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(19) **United States**(12) **Patent Application Publication**  
**Curran**(10) **Pub. No.: US 2004/0111061 A1**(43) **Pub. Date: Jun. 10, 2004**(54) **TROCAR HAVING AN INFLATABLE CUFF  
FOR MAINTAINING AN INSUFFLATED  
ABDOMINAL CAVITY DURING AN OPEN  
LAPAROSCOPY PROCEDURE****Publication Classification**(51) **Int. Cl.<sup>7</sup>** ..... **A61M 5/32**(52) **U.S. Cl.** ..... **604/174**(76) **Inventor: Diana Curran, Omaha, NE (US)**

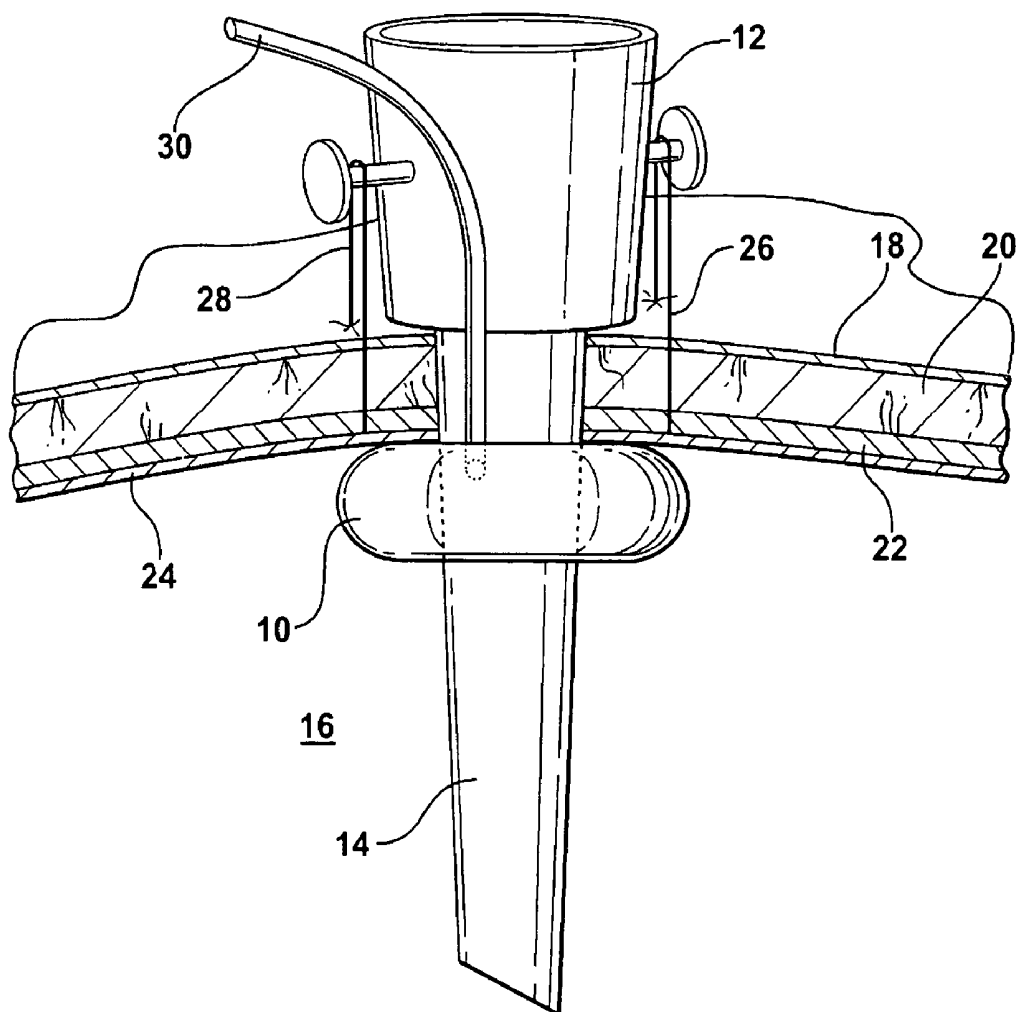
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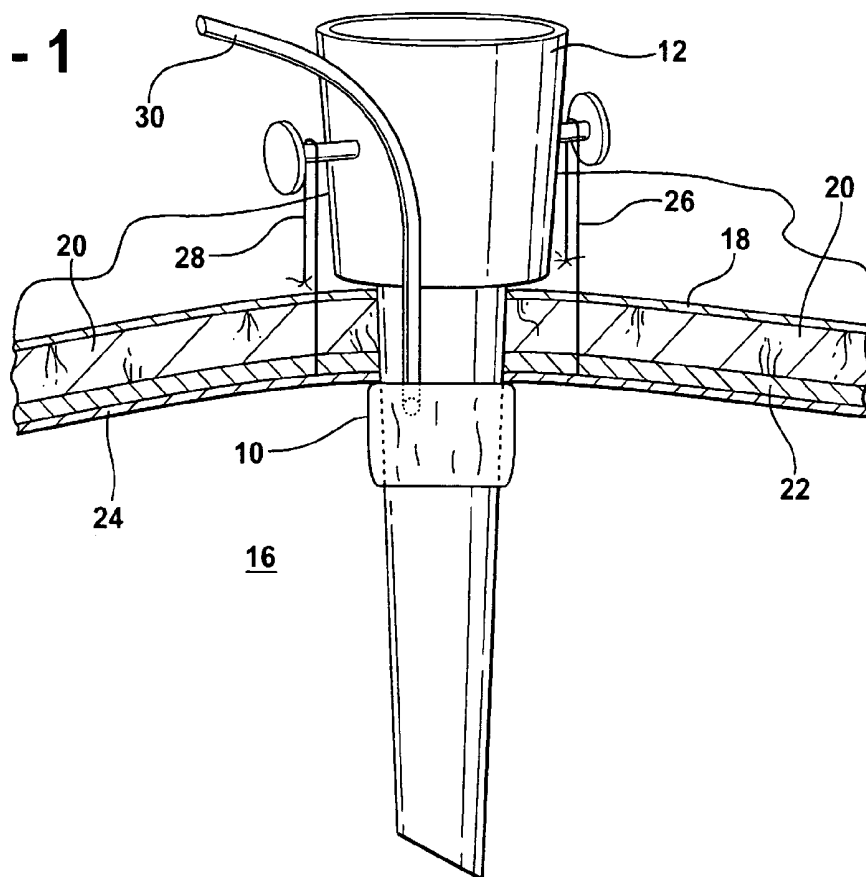
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**ABSTRACT**

