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(54) **MODULAR AUTOCLAVABLE INTRODUCER FOR ENDOSCOPE**

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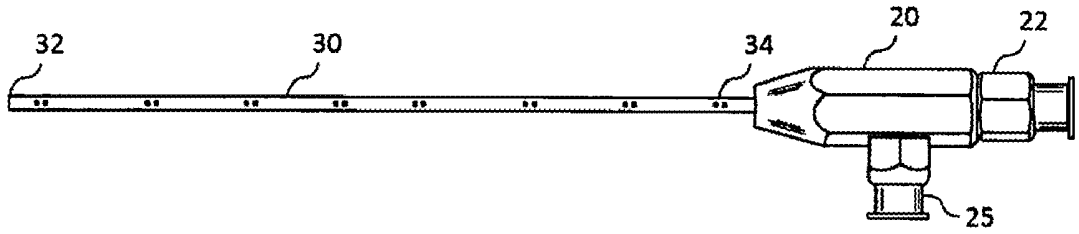
(57) **ABSTRACT**

An endoscopic or laparoscopic introducer, a medical device to assist the surgeon with the insertion, maneuvering, and removal of an endoscope, laparoscope, biopsy device, or medical device from a patient's body during endoscopic or laparoscopic surgery. The advancement relates to an introducer and specifically to an autoclavable modular introducer. Introducer is modular and is capable of attachment to numerous types of fittings and thereby capable of coupling and decoupling to numerous types of endoscopes, cannulas, insufflation flow sources, biopsy devices, and other medical devices. Introducer is autoclavable in that it is capable of sterilization by autoclave without incurring deterioration or degradation. This invention incorporates a biopsy port in the modular introducer system for the surgeon to extract cells and tissues for biopsy procedure.



