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(54) **Bladeless optical obturator**

Optischer Obturator ohne Klinge

Obturateur optique sans lame

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention generally relates to trocar systems including obturators and, more specifically, to blunt tip obturators having hollow shafts for insertion of optical instruments.

Discussion of the Prior Art

[0002] Trocar systems have been of particular advantage in facilitating less invasive surgery across a body wall and within a body cavity. This is particularly true in abdominal surgery where trocars have provided a working channel across the abdominal wall to facilitate the use of instruments within the abdominal cavity.

[0003] The trocar systems of the past typically included a cannula, which provides the working channel, and an obturator which is used to place the cannula across the abdominal wall. The obturator is inserted into the working channel of the cannula and then pushed through the abdominal wall with a penetration force of sufficient magnitude resulting in penetration of the abdominal wall. Once the cannula is in place, the obturator can be removed.

[0004] Obturators have been developed with an attempt to reduce the penetration force of the abdominal wall. For example, sharp blades, sharp edges and piercing points have typically been used to enable the obturator to cut or pierce its way through the abdominal wall. While the sharp blades, sharp edges and piercing points have facilitated a reduced penetration force, they have also caused larger trocar site defects. These trocar site defects may have to be sutured closed resulting in increased operating room costs and procedural time. Moreover, once the abdominal wall has been penetrated, the sharp blades, sharp edges and piercing points of the obturator may still cause damage to the vessels and organs that lie within the peritoneal cavity. For example, the blades on the obturators that serve to cut tissue during insertion may also cut vessels or puncture organs that may result in patient injury or surgical complications.

[0005] Known obturators that can accommodate a laparoscope to permit viewing through a transparent tip are disclosed in International Patent Applications WO 03/026512 and WO 96/01074 on which disclosure the preamble of appended claim 1 is based.

[0006] There remains a need in the art for an improved surgical access device that separates tissue during insertion through a body wall. With a transparent blunt tip obturator having a hollow shaft to enable insertion of an optical instrument to view the insertion of the obturator through the body wall.

SUMMARY OF THE INVENTION

[0007] According to the present invention there is provided a surgical access device comprising: a tissue separating obturator comprising: an elongate shaft portion extending along a longitudinal axis and defining a first lumen between an open proximal end and a distal end; and a transparent distal tip portion with an inner surface and an outer surface adapted for penetrating tissue; the distal tip portion disposed at the distal end of the shaft portion; at least part of the tip portion having a generally tapered configuration; wherein the first lumen is sized and configured to receive an optical instrument having a distal end adapted to receive an image and the tip portion being adapted to permit passage of an image; and characterized by a lock disposed at the proximal end of the shaft portion configured to allow the optical instrument to rotate freely inside and relative to the elongate shaft of the obturator while restraining the optical instrument inserted into the first lumen from moving axially relative to the obturator.

[0008] These and other features of the invention will become more apparent with a discussion of the various embodiments in reference to the associated drawings.

DESCRIPTION OF THE DRAWINGS

[0009] The accompanying drawings explain the features and principles of the invention. In the drawings:

FIGS. 1A and 1 B illustrate side views of a trocar system including a cannula with associated valve housing, and an obturator with a blunt tip extending through the working channel of the cannula to facilitate placement across the abdominal wall;
FIG. 2 is a side elevation view of the blunt tip of the obturator of the invention;
FIG. 3 is a side elevation view of the blunt tip taken along line 3-3 of FIG. 2;
FIG. 4 is an end view taken along line 4-4 of FIG. 2;
FIG. 5 is a radial cross-section view taken along line 5-5 of FIG. 2;
FIG. 6 is a radial cross-section view taken along line 6-6 of FIG. 2;
FIG. 7 is a radial cross-section view taken along line 7-7 of FIG. 2;
FIG. 8 is a radial cross-section view taken along line 8-8 of FIG. 2;
FIG. 9 is a radial cross-section view taken along line 9-9 of FIG. 2;
FIG. 10 is a schematic view illustrating each of the FIGS. 4-9 superimposed to facilitate an understanding of the blunt tip and its twisted configuration;
FIG. 11 illustrates a side view of a bladeless obturator of the invention having a tip formed as a blunt tapered shape;
FIG. 12 illustrates a side view of a bladeless obturator of the invention having a tip formed as a pyramidal

shape;

FIG. 13 illustrates a side view of a bladeless obturator of the invention having a fully radiused tip;

FIGS. 14 and 15 illustrate a side view and a cross-section view, respectively, of the trocar system of FIGS. 1 A and 1 B and further illustrating the insertion of a laparoscope;

FIG. 16 illustrates a side view of a bladeless obturator of the invention having a bulbous tip;

FIG. 17 illustrates a side view of a bladeless obturator of the invention having a tip with a cutout section;

FIG. 18 illustrates a side view of a bladeless obturator of the invention having a shaft with a cutout section;

FIG. 19 illustrates a side view of a bladeless obturator of the invention and a cover for the cutout section of the shaft of FIG. 18;

FIGS. 20 and 21 illustrate side views of a bladeless obturator of the invention having a laparoscope lock;

FIGS. 22 and 23 illustrate side views of a bladeless obturator of the invention including a cap with pistol-grip handle;

FIGS. 24 and 25 illustrate the locking mechanism between the bladeless obturator and the trocar seal of the invention;

FIGS. 26 and 27 illustrate the release mechanism between the bladeless obturator and the trocar seal of the invention;

FIG. 28 illustrates a top view of a laparoscope lock of the invention comprising a multiple-finger collet;

FIG. 29 illustrates an optical instrument having a transparent bladeless tip of the invention;

FIGS. 30 and 31 illustrate a top view and a side view, respectively, of a laparoscope lock of the invention comprising a camming member;

FIGS. 32 and 33 illustrate a top view and a side view, respectively, of a laparoscope lock of the invention comprising a clamping member;

FIGS. 34 and 35 illustrate a top view and a side view, respectively, of a laparoscope lock of the invention comprising a locking collar; and

FIGS. 36 and 37 illustrate a top view and a side view, respectively, of a laparoscope lock of the invention comprising a locking nut and thread.

DESCRIPTION OF THE INVENTION

[0010] A trocar system is illustrated in FIG. 1 and is designated by reference numeral 10. This system includes a cannula 12, defining a working channel 14, and a valve housing 16. The system 10 also includes an obturator 18 having a shaft 21 extending along an axis 23. A handle 25 is disposed at a proximal end of the shaft 21 while a blunt tip 27 is disposed at a distal end of the shaft 21. The shaft 21 of the obturator 18 is sized and configured for disposition within the working channel 14 of the cannula 12. With this disposition, the obturator 18 can be placed across a body wall such as the abdominal wall to provide the cannula 12 with access across the wall and into a body cavity, such as the peritoneal or abdominal cavity. The blunt tip 27 serves to direct the obturator 18 through the abdominal wall and the peritoneum, and can be removed with the obturator 18 once the cannula 12 is operatively disposed with the working channel 14 extending into the abdominal cavity. The diameter of the shaft 21 can range from about 3 mm to about 20 mm and is designed to fit within a trocar seal and the cannula 12.

[0011] The tip 27 is provided with a blunt tip configuration. The blunt tip 27 takes into account the anatomical configuration of the abdominal wall with an improved structural design and method of insertion. To fully appreciate these aspects, it is helpful to initially discuss the anatomy associated with the abdominal wall. The abdominal wall typically includes a skin layer and a series of muscle layers, in addition to fat and fascia. The muscle layers are each defined by muscle fibers that extend generally parallel to each other in a direction that is different for each of the layers. For example, fibers of a first muscle layer and a second muscle layer may extend in directions that are generally 90 degrees off of each other.

[0012] Having noted the directional nature of the muscle fibers, it can be appreciated that such a structure may be separated or divaricated by an obturator having a blunt tip. The blunt tip may also include a twisted rectangular configuration to facilitate movement between the muscle fibers and layers. That is, the blunt tip is capable of being moved generally parallel to and between the fibers associated with a particular muscle layer.

[0013] As described earlier, the fibers of the muscle layers may be oriented at different angles to each other such that proper alignment of the tip 27 for separation of one layer may not necessarily result in proper alignment for separation of the next layer. For at least this reason, the obturator 18 has a blunt tip 27 to direct the obturator 18 through the different layers and a rectangular configuration that is twisted slightly so that separation of a first layer begins to rotate the distal end of the blunt tip 27 into proper orientation for separation of the next layer.

[0014] The twisted configuration of the blunt tip 27 also causes the blunt tip 27 to function, for example, with the mechanical advantage of a screw thread. With this configuration, an exemplary method of placement requires that the user grip the handle 25 of the obturator 18 and twist it about the axis 23. This twisting motion in combination with the screw configuration of the blunt tip 27 converts radial movement into forward movement along the axis 23. Thus, the user applies both a forwardly directed force as well as a radial force to move the trocar system 10 in a forward direction.

[0015] The twisted configuration of the blunt tip 27 is most apparent in the side elevation views of FIGS. 2 and 3. In this embodiment, the blunt tip 27 comprises generally of eight surfaces: two opposing surfaces 50 and 52, separated by two side surfaces 54 and 56, two end surfaces 58 and 59, a generally tapered surface 60 formed in surfaces 50 and 52 around axis 23 and extending be-

yond end surfaces 58 and 59, and a blunt surface 62.

[0016] The surfaces 50 and 52, side surfaces 54 and 56, and tapered surface 60 generally define the cross-section of the blunt tip 27 from blunt surface 62 to proximal end 61. This configuration can best be appreciated with reference to the cross-section views of FIGS. 4-9. In FIG. 4, the distal end of the blunt tip 27 is shown with a circle 64 having the smallest circular area and a rectangle 63 having the greatest length-to-width ratio. The rectangle 63 has a twisted, S-shaped configuration at end surfaces 58 and 59.

[0017] As views are taken along progressive proximal cross-sections, it can be seen that the circle 64 becomes larger and the rectangle 63 becomes less twisted, and the width increases relative to the length of the rectangle 63. The spiral nature of the blunt tip 27 is also apparent as the circle 64 and rectangle 63 move counterclockwise around the axis 23. This is perhaps best appreciated in a comparison of the circle 64 and the rectangle 63 in FIG. 6 relative to that in FIG. 5. With progressive proximal positions, the circle 64 begins to expand with increasing circular area and the rectangle 63 begins to widen with a reduction in the ratio of length to width. The long sides of the rectangle 63 also tend to become more arcuate as they approach a more rounded configuration most apparent in FIGS. 8 and 9. That is, the circle 64 and the rounded rectangle 63 become more circular with progressive proximal positions. Furthermore, the circle 64 expands at a lesser rate than the rectangle 63, which eventually absorbs the circle 64 as shown in FIGS. 8 and 9. In these figures, it will also be apparent that the rotation of the rectangle 63 reaches a most counterclockwise position and then begins to move clockwise. This is best illustrated in FIGS. 7-9. This back and forth rotation results from the configuration of the side surfaces 54 and 56, which in general are U-shaped as best illustrated in FIGS. 2 and 3.

[0018] The ratio of the length to width of the rectangle 63 is dependent on the configuration of the side surfaces 54 and 56, which define the short sides of the rectangle 63 as well as the configuration of the surfaces 50 and 52, which define the long sides of the rectangle 63. Again with reference to FIGS. 2 and 3, it can be seen that the side surfaces 54 and 56 are most narrow at the end surfaces 58 and 59. As the side surfaces 54 and 56 extend proximally, they reach a maximum width near the point of the most counterclockwise rotation, shown generally in FIG. 8, and then reduce in width as they approach the proximal end 61. Along this same distal to proximal path, the surfaces 50 and 52 transition from a generally flat configuration at the end surfaces 58 and 59 to a generally rounded configuration at the proximal end 61.

[0019] In the progressive views of FIGS. 5-7, the circle 64 is further designated with a lower case letter a, b or c, respectively; similarly, the rectangle 63 is further designated with a lower case letter a, b, c, d or e, respectively, in FIGS. 5-9. In FIG. 10, the circles 64, 64a-64c and the rectangles 63, 63a-63e are superimposed on the axis 23 to show their relative sizes, shapes and angular orientations.

[0020] With a generally tapered configuration at the distal end and a rectangular configuration at a distal portion of the tip, the tip 27 appears much like a flathead screwdriver having a blunt tip. More particularly, the tip 27 includes a tapered structure extending outward from the end surfaces 58 and 59 that serves to direct the obturator 18 through the tissue fibers.

