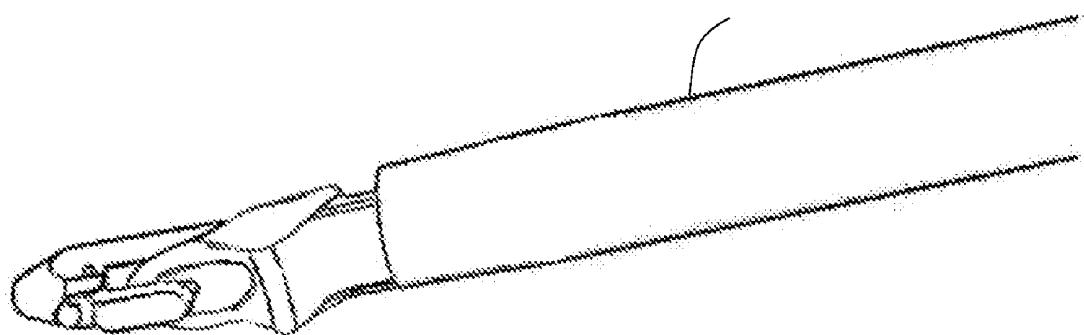
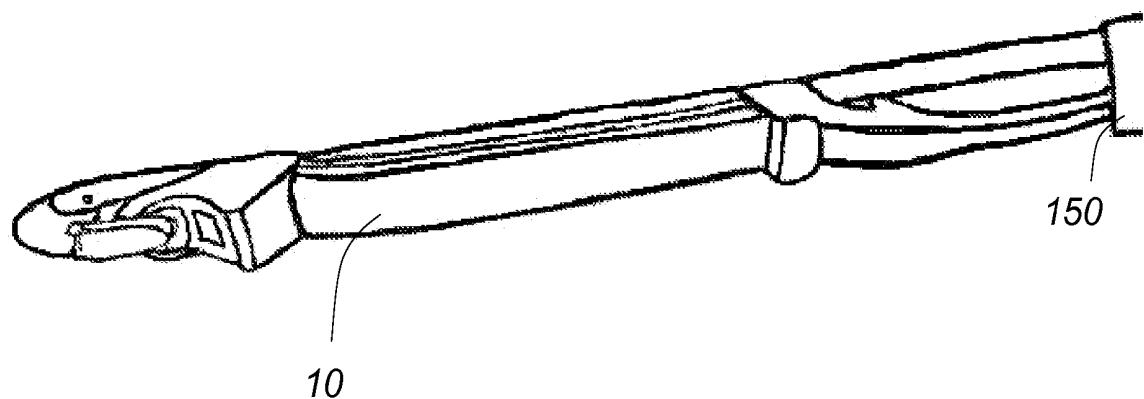


FIG. 12



*FIG. 13*

## GASTRIC BAND INSERTION INSTRUMENT

### CROSS REFERENCE TO RELATED CO-PENDING APPLICATIONS

[0001] This application is a divisional and claims the benefit of U.S. patent application Ser. No. 11/315,714 filed on Dec. 22, 2005 and entitled GASTRIC BAND INSERTION INSTRUMENT which is commonly assigned and the contents of which are expressly incorporated herein by reference.

### FIELD OF THE INVENTION

[0002] The present invention relates to an endoscopic surgical instrument, and more particularly to a surgical instrument used in minimally invasive laparoscopic surgery for inserting a gastric band into a patient's abdomen through a laparoscopic port.

### BACKGROUND OF THE INVENTION

[0003] One method of controlling the intake of food in an obese person is to place an adjustable restriction band 10 around the upper stomach 20, shown in FIG. 1. This creates a new small stomach pouch in the upper stomach 20 for holding a small amount of food and leaves the larger part of the stomach below the band so the stomach volume available for holding food is reduced. The band also controls the stoma, i.e., stomach outlet, between the upper stomach and the lower stomach 30. The size of the stoma regulates the flow of food from the upper stomach to the lower stomach. When the stoma is small the patient feels full sooner and has a feeling of satiety that lasts longer.