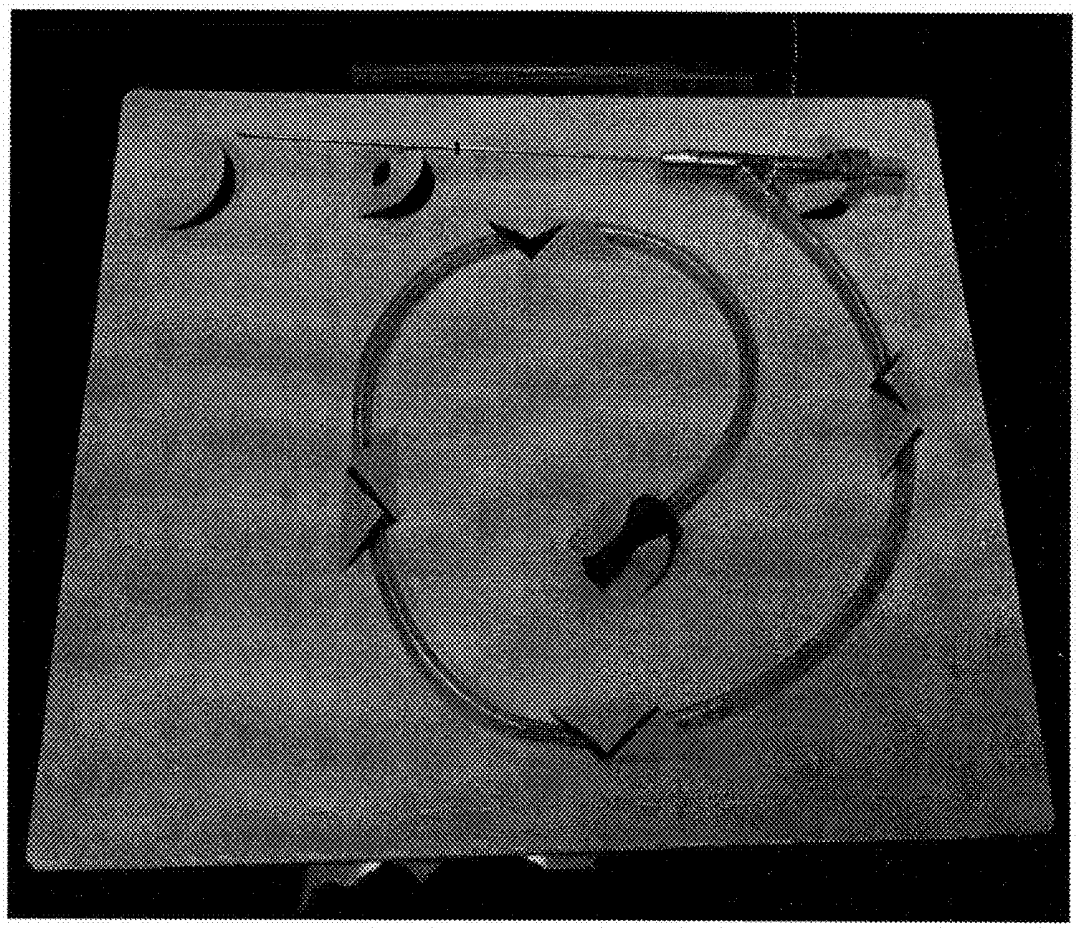


FIG. 1

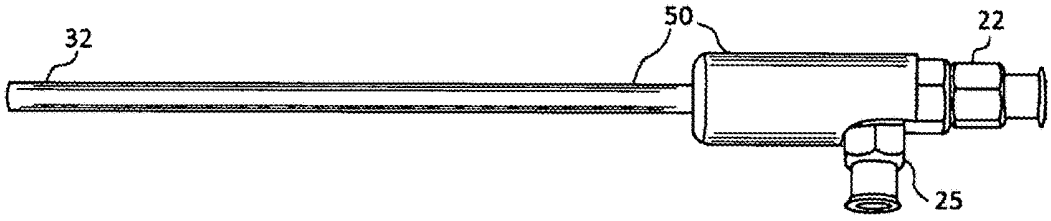


FIG. 2A

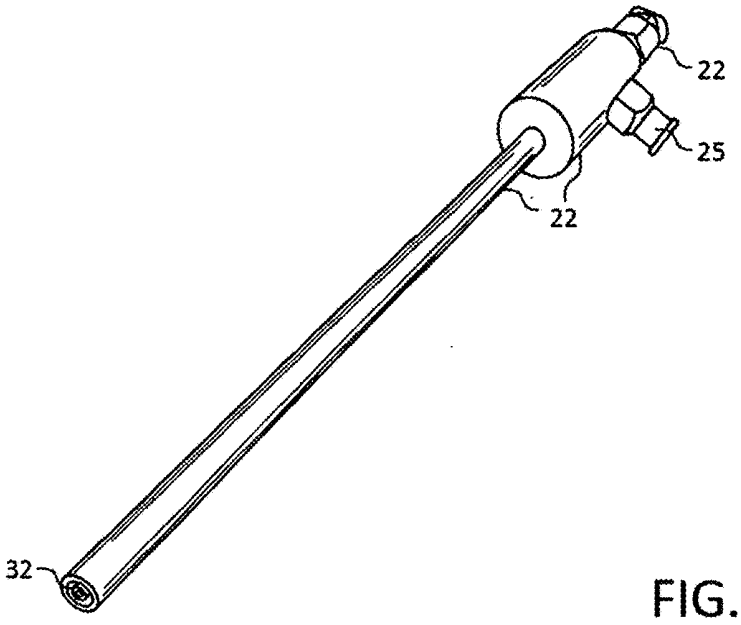


FIG. 2B

FIG. 3

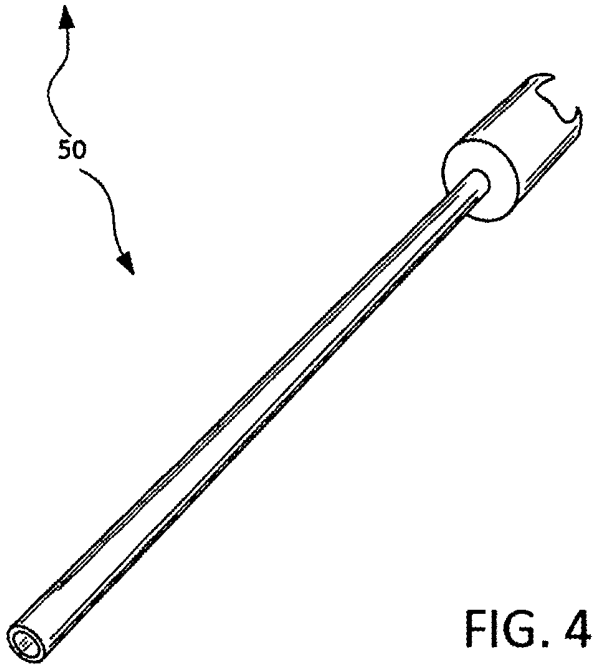


FIG. 4

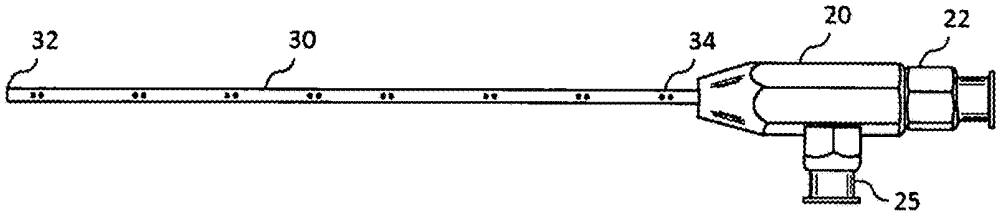


FIG. 5

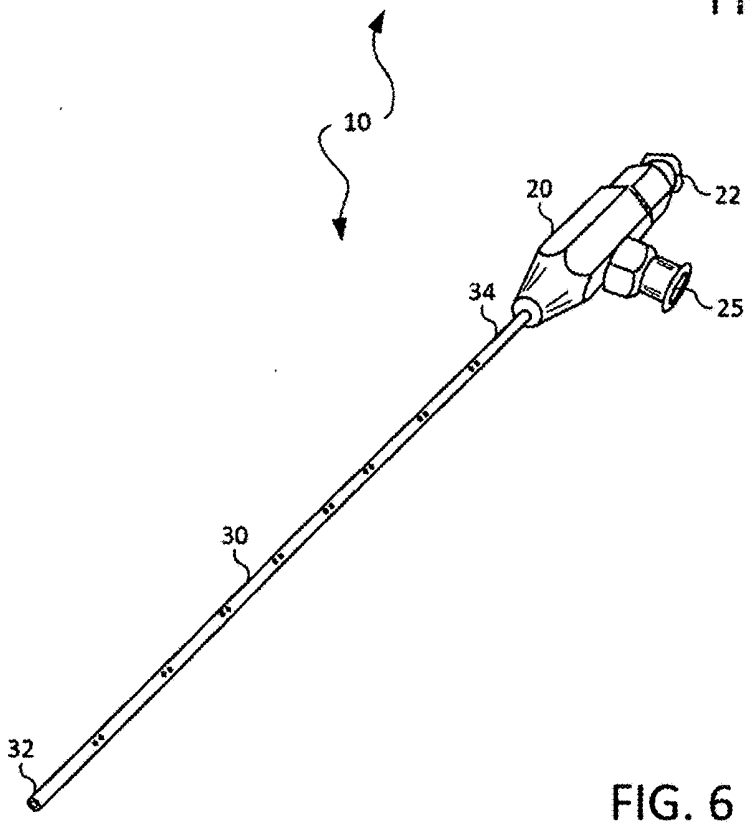


FIG. 6

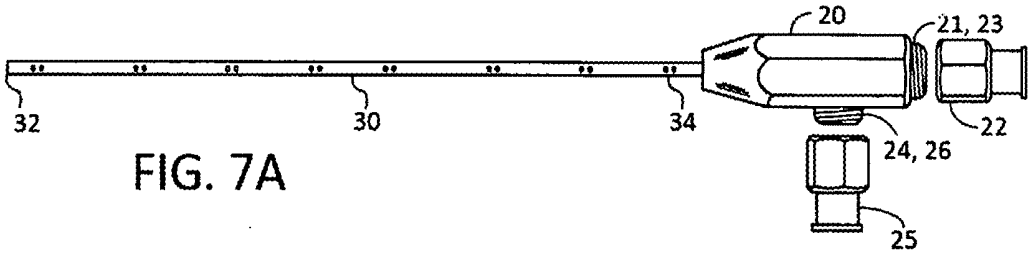


FIG. 7A

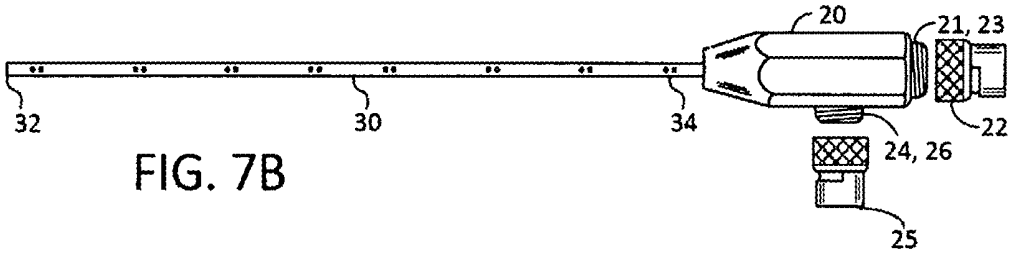


FIG. 7B

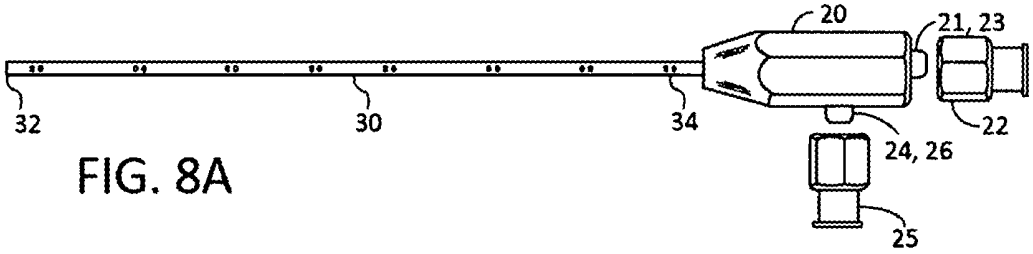


FIG. 8A

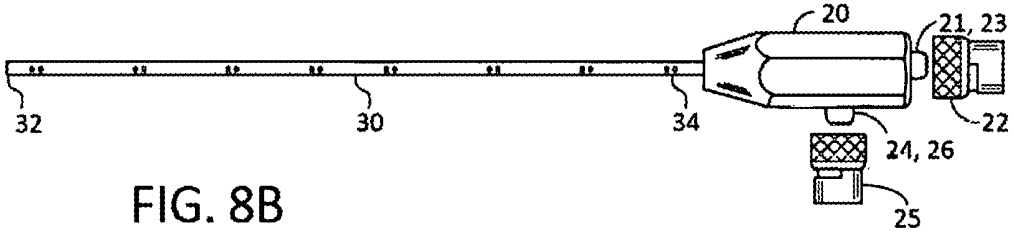


FIG. 8B

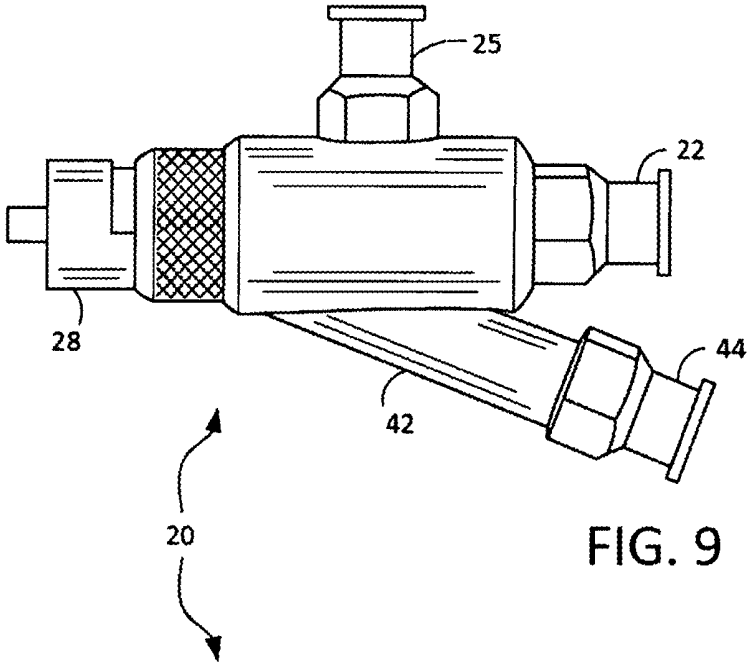


FIG. 9

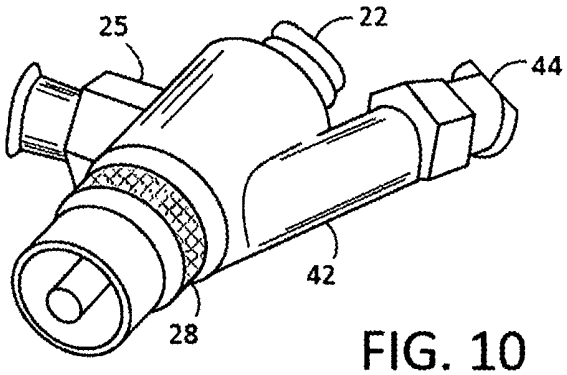


FIG. 10

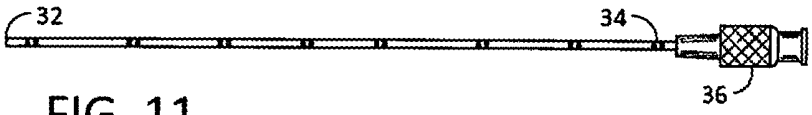


FIG. 11

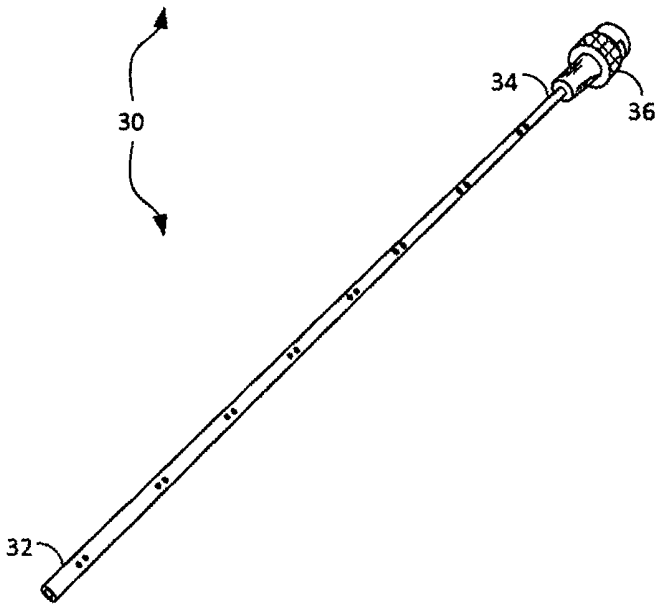


FIG. 12

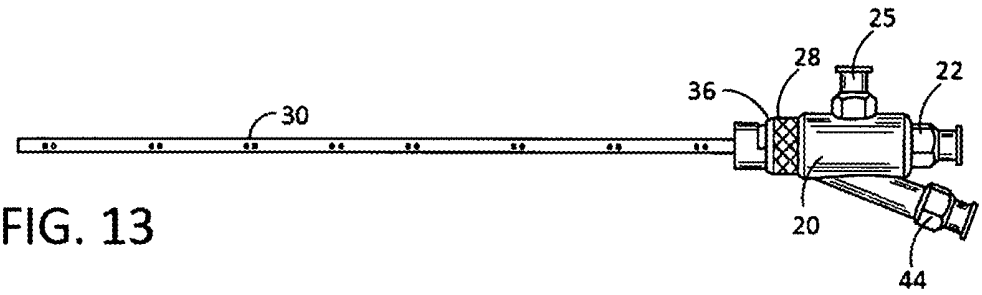


FIG. 13

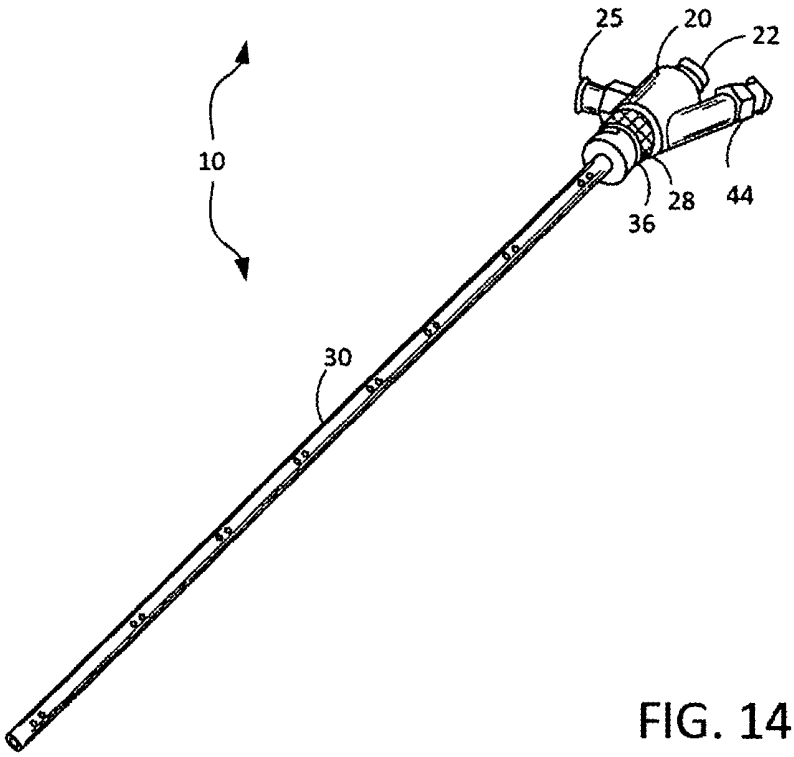


FIG. 14

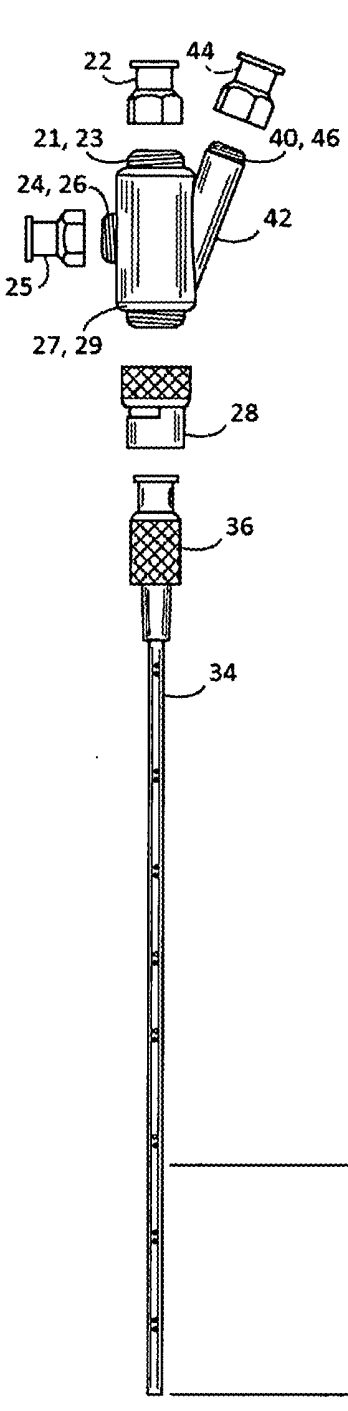


FIG. 15A

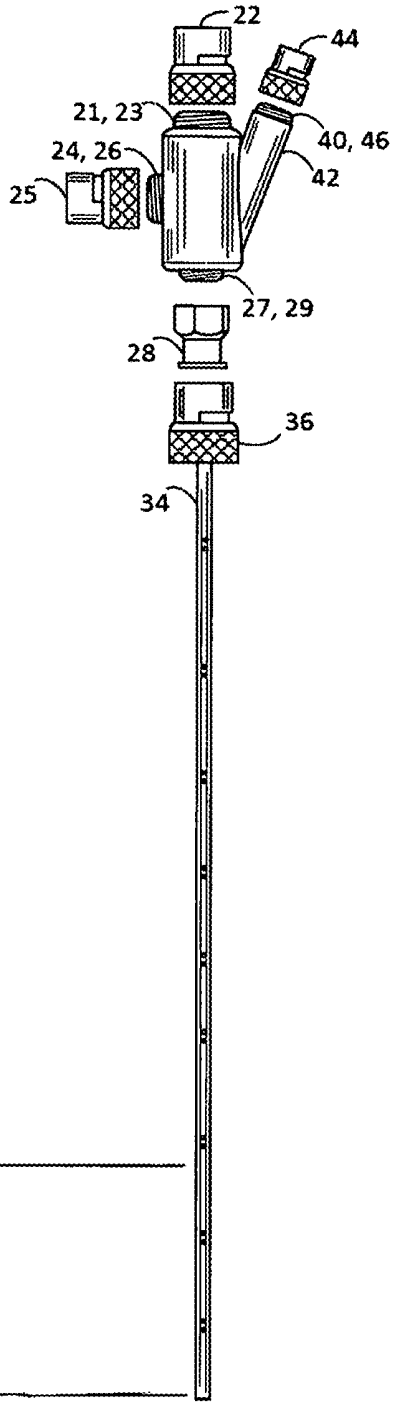


FIG. 15B

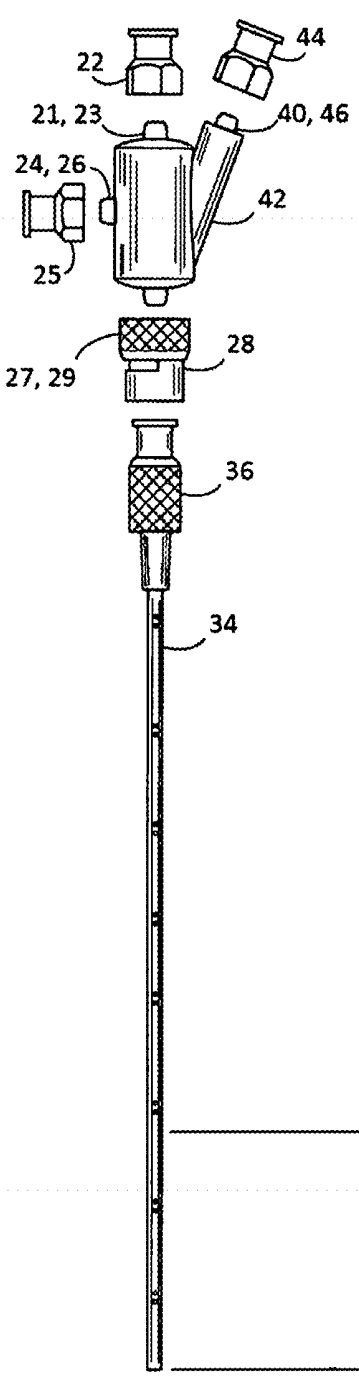


FIG. 16A

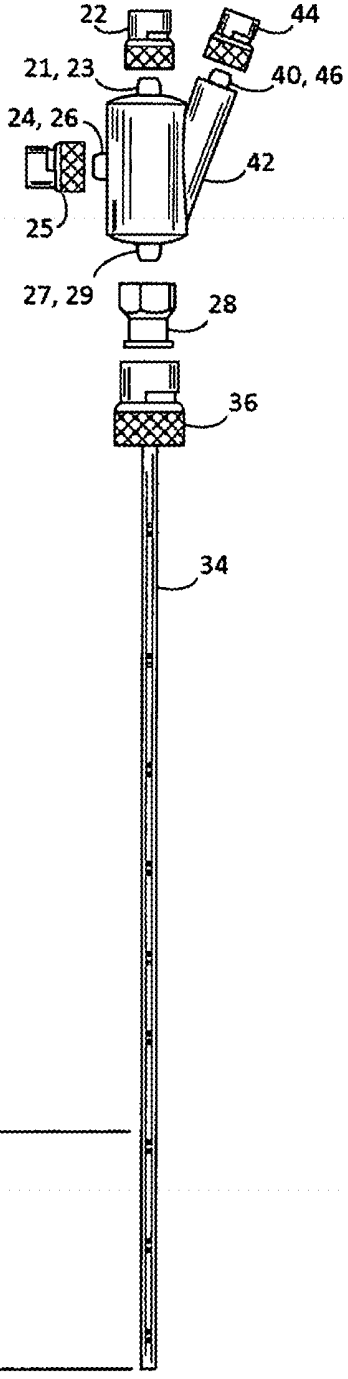


FIG. 16B

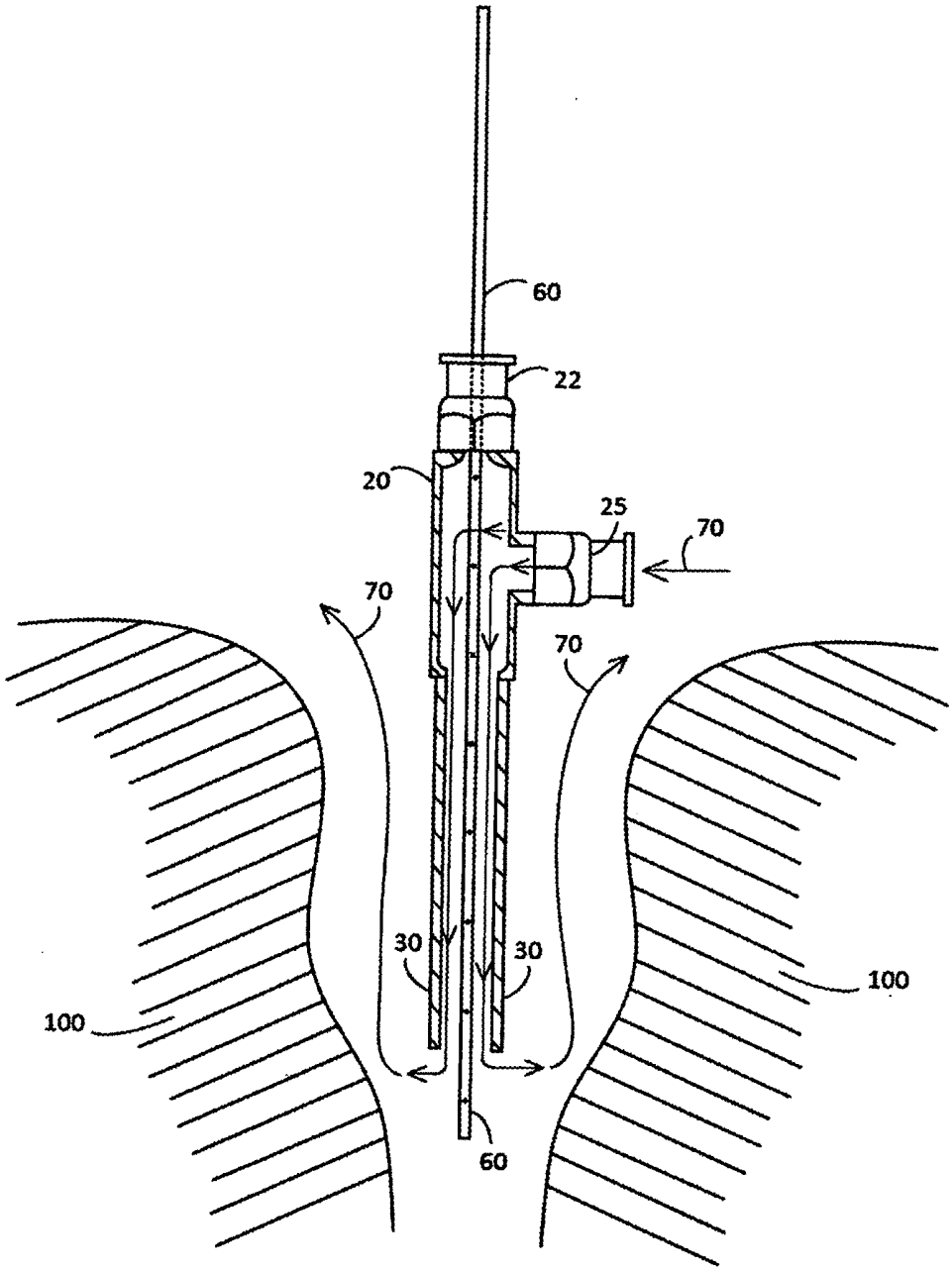


FIG. 17

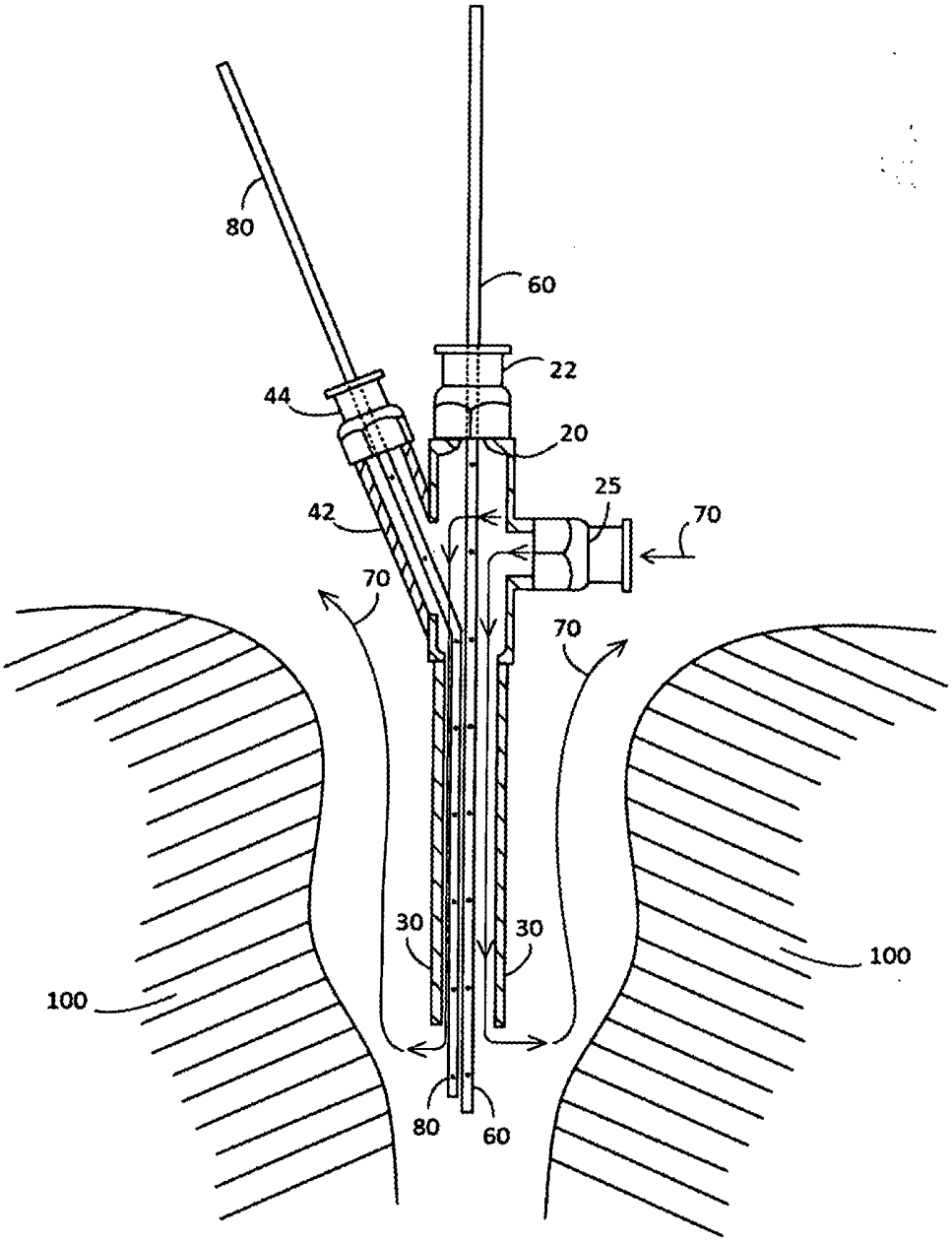


FIG. 18

MODULAR AUTOCLAVABLE INTRODUCER FOR ENDOSCOPE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an endoscopic or laparoscopic introducer, which is a medical device that assists the surgeon with the insertion, maneuvering, and removal of an endoscope, laparoscope, biopsy device, or medical device from a patient's body during endoscopic or laparoscopic surgery. An endoscope or laparoscope is used by a surgeon to visually inspect small lesions or clusters of cells or an interior organ of a patient, where visual inspection is required for surgery. Endoscopic surgery is surgery performed through a small incision or natural opening in the patient's body where endoscope and introducer are inserted in tandem through the small incision or natural opening. This invention deals with an introducer and specifically to an autoclavable modular introducer. Introducer is modular in that it is capable of attachment to numerous types of fittings and thereby capable of coupling and decoupling to numerous types of endoscopes, cannulas, insufflation flow sources, biopsy devices, and other medical devices. Introducer is autoclavable in that it is capable of sterilization by autoclave without incurring deterioration or degradation.

2. Description of Related Art

[0002] Endoscopic or laparoscopic surgery is minimally invasive because it is performed through one or more small incisions or natural openings in the body. Typically, prior to or during the introduction of the endoscope, biopsy device, or other surgical object into the patient's body, an introducer pumps insufflation gasses or liquids into the small incision or natural opening that are used to enlarge the area surrounding the target surgical site in order allow for easier insertion, better visual inspection, and more work area for the surgeon. An introducer performs such tasks as follows:

[0003] An introducer comprises a hub or rigid hollow vessel capable of containing the pressurized flow of gas or liquid there through a long rigid cannula or tube at its distal end and connected to an endoscope port and an insufflation port on its proximal end. Insufflation port is typically coupled to a flow source of gas or liquid that forces the pressurized flow of gas or liquid into and through the hub, into the cannula, and out the distal end of the cannula. With this flow of gas or liquid occurring, the distal end of the cannula is inserted into the patient's body to enlarge the area of the patient's body. The flow of gas or liquid and ensuing enlargement allows for much easier insertion, navigation, maneuverability, and extraction of an endoscope. The endoscope is inserted into the endoscope port, through the hub, through the cannula, and then out of the distal end of the cannula. In this configuration, with the flow of insufflation gas or liquid, there is a "jacket" of gas or liquid flowing around the outside of the endoscope that allows for much easier insertion, movement, and withdrawal of the endoscope. The flow of gas or liquid through the distal end of the cannula is small in degree and is typically about a drop every few seconds or so.