[0021] In one aspect, the lengths of the end surfaces 58 and 59 may be aligned parallel with the fibers of each muscle layer. A simple back and forth twisting motion of the blunt tip 27 tends to separate the fibers along natural lines of separation, opening the muscle layer to accept the larger diameter of the cannula 12. Once the first layer is substantially separated, the tapered and twisted configuration of the blunt tip 27 directs and turns the rectangle 63 more into a parallel alignment with fibers in the next layer. Again, the blunt tip 27 and the twisting or dithering motion facilitates an easy separation of the fibers requiring a significantly reduced insertion force.

[0022] This facilitates a unique method of separating tissue and can be applied to any object with a blunt tip and generally flat sides. In particular, the device of the invention can be operated by rotating in alternating clockwise and counterclockwise directions while applying a downward force. When rotating in alternating directions, the tissue is moved apart and a larger opening is created for a profile of greater cross-sectional area to follow. This process continues safely as the device enters the peritoneal cavity and moves to its operative position.

[0023] When the cannula 12 is ultimately removed, the size of the opening left in the tissue is minimal. Importantly, this opening is left with a small defect that does not require suturing due to a dilating effect caused by the mere separation of fibers. Since there are no sharp blades, sharp edges or piercing points to cut tissue fibers, the healing process is shortened. It is appreciated that the tip of the bladeless obturator 18 can be formed as a generally tapered shape 27a with a blunt distal end as illustrated in FIG. 11, as a pyramidal shape 27b with a blunt distal end and blunt edges as illustrated in FIG. 12, and as a fully radiused tip 27c for insertion through flaccid tissue or an existing body orifice such as the urethra as illustrated in FIG. 13.

[0024] The blunt tip 27 in accordance with the invention is formed from a transparent material. The blunt tip 27 can be formed from a plastic material or a glass material. In one aspect, the shaft 21 and the tip 27 are formed from a transparent polycarbonate material.

[0025] Referring to FIGS. 14 and 15, the bladeless obturator 18 of the invention is designed to accommodate the insertion of a conventional laparoscope 30. In particular, the shaft 21 of the bladeless obturator 18 is hollow to allow for the insertion of the laparoscope 30 at an opening 32. The shaft 21 is sized and configured to allow the laparoscope 30 to slide within proximity of the tip 27 thus providing a viewing area through the tip 27. An endo-

scopic video camera (not shown) is typically connected to the laparoscope 30 and this combination is connected to a video monitor. By enabling the positioning of the conventional laparoscope 30 within the tip 27 of the bladeless obturator 18, it is possible to visually observe body tissue as it is being separated by the trocar system 10. Visualization of body tissue as it is being separated by the trocar system 10 allows a surgeon to monitor the advancement of the trocar system 10 and to avoid traumatizing vessels or organs. For example, during a laparoscopic cholecystectomy, a trocar is usually placed through the umbilicus of the patient. The placement of this trocar is typically performed in a blind fashion in that the surgeon cannot see where the tip of the trocar is as it is advanced through the abdominal wall and into the abdominal cavity of the patient. This results in a high degree of risk that the trocar may be inadvertently advanced too far into the abdomen of the patient resulting in trauma to vital organs and/or vessels. By providing a trocar system with visualization properties, this risk is diminished as the surgeon is better able to determine when the trocar has traversed the abdominal wall.

[0026] It is appreciated that the tip 27 may be generally hollow or it may be substantially solid to receive the distal end of the laparoscope 30. In another aspect, the tip 27 may be a solid tip. The tip 27 may further comprise at least one portion that is marked differently from the rest of the tip to serve as an indicator, for example, of depth as the tip 27 is being inserted into the body tissue. The at least one portion may be opaque or marked with a different color from the rest of the tip 27.

[0027] The shaft 21 and the tip 27 of the bladeless obturator 18 can accommodate a laparoscope with a non-angled lens, also known as a 0° laparoscope. The shaft 21 and the tip 27 can also accommodate a laparoscope with an angled lens such as a 30° laparoscope. The tip 27 is designed such that when either a 0° laparoscope or a 30° laparoscope is inserted therein, the lens of the laparoscope extends beyond a distal edge 36 of the cannula 12 thereby providing a clear and unobstructed view through the tip 27. The tip 27 further includes a ledge 39 that properly engages either the 0° laparoscope or the 30° laparoscope.

[0028] It should be noted that conventional trocars with visualization properties typically require a 0° laparoscope for insertion of the trocars and a 30° laparoscope for viewing anatomical structures during the remainder of the laparoscopic procedure. This requires the operating staff to provide two laparoscopes for the laparoscopic procedure, which increases hospital inventory costs and surgical preparation costs relating to cleaning and sterilization of the laparoscopes. In addition, because two laparoscopes are required for the laparoscopic procedure, there is additional operating room time required during the surgical procedure to transfer the endoscopic video camera from the 0° laparoscope to the 30° laparoscope which results in increased operating room costs for the hospital.

[0029] The surgical access device of the present invention can provide a clear unobstructed view of body tissue through either a 0° or a 30° laparoscope, therefore obviating the need for a hospital to carry the additional inventory required to provide two laparoscopes for each laparoscopic surgical procedure, and obviating the need for a hospital to clean and sterilize a second laparoscope for each laparoscopic surgical procedure, and obviating the need to transfer the endoscopic video equipment from one laparoscope to the other laparoscope during each laparoscopic surgical procedure. Referring to FIG. 16, the shaft 21 may include a tip with a bulbous section 27d to better accommodate the distal end of the angled lens laparoscope. By adding the bulbous section 27d, the distal end of the angled lens laparoscope would be closer to the tip of the obturator thereby improving visualization.

[0030] The bladeless obturator can include integral fiber optic light fiber elements and an integral imaging element within the shaft and the tip of the obturator. The bladeless obturator with integral imaging means can be formed of reusable or disposable materials.

[0031] The bladeless obturator 18 can be constructed as a single component or as multiple components such as the shaft 21 and the tip 27. If the obturator 18 is constructed as a single component, then it can be formed from either disposable or reusable materials. If the obturator 18 is constructed as two or more components, then each component can be formed from either disposable or reusable materials as desired for a particular configuration. In one aspect, the obturator 18 is constructed from a single reusable material such as metal (e.g., stainless steel) or an autoclavable polymer to facilitate resterilization. In another aspect, the obturator 18 is formed from a transparent steam sterilizable reusable plastic material such as polyphenylsulfone or polyetherimide. The blunt tip 27 can also be coated or otherwise constructed from a soft elastomeric material. In such a case, the material can be a solid elastomer or composite elastomer/polymer.

[0032] It is further appreciated that the shaft 21 can be formed so as to be partially or fully flexible. With this configuration, the obturator 18 can be inserted through a passageway containing one or more curves of virtually any shape. A partially or fully flexed obturator 18 can then be used with a flexible cannula 12 allowing greater access to an associated body cavity.

[0033] The obturator 18 can include a separately molded tip 27 and a molded or extruded shaft 21 with the two components, as explained above, comprising of the same material or different materials. The tip 27 can then be attached to the shaft 21 by adhesive bonding, ultrasonic welding, snap-fitting, or with a shrink tube. The tip 27 can also be overmolded over the shaft 21 to mechanically lock the two components together. The tip 27 can be formed from a transparent material such as polycarbonate to enable visualization while the shaft 21 can be formed from either an opaque material or a transparent

material. The shaft 21 can also be formed from a metal material.

[0034] The obturator 18 can include a disposable tip that is releasably attached to a reusable shaft 21. Thus, a new tip 27 can be used for each procedure to provide optimal visualization through the tip 27 of the obturator 18 during each procedure.

[0035] Referring to FIG. 17, there is shown a shaft 21e including a cutout section 100e in the tip portion 27e that enables direct visualization of the body tissue as the tip 27e separates tissue fibers. By providing an obturator with cutout sections, the reflection of light from the laparoscope is minimized and the visibility of the tissue through the laparoscope is improved as compared to a design where visualization occurs through a plastic or glass window. It is appreciated that the shaft 21 e can include a single or a plurality of cutouts 100e in the tip 27e or along the shaft of the obturator.

[0036] Referring to FIG. 18, there is shown a shaft 21f having a cutout portion 100f along the axial axis of the shaft 21 f. The shaft 21f has a cross-section of about ½-circle to about ¾-circle and the cutout portion 100f has a cross-section of about ½-circle to about ¼-circle. An advantage of this is the wall of the shaft 21 f can be a little thicker as a result of the cutout section, which makes injection molding of the shaft easier.

[0037] Referring to FIG. 19, there is shown a cover 102f that can be attached over the cutout portion 100f of the ½-circle shaft 21f as shown in FIG. 18. In particular, a polycarbonate cover also with a ½-circle shaped cross-section can be attached to the shaft to form a tubular cross-section. An advantage of molding the tubular shaft 21 f in two pieces is increased manufacturability of the shaft 21 f. The cover 1 02f can be attached to the shaft 21 f with an adhesive bond, an ultrasonic weld, a snap-fit, or with a shrink tube.

[0038] In another aspect, the obturator can be formed from two clam-shell components each including one-half of the shaft and tip configuration along the axial axis of the obturator. The two components can then be affixed together using an adhesive bond, an ultrasonic weld, an outer shrink tube, or a snap fit.

[0039] Referring to FIGS. 20 and 21, a feature of the surgical access device of the invention is that the shaft 21 of the obturator 18 is designed to frictionally lock the laparoscope 30 in place using a laparoscope lock 40, which can be formed within the handle 25. More specifically, the laparoscope lock 40 prevents the laparoscope 30 from moving axially relative to the shaft 21 of the obturator 18 during handling within the sterile field and during insertion through a body wall but enables the laparoscope 30 to rotate freely relative to the shaft 21. This rotation of the lock 40 enables the trocar system 10 to be twisted during insertion into and through the abdominal wall while maintaining the laparoscope 30 in a fixed rotational position that provides for a stable viewing image on the video monitor.

[0040] The conventional obturators with visualization properties include means for locking the laparoscope in place but these obturators lock the laparoscope both axially and rotationally. A drawback of the conventional devices is the viewing image on the video monitor is unstable if the trocar is twisted during insertion. More specifically, with prior art obturator laparoscope locks, if the trocar is twisted back and forth in a clockwise and counter-clockwise fashion, the laparoscope also moves clockwise and counter-clockwise with the trocar resulting in an oscillating and disorienting viewing image on the video monitor. The laparoscope lock 40 of the present invention improves visualization and enables a more precise placement of the trocar within the body tissue and across the body wall as compared to obturators of the prior art while preventing inadvertent axial movement of the laparoscope during handling and use.

[0041] In another aspect of the invention as illustrated in FIGS. 20 and 21, the bladeless obturator 18 further comprises a cap 42 that can be snap-fitted onto the proximal end of the obturator shaft 21, after which the laparoscope lock 40 can be snap-fitted onto the end of the cap 42. Both the cap 42 and the lock 40 can be formed of a plastic material such as polycarbonate. The obturator cap 42 can be provided with and without a pistol-grip handle. The handled version of the bladeless obturator provides a pistol-grip to ease insertion of the trocar system as illustrated in FIGS. 22 and 23. The pistol-grip handle is designed to nest into the handle on the trocar seal to prevent excessive flexure of the handle during insertion of the trocar as illustrated in FIG. 23. More particularly, the handled bladeless obturator includes three components comprising of an obturator shaft 21 b, an obturator cap 42b having a pistol-grip handle 26b, and a laparoscope lock 40b, all of which can be injection molded out of polycarbonate. The pistol-grip handle 26b can be formed with two components frictionally fitted together with, for example, interference pins. The interference pins can be fitted into holes in the handle 26b to affect a frictional lock between the two components.

[0042] Referring to FIG. 24, the bladeless obturator 18 is designed to releasably attach to a trocar seal 17 via two cantilever snap-fits 70a, 70b. As the obturator 18 is inserted into the trocar seal 17 and cannula 12, the snap-fits 70a, 70b passively engage the trocar seal 17 and serve to axially lock the obturator 18 to the trocar seal 17 and cannula 12 (FIGS. 24 and 25). To release the obturator 18 from the trocar seal 17 and cannula 12, outboard tabs 72a, 72b on the obturator cap 42 are depressed inwardly and the obturator 18 is then free to be slidably removed as illustrated in FIGS. 26 and 27. Referring back to FIGS. 20 and 21, the bladeless obturator 18 includes axial key members 74 at its proximal end which are designed to mate with axial keyways on the trocar seal 17. As the bladeless obturator 18 is inserted into the trocar seal 17 and cannula 12, the obturator 18 is rotated slightly to align the axial key members 74 with the axial keyways and then advanced until the snap-fits 70a, 70b engage the trocar seal 17. The axial key members 74 serve to

rotationally lock the obturator 18 to the trocar seal 17.