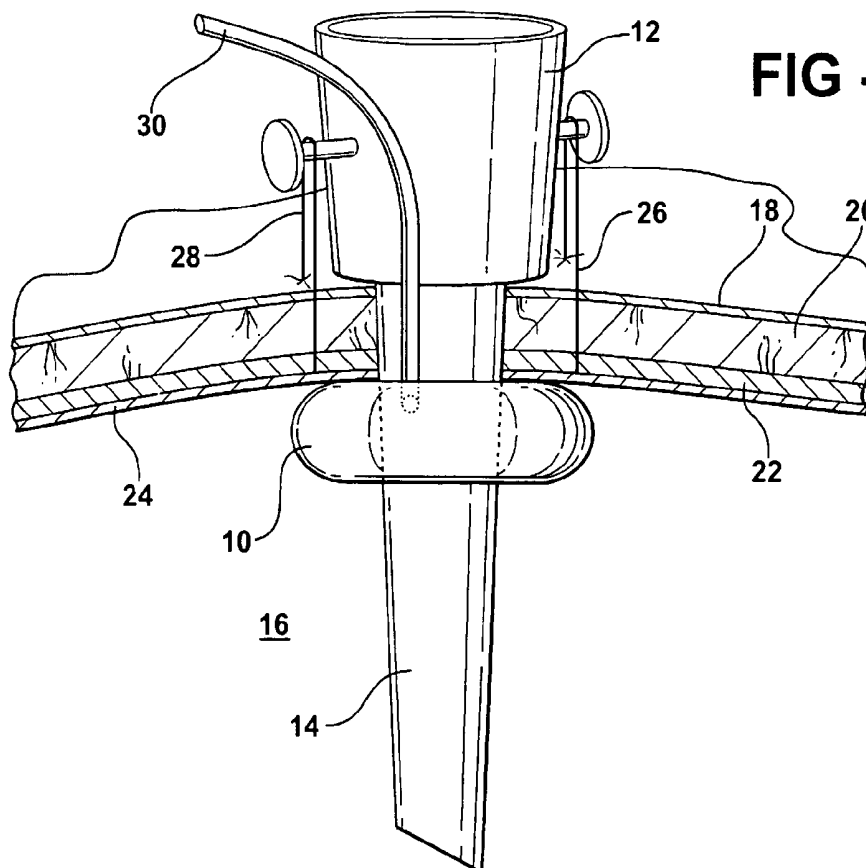
An inflatable cuff for use with a trocar inserted within an abdominal cavity. The trocar exhibits a hollowed interior and includes an upper funnel portion and an interconnecting and downwardly extending sleeve portion. The cuff exhibits a flexible and inflatable annular shape and is constructed of a fluid-tight material. The cuff secures in an initially deflated condition at a location about the sleeve portion of the trocar. A fluid line extends through a port in the trocar and to a location along the cuff, the cuff being inflated after insertion of the sleeve within a patient's abdominal cavity to maintain a sealed condition within the abdominal cavity.