[0004] The distal tip of the endoscope must protrude through the distal tip of the cannula on the introducer so that it can provide illumination and receive image from the patient's body. The distal tip of the endoscope must remain within a certain range or zone of extension beyond the distal tip of the cannula on the introducer for the endoscope to function properly.

[0005] There are many types of introducer devices in the prior art where most are plastic disposable devices. More specifically reference is invited to a conventional and presently available single use introducer an embodiment of which is represented in accompanying FIG. **1**. As would be apparent from the illustration in the FIG. **1**, such a conventional introducer basically has a metallic-polymeric combination with a front metallic end thereof attached to a metallic cannula and a polymeric material based rear end providing for fixed tubular extension which is there to accommodate a very specific variety of endoscope input connection and at a side thereof a long tubular member for operative connection to insufflations means or dilators, and/or biopsy tools. The unit is integral and a single use introducer. Thus, not only there is limitation in the variety of endoscope that can fit into the conventional introducer due to the integral nature of the endoscope port but also the construction of the introducer has been limited to a single application/use since after use the construction or the material involved were not fit for sterilization for subsequent reuse of the same introducer even with the same endoscope or with any other endoscope or sufflation means.

[0006] Thus, no prior art introducers are modular in that they can only connect or couple to certain endoscopes, insufflation flow sources, cannulas or dilators, and/or biopsy tools that have the specific type of fitting or connector that is capable of proper connection with or coupling to the fixed fitting on the non-modular introducer. Thus, prior art introducers severely limit the types of devices that can be used with insufflation endoscopic surgery. This aspect of prior art introducers substantially limits the allowable procedures that can be successfully accomplished with insufflation endoscopic surgery because only certain devices can be connected to the introducer. Also, prior art disposable introducers are by definition single use and cannot be sterilized or autoclaved and thus cannot be used over and over again on different patients. This combined with the fact that prior art disposable introducers are relatively costly in price results in an unnecessary increase in the cost to perform laparoscopic or endoscopic surgery.

[0007] It is thus the basic object of the present invention to provide for a modular introducer construction with an introducer hub that would be interchangeable with different types of fittings to accommodate proper connection to and/or coupling with virtually any type of fitting on any endoscope, insufflation flow source, cannula, or dilator.

[0008] Another object of the present invention it to provide for a modular introducer with biopsy port in addition to the endoscope and insufflations ports and provide for a biopsy port that would also be interchangeable with different types of fittings to accommodate proper connection to and/or coupling with virtually any type of fitting on any biopsy device or other endoscopic medical device to allow for the use of new medical devices with insufflation endoscopic surgery and also to yield increased precision and control of tissue sample collection with a biopsy device or other endoscopic medical device.