[0004] One specific type of an adjustable restriction band 10 is the LAP-BAND system manufactured by INAMED Corporation, shown in FIG. 2A and FIG. 2B. The LAP-BAND system is described in U.S. Pat. No. 5,601,604, the contents of which are incorporated herein by reference. Referring to FIG. 2A, the gastric band 10 of the LAP-BAND system includes a body portion 11 a head portion 12 and a tail portion 13. The head portion 12 has a buckle 19 with a pull tab 18 and the pull tab 18 has a hole 18a for receiving a post. The tail portion 13 has a tube 14 extending from one end, a triangular shaped member 13a and a conical shaped barb 13b. Tube 14 is in communication with an inflatable member 16 of the inner surface 15 of the body portion 11. The inflatable member 16 is gradually inflated by injecting a saline solution through the tube 14. The inflated member 16 presses against and constricts the stomach wall underlying the band 10. This results in decreasing the diameter of the stoma. The amount of the injected solution controls the size of the inflated member 16 and accordingly the diameter of the stoma.

[0005] During a minimally invasive laparoscopic surgical procedure, the tube 14 of the gastric band 10 is pushed through a laparoscopic cannula and is inserted in the patient's abdomen. The gastric band 10 is then placed around the patient's upper stomach and the tail portion 13 is inserted into the buckle 19 thereby forming a ring structure around the upper stomach. The triangular shaped member 13a of the tail portion 13 interlocks with the buckle 19 and prevents the tube 14 from slipping backwards.

[0006] Minimally invasive tools are used for inserting the gastric band into the patient's abdomen and for performing the mechanical manipulations needed for tightening the gastric band around the upper stomach. Surgeons performing this type of laparoscopic surgery have encountered the problem of

the gastric band unintentionally disengaging from the insertion tool during insertion. This requires regrasping the tab 18 several times during the insertion procedure, which increases both the operation time and the complexity of the operation.

[0007] Accordingly there is a need for an improved minimally invasive tool used for inserting the gastric band through a laparoscopic port into the patient's abdomen that prevents unintentional disengaging.

### SUMMARY OF THE INVENTION

[0008] The present invention provides a surgical instrument used in minimally invasive laparoscopic surgery for inserting a gastric band into a patient's abdomen through a laparoscopic port that prevents unintentional disengagement of the gastric band.

[0009] In general, in one aspect, the invention features an endoscopic surgical insertion tool used in minimally invasive surgery for capturing and inserting an elongated strap into a patient's body. The elongated strap has a pull tab at one end. The insertion tool includes an elongated shaft having a longitudinal axis, a handle at a proximal end and an end assembly at a distal end. The end assembly is configured to engage a hole in the pull tab and securely capture the pull tab and then the elongated shaft is used to push the pull tab and thereby the elongated strap into the patient's body.

[0010] Implementations of this aspect of the invention may include one or more of the following features. The end assembly comprises a flat member having a first end attached to the distal end of the elongated shaft, a rounded cone-shaped nose extending from a second end of the flat member, and a movable jaw articulately connected to the second end. The flat member further comprises a top surface having a pin projecting from it. The pin is configured to first engage the hole in the pull tab and then the movable jaw is configured to close downward over the pin, and thereby securely capturing the pull tab between the pin and the closed movable jaw. The elongated shaft comprises a hollow tube and the hollow tube encloses an actuator rod configured to move back and forth along the longitudinal axis. The actuator rod is connected to the movable jaw and is configured to actuate the movable jaw through the back and forth motion. The handle comprises a collar configured to slide back and forth along the handle and thereby to move the actuator rod back and forth along the longitudinal axis. The handle is configured to provide tactile control of the movable jaw orientation. The handle comprises a cylindrical body having first and second side indentations opposite to each other and a thumb indentation on a top surface of the cylindrical body. The thumb indentation is aligned with the movable jaw. The elongated shaft is inserted into the patient's body through a cannula and the shaft is dimensioned to enter one end, pass through and extend beyond the other end of the cannula. The rounded cone-shaped nose is configured to open seals and gates in a port of the cannula. The elongated strap comprises a ligature band having a buckle end and a distal end, the buckle end having an aperture and the pull tab. The elongated strap is configured to encircle an internal organ and the distal end is configured to pass through and lockingly engage the aperture thereby tightening the ligature band around the internal organ.

[0011] In general, in another aspect, the invention features a method for inserting an elongated strap via minimally invasive surgery into a patient's body. The method includes the following steps. First providing an elongated strap having a pull tab at one end. Then providing an elongated shaft having

a longitudinal axis, a handle at a proximal end and an end assembly at a distal end. Then engaging a hole in the pull tab with the end assembly and securely capturing the pull tab. Then inserting the elongated shaft with the captured elongated strap into the patient's body and pushing the pull tab and thereby the elongated strap into the patient's body.