(21) **Appl. No.: 10/706,581**(22) **Filed: Nov. 12, 2003****Related U.S. Application Data**(60) **Provisional application No. 60/425,476, filed on Nov. 12, 2002.**

**FIG - 1**



**FIG - 2**



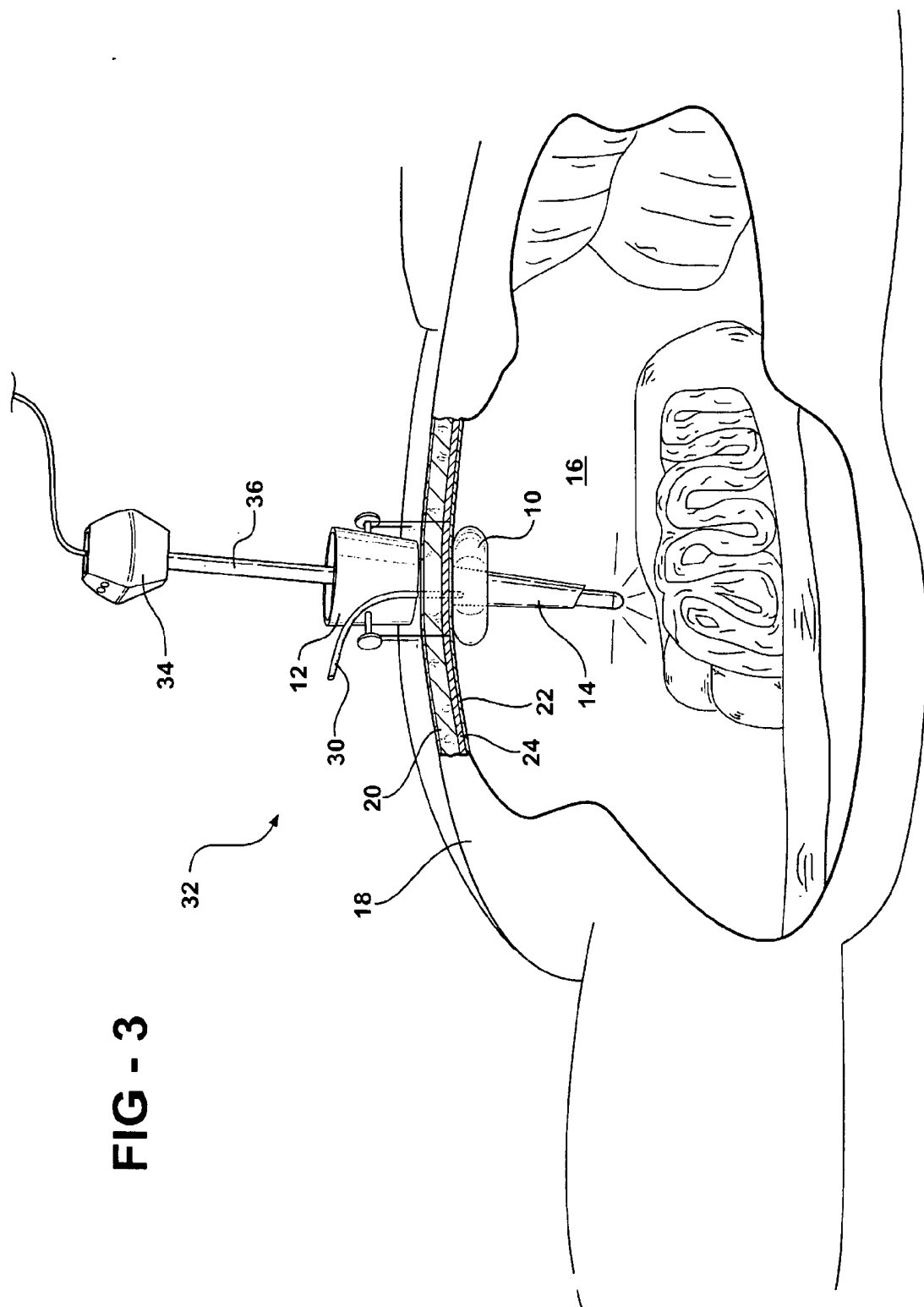


FIG - 3

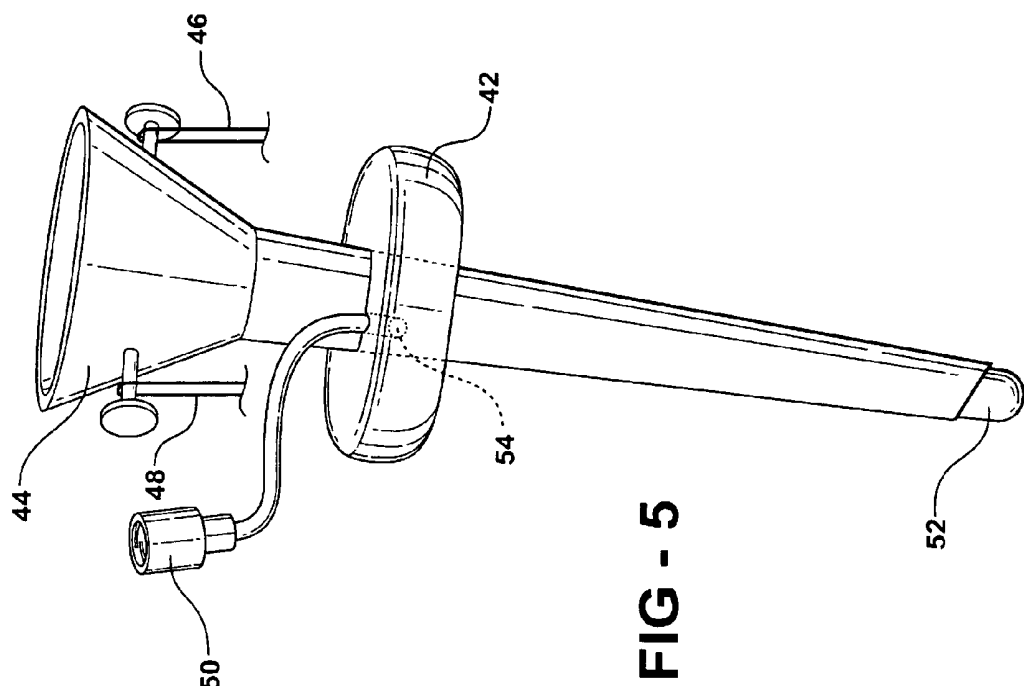


FIG - 5

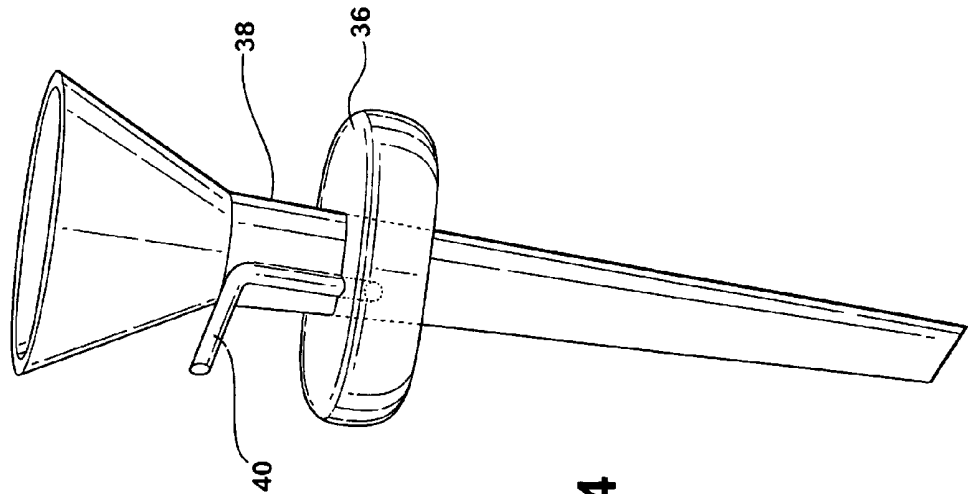


FIG - 4

# TROCAR HAVING AN INFLATABLE CUFF FOR MAINTAINING AN INSUFFLATED ABDOMINAL CAVITY DURING AN OPEN LAPAROSCOPY PROCEDURE

## CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the priority of Provisional Application Serial No. 60/425,476, filed Nov. 12, 2002, and entitled "Trocac Having an Inflatable Cuff for Maintaining an Insufflated Abdominal Cavity During an Open Laparoscopy Procedure."

## BACKGROUND OF THE INVENTION

### [0002] 1. Field of the Invention

[0003] The present invention relates generally to open laparoscopic procedures employing a trocar. More particularly, the present invention is directed to a modification and improvement of a trocar which employs an inflatable cuff surrounding a sleeve portion of the trocar and which, upon insertion of the trocar into a patient's abdominal cavity which has been insufflated with CO<sub>2</sub>, acts to maintain the sealing condition within the cavity during the performance of a medical procedure.

### [0004] 2. Description of the Prior Art

[0005] A number of medical procedures are known in the prior art which employ the use of a trocar for assisting in open abdominal surgical procedures. A trocar is most generally defined as a sharp pointed rod which fits inside a tube and is used to pierce the skin and wall of a cavity or canal within the body and in order to inject or vacuum out raw fluids, to insert drugs or solutions, or to guide the placement of a soft tube or catheter. In certain applications, the trocar is removed after insertion of the tube, which is left in place.

[0006] A particular medical procedure is known as a laparoscopic procedure and involves inserting the trocar through a dissection made through the skin, subcutaneous tissue, muscle and peritoneum and into the abdominal cavity of the patient. Stabilizing sutures are then placed through the fascia to attach the sleeve of the trocar in place against the abdominal cavity wall.