[0009] In addition, all components in this invention of a modular introducer which would be repeatedly sterilized by

autoclave and thus the introducer of this invention is reusable and capable of much more economical repeated safe use with multiple patients.

BRIEF SUMMARY OF THE INVENTION

[0010] Thus, according to the basic aspect of the present invention there is provided a modular sterilizable and reusable introducer system comprising:

[0011] a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port, each said ports communicating with said internal hollow passage of said hub;

[0012] said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilizable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner;

[0013] said insufflation port comprising a sterilizable insufflation fitting attachment means a sterilizable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflations means in a leak proof manner;

[0014] a sterilizable cannula cooperatively communicating in leak proof manner with said internal hollow passage of said hub.

[0015] According to another aspect of the invention there is provided a modular sterilizable and reusable introducer system as above comprising:

[0016] a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port and having a cannula entry opening, each said ports and said cannula entry opening communicating with said internal hollow passage of said hub;

[0017] said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilizable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner;

[0018] said insufflation port comprising a sterilizable insufflation fitting attachment means a sterilizable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflation means in a leak proof manner;

[0019] said cannula entry opening provided with a sterilizable cannula fitting attachment means, a serializable cannula fitting for operative connection at one end to said cannula entry opening through said serializable cannula fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable cannula means in a leak proof manner.

[0020] According to yet another aspect of the invention there is provided a modular sterilizable and reusable introducer system as above comprising:

[0021] a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port and having a cannula entry opening each said port and said cannula entry opening communicating with said internal hollow passage of said hub;

[0022] said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilisable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative endoscope means in a leak proof manner;

[0023] said insufflation port comprising a sterilizable insufflation fitting attachment means a sterilizable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative insufflation means in a leak proof manner;

[0024] said cannula entry opening comprising a serializable cannula fitting attachment means a sterilisable cannula fitting for operative connection at one end to said cannula entry opening through said serializable cannula fitting attachment means in a leak proof manner and at its other end to a cooperative cannula means in a leak proof manner.

[0025] This present invention provides a modular sterilizable and reusable introducer system as above wherein said sterilizable hub comprises an oblong shaped container or vessel body with internal hollow passage and has a proximal end which during use if adjacent to surgeon and a distal end opposite to said proximal end which in use is adjacent to the patient and said endoscope port is located at the said proximal end and said cannula entry opening is located at the said distal end of the hub with said insufflations port located at a side of the hub.