[0012] Among the advantages of this invention may be one or more of the following. The movable jaw and the pin of the end assembly engage and securely capture the pull tab. The risk of unintentional disengagement is very low.

[0013] The details of one or more embodiments of the invention are set forth in the accompanying drawings and description below. Other features, objects and advantages of the invention will be apparent from the following description of the preferred embodiments, the drawings and from the claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Referring to the figures, wherein like numerals represent like parts throughout the several views:

[0015] FIG. 1 is a side view of a stomach with the an adjustable gastric band around the upper part of the stomach;

[0016] FIG. 2A is a perspective view of an open LAP-BAND gastric band;

[0017] FIG. 2B is the gastric band of FIG. 2A in a closed position forming a ring structure;

[0018] FIG. 3 is a perspective view of the endoscopic insertion instrument of this invention;

[0019] FIG. 4 is a perspective view of the distal end assembly of the instrument of FIG. 3;

[0020] FIG. 5 is a side view of the distal end assembly of the instrument of FIG. 3 in the open position;

[0021] FIG. 6 is a side view of the distal end assembly of the instrument of FIG. 3 in the closed position;

[0022] FIG. 7 is a cross-sectional side view of the distal end of the instrument of FIG. 3 in the open position;

[0023] FIG. 8 is a cross-sectional side view of the distal end of the instrument of FIG. 3 in the closed position;

[0024] FIG. 9 is a side view of the handle of the instrument of FIG. 3;

[0025] FIG. 10 depicts the distal end of the instrument of FIG. 3 engaging the hole in the tab of the buckle of the gastric band of FIG. 2A;

[0026] FIG. 11 depicts the insertion of the gastric band of FIG. 2A through an insertion port and through the front end of the laparoscopic cannula;

[0027] FIG. 12 depicts the gastric band of FIG. 2A and the front end assembly of the insertion instrument of FIG. 3 as they emerge from the laparoscopic cannula; and

[0028] FIG. 13 shows the distal end of the instrument of FIG. 3 securely holding the tab of the buckle of the gastric band of FIG. 2A as it exits the laparoscopic cannula.

#### DETAILED DESCRIPTION OF THE INVENTION

[0029] Referring to FIG. 3, a gastric band insertion instrument 100 includes a handle 110, an elongated shaft 120 and a distal end assembly 130. The handle 110 provides control of the distal end assembly 130 via an actuator rod 125, shown in FIG. 7. Referring to FIG. 9 the handle 110 features a cylindrical body 115 having a diameter of 15.9 mm and a length of 11.4 cm and it includes two side indentations 111, 112 (not shown) opposite to each other and a thumb indentation 113 (not shown) on the top surface. The thumb indentation 113 is

aligned with the orientation of a movable jaw element 138, shown in FIG. 4. The handle 110 also features a flared collar 114 that slides back and forth along the direction 116 in order to move the actuator 125, shown in FIG. 7, that controls the movement of the movable jaw element 138 (shown in FIG. 7) of the distal end assembly 130.

[0030] The elongated shaft 120 has a cylindrical shape and is dimensioned to fit through a laparoscopic cannula 150, shown in FIG. 11 and FIG. 12, for minimally invasive surgery. In one example, the elongated shaft 120 has a length of 45 cm and a diameter of 5 mm. The elongated shaft 120 is hollow inside, forming a tube that encloses the above mentioned actuator rod 125, shown in FIG. 7. The actuator rod 125 engages a slot 137 in the bottom of the above mentioned movable jaw 138 (also shown in FIG. 7).

[0031] Referring to FIGS. 4-8, the distal end 130 includes a flat portion 132, a movable jaw 138 and a rounded cone shaped nose 140. The flat portion 132 has a top surface 132a and a bottom surface 132b. The top surface 132a includes an angled portion 131 and a pin 136 projecting from it. The pin 136 engages the hole 18a of the tab 18 and the movable jaw 138 is spring-loaded to the closed position and closes downward over the pin to securely capture the tab 18. Once the gastric band is securely captured by the closed jaw 138, the gastric band 10 is stretched out along the length of the shaft 120 and the tubing is pulled slightly to keep the band stretched. Ahead of the jaw pivot 139 is the rounded cone shaped nose 140 that is used to smoothly open the seals and gates of the port 152 as it is pushed through, shown in FIG. 11. Once the gastric band 10 is completely through the cannula 150 and at the release site, the handle collar 114 is actuated again, and the movable jaw 138 opens, releasing the pull tab 18. The natural tendency of the band 10 to curl up causes the tab 18 to disengage from the pin 136. The collar 114 is released and the movable jaw 138 is closed. The inserter 100 is then retracted back through the cannula 150. A capped luer connector 118, shown in FIG. 9, at the end of the handle 110 is available for flushing the instrument clean prior to sterilization. The insertion process may be performed under optical or fluoroscopic visualization.