[0043] Referring to FIG. 28, there is shown another embodiment of the laparoscope lock 40c comprising a multiple-finger collet 80c comprising a plurality of fingers 82c. The multiple-finger collet 80c has an inner diameter that is smaller than the outer diameter of the laparoscope. The fingers 82c of the collet 80c spread open during insertion of the laparoscope providing frictional engagement with the outer diameter of the laparoscope. The laparoscope lock 40c is free to rotate on an obturator cap 42c, and allows the laparoscope to freely rotate relative to the shaft of the bladeless obturator.

[0044] Referring back to FIGS. 20 and 21, the obturator shaft 21 of the bladeless obturator 18 can be configured with a barb 76 at its proximal end. The barb 76 is vertically slotted to enable the shaft 21 to flex during assembly. The obturator shaft 21 may also include a plurality of keys (not shown) near its proximal end. The obturator cap 42 is configured to axially slide over the barb 76 on the obturator shaft 21 to affect a one-way snap-fit lock between the two components. This snap-fit prevents the removal of the obturator cap 42 from the obturator shaft 21. The obturator cap 42 may further include keyways (not shown) that engage the keys on the obturator shaft 21 to rotationally index the components together. The obturator cap 42 may further include a second barb (not shown) at its proximal end. The laparoscope lock 40 may include a plurality of tabs (not shown) that are designed to spread and axially slide over the second barb on the obturator cap 42 to affect a one-way snap-fit lock between the obturator cap 42 and the laparoscope lock 40. This snap-fit prevents the axial removal of the laparoscope lock 40 from the obturator cap 42. The laparoscope lock 40 is free to rotate relative to the obturator cap 42.

[0045] Referring to FIG. 29, there is shown a laparoscope 30a having a tip 33a configured similar to that of the tip 27 of the bladeless obturator 18 described above, the tip 33a being adapted to snap-fit or frictionally engage the end of the laparoscope 30a. With this configuration, the combination of the tip 33a and the laparoscope 30a serve to form an optical obturator having a blunt tip. Once the trocar is inserted and the laparoscope removed from the trocar seal and cannula, the bladeless tip 33a can then be removed from the laparoscope 30a. The bladeless tip 33a can be formed from either a disposable or reusable transparent material. The bladeless tip 33a can be temporarily or permanently affixed to the scope 30a by any of the known methods of attaching the two components together as explained above.

[0046] Referring to FIGS. 30 and 31, there is shown a laparoscope lock 40d in accordance with of the invention including an active lock comprising a camming member 43d. With this type of lock, the laparascope would first be inserted into the shaft of the obturator and then the lock 40d would be activated to lock the laparoscope in an axial position relative to the shaft. The lock 40d can rotate freely to enable the laparoscope to rotate freely relative to the shaft. In another aspect as illustrated in FIGS. 32 and 33, a lock 40e can include an active lock comprising a clamping member 45e. With this type of lock, the laparascope would first be inserted into the shaft of the obturator and then the lock would be activated to lock the laparoscope in an axial position relative to the shaft. The lock 40e can rotate freely to enable the laparoscope to rotate freely relative to the shaft.

[0047] Referring to FIGS. 34 and 35, there is shown a lock 40f in accordance with another embodiment of the invention including an active lock comprising a locking collar 46 positioned eccentrically with respect to the axis of the obturator so that as the locking collar 46 is turned, a frictional engagement with the laparoscope is affected. The laparoscope would first be inserted into the locking collar 46 and the shaft of the obturator, the locking collar 46 can then be turned to frictionally engage the laparoscope. The laparoscope lock 40f can rotate freely to enable the laparoscope to rotate freely relative to the shaft.

[0048] In FIGS. 36 and 37, there is shown a laparoscope lock 40g including an active lock comprising of a locking nut 48 and a thread. The threaded portion of the lock 40g has flexible elements similar to those on a collet. The laparoscope would first be inserted into the threaded portion of the lock 40g and the nut then rotated clockwise to collapse the flexible elements to frictionally engage the laparoscope. To release the laparoscope, the nut is rotated counter-clockwise.

[0049] In another aspect, the laparoscope lock can include a lock that includes an elastomeric element. The addition of the elastomeric element can enhance the frictional engagement with the laparoscope. An example of such an elastomeric element is a silicone O-ring sized with an inside diameter smaller than the outside diameter of the laparoscope. The laparoscope lock can either rotate freely to enable the laparoscope to rotate freely relative to the shaft

[0050] An insufflation needle having a passageway and valve can be used to administer carbon dioxide or other insufflation gas to the peritoneal cavity. The obturator 18 can also be used with an insufflation needle cannula in which case removal of the obturator 18 upon entry would allow for rapid insufflation of the peritoneal cavity.

[0051] The bladeless obturator can be formed with a 2-3 mm outer diameter and with a small thru-hole at its distal end. The bladeless obturator can be used in conjunction with a miniaturized laparoscope to provide initial access into a hollow bodycavity. Once access is obtained, the laparoscope can be removed from the bladeless obturator and an insufflation gas such as carbon dioxide can be dispensed through the obturator into the hollow body cavity. The bladeless obturator can also include holes in the tip portion to enhance the flow of insufflation gases though the obturator. More particularly, the bladeless obturator can be formed with a 2-3 mm outer diameter and used in conjunction with a miniaturized laparoscope to provide initial access into a hollow body cavity. After access is obtained, the bladeless obturator can be removed from the trocar cannula and an

insufflation gas such as carbon dioxide can be dispensed though the cannula and into the hollow body cavity.

[0052] It will be understood that many modifications can be made to the disclosed embodiments without departing from the scope of the invention as defined in appended claim 1. For example, various sizes of the surgical device are contemplated as well as various types of constructions and materials. It will also be apparent that many modifications can be made to the configuration of parts as well as their interaction. For these reasons, the above description should not be construed as limiting the invention, but should be interpreted as merely exemplary of preferred embodiments.

Claims

1. A surgical access device comprising:

a tissue separating obturator (18) comprising:

an elongate shaft portion (21) extending along a longitudinal axis (23) and defining a first lumen between an open proximal end and a distal end; and
a transparent distal tip portion (27) with an inner surface and an outer surface adapted for penetrating tissue; the distal tip portion (27) disposed at the distal end of the shaft portion (21); at least part of the tip portion (27) having a generally tapered configuration;
wherein the first lumen is sized and configured to receive an optical instrument having a distal end adapted to receive an image and the tip portion being adapted to permit passage of an image; and
a lock (40) disposed at the proximal end of the shaft portion (21) **characterized in that** the lock (40) is configured to allow the optical instrument to rotate freely inside and relative to the elongate shaft of the obturator while restraining the optical instrument inserted into the first lumen from moving axially relative to the obturator (18).

2. The surgical access device of claim 1 wherein the lock (40) is configured to enable the shaft portion (21) to be twisted in a back and forth motion while maintaining the optical instrument in a fixed rotational position to provide for a stable viewing image via the optical instrument.

3. The surgical access device of claim 1 wherein the lock (40) rotates relative to the elongate shaft (21).

4. The surgical access device of claim 1 wherein the lock (40) rotates with respect to the elongate shaft (21) and the optical instrument inserted into the first lumen is fixed with respect to the lock (40).

5. The surgical access device of claim 1 wherein the lock (40) includes an elastomeric element that frictionally engages with the optical instrument.

6. The surgical access device of claim 1 wherein the lock (40) further includes flexible elements configured to move into frictional engagement with an optical instrument disposed inside the first lumen to frictionally restrain the optical instrument relative to the obturator (18).

7. The surgical access device of claim 1 wherein the lock (40) rotates relative to the elongate shaft (21) and wherein the rotatable lock (40) includes a fixed position in which it does not rotate relative to the shaft (21).

8. The surgical access device of claim 1 wherein the lock (40) is connected to the obturator (18) and configured such that the lock (40) is free to rotate relative to the elongate shaft (21) and the optical instrument inserted into the first lumen rotates with the lock (40).

9. The surgical access device of claim 1 further including a cannula (12) comprising an elongate shaft extending along a longitudinal axis and defining a second lumen (14) between an open proximal end and an open distal end; the cannula (12) being configured to receive the obturator (18) inside the second lumen (14) and to connect to the obturator (18) such that the obturator (18) does not move axially or rotationally relative to the cannula (12).

10. The surgical access device of claim 1 wherein the lock (40) is configured to allow the shaft portion (21) to rotate freely relative to the inserted optical instrument.

11. The surgical access device of claim 1 wherein the lock (40d) includes a caming member (43d) configured to lock the optical instrument in an axial position relative to the shaft of the obturator (18).

12. The surgical access device of claim 1 wherein the lock (40g) includes a rotatable locking nut (48) and threaded portion.

13. The surgical access device of claim 12 wherein the threaded portion of the lock (40g) further includes flexible elements configured to frictionally engage with the optical instrument disposed inside the first lumen to frictionally restrain the optical instrument relative to the shaft of the obturator (18) when the nut (48) is rotated relative to the shaft portion (21) in one direction and unlock the optical instrument rel-

ative to the shaft of the obturator (18) when the nut (48) is rotated relative to the shaft portion (21) in the opposite direction.

14. The surgical access device of claim 1 wherein the tip portion (27) is generally hollow.

15. The surgical access device of claim 1 further including an obturator cap (42) connected to the proximal end of the obturator shaft (21).

16. The surgical access device of claim 15 wherein the lock (40) is connected to the obturator cap (42).

17. The surgical access device of claim 1 wherein the lock (40c) is a multi-fingered collet (80c) having an inner diameter smaller than an outer diameter of the optical instrument and includes fingers (82c) that are configured to spread open during insertion of the optical instrument providing frictional engagement with the outer diameter of the optical instrument.

18. The surgical access device of claim 1 wherein the optical instrument is a laparoscope.

19. The surgical access device of claim 1 wherein the lock (40) is made of elastomeric material.

Patentansprüche

1. Ein chirurgisches Zugangsgerät, das umfasst:

einen gewebetrennenden Obturator (18), der umfasst:

einen länglichen Schaft (21), der sich entlang einer Längsachse (23) erstreckt und ein erstes Lumen zwischen einem offenen proximalen Ende und einem distalen Ende definiert; und
einen transparenten distalen Spitzenabschnitt (27) mit einer Innenfläche und einer Außenfläche, der zum Durchdringen von Gewebe angepasst ist; wobei der distale Spitzenabschnitt (27) an dem distalen Ende des Schaftabschnitts (21) angeordnet ist; wobei mindestens Teil des Spitzenabschnitts (27) eine im Allgemeinen konisch zulaufende Konfiguration aufweist;
wobei das erste Lumen dazu dimensioniert und konfiguriert ist, ein optisches Instrument zu empfangen, das ein distales Ende aufweist, das zum Empfangen eines Bilds angepasst ist, und wobei der Spitzenabschnitt zum Durchtretenlassen eines Bilds angepasst ist; und
eine Arretierung (40), die an dem proximalen Ende des Schaftabschnitts (21) angeordnet ist, **dadurch gekennzeichnet, dass** die Arretierung (40) dazu konfiguriert ist, es dem optischen Instrument zu erlauben, frei im Innern und relativ zu dem länglichen Schaft des Obturators zu rotieren, während es das optische Instrument, das in das erste Lumen eingeführt ist, davon zurückhält, sich axial relativ zu dem Obturator (18) zu bewegen.

2. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) dazu konfiguriert ist, es dem Schaftabschnitt (21) zu ermöglichen, in einer Hin- und Herbewegung verdreht zu werden, während sie das optische Instrument in einer fixierten Rotationsposition hält, um ein stabiles Sichtbild über das optische Instrument bereitzustellen.

3. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) relativ zu dem länglichen Schaft (21) rotiert.

4. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) in Bezug auf den länglichen Schaft (21) rotiert und das optische Instrument, das in das erste Lumen eingeführt ist, in Bezug auf die Arretierung (40) fixiert ist.

5. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) ein elastomeres Element einschließt, das mit dem optischen Instrument reibschließt.

6. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) weiterhin flexible Elemente einschließt, die dazu konfiguriert sind, sich in einen Reibschluss mit einem optischen Instrument zu bewegen, das innerhalb des ersten Lumens angeordnet ist, um das optische Instrument relativ zu dem Obturator (18) durch Reibung zurückzuhalten.

7. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) relativ zu dem länglichen Schaft (21) rotiert und wobei die rotierbare Arretierung (40) eine fixierte Position einschließt, in der sie nicht relativ zu dem Schaft (21) rotiert.

8. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) mit dem Obturator (18) verbunden ist und so konfiguriert ist, dass die Arretierung (40) frei ist, relativ zu dem länglichen Schaft (21) zu rotieren, und das optische Instrument, das in das erste Lumen eingeführt ist, mit der Arretierung (40) rotiert.

9. Das chirurgische Zugangsgerät gemäß Anspruch 1, das weiterhin eine Kanüle (12) einschließt, die einen

länglichen Schaft umfasst, der sich entlang einer Längsachse erstreckt und ein zweites Lumen (14) zwischen einem offenen proximalen Ende und einem distalen Ende definiert; wobei die Kanüle (12) dazu konfiguriert ist, den Obturator (18) innerhalb des zweiten Lumens (14) aufzunehmen und eine derartige Verbindung mit dem Obturator (18) einzugehen, dass sich der Obturator (18) nicht axial oder rotational relativ zu der Kanüle (12) bewegt.

10. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) dazu konfiguriert ist, es dem Schaftabschnitt (21) zu erlauben, frei relativ zu dem eingeführten optischen Instrument zu rotieren.

11. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40d) ein Profilierungsglied (43d) einschließt, das dazu konfiguriert ist, das optische Instrument in einer axialen Position relativ zu dem Schaft des Obturators (18) zu arretieren.

12. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40g) eine rotierbare Sicherungsmutter (48) und einen Gewindeabschnitt einschließt

13. Das chirurgische Zugangsgerät gemäß Anspruch 12, wobei der Gewindeabschnitt der Arretierung (40g) weiterhin flexible Elemente einschließt, die zum Reibschluss mit dem optischen Instrument konfiguriert sind, das innerhalb des ersten Lumens angeordnet ist, um das optische Instrument relativ zu dem Schaft des Obturators (18) durch Reibung zurückzuhalten, wenn die Mutter (48) relativ zu dem Schaftabschnitt (21) in eine Richtung rotiert wird, und das optische Element relativ zu dem Schaft des Obturators (18) zu entsperren, wenn die Mutter (48) relativ zu dem Schaftabschnitt (21) in die entgegengesetzte Richtung rotiert wird.

14. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei der Spitzenabschnitt (27) im Allgemeinen hohl ist.

15. Das chirurgische Zugangsgerät gemäß Anspruch 1, das weiterhin eine Obturatorkappe (42) einschließt, die mit dem proximalen Ende des Obturatorschafts (21) verbunden ist.

16. Das chirurgische Zugangsgerät gemäß Anspruch 15, wobei die Arretierung (40) mit der Obturatorkappe (42) verbunden ist.

17. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40c) eine Klemmhülse mit mehreren Fingern (80c) ist, die einen Innendurchmesser aufweist, der kleiner als ein Außendurchmesser des optischen Instruments ist und Finger (82c) einschließt, die dazu konfiguriert sind, sich während der Einführung des optischen Instruments auszubreiten und zu öffnen, wobei sie einen Reibschluss mit dem Außendurchmesser des optischen Instruments bereitstellen.

18. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei das optische Instrument ein Laparoskop ist.

19. Das chirurgische Zugangsgerät gemäß Anspruch 1, wobei die Arretierung (40) aus einem elastomeren Material gefertigt ist.

Revendications

1. Dispositif pour accès chirurgical comprenant :

un obturateur séparateur de tissus (18) comprenant :

une partie corps allongée (21) s'étendant le long d'un axe longitudinal (23) et définissant une première lumière entre une extrémité proximale et une extrémité distale ; et
une partie embout distale transparente (27) ayant une surface interne et une surface externe, adaptée de manière à pénétrer dans les tissus ; la partie embout distale (27) étant disposée à l'extrémité distale de la partie corps (21) ; au moins un segment de la partie embout (27) ayant une configuration généralement conique ;
dans lequel la première lumière est dimensionnée et configurée de manière à recevoir un instrument optique ayant une extrémité adaptée de manière à recevoir une image et la partie embout étant adaptée pour permettre le passage d'une image ; et
un dispositif de blocage (40) disposé à l'extrémité proximale de la partie corps (21) **caractérisé en ce que** le dispositif de blocage (40) est configuré de manière à permettre à l'instrument optique de tourner librement à l'intérieur du et relativement au corps allongé de l'obturateur tout en empêchant à l'instrument optique introduit dans la première lumière de se déplacer axialement relativement à l'obturateur (18).

2. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) est configuré de manière à permettre à la partie corps (21) d'être tordue en un mouvement de va-et-vient tout en maintenant l'instrument optique dans une position rotationnelle fixe afin de fournir une image de visualisation stable par le biais de l'instrument optique.

3. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) tourne relativement au corps allongé (21).

4. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) tourne par rapport au corps allongé (21) et l'instrument optique introduit dans la première lumière est fixe par rapport au dispositif de blocage (40).

5. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) comprend un élément élastomère qui s'engage par friction avec l'instrument optique.

6. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) comprend, en outre, des éléments souples configurés de manière à s'engager par friction avec un instrument optique disposé à l'intérieur de la première lumière pour restreindre l'instrument optique par friction, relativement à l'obturateur (18).

7. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) tourne autour du corps allongé (21) et dans lequel le dispositif de blocage rotatif (40) inclut une position fixe dans laquelle il n'est pas en rotation, relativement au corps (21).

8. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) est relié à l'obturateur (18) et est configuré de telle sorte que le dispositif de blocage (40) est libre de tourner relativement au corps allongé (21) et que l'instrument optique introduit dans la première tourne avec le dispositif de blocage (40).

9. Dispositif pour accès chirurgical selon la revendication 1 comprenant, en outre, une canule (12) comprenant un corps allongé s'étendant le long d'un axe longitudinal et définissant une seconde lumière (14) entre une extrémité proximale ouverte et une extrémité distale ouverte ; la canule (12) étant configurée de manière à recevoir l'obturateur (18) dans la seconde lumière (14) et à être reliée à l'obturateur (18) de sorte que l'obturateur (18) ne se déplace pas sur le plan axial ou rotationnel relativement à la canule (12).

10. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) est configuré de manière à permettre à la partie corps (21) de tourner librement relativement à l'instrument optique introduit.

11. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40d) inclut un élément-came (43d) configuré de manière à bloquer l'instrument optique en une position axiale relativement au corps de l'obturateur (18).

12. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40g) inclut un contre-écrou rotatif (48) et un segment fileté.

13. Dispositif pour accès chirurgical selon la revendication 12, dans lequel le segment fileté du dispositif de blocage (40g) comprend, en outre, des éléments souples configurés de manière à s'engager par friction avec l'instrument optique disposé à l'intérieur de la première lumière afin de limiter l'instrument optique par friction relativement au corps de l'obturateur (18) quand l'écrou (48) est tourné relativement à la partie corps (21) dans un sens et de débloquer l'instrument optique relativement au corps de l'obturateur (18) quand l'écrou (48) est tourné relativement à la partie corps (21) dans le sens opposé.

14. Dispositif pour accès chirurgical selon la revendication 1, dans lequel la partie embout (27) est généralement creuse.

15. Dispositif pour accès chirurgical selon la revendication 1 comprenant, en outre, un capuchon d'obturateur (42) relié à l'extrémité proximale du corps de l'obturateur (21).

16. Dispositif pour accès chirurgical selon la revendication 15, dans lequel le dispositif de blocage (40) est relié au capuchon de l'obturateur (42).

17. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40c) est un collet à multi-doigts (80c) dont le diamètre interne est inférieur à un diamètre externe de l'instrument optique et qui inclut des doigts (82c) qui sont configurés de manière à s'écarter et à s'ouvrir durant l'introduction de l'instrument optique afin qu'il y ait engagement par friction avec le diamètre externe de l'instrument optique.

18. Dispositif pour accès chirurgical selon la revendication 1, dans lequel l'instrument optique est un laparoscope.

19. Dispositif pour accès chirurgical selon la revendication 1, dans lequel le dispositif de blocage (40) est construit en un matériau élastomère.