[0026] According to yet further aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said hub is capable of containing pressurized flow of gas and/or liquid there through.

[0027] According to yet further aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said endoscope port with endoscope fitting attachment means and said endoscope fitting are capable of coupling and decoupling to numerous types of endoscopes, said cannula entry opening with cannula fitting attachment means and said cannula fitting are capable of coupling and decoupling to numerous types of cannulas, and said insufflations port with insufflations fitting attachment means and said insufflations fitting are capable of coupling and decoupling to numerous types of insufflations means.

[0028] According to yet another aspect of the invention there is provided a modular sterilizable and reusable introducer system as above wherein said hub further comprises a biopsy port on a side for insertion of biopsy tool or other endoscope devices.

[0029] According to yet another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said biopsy port is located directly opposite to the insufflations port and preferably extends from the hub side on a cylindrical shaped biopsy port body such that the longitudinal axes of the hub and the port body form a V shape to ensure that biopsy tool

or other endoscopic devices can slide easily with minimal blockage into and out of cannula along with endoscope also inside cannula.

[0030] According to another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above with said biopsy port comprising a sterilizable biopsy or other device fitting attachment means a sterilizable biopsy or other device fitting for operative connection at one end to said biopsy port through said sterilizable biopsy or other device fitting attachment means in a leak proof manner and at its other end to a cooperative biopsy means or other device in a leak proof manner.

[0031] According to yet another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein endoscope fitting, insufflations fitting, cannula fitting, and biopsy fitting is a hydraulic or pneumatic fitting that mates with or couples to hydraulic or pneumatic fittings of endoscope, insufflation, cannula and biopsy/devices.

[0032] According to yet another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein each said endoscope fitting, insufflations fitting, cannula fitting, and biopsy fitting comprise a rigid oblong hollow vessel with a connector end and an attachment end, the connector end adapted to mate with or couple to other hydraulic or pneumatic fittings/devices with corresponding connector ends to yield a leak proof connection between the two fittings and said attachment end connects to said endoscope fitting attachment means, insufflations fitting attachment means, cannula fitting attachment means and biopsy fitting attachment means respectively involving any type of leak proof fitting.

[0033] According to another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein each said endoscope attachment means, said insufflations attachment means, said cannula attachment means and said biopsy attachment means are selected from any cooperative leak proof attachment including selected from threaded male-female attachment, socket attachment, compression ring attachment, luer type taper fitting.

[0034] According to another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said cannula comprise length of about 2 to 10 centimeters, outer diameter of about 0.3 to 3 millimeters, and wall thickness of about 0.03 to 0.10 millimeter and is obtained as semi-rigid cannula for a small degree of flexibility required to insert and navigate the cannula within the patient preferably the cannula can flex about 1 to 4 millimeters from end to end for this purpose.

[0035] According to yet another aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above comprising said cannula is permanently attached or fixed to the hub wherein a proximal end of cannula is positioned around said cannula entry opening and permanently attached to cannula entry opening such as to contain without leaking the pressurized flow of gas or liquid from the interior of hub to the interior of cannula.

[0036] According to yet further aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said leak proof operative connection between the modular components of the hub includes accomplishing the connection involving selectively welded, glued, solvent welded joints.

[0037] According to yet further aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above comprising a cannula cover to cover and protect cannula during the autoclave sterilization process to help insure that cannula remains straight and does not bend or warp as a result of the high temperatures reached during the autoclave sterilization process.

[0038] According to yet further aspect of the present invention there is provided a modular sterilizable and reusable introducer system as above wherein said cannula cover comprises a retaining cylinder member that is a rigid cylindrical member with open ends, said retaining cylinder having an inner diameter that is sized to make a slip fit over the outside diameter of cannula, the retaining cylinder having a length that is at least as long as that of cannula, a wall thickness that is greater than that of cannula and capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure.

[0039] According to yet another aspect of the present invention there is provided a method of assembling and disassembling for use and reuse repeated times the modular sterilizable and reusable introducer system as above comprising:

[0040] providing said stabilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port and having a cannula entry opening each said ports and a cannulas entry opening communicating with said internal hollow passage of said hub;

[0041] operatively connecting to said hub having permanently secured or releasable connected cannula or disconnecting after releasable connection selectively anyone or more of the following modular components involving:

[0042] operatively connecting said serializable endoscope fitting at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner;

[0043] operatively connecting said sterilizable insufflation fitting at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflations means in a leak proof manner;

[0044] and operatively connecting said sterilisable biopsy or other device fitting at one end to said biopsy port through said sterilizable biopsy or other device fitting attachment means in a leak proof manner and at its other end to a cooperative biopsy means or other device in a leak proof manner; such as to depending upon the use selectively connect or disconnect to and from said hub depending upon the stage of application of the relevant devices selected from endoscope, insufflations, biopsy or other such releasable connectable device.

[0045] According to another aspect there is provided a method as above wherein in case of replaceable cannula use operatively connecting said sterilisable cannula fitting at one end to said cannula entry opening through said sterilizable cannula fitting attachment means in a leak proof manner and at its other end to a cooperative cannula means in a leak proof manner.

[0046] The details of the invention, its objects and advantages are explained hereunder in greater detail in relation to non-limiting exemplary illustrations as per the following accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047] FIG. **1**: is a front elevation view of a conventional presently available one time use introducer with provision for insufflations;

[0048] FIG. **2**A is a side elevation view of modular autoclavable introducer with permanent cannula attachment with cannula cover installed.

[0049] FIG. **2**B is a perspective view from the distal end of modular autoclavable introducer with permanent cannula attachment with cannula cover installed.

[0050] FIG. **3** is a side elevation view of cannula cover.

[0051] FIG. **4** is a perspective view from the distal end of cannula cover.

[0052] FIG. **5** is a side elevation view of modular autoclavable introducer with permanent cannula attachment.

[0053] FIG. **6** is a perspective view from the distal end of modular autoclavable introducer with permanent cannula attachment.

[0054] FIG. **7**A is an exploded view of FIG. **5** with female Luer-type endoscope fitting, female Luer-type insufflation fitting, threaded endoscope fitting attachment means, and threaded insufflation fitting attachment means.

[0055] FIG. **7**B is an exploded view of FIG. **5** with male Luer-type endoscope fitting, male Luer-type insufflation fitting, threaded endoscope fitting attachment means, and threaded insufflation fitting attachment means.

[0056] FIG. **8**A is an exploded view of FIG. **5** with female Luer-type endoscope fitting, female Luer-type insufflation fitting, socket endoscope fitting attachment means, and socket insufflation fitting attachment means.

[0057] FIG. **8**B is an exploded view of FIG. **5** with male Luer-type endoscope fitting, male Luer-type insufflation fitting, socket endoscope fitting attachment means, and socket insufflation fitting attachment means.

[0058] FIG. **9** is a side elevation view of hub **20** with reversible cannula attachment and a biopsy port.

[0059] FIG. **10** is a perspective view of hub **20** with reversible cannula attachment and a biopsy port.

[0060] FIG. **11** is a side elevation view of cannula with female Luer-type hub fitting.

[0061] FIG. **12** is a perspective view of cannula with male Luer-type hub fitting.

[0062] FIG. **13** is a side elevation view of modular autoclavable introducer with reversible cannula attachment and a biopsy port.

[0063] FIG. **14** is a perspective view from the distal end of modular autoclavable introducer with reversible cannula attachment and a biopsy port.

[0064] FIG. **15**A is an exploded view of FIG. **13** with female Luer-type endoscope fitting, female Luer-type insufflation fitting, female Luer-type biopsy fitting, male Luer-type cannula fitting, threaded endoscope fitting attachment means, threaded insufflation fitting attachment means, threaded biopsy fitting attachment means, and threaded cannula fitting attachment means.

[0065] FIG. **15**B is an exploded view of FIG. **13** with male Luer-type endoscope fitting, male Luer-type insufflation fitting, male Luer-type biopsy fitting, female Luer-type cannula fitting, threaded endoscope fitting attachment means, threaded insufflation fitting attachment means, threaded biopsy fitting attachment means, and threaded cannula fitting attachment means.

[0066] FIG. **16**A is an exploded view of FIG. **13** with female Luer-type endoscope fitting, female Luer-type insufflation fitting, female Luer-type biopsy fitting, male Luer-type cannula fitting, socket endoscope fitting attachment means, socket insufflation fitting attachment means, socket biopsy fitting attachment means, and socket cannula fitting attachment means.

[0067] FIG. **16**B is an exploded view of FIG. **13** with male Luer-type endoscope fitting, male Luer-type insufflation fitting, male Luer-type biopsy fitting, female Luer-type cannula fitting, socket endoscope fitting attachment means, socket insufflation fitting attachment means, socket biopsy fitting attachment means, and socket cannula fitting attachment means.

[0068] FIG. **17** is a cross-sectional view of modular autoclavable introducer with permanent cannula attachment along with an endoscope inserted therein during endoscopic surgery with the flow of insufflation gas or liquid.

[0069] FIG. **18** is a cross-sectional view of modular autoclavable introducer with permanent cannula attachment and a biopsy port along with an endoscope and a biopsy device inserted therein during endoscopic surgery with the flow of insufflation gas or liquid.

DEFINITION LIST

[0070]

Term	Definition
10	Modular Autoclavable Introducer
20	Hub
21	Endoscope Port
22	Endoscope Fitting
23	Endoscope Fitting Attachment Means
24	Insufflation Port
25	Insufflation Fitting
26	Insufflation Attachment Means
27	Cannula Port
28	Cannula Fitting
29	Cannula Fitting Attachment Means
30	Cannula
32	Distal End of Cannula
34	Proximal End of Cannula
36	Hub Fitting
40	Biopsy Port
42	Biopsy Port Body
44	Biopsy Fitting
46	Biopsy Fitting Attachment Means
50	Cannula Cover
60	Endoscope
70	Insufflation Gas or Liquid
80	Biopsy Tool or other Endoscopic Device
100	Patient Tissue

DETAILED DESCRIPTION OF THE INVENTION

[0071] The reference to FIG. **1** shows an embodiment of a conventional single use introducer in accordance with the present invention. As would be clearly apparent from the FIG. **1** such a conventional introducer basically has a metallic-polymeric combination with a front metallic end thereof attached to a metallic cannula and a polymeric material based rear end providing for fixed tubular extension

which is there to accommodate a very specific variety of endoscope input connection and at a side thereof a long tubular member for operative connection to insufflations means or dilators, and/or biopsy tools. The unit is integral and a single use introducer. Thus, not only there is limitation in the variety of endoscope that can fit into the conventional introducer due to the integral nature of the endoscope port but also the construction of the introducer has been limited to a single application/use since after use the construction or the material involved were not fit for sterilization for subsequent reuse of the same introducer even with the same endoscope or with any other endoscope or sufflation means.