[0032] Other embodiments may include one or more of the following. The insertion instrument 100 may be inserted directly through the incision, without the need to use a laparoscopic cannula 150. The rounded cone shaped nose 140 helps direct the instrument through the skin, fascia and muscle layers.

[0033] Several embodiments of the present invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.

#### What is claimed is:

1. A method for inserting an elongated strap via minimally invasive surgery into a patient's body the method comprising: providing an elongated strap comprising a buckle end and a distal end, said buckle end comprising a pull tab; providing an elongated shaft extending along a longitudinal axis, wherein said elongated shaft comprises a handle attached to a proximal end of said elongated shaft and an end assembly attached to a distal end of said elongated shaft, and wherein said end assembly comprises a flat member having a first end attached to said distal end of said elongated shaft, a rounded cone-shaped nose extending from a second end of said flat member, and a movable jaw articulately connected to said second end of said flat member;

engaging a hole in said pull tab with said end assembly and securely capturing said pull tab; inserting said elongated shaft with the captured elongated strap into the patient's body; and pushing said pull tab and thereby said elongated strap through into the patient's body.

**2.** The method of claim 1 wherein said flat member further comprises a top surface having a pin projecting from it and wherein said pin is configured to first engage said hole in said pull tab and then said movable jaw is configured to close downward over said pin, and thereby securely capturing said pull tab between said pin and said closed movable jaw.

**3.** The method of claim 2 wherein said elongated shaft comprises a hollow tube and said hollow tube encloses an actuator rod configured to move back and forth along said longitudinal axis, and wherein said actuator rod is connected to said movable jaw and is configured to actuate said movable jaw through said back and forth motion.

**4.** The method of claim 3 wherein said handle comprises a collar configured to slide back and forth along said handle and thereby to move said actuator rod back and forth along said longitudinal axis.

**5.** The method of claim 2 wherein said handle is configured to provide tactile control of said movable jaw orientation.

**6.** The method of claim 2 wherein said handle comprises a cylindrical body having first and second side indentations opposite to each other and a thumb indentation on a top surface of said cylindrical body, said thumb indentation being aligned with said movable jaw.

**7.** The method of claim 1 further comprising inserting a minimally invasive cannula into the patient's body and inserting said elongated shaft through said cannula into the patient's body.

**8.** The method of claim 7 wherein said elongated shaft is dimensioned to enter one end, pass through and extend beyond the other end of said cannula.

**9.** The method of claim 7 wherein said rounded cone-shaped nose opens seals and gates in a port of said cannula.

**10.** The method of claim 7 wherein said elongated strap encircles an internal organ and said distal end passes through and lockingly engage said hole thereby tightening said elongated strap around said internal organ.

\* \* \* \* \*

专利名称(译)	胃束带插入仪		
公开(公告)号	<a href="#">US20100249803A1</a>	公开(公告)日	2010-09-30
申请号	US12/813894	申请日	2010-06-11
[标]申请(专利权)人(译)	对称医疗新贝德福德		
申请(专利权)人(译)	对称医疗新贝德福德 , INC		
当前申请(专利权)人(译)	特种手术器械INC.		
[标]发明人	GRIFFITHS JERRY R		
发明人	GRIFFITHS, JERRY R.		
IPC分类号	A61B17/128		
CPC分类号	A61B2017/2808 A61F5/0089 A61F5/0066 A61F5/005		
优先权	60/670111 2005-04-11 US 60/650284 2005-02-04 US 60/650290 2005-02-04 US		
其他公开文献	US8333775		
外部链接	<a href="#">Espacenet</a> <a href="#">USPTO</a>		

## 摘要(译)

内窥镜手术器械用于微创腹腔镜手术，用于通过腹腔镜端口将胃束带插入患者的腹部。胃束带插入器械包括手柄，细长轴和远端组件。细长轴包括致动器杆，致动器杆在远端处打开和关闭可动夹爪。远端组件处的销接合胃束带前部的孔，并且可动钳口闭合，从而牢固地捕获胃束带的前端。将轴和捕获的胃束带通过腹腔镜端口插入患者的腹部。