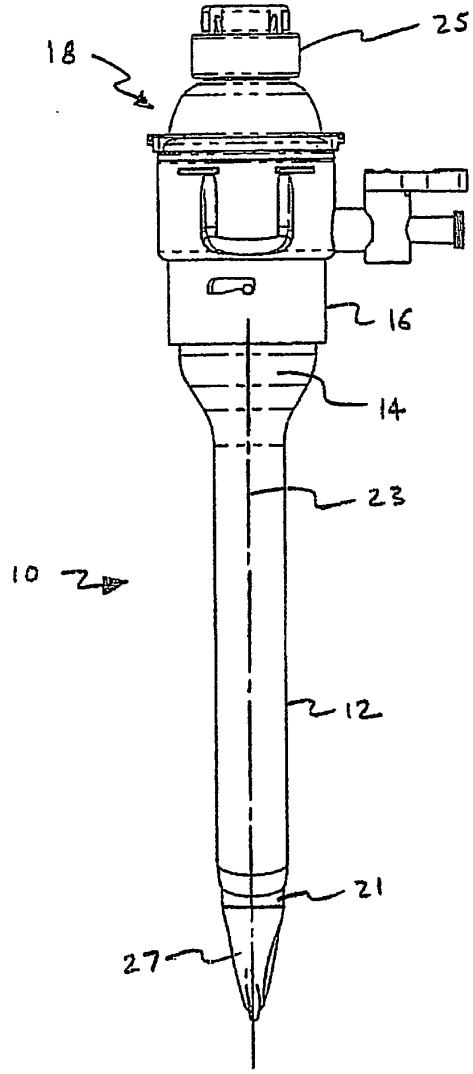

FIG. 1A

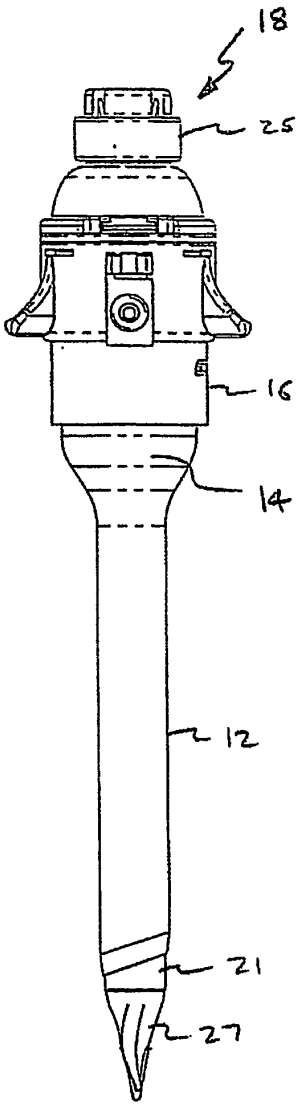

FIG. 1B

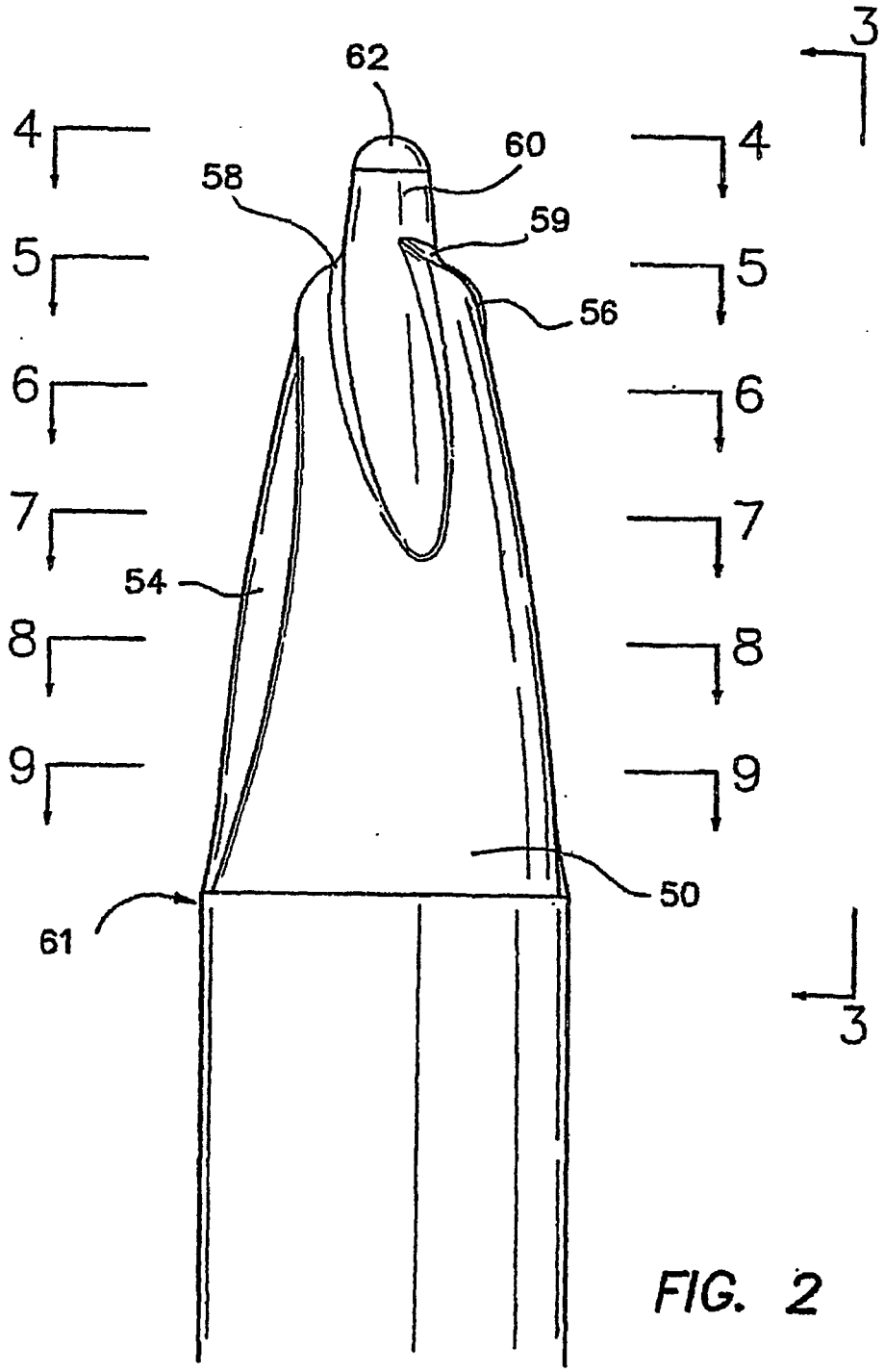

FIG. 2

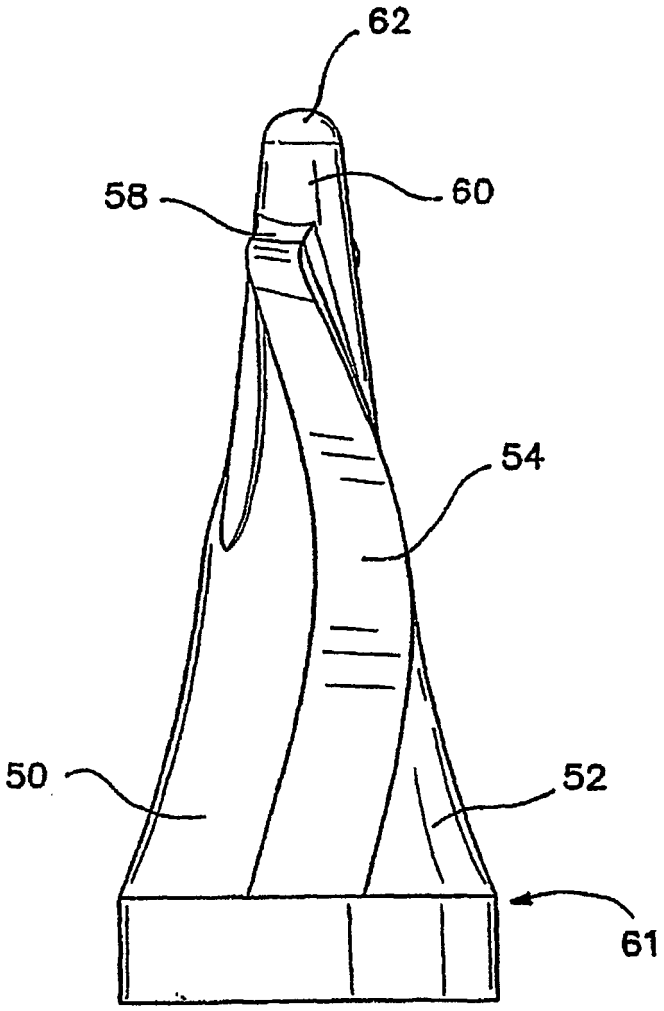

FIG. 3

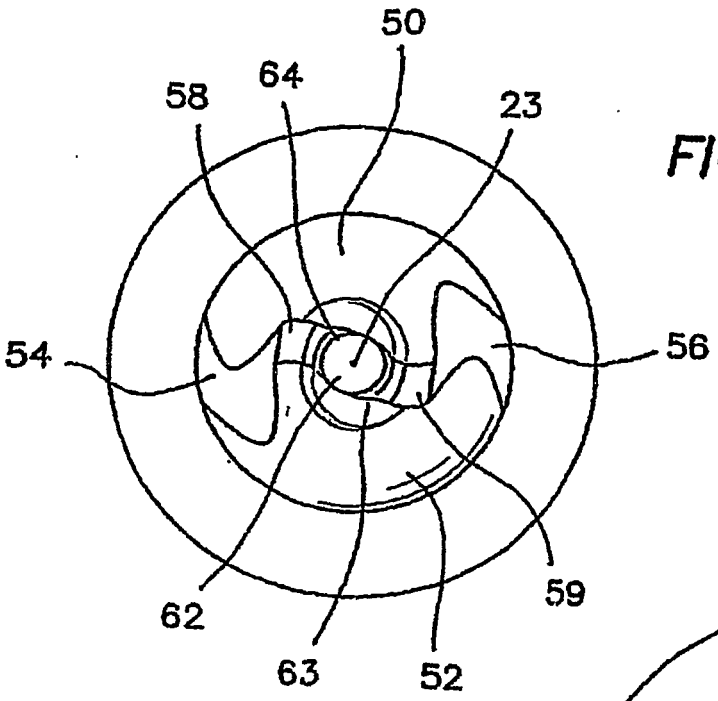

FIG. 4

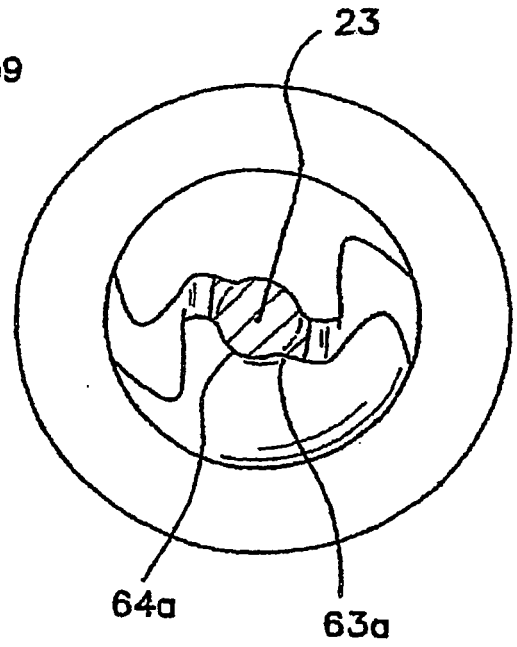

FIG. 5

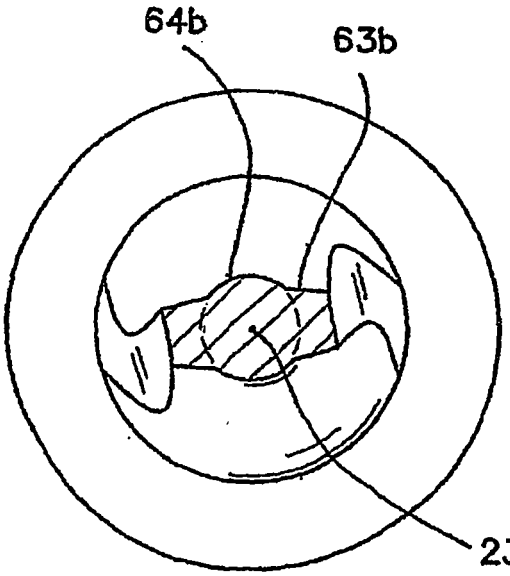

FIG. 6

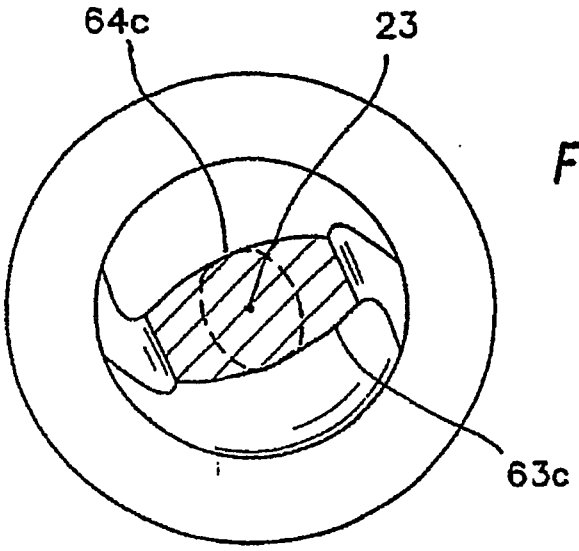

FIG. 7

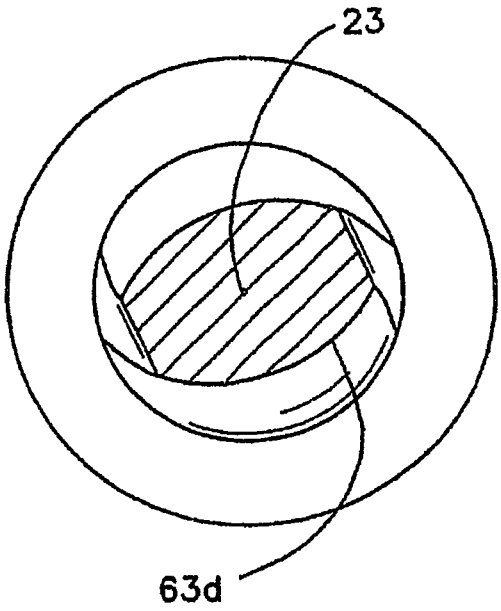

FIG. 8

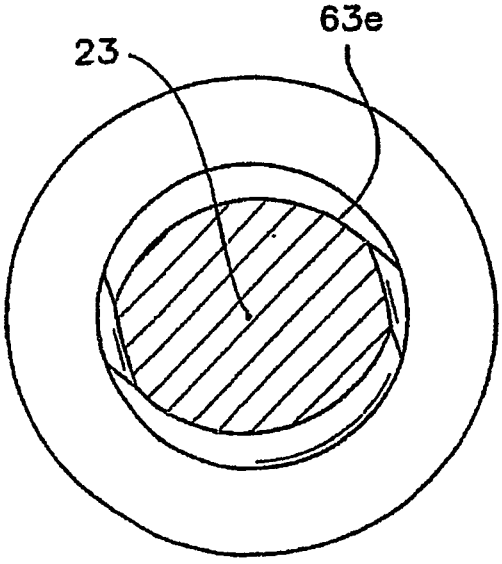

FIG. 9

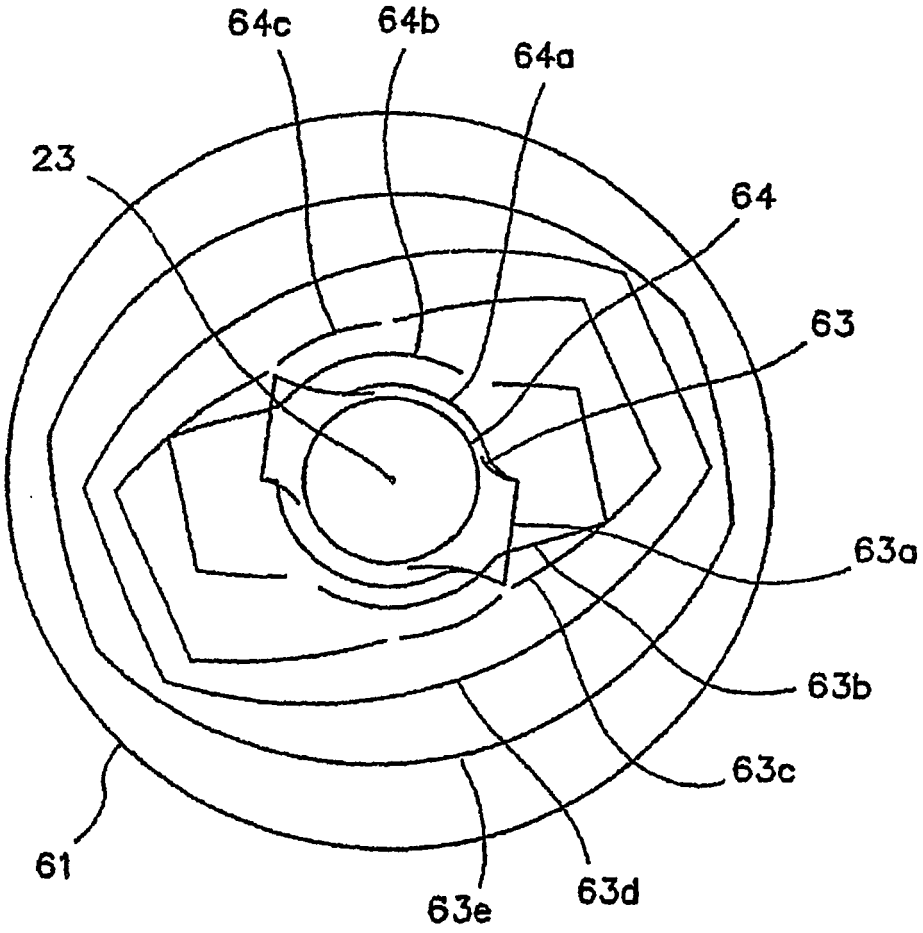

FIG. 10

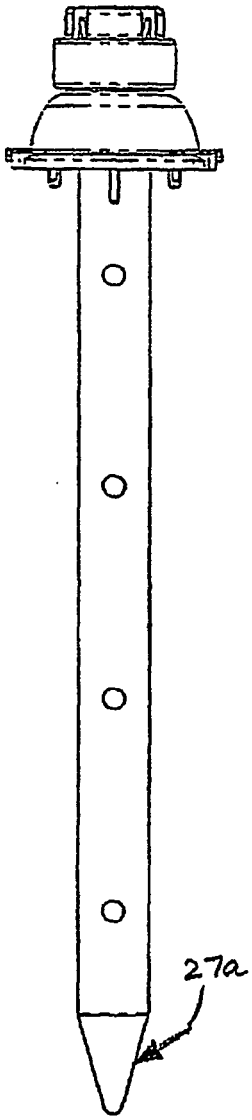

FIG. 11

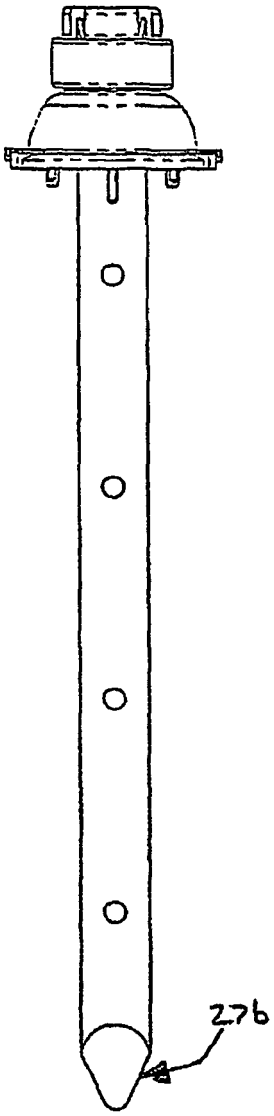

FIG. 12

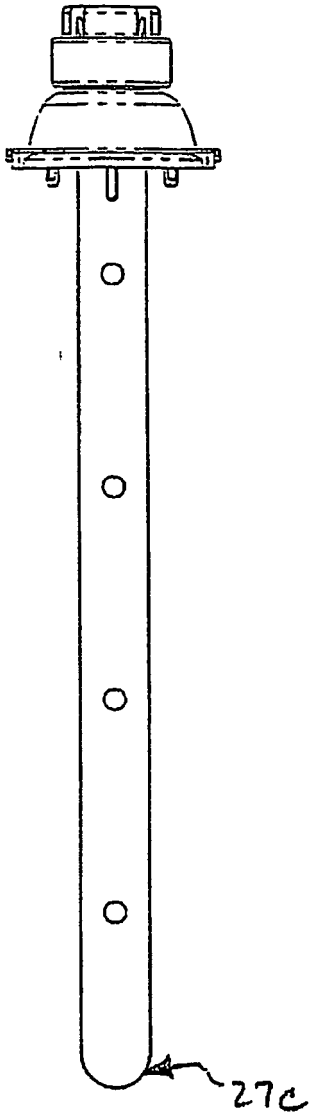

FIG. 13

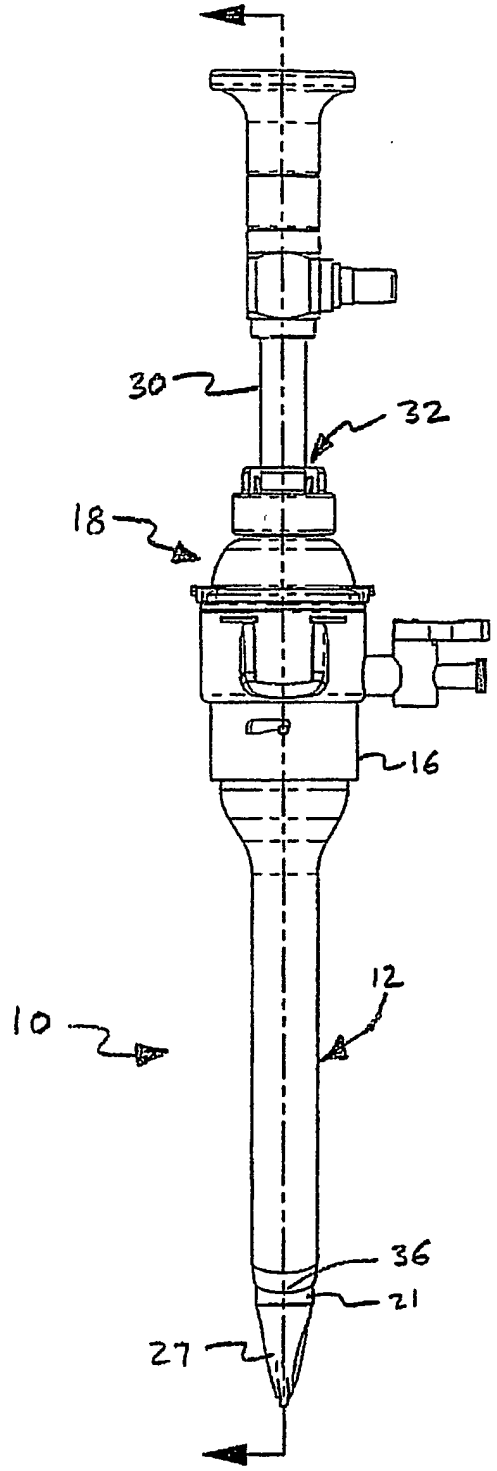