[0072] The illustrations of the modular autoclavable and reusable introducer in accordance with the present advancement as illustrated in relation to accompanying FIGS. **2**A to **18**.

[0073] The modular autoclavable introducer **10** of the invention comprises a hub **20** coupled to a cannula **30**. Hub **20** is an oblong rigid hollow container or vessel with at least three openings or ports therein, a proximal end, and a distal end. In use, the proximal end is position adjacent to the surgeon and the distal end is held adjacent to the patient to perform surgery. At least three openings in hub **20** comprise: an endoscope port **21** located on the proximal end of hub **20**, an insufflation port **24** located on the side of hub **20**, and a cannula port **27** located on the distal end of hub **20**. Hub **20** is capable of containing the pressurized flow of gas or liquid there through. With endoscope port **21** sealed or plugged to prevent the flow of liquid or gas there through hub **20** is capable of containing the pressurized flow of gas or liquid that enters through insufflation port **24**, travels along the longitudinal axis of hub **20**, and exits through cannula port **27**, without leaking through the oblong rigid hollow container or vessel.

[0074] Hub **20** must be capable of undergoing sterilization by autoclave without incurring deterioration or degradation. Hub **20** further comprises an endoscope fitting **22** reversibly coupled to endoscope port **21** by an endoscope fitting attachment means **23**. Endoscope fitting **22** is a hydraulic or pneumatic fitting those mates with or couples to other hydraulic or pneumatic fittings. Endoscope fitting **22** is a rigid oblong hollow vessel with a connector end and an attachment end. Connector end has a certain shape that mates with or couples to other hydraulic or pneumatic fittings with other certain shaped connector ends to yield a leak proof connection between the two fittings. The attachment end connects to endoscope fitting attachment means **23**. Endoscope fitting attachment means **23** is a means to couple endoscope fitting **22** to hub **20**, positioned around endoscope port **21**, and in such a way so as to contain without leaking the pressurized flow of gas or liquid from hub **20** to endoscope fitting **22**.

[0075] Endoscope fitting attachment means **23** can be accomplished by threaded attachment where female threads are inscribed onto the inner diameter of the attachment end of endoscope fitting **22** that are sized to mate with male threads inscribed onto the exterior of hub **20**, to provide leak-proof reversible threaded attachment between these members. Endoscope fitting attachment means **23** can be accomplished by threaded attachment where male threads are inscribed onto the outer diameter of the attachment end of endoscope fitting **22** that are sized to mate with female threads inscribed onto the interior of hub **20**, to provide leak-proof reversible threaded attachment between these members.

[0076] Endoscope fitting attachment means **23** can be accomplished by socket attachment where a female socket is formed in the inner diameter of the attachment end of endoscope fitting **22** that is sized to form a slip-fit with a male socket formed on the exterior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members. Endoscope fitting attachment means **23** can be accomplished by socket attachment where a male socket is formed in the outer diameter of the attachment end of endoscope fitting **22** that is sized to form a slip-fit with a female socket formed on the interior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members.

[0077] Endoscope fitting attachment means **23** can be accomplished by compression ring attachment where a resilient compression ring is inserted between a female endoscope fitting **22** and a male hub **20** or a male endoscope fitting **22** and a female hub **20** and a nut or clamp is used to compress the compression ring between these members to form a leak-proof reversible compression attachment between these members.

[0078] Endoscope fitting **22** and endoscope fitting attachment means **23** must be capable of undergoing sterilization by autoclave. In best mode, endoscope fitting **22** is made of surgical stainless steel. In best mode, endoscope fitting **22** is a Luer type taper fitting that is capable of mating with other Luer type taper fittings. Luer type taper fittings reversibly couple together by a male convex hollow taper end from one Luer type taper fitting being inserted and pressed against a female concave hollow taper end from another Luer type taper fitting to provide a leak-proof reversible attachment between these two Luer type taper fittings. Luer type fittings have connection ends that are designated as either male or female based on these criteria. Typically, a helical notch on a collar on the male end receives a lip on the female end where the helical notch and/or the lip is rotated to compress female taper against male taper and vice versa to properly couple the two Luer type taper fittings together.

[0079] Hub **20** further comprises an insufflation fitting **25** reversibly coupled to insufflation port **24** by an insufflation fitting attachment means **26**. Insufflation fitting **25** is a hydraulic or pneumatic fitting those mates with or couples to other hydraulic or pneumatic fittings. Insufflation fitting **25** is a rigid oblong hollow vessel with a connector end and an attachment end. Connector end has a certain shape that mates with or couples to other hydraulic or pneumatic fittings with other certain shaped connector ends to yield a leak proof connection between the two fittings. The attachment end connects to insufflation fitting attachment means **26**. Any known or unknown type of fitting may be used here. Insufflation fitting attachment means **26** is a means to couple insufflation fitting **25** to hub **20**, positioned around insufflation port **24**, and in such a way so as to contain without leaking the pressurized flow of gas or liquid from hub **20** to insufflation fitting **25**.

[0080] Insufflation fitting attachment means **26** can be accomplished by threaded attachment where female threads

are inscribed onto the inner diameter of the attachment end of insufflation fitting **25** that are sized to mate with male threads inscribed onto the exterior of hub **20**, to provide leak-proof reversible threaded attachment between these members. Insufflation fitting attachment means **26** can be accomplished by threaded attachment where male threads are inscribed onto the outer diameter of the attachment end of insufflation fitting **25** that are sized to mate with female threads inscribed onto the interior of hub **20**, to provide leak-proof reversible threaded attachment between these members.

[0081] Insufflation fitting attachment means **26** can be accomplished by socket attachment where a female socket is formed in the inner diameter of the attachment end of insufflation fitting **25** that is sized to form a slip-fit with a male socket formed on the exterior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members. Insufflation fitting attachment means **26** can be accomplished by socket attachment where a male socket is formed in the outer diameter of the attachment end of insufflation fitting **25** that is sized to form a slip-fit with a female socket formed on the interior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members.

[0082] Insufflation fitting attachment means **26** can be accomplished by compression ring attachment where a resilient compression ring is inserted between a female insufflation fitting **25** and a male hub **20** or a male insufflation fitting **25** and a female hub **20** and a nut or clamp is used to compress the compression ring between these members to form a leak-proof reversible compression attachment between these members.

[0083] Insufflation fitting **25** and insufflation fitting attachment means **26** must be capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure. In best mode, endoscope fitting **22** is made of surgical stainless steel. In best mode, insufflation fitting **25** is a Luer type taper fitting that is capable of mating with other Luer type taper fittings.

[0084] Cannula **30** is a semi-rigid tube or cylindrical-shaped member with open ends. Cannula **30** has a proximal end **34** and a distal end **32**. The distal end **32** of cannula **30** is inserted into the patient's body for use with endoscopic surgery as described above. The proximal end **34** of cannula **30** is attached to the distal end of hub **20**. Cannula **30** is semi-rigid because a small degree of flexibility is required to insert and navigate the cannula **30** within the patient.

[0085] Cannula **30** may flex about 1 to 4 millimeters from end to end for this purpose. However, cannula **30** may not flex more than this amount because a certain amount of rigidity is required to properly insufflate the target area of tissue and navigate the endoscope as described above. Cannula **30** has length of about 2 to 10 centimeters, outer diameter of about 0.3 to 3 millimeters, and wall thickness of about 0.03 to 0.10 millimeters. Cannula **30** must be capable of sterilization by autoclave without incurring deterioration or degradation. In some modes of the invention, the proximal end **34** of cannula **30** is permanently coupled or attached to hub **20**. Thus, these members may not be disconnected and there is no cannula fitting **28** or hub fitting **36** in these modes. In permanent cannula attachment modes, the proximal end **34** of cannula **30** is positioned around cannula port **27** and permanently attached to cannula port **27** in such a way so as to contain without leaking the pressurized flow of gas or liquid from the interior of hub **20** to the interior of cannula **30**. A female socket is formed in the inner diameter of the distal end of hub **20** that is sized to form a slip-fit with a male socket that is the exterior surface of the proximal end **34** of cannula **30**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members that is capable of undergoing sterilization by autoclave without incurring deterioration or degradation. These modes are useful because the modular aspect or the ability to connect to numerous types of fittings and thereby capable of coupling and decoupling to numerous types of endoscopes, cannulas, insufflation flow sources, biopsy devices, and other medical devices is primarily desired with the endoscope port **21** connection and the insufflation port **24** connection. In many cases, it is preferred that the connection between hub **20** and cannula **30** remain permanent and non-modular. Examples of these modes are depicted in FIGS. **1**, **2**, **5-8**B, **17**, and **18**.

[0086] In other modes of the invention, cannula **30** is reversibly coupled or attached to hub **20**. With these modes, it is preferred that the modular aspect extend to the cannula port **27** connection along with the endoscope port **21** connection and the insufflation port **24** connection. Examples of these modes are depicted in FIGS. **9-16**B.

[0087] In reversible cannula attachment modes, the distal end of hub **20** further comprises a cannula fitting **28** reversibly coupled to cannula port **27** by a cannula fitting attachment means **29**. Cannula fitting **28** is a hydraulic or pneumatic fitting those mates with or couples to other hydraulic or pneumatic fittings. Cannula fitting **28** is a rigid oblong hollow vessel with a connector end and an attachment end. Connector end has a certain shape that mates with or couples to other hydraulic or pneumatic fittings with other certain shaped connector ends to yield a leak proof connection between the two fittings. The attachment end connects to cannula fitting attachment means **29**. Any known or unknown type of fitting may be used here. Cannula fitting attachment means **29** is a means to couple cannula fitting **28** to hub **20**, positioned around cannula port **27**, and in such a way so as to contain without leaking the pressurized flow of gas or liquid from hub **20** to cannula fitting **28**.

[0088] Cannula fitting attachment means **29** can be accomplished by threaded attachment where female threads are inscribed onto the inner diameter of the attachment end of cannula fitting **28** that are sized to mate with male threads inscribed onto the exterior of hub **20**, to provide leak-proof reversible threaded attachment between these members. Cannula fitting attachment means **29** can be accomplished by threaded attachment where male threads are inscribed onto the outer diameter of the attachment end of cannula fitting **28** that are sized to mate with female threads inscribed onto the interior of hub **20**, to provide leak-proof reversible threaded attachment between these members.

[0089] Cannula fitting attachment means **29** can be accomplished by socket attachment where a female socket is formed in the inner diameter of the attachment end of cannula fitting **28** that is sized to form a slip-fit with a male socket formed on the exterior of hub **20**, where female and male sockets are nested together and welded, glued, sol-

dered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members. Cannula fitting attachment means **29** can be accomplished by socket attachment where a male socket is formed in the outer diameter of the attachment end of cannula fitting **28** that is sized to form a slip-fit with a female socket formed on the interior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members.

[0090] Cannula fitting attachment means **29** can be accomplished by compression ring attachment where a resilient compression ring is inserted between a female cannula fitting **28** and a male hub **20** or a male cannula fitting **28** and a female hub **20** and a nut or clamp is used to compress the compression ring between these members to form a leak-proof reversible compression attachment between these members.