[0007] One known laparoscopic technique is known as a "blind technique", while another "open technique" involves insufflating the patient's abdominal cavity with such as a CO<sub>2</sub> charge to create a pneumoperitoneum condition which allows the surgeon to operate within the abdomen with the patient's bowels out of the way. One problem associated with the open technique is in maintaining the CO<sub>2</sub> seal because of inherent leakage occurring around the trocar sleeve.

[0008] Relevant examples drawn from the prior art include U.S. Pat. No. 5,628,732, issued to Antoon, Jr. et al., which teaches a trocar having a universal seal for sealing against surgical instruments of varying diameter and in order to maintain an insufflated condition in a body cavity. The universal seal has an elastomeric sealing component with a centrally located interior region containing an aperture, and a concentrically located sealing region. The sealing region is composed of an integral laminate having an overlaying layer co-molded with an underlying layer. The co-molded lami-

nate balances the properties of tear resistance and elasticity and which are necessary for a working universal seal, and does so without the need for resilient legs or protectors to facilitate the opening of the aperture of the seal or to prevent tearing when instruments are used.

[0009] U.S. Pat. No. 5,147,316, to Castillenti, discloses a laparoscopic trocar exhibiting a sleeve which may be selectively fixed to an abdominal wall by a bumper in cooperation with a balloon mounted on the distal end of the sleeve. Following insertion of the trocar and the distal end of the sleeve, the trocar is withdrawn and the balloon inflated by a syringe through the distensible coupling and a balloon inflation duct. The sleeve includes ratchets on its outer surface, and the bumper exhibits a ratchet tool in its inner channel and which ensures that the bumper will not move backwards along the sleeve and which may further be released and the balloon deflated to permit removal of the sleeve from the abdomen.

[0010] Finally, U.S. Pat. No. 5,941,852, issued to Dunlap et al., teaches a cannula converter for use with a trocar assembly used in surgical procedures, such as appendectomies, and for maintaining a sealed working channel in a body wall and an obturator which creates the working channel through the body wall while protecting patients and medical personnel from harm. A cannula converter can be employed from the trocar to enable a surgeon to use surgical instruments having a smaller outer diameter than the inner diameter of the cannula without deflating a body cavity. A site stabilizer is also discussed and which can be used with the trocar to prevent the cannula from being inadvertently withdrawn from the body cavity during a surgical procedure.

## SUMMARY OF THE PRESENT INVENTION

[0011] The present invention discloses an inflatable cuff for use with a trocar sleeve. The trocar exhibits an upper funnel portion and a lower and interconnected sleeve portion. A substantially doughnut-shaped cuff surrounds the base of the sleeve.

[0012] Upon insertion of the sleeve portion of the trocar within the abdominal cavity, sutures are applied between the upper funnel portion of the trocar and the area of the abdominal wall surrounding the trocar. The cuff is maintained in an initially deflated condition upon insertion and is subsequently inflated in order to create a sealed condition about the trocar at the underside of the patient's peritoneum.

[0013] A known and popular surgical technique is further the insufflating of a patient's abdominal cavity, such as utilizing a carbon dioxide gas, and in order to provide the surgeon with an unobstructed view of the patient's cavity. The advantage of the inflatable cuff is that it maintains a sealed condition of the insufflated abdominal cavity, thus decreasing the surgeon's frustrations as well as operating time by avoiding the required waiting period for the pneumoperitoneum (insufflated) condition to be reestablished.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Reference will now be made to the attached drawings, when read in combination with the following detailed description, wherein like reference numerals refer to like parts throughout the several views, and in which:

[0015] FIG. 1 illustrates a first dissected, inserted and pre-inflated condition of the trocar cuff, inserted within the

patient's abdominal cavity and according to a preferred embodiment of the present invention;

[0016] **FIG. 2** illustrates a succeeding and inflated condition of the trocar cuff according to the present invention;