FIG. 14

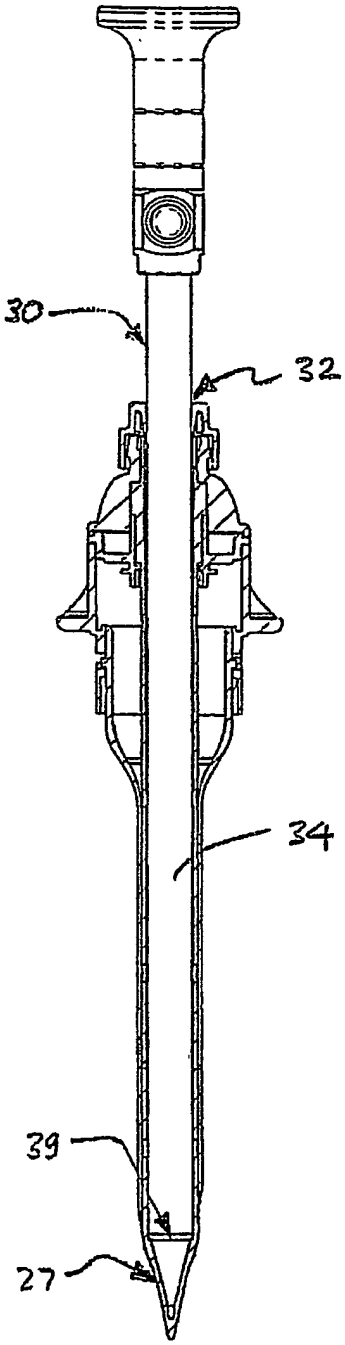

FIG. 15

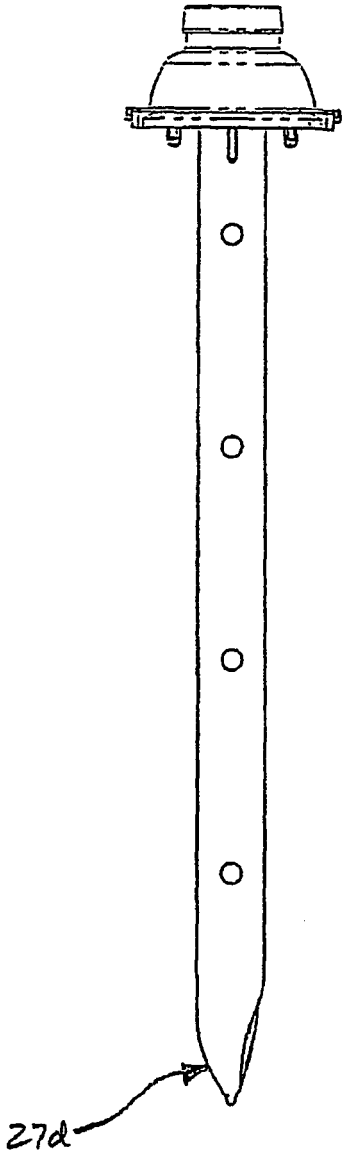

FIG. 16

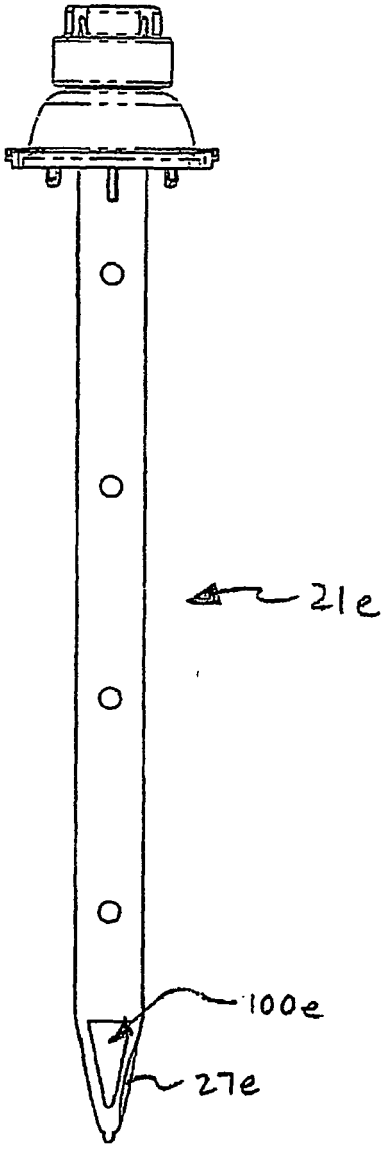

FIG. 17

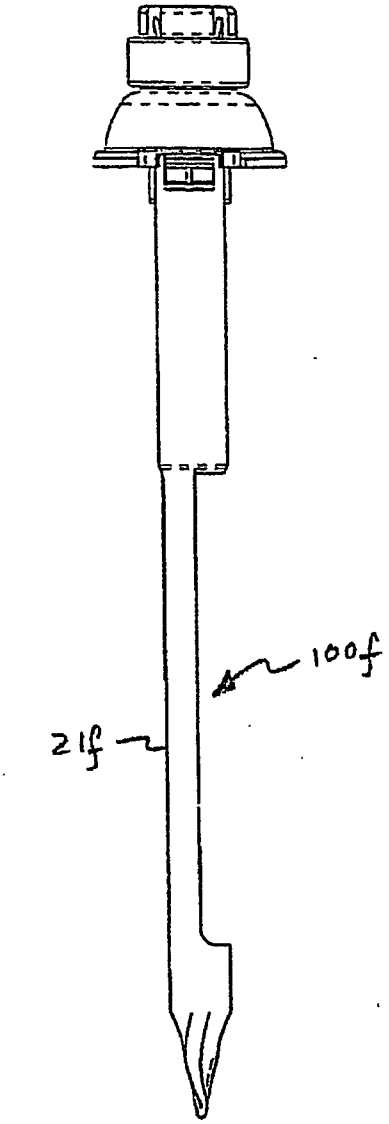

FIG. 18

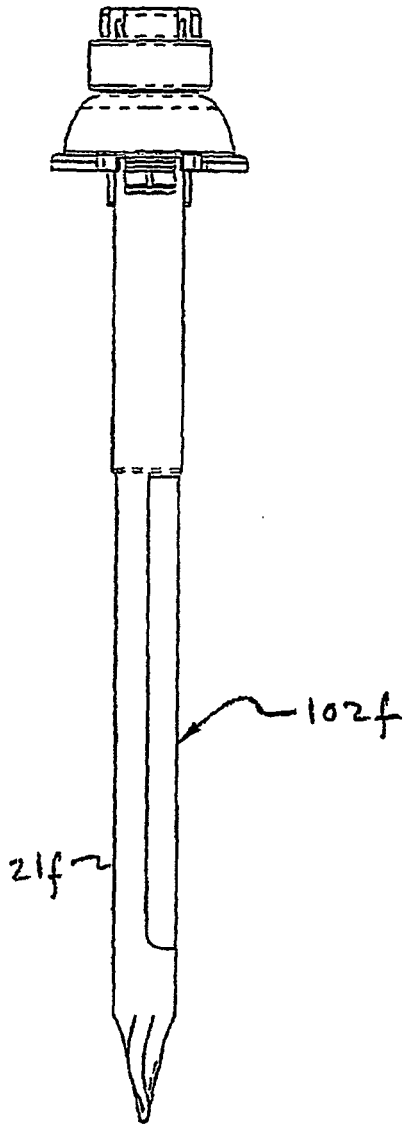

FIG. 19

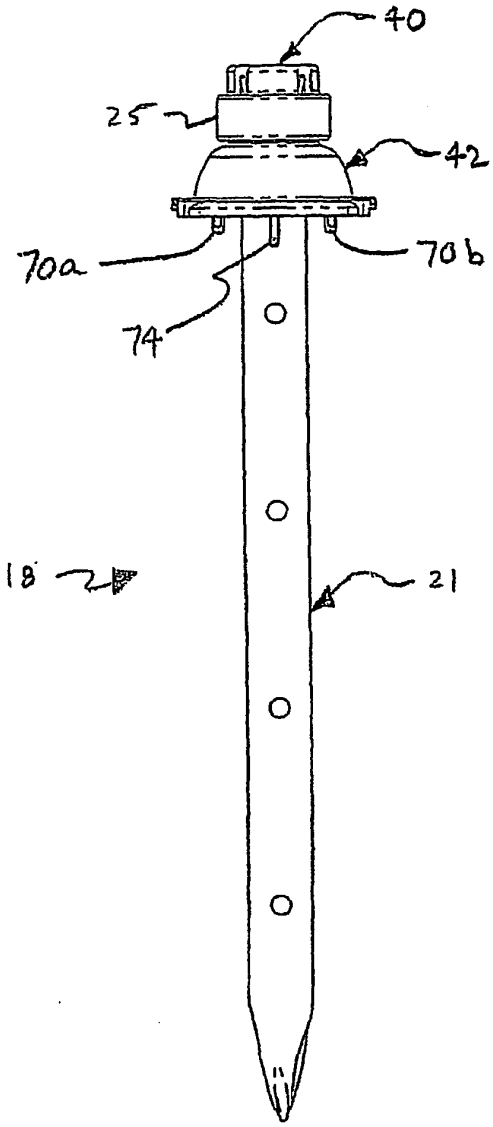

FIG. 20

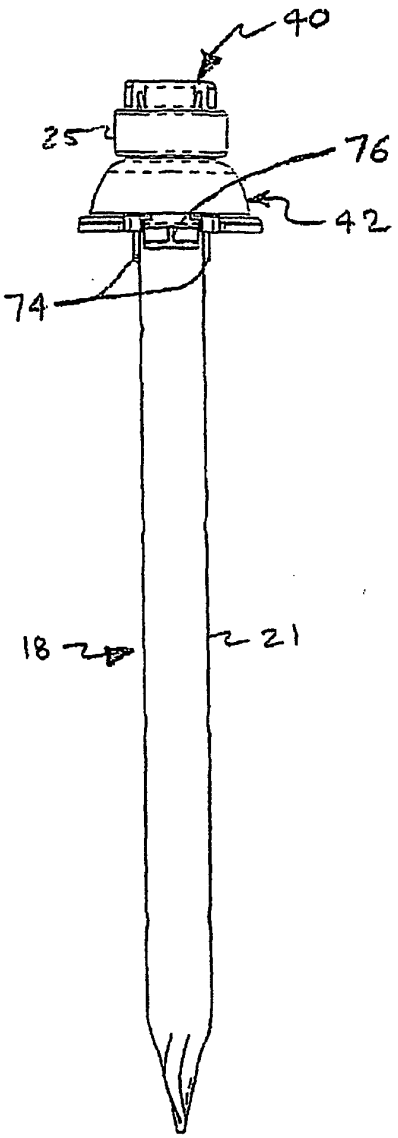

FIG. 21

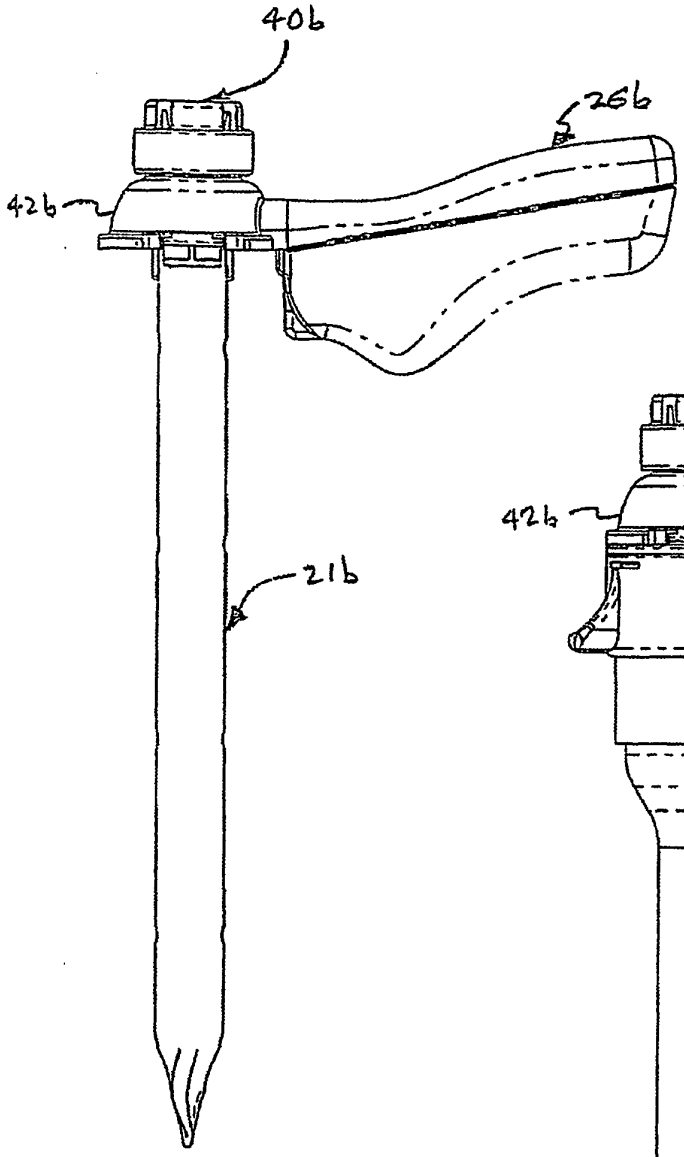

FIG. 22

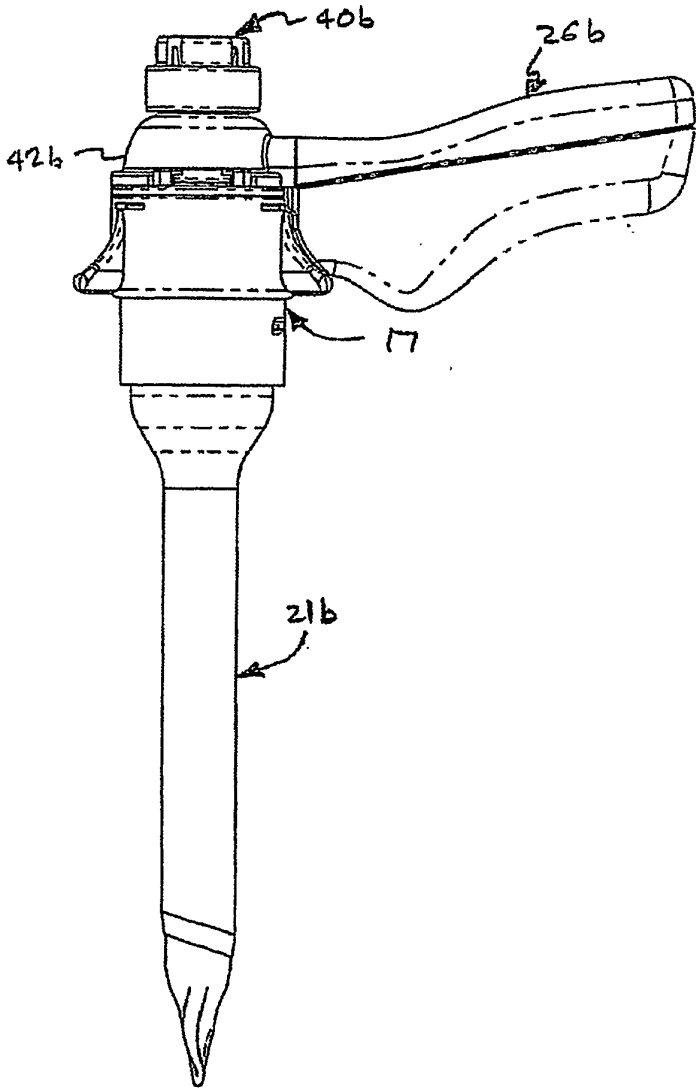

FIG. 23

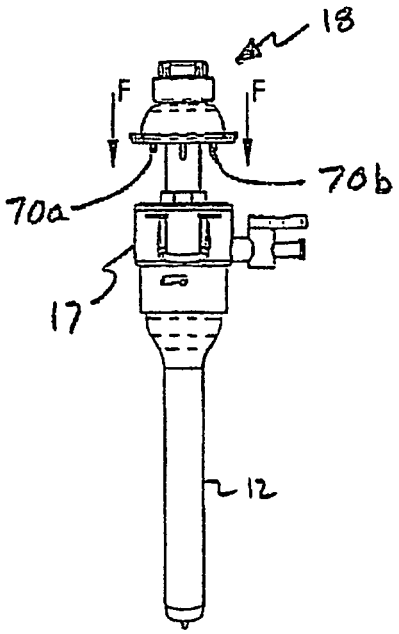

FIG. 24

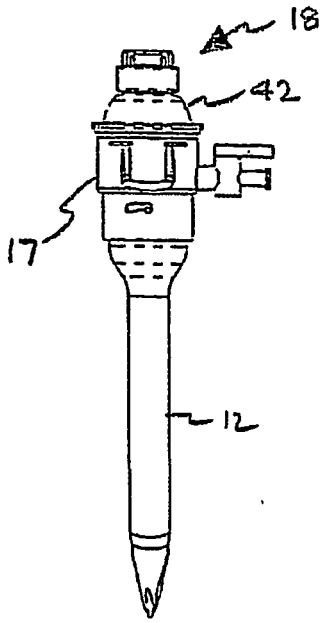

FIG. 25

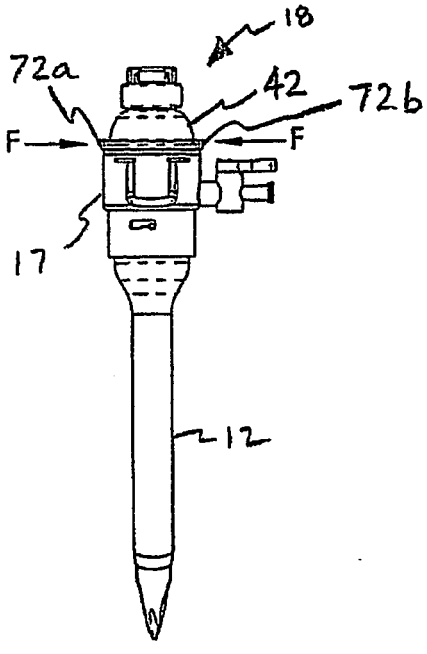

FIG. 26

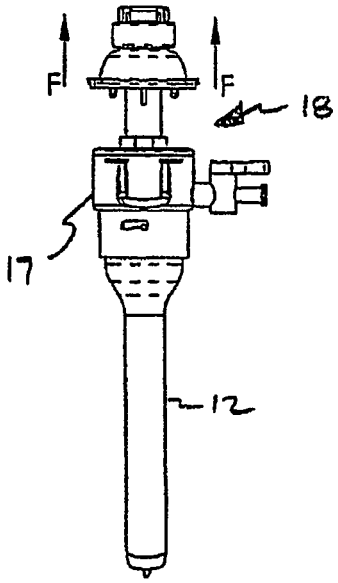

FIG. 27

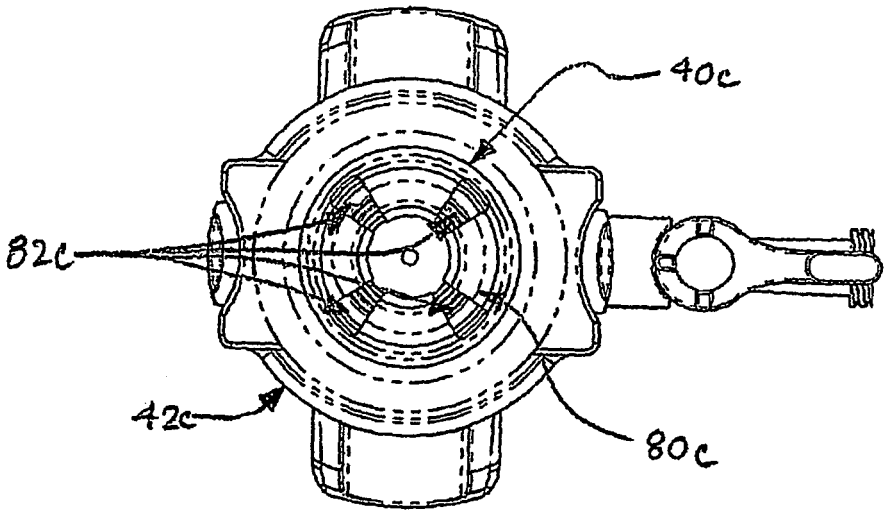

FIG. 28