[0091] Cannula fitting **28** and cannula fitting attachment means **29** must be capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure. Cannula fitting **28** is made of a material with a melting temperature greater than 1000 degrees Fahrenheit such as metal, steel, steel alloy, ceramic, composite, or certain plastics. In best mode, cannula fitting **28** is made of surgical stainless steel. In best mode, cannula fitting **28** is a Luer type taper fitting that is capable of mating with other Luer type taper fittings.

[0092] In reversible cannula attachment modes, the proximal end **34** of cannula **30** is permanently coupled or attached to a hub fitting **36**. Hub fitting **36** is a hydraulic or pneumatic fitting those mates with or couples to other hydraulic or pneumatic fittings. Hub fitting **36** is a rigid oblong hollow vessel with a connector end and an attachment end. Connector end has a certain shape that mates with or couples to other hydraulic or pneumatic fittings with other certain shaped connector ends to yield a leak proof connection between the two fittings. Any known or unknown type of fitting may be used here. A female socket is formed in the inner diameter of the attachment end of hub fitting **36** that is sized to form a slip-fit with a male socket that is the exterior surface of the proximal end **34** of cannula **30**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members that is capable of undergoing sterilization by autoclave without incurring deterioration or degradation.

[0093] Hub fitting **36** must be capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure. In best mode, hub fitting **36** is made of surgical stainless steel. In best mode, hub fitting **36** is a taper fitting that is capable of mating with other Luer type taper fittings.

[0094] Hub **20** may further comprise a biopsy port **40** and a biopsy port body **42**. Biopsy port **40** is an additional opening or port in hub **20** to the three openings or ports described above. Biopsy port **40** is positioned on the side of hub **20**, on the direct directly opposite side from that where insufflation port **24** is located. Biopsy port **40** is used to insert a biopsy tool or other endoscopic device **80** into the small incision or natural opening that is the operation site along with the endoscope **60** in order to take a biopsy tissue sample from the target area and remove the tissue sample from the small incision or natural opening or to perform another endoscopic medical procedure.

[0095] Biopsy port body **42** is a rigid cylindrical member with open ends. Biopsy port body **42** has a distal end and a proximal end. With open ends sealed or plugged to prevent the flow of liquid or gas there through, biopsy port body **42** is capable of containing the pressurized flow of gas or liquid therein without leaking. The distal end **34** of biopsy port body **42** is positioned around biopsy port **40** and permanently attached to biopsy port **40** in such a way so as to contain without leaking the pressurized flow of gas or liquid from the interior of hub **20** to the interior of biopsy port body **42**. This attachment being accomplished by welding, gluing, soldering, brazing, or solvent welding to provide leak-proof permanent socket attachment between these members,

[0096] that is capable of undergoing sterilization by autoclave without incurring deterioration or degradation. With this attachment, the proximal end of biopsy port body **42** forms an acute angle with the proximal end of hub **20** so that the longitudinal axes of hub **20** and biopsy port body **42** form a V-shape. This design ensures that the biopsy tool or other endoscopic device **80** may slide more easily with minimal blockage into and out of cannula **30** along with endoscope **60** also inside cannula **30**.

[0097] Biopsy port modes of the invention include a biopsy fitting **44**. The proximal end of biopsy port body includes a biopsy fitting attachment means **46**. Biopsy fitting **44** reversibly couples to biopsy port body **42** by biopsy fitting attachment means **46**. Biopsy fitting **44** is a hydraulic or pneumatic fitting those mates with or couples to other hydraulic or pneumatic fittings. Biopsy fitting **44** is a rigid oblong hollow vessel with a connector end and an attachment end.

[0098] Connector end has a certain shape that mates with or couples to other hydraulic or pneumatic fittings with other certain shaped connector ends to yield a leak proof connection between the two fittings. The attachment end connects to biopsy fitting attachment means **46**. Any known or unknown type of fitting may be used here. Biopsy fitting attachment means **46** is a means to couple biopsy fitting **44** to biopsy port body **42** in such a way so as to contain without leaking the pressurized flow of gas or liquid from biopsy port body **42** to biopsy fitting **44**.

[0099] Biopsy fitting attachment means **46** can be accomplished by threaded attachment where female threads are inscribed onto the inner diameter of the attachment end of biopsy fitting **44** that are sized to mate with male threads inscribed onto the exterior of hub **20**, to provide leak-proof reversible threaded attachment between these members. Biopsy fitting attachment means **46** can be accomplished by threaded attachment where male threads are inscribed onto the outer diameter of the attachment end of biopsy fitting **44** that are sized to mate with female threads inscribed onto the interior of hub **20**, to provide leak-proof reversible threaded attachment between these members.

[0100] Biopsy fitting attachment means **46** can be accomplished by socket attachment where a female socket is formed in the inner diameter of the attachment end of biopsy fitting **44** that is sized to form a slip-fit with a male socket formed on the exterior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members. Biopsy fitting attachment means **46** can be accomplished by

socket attachment where a male socket is formed in the outer diameter of the attachment end of biopsy fitting **44** that is sized to form a slip-fit with a female socket formed on the interior of hub **20**, where female and male sockets are nested together and welded, glued, soldered, brazed, or solvent welded in place to provide leak-proof permanent socket attachment between these members.

[0101] Biopsy fitting attachment means **46** can be accomplished by compression ring attachment where a resilient compression ring is inserted between a female biopsy fitting **44** and a male hub **20** or a male biopsy fitting **44** and a female hub **20** and a nut or clamp is used to compress the compression ring between these members to form a leak-proof reversible compression attachment between these members.

[0102] Biopsy fitting **44** and biopsy fitting attachment means **46** must be capable of undergoing sterilization by autoclave. In best mode, biopsy fitting **44** is made of surgical stainless steel. In best mode, biopsy fitting **44** is a Luer type taper fitting that is capable of mating with other Luer type taper fittings.

[0103] Optionally, modular autoclavable introducer **10** may include a cannula cover **50** to cover and protect cannula **30** during the autoclave sterilization process to help insure that cannula **20** remains straight and does not bend or warp as a result of the high temperatures reached during the autoclave sterilization process. Cannula cover **50** comprises a retaining cylinder member that is a rigid cylindrical member with open ends. Retaining cylinder has an inner diameter that is sized to make a slip fit over the outside diameter of cannula **30**. Retaining cylinder has a length that is at least as long as that of cannula **30**. Retaining cylinder has a wall thickness that is greater than that of cannula **30**. Cannula cover **50** must be capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure. In best mode, cannula cover **50** is made of surgical stainless steel. Cannula cover **50** is slid over cannula **30** prior to and during the sterilization process and functions to prevent cannula from bending or warping during sterilization. After the sterilization process is completed and the cannula **30** is cooled, cannula cover **50** is removed to use the cannula **30** as detailed here within.

[0104] Modular autoclavable introducer **10** can be used to help perform endoscopic surgery with an endoscope **60** as follows. First, the surgeon determines what particular type of endoscope **60** he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen endoscope. Next, the surgeon determines what particular type of insufflation source he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen insufflation source. Then, the particular type of endoscope fitting **22** that will properly couple to the particular fitting on the chosen endoscope is determined where this fitting **22** is then attached to hub **20** with endoscope fitting attachment means **23** as described above. Also, the particular type of insufflation fitting **25** that will properly couple to the particular fitting on the chosen insufflation source is determined where this fitting **25** is then attached to hub **20** with insufflation fitting attachment means **26** as described above. Next, the chosen endoscope **60** is coupled to modular autoclavable introducer **10** by threading the distal end of endoscope **60** through endoscope fitting **22**, hub **20**, cannula **30**, and then out through the distal end **32** of cannula **30** and coupling the fitting (not depicted) on endoscope **60** to the endoscope fitting **22** on hub **20**. With this connection completed, the flow of insufflation gas or liquid **70** cannot flow back through endoscope port **21**. Next, the insufflation flow source is coupled to modular autoclavable introducer **10** by coupling the fitting (not depicted) on the insufflation flow source to insufflation fitting **25** on hub **20**. With this connection completed, the insufflation flow source is then turned on to start the flow insufflation gas or liquid **70** from insufflation flow source through insufflation port **24**, hub **20**, cannula **30**, and then out through the distal end **32** of cannula **30**. Next, the modular autoclavable introducer **10** and endoscope **60** are inserted into the small incision or natural opening so that insufflation gas or liquid **70** expands patient tissue **100** as depicted in FIG. **17** to perform endoscopic surgery. Typically, the small incision or natural opening that is the operation site is dilated using a dilating device in preparation for the initial insertion of modular autoclavable introducer **10** and endoscope **60** and prior to the insertion of modular autoclavable introducer **10** and endoscope **60**. Endoscopic surgery is then conducted by moving modular autoclavable introducer **10** and endoscope **60** within the small incision or natural opening.

[0105] Afterward endoscopic surgery is completed; endoscope **60** and modular autoclavable introducer **10** are removed from the small incision or natural opening operation. The insufflation flow source is then turned off and decoupled from hub insufflation fitting **25** and removed from hub **20**. The endoscope **60** is then decoupled from endoscope fitting **22** and removed from hub **20**. Modular autoclavable introducer **10** is then sterilized by autoclave after the surgery for repeated surgical use with many patients.

[0106] Modular autoclavable introducer **10** can be used to help perform endoscopic surgery with an endoscope **60** as follows. First, the surgeon determines what particular type of endoscope **60** he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen endoscope. Next, the surgeon determines what particular type of insufflation source he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen insufflation source. Next, the surgeon determines what particular type of cannula or dilator **30** he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen cannula or dilator. Next, the surgeon determines what particular type of biopsy tool or other endoscopic medical device **80** he or she would like to use during the surgery and what particular type of fitting is affixed to the chosen biopsy tool. Then, the particular type of endoscope fitting **22** that will properly couple to the particular fitting on the chosen endoscope is determined where this fitting **22** is then attached to hub **20** with endoscope fitting attachment means **23** as described above. Also, the particular type of insufflation fitting **25** that will properly couple to the particular fitting on the chosen insufflation source is determined where this fitting **25** is then attached to hub **20** with insufflation fitting attachment means **26** as described above.

[0107] Also, the particular type of cannula fitting **28** that will properly couple to the particular fitting on the chosen cannula or dilator is determined where this fitting **28** is then attached to hub **20** with cannula fitting attachment means **29** as described above. Also, the particular type of biopsy fitting **44** that will properly couple to the particular fitting on the chosen biopsy tool or other endoscopic device **80** is determined where this fitting **44** is then attached to biopsy port

body **42** with biopsy fitting attachment means **46** as described above. Next, the chosen endoscope **60** is coupled to modular autoclavable introducer **10** by threading the distal end of endoscope **60** through endoscope fitting **22**, hub **20**, cannula **30**, and then out through the distal end **32** of cannula **30** and coupling the fitting (not depicted) on endoscope **60** to the endoscope fitting **22** on hub **20**. With this connection completed, the flow of insufflation gas or liquid **70** cannot flow back through endoscope port **21**.