[0017] **FIG. 3** is an environmental view illustrating one laparoscopic procedure employing the trocar and inflatable cuff and which in particular shows a camera inserted through the open interior of the trocar tube;

[0018] **FIG. 4** is a view of the inflatable cuff and which is capable of being retrofitted with any size of disposable trocar according to the present invention; and

[0019] **FIG. 5** is an illustration of an inflatable cuff in use with a trocar and according to a further preferred variant of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Referring to **FIG. 1**, a first dissected, inserted and pre-inflated condition of a cuff **10** in use with a trocar is illustrated according to a preferred embodiment of the present invention. As explained previously, the trocar (and referencing in the variant of **FIG. 1** features an upper funnel portion **12** and lower and interconnected sleeve portion **14**) is constructed of a durable polymer or other suitable and hygienic material and is inserted within the patient's abdominal cavity **16**, such again occurring through the dissection of the skin **18**, subcutaneous tissue **20**, muscle **22** and peritoneum **24** layers with a scalpel or other suitable cutting instrument (not shown).

[0021] The trocar sleeve **14** is then inserted through the dissected layers and sutures **26** and **28** are applied between the upper funnel portion **12** of the trocar, see additionally lateral button projections **29**, and the area of the patient's abdominal wall (see again layers **18**, **20**, **22**, and **24**) surrounding the trocar. A port or passageway **30** is secured to the trocar, such as extending from a first inlet location proximate the upper funnel portion **12** to an outlet location proximate a location of the lower sleeve portion **14**, which is in communication with the inflatable cuff **10**. As again is illustrated in **FIG. 1**, the cuff **10** (usually constructed of a flexible and airtight material such as a thin rubber or the like) is initially provided in a deflated condition in order to be positioned at the underside location of the patient's peritoneum **24** (this again defining the inner wall surface of the patient's abdomen).

[0022] Upon subsequent reference to **FIG. 2**, a further inflated condition of the encircling trocar cuff **10** is illustrated. The cuff **10** typically is constructed of a plasticized/polymerized, flexible and air impermeable material and into which is introduced a pressurized fluid (such as typically being a gaseous  $O_2$ ) fed through the passageway **30** and in order to expand and seal the cuff **10** against the underside of the peritoneum. In this fashion, and as has been previously described, the cuff serves to seal the inner edges of the abdominal wall dissection surrounding the inserted trocar sleeve and to thereby maintain the insufflated condition within the abdominal cavity.

[0023] Referring to **FIG. 3**, an environmental view is generally illustrated at **32** of a laparoscopic procedure employing the trocar and inflatable cuff. In particular, **FIG.**

**3** shows a camera **34** applied in combination with a laparoscope **36** and inserted through the open interior of the trocar sleeve. As again has been previously described, the advantage of having the inflatable cuff **10** maintain the insufflated condition of the abdominal cavity **10** is to afford the surgeon an unobstructed view of the patient's cavity and without interference of the bowels and the like.

[0024] **FIG. 4** illustrates at **36** a view of an inflatable cuff **36** and which is capable of being retrofitted with any size of disposable trocar, see also illustrated at **38**, according to the present invention. As with the previous variants disclosed, the trocar **38** includes a port **40** for inflating (or insufflating) the cuff **36**. It is also understood that the cuff **36** is capable of being utilized with any size of trocar, such including those exhibiting diameters of 5 mm, 7 mm, 8 mm, 10 mm, 12 mm, and upward.

[0025] Finally, and referring to **FIG. 5**, an illustration is shown of an inflatable cuff **42** according to a yet further modification and in use with a likewise further modified trocar **44**. The trocar **44** in this variant includes anchoring sutures **46** and **48**, as well as a modified port **50** for insufflating the cuff after insertion within the abdomen.