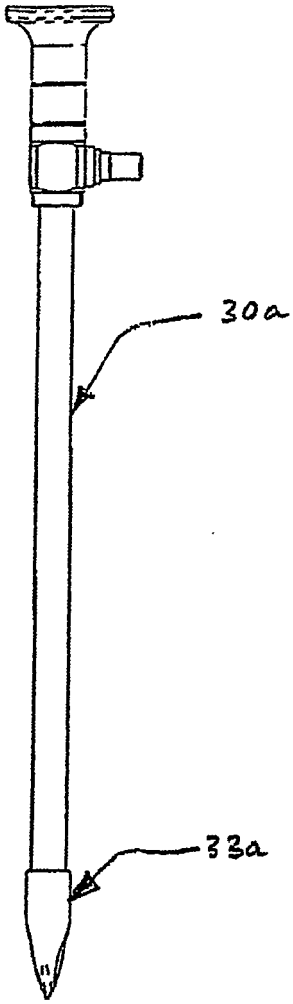

FIG. 29

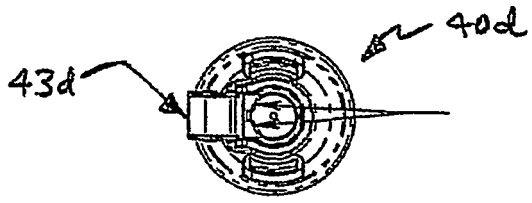

FIG. 30

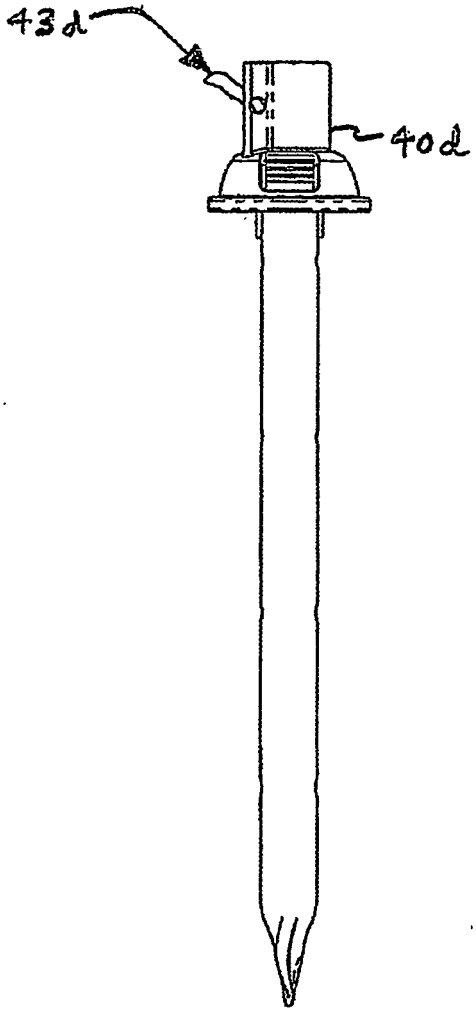

FIG. 31

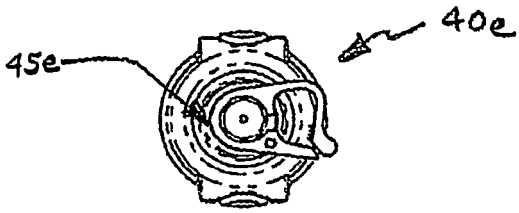

FIG. 32

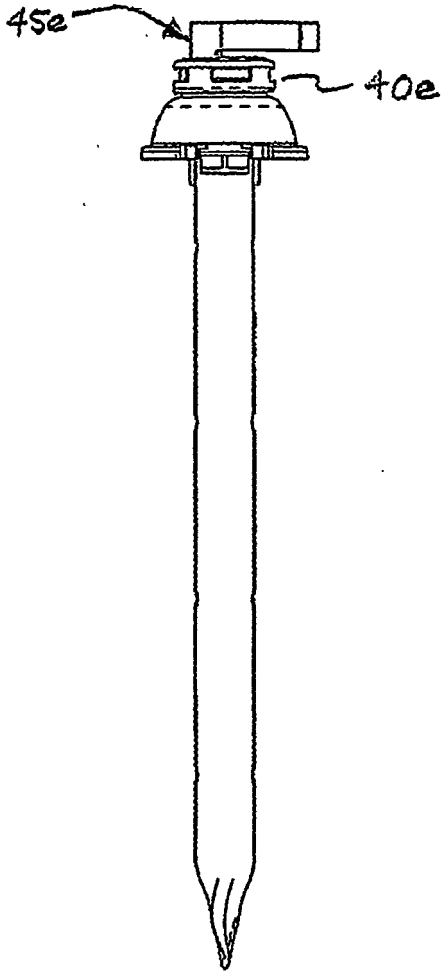

FIG. 33

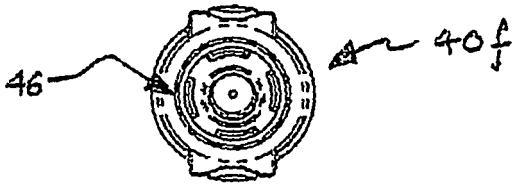

FIG. 34

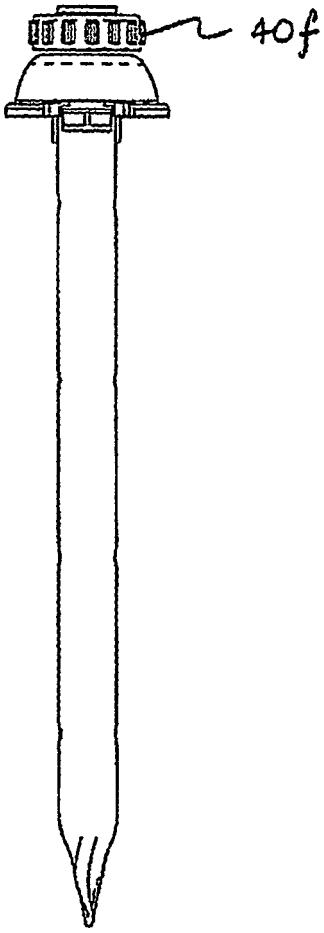

FIG. 35

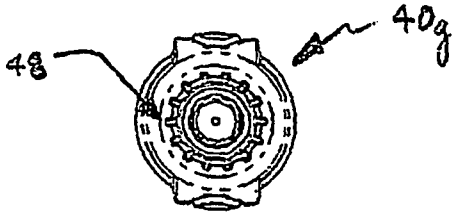

FIG. 36

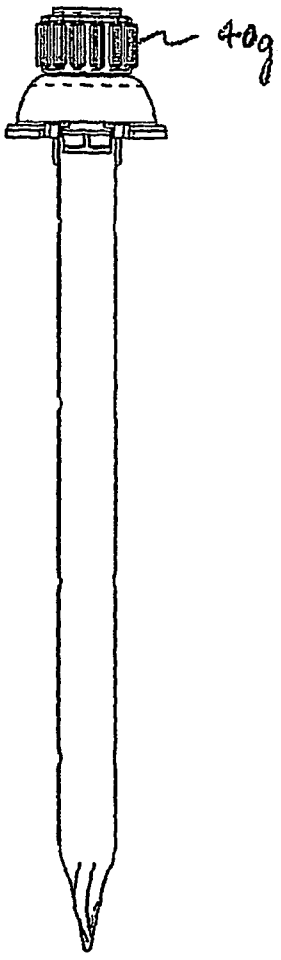

FIG. 37

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 03026512 A **[0005]**
- WO 9601074 A **[0005]**

专利名称(译)	无叶光学闭孔器		
公开(公告)号	EP2543329B1	公开(公告)日	2014-02-12
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[标]申请(专利权)人(译)	应用医疗资源		
申请(专利权)人(译)	应用医疗资源CORPORATION		