[0108] Next, the chosen insufflation flow source is coupled to modular autoclavable introducer **10** by coupling the fitting (not depicted) on the insufflation flow source to insufflation fitting **25** on hub **20**. Next, the chosen cannula or dilator **30** is coupled to modular autoclavable introducer **10** by coupling hub fitting **36** on cannula **30** to cannula fitting **28** on hub **20**. Next, a cap or plug is installed over biopsy fitting **44** to prevent the flow of insufflation gas or liquid **70** back through biopsy port **40**. Next, the insufflation flow source is then turned on to start the flow insufflation gas or liquid **70** from insufflation flow source through insufflation port **24**, hub **20**, cannula **30**, and then out through the distal end **32** of cannula **30**. Next, the modular autoclavable introducer **10** and endoscope **60** are inserted into the small incision or natural opening so that insufflation gas or liquid **70** expands patient tissue **100** as depicted in FIG. **18** to perform endoscopic surgery. Typically, the small incision or natural opening that is the operation site is dilated using a dilating device in preparation for the initial insertion of modular autoclavable introducer **10** and endoscope **60** and prior to the insertion of modular autoclavable introducer **10** and endoscope **60**. The surgeon then navigates modular autoclavable introducer **10** and endoscope **60** to a target tissue area. Next, the chosen biopsy tool or other endoscopic device **80** is coupled to modular autoclavable introducer **10** by threading the distal end of biopsy tool or other endoscopic device **80** through biopsy fitting **44**, biopsy port body **42**, hub **20**, cannula **30**, and then out through the distal end **32** of cannula **30** and coupling the fitting (not depicted) on biopsy tool or other endoscopic device **80** to the biopsy fitting **44** on biopsy port body **42** as depicted in FIG. **18**. Biopsy tool or other endoscopic device **80** is then used to collect a biopsy tissue sample or perform another endoscopic procedure. After a biopsy tissue sample has been collected or other endoscopic procedure has been completed, biopsy tool or other endoscopic device **80**, endoscope **60**, and modular autoclavable introducer **10** are removed from the small incision or natural opening operation. The insufflation flow source is then turned off and decoupled from hub insufflation fitting **25** and removed from hub **20**. The biopsy tool or other endoscopic device **80** is then decoupled from biopsy fitting **22** and removed from hub **20**.

[0109] The endoscope **60** is then decoupled from endoscope fitting **22** and removed from hub **20**. The cannula or dilator **30** is then decoupled from cannula fitting **28** and removed from hub **20**. All components of modular autoclavable introducer **10** are then sterilized by autoclave after the surgery for repeated surgical use with many patients.

[0110] It is thus possible by way of the present invention to provide for an endoscopic or laparoscopic introducer and specifically to an autoclavable modular introducer which is modular in that it is capable of attachment to numerous types of fittings and thereby capable of coupling and decoupling to numerous types of endoscopes, cannulas, insufflation flow sources, biopsy devices, and other medical devices and importantly the introducer of the present advancement having modular construction is also autoclavable in that it is capable of safely and efficiently sterilized by autoclave without incurring deterioration or degradation.

1. A modular sterilizable and reusable introducer system comprising:

a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port, each said ports communicating with said internal hollow passage of said hub; said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilizable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner; said insufflation port comprising a sterilizable insufflation fitting attachment means a sterilizable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflations means in a leak proof manner; a sterilizable cannula cooperatively communicating in a leak proof manner with said internal hollow passage of said hub.

2. A modular sterilizable and reusable introducer system is claimed comprising:

a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port, and having a cannula entry opening each said port and said cannula entry opening communicating with said internal hollow passage of said hub; said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilizable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner; said insufflation port comprising a sterilizable insufflation fitting attachment means:

a sterilisable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflations means in a leak proof manner;

said cannula entry opening provided with a sterilizable cannula fitting attachment means a sterilisable cannula fitting for operative connection at one end to said cannula entry opening through said sterilizable cannula fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable cannula means in a leak proof manner.

3. A modular sterilizable and reusable introducer system is claimed:

a sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port, and having a cannula entry opening, each said ports and said cannula entry opening communi-

cating with said internal hollow passage of said hub; said endoscope port comprising a sterilizable endoscope fitting attachment means a sterilizable endoscope fitting for operative connection at one end to said endoscope port through said sterilizable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative endoscope means in a leak proof manner; said insufflation port comprising a sterilizable insufflation fitting attachment means:

a sterilisable insufflation fitting for operative connection at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative insufflations means in a leak proof manner; said cannula entry opening comprising a sterilizable cannula fitting attachment means:

a sterilisable cannula fitting for operative connection at one end to said cannula entry opening through said sterilizable cannula fitting attachment means in a leak proof manner and at its other end to a cooperative cannula means in a leak proof manner.

4. A modular sterilizable and reusable introducer system is claimed wherein said sterilizable hub comprises an oblong shaped container or vessel body with internal hollow passage and has a proximal end which during use if adjacent to surgeon and a distal end opposite to said proximal end which in use is adjacent to the patient and said endoscope port is located at the said proximal end and said cannula entry opening is located at the said distal end of the hub with said insufflations port located at a side of the hub.

5. A modular sterilizable and reusable introducer system as claimed: wherein said endoscope port with endoscope fitting attachment means and said endoscope fitting are capable of coupling and decoupling to numerous types of endoscopes, said cannula entry opening with cannula fitting attachment means and said cannula fitting are capable of coupling and decoupling to numerous types of cannulas, and said insufflations port with insufflations fitting attachment means and said insufflations fitting are capable of coupling and decoupling to numerous types of insufflations means.

6. A modular sterilizable and reusable introducer system as claimed: wherein said hub further comprises a biopsy port on a side for insertion of biopsy tool or other endoscope devices.

7. A modular sterilizable and reusable introducer system as claimed: wherein said biopsy port is located directly opposite to the insufflations port and preferably extends from the hub side on a cylindrical shaped biopsy port body such that the longitudinal axes of the hub and the port body form a V shape to ensure that biopsy tool or other endoscopic devices can slide easily with minimal blockage into and out of cannula along with endoscope also inside cannula.

8. A modular sterilizable and reusable introducer system as claimed: said biopsy port comprising a sterilizable biopsy or other device fitting attachment means a serializable biopsy or other device fitting for operative connection at one end to said biopsy port through said sterilizable biopsy or other device fitting attachment means in a leak proof manner and at its other end to a cooperative biopsy means or other device in a leak proof manner.

9. A modular sterilizable and reusable introducer system as claimed: wherein endoscope fitting, insufflations fitting, cannula fitting, and biopsy fitting is a hydraulic or pneumatic fitting that mates with or couples to hydraulic or pneumatic fittings of endoscope, insufflation, cannula and biopsy/devices.

10. A modular sterilizable and reusable introducer system is claimed: wherein each said endoscope fitting, insufflations fitting, cannula fitting, and biopsy fitting comprise a rigid oblong hollow vessel with a connector end and an attachment end, the connector end adapted to mate with or couple to other hydraulic or pneumatic fittings/devices with corresponding connector ends to yield a leak proof connection between the two fittings and said attachment end connects to said endoscope fitting attachment means, insufflations fitting attachment means, cannula fitting attachment means and biopsy fitting attachment means respectively involving any type of leak proof fitting.

11. A modular sterilizable and reusable introducer system as claimed: wherein each said endoscope attachment means, said insufflations attachment means, said cannula attachment means and said biopsy attachment means are selected from any cooperative leak proof attachment including selected from threaded male-female attachment, socket attachment, compression ring attachment, luer type taper fitting.

12. A modular sterilizable and reusable introducer system as claimed: wherein said cannula comprise length of about 2 to 10 centimeters, outer diameter of about 0.3 to 3 millimeters, and wall thickness of about 0.03 to 0.10 millimeter and is obtained as semi-rigid cannula for a small degree of flexibility required to insert and navigate the cannula within the patient preferably the cannula can flex about 1-4 millimeters from end to end for this purpose.

13. A modular sterilizable and reusable introducer system as claimed: comprising said cannula is permanently attached or fixed to the hub wherein a proximal end of cannula is positioned around said cannula entry opening and permanently attached to cannula entry opening such as to contain without leaking the pressurized flow of gas or liquid from the interior of hub to the interior of cannula.

14. A modular sterilizable and reusable introducer system is claimed:

wherein said cannula cover comprises a retaining cylinder member that is a rigid cylindrical member with open ends, said retaining cylinder having an inner diameter that is sized to make a slip fit over the outside diameter of cannula, the retaining cylinder having a length that is at least as long as that of cannula, a wall thickness that is greater than that of cannula and capable of undergoing sterilization by autoclave without incurring deterioration, degradation, or failure.

15. A method of assembling and disassembling for use and reuse repeated times the modular sterilizable and reusable introducer system as claimed:

providing said sterilizable hub comprising a container or vessel body defining an internal hollow passage and having at least two ports comprising an endoscope port and an insufflations port, and having a cannula entry opening each said ports and cannula entry opening communicating with said internal hollow passage of said hub;

operatively connecting to said hub having permanently secured or releasable connected cannula or disconnecting after releasable connection selectively anyone or more of the following modular components involving:

operatively connecting said sterilizable endoscope fitting at one end to said endoscope port through said steril-

izable endoscope fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable endoscope means in a leak proof manner;

operatively connecting said sterilizable insufflation fitting at one end to said insufflation port through said sterilizable insufflation fitting attachment means in a leak proof manner and at its other end to a cooperative releasable connectable insufflations means in a leak proof manner; and

operatively connecting said sterilizable biopsy or other device fitting at one end to said biopsy port through said sterilizable biopsy or other device fitting attachment means in a leak proof manner and at its other end to a cooperative biopsy means or other device in a leak proof manner; such as to depending upon the use selectively connect or disconnect to and from said hub depending upon the stage of application of the relevant devices selected from endoscope, insufflations, biopsy or other such releasable connectable device.

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专利名称(译)	用于内窥镜的模块化可高压灭菌导入器		
公开(公告)号	US20180228511A1	公开(公告)日	2018-08-16
申请号	US15/431028	申请日	2017-02-13
[标]申请(专利权)人(译)	慕克吉APURBA		
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IPC分类号	A61B17/34 A61M13/00 A61B1/00 A61B1/313		
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外部链接	Espacenet USPTO		

摘要(译)

内窥镜或腹腔镜导引器，一种医疗装置，用于在内窥镜或腹腔镜手术期间帮助外科医生从患者身体插入，操纵和移除内窥镜，腹腔镜，活检装置或医疗装置。该进步涉及导入器，特别是可高压灭菌的模块化导入器。引导器是模块化的并且能够附接到多种类型的配件，从而能够耦合和分离到多种类型的内窥镜，套管，吹气流源，活检装置和其他医疗装置。导入器是可高压灭菌的，因为它能够通过高压灭菌器灭菌而不会导致变质或降解。本发明在模块化导引器系统中包括活检端口，用于外科医生提取细胞和组织以进行活组织检查。