[0026] The variant of **FIG. 5** also contemplates the terminating sleeve end of the trocar exhibiting a blunt tip **52** and the inflated cuff **42** further exhibiting a peephole **54** for an associated camera (not shown). Also, the port **50** for insufflating the cuff **42** can also be provided with an IV (intravenous) type tubing, such as having a 4-5 cm length and a Luer lock end, this providing the cuff with operating characteristics similar to that of an endotracheal tube.

[0027] Having described my invention, additional preferred embodiments will become apparent to those skilled in the art to which it pertains and without deviating from the scope of the appended claims:

I claim:

1. An inflatable cuff for use with a trocar inserted within an abdominal cavity, the trocar exhibiting a hollowed interior and including an upper funnel portion and an interconnecting and downwardly extending sleeve portion, said cuff comprising:

said cuff exhibiting a flexible and inflatable annular shape and being constructed of a fluid-tight material;

said cuff securing in an initially deflated condition at a location about the sleeve portion of the trocar, said cuff being subsequently inflated after insertion of said sleeve within a patient's abdominal cavity and insufflation of the cavity, said cuff maintaining a sealed condition within the abdominal cavity during insertion of the trocar.

2. The inflatable cuff according to claim 1, further comprising a port extending through said trocar from a first location outside of the patient's abdominal cavity to a second location in communication with said cuff, a fluid line extending through said port to said cuff and communicating a pressurized gas to inflate said cuff.

3. The inflatable cuff according to claim 1, further comprising said cuff capable of being retrofitted to a variety of different trocar devices.

4. The inflatable cuff according to claim 1, the trocar having a specified shape and size, further comprising a

laparoscope inserting through an open interior of the trocar and into the abdominal cavity.

5. The inflatable cuff according to claim 2, further comprising a modified port located at a first extending end of said fluid line, said port capable of receiving an intravenous type tubing in order to provide said cuff and trocar with operating characteristics similar to that of an endotracheal tube.

6. An inflatable cuff for use with a trocar inserted within an abdominal cavity, the trocar exhibiting a hollowed interior and including an upper funnel portion and an interconnecting and downwardly extending sleeve portion, said cuff comprising:

said cuff exhibiting a flexible and inflatable annular shape and being constructed of a fluid-tight material;

said cuff securing in an initially deflated condition at a location about the sleeve portion of the trocar, a fluid line extending through a port in said trocar and to a location along said cuff, said cuff being inflated after insertion of said sleeve within a patient's abdominal cavity to maintain a sealed condition within the abdominal cavity.

\* \* \* \* \*

专利名称(译)	Trocars具有可充气的袖带，用于在打开的腹腔镜检查过程中维持吹气的腹腔		
公开(公告)号	<a href="#">US20040111061A1</a>	公开(公告)日	2004-06-10
申请号	US10/706581	申请日	2003-11-12
[标]申请(专利权)人(译)	DIANA CURRAN		
申请(专利权)人(译)	DIANA CURRAN		
当前申请(专利权)人(译)	DIANA CURRAN		
[标]发明人	CURRAN DIANA		
发明人	CURRAN, DIANA		
IPC分类号	A61B17/34 A61B19/00 A61M5/32		
CPC分类号	A61B17/3421 A61B2017/3419 A61B2019/5231 A61B2017/3492 A61B2017/3486 A61B2090/373		
优先权	60/425476 2002-11-12 US		
外部链接	<a href="#">Espacenet</a> <a href="#">USPTO</a>		

#### 摘要(译)

一种可充气的袖带，用于插入腹腔内的套管针。套管针具有中空的内部并包括上部漏斗部分和互连且向下延伸的套管部分。袖带呈现出柔韧且可膨胀的环形形状，并由不透流体的材料构成。袖带在围绕套管针的套管部分的位置处以初始放气的状态固定。流体管线延伸穿过套管针中的端口并且到达沿着袖带的位置，在将套管插入患者的腹腔内之后，袖带被充气以在腹腔内保持密封状态。