当前申请(专利权)人(译)	应用医疗资源CORPORATION		
[标]发明人	KAHLE HENRY STROKOSZ ARKADIUSZ A MCGINLEY KIMBALL B TAYLOR SCOTT V JOHNSON GARY M BRUSTAD JOHN R		
发明人	KAHLE, HENRY STROKOSZ, ARKADIUSZ A MCGINLEY, KIMBALL B TAYLOR, SCOTT V JOHNSON, GARY M BRUSTAD, JOHN R		
IPC分类号	A61B17/32 A61B17/34 A61B19/00 A61B A61B17/00		
CPC分类号	A61B17/3417 A61B17/3462 A61B17/3474 A61B17/3478 A61B17/3496 A61B90/361 A61B90/92 A61B2017/0046 A61B2017/00477 A61B2017/00907 A61B2017/320044 A61B2017/3456 A61B2017/346 A61B2017/3464 A61B2017/347 A61B2090/3937 A61B1/3132 A61B17/3415 A61B17/3421 A61B17/3423 A61B17/3468 A61B2017/3425 A61B2017/3445		
优先权	60/508390 2003-10-03 US		
其他公开文献	EP2543329A2 EP2543329A3		
外部链接	Espacenet		

摘要(译)

本发明涉及一种无刀片套管针闭塞器，用于在穿过体壁插入期间分离或分离身体组织。在一个方面，本发明的填塞器包括沿近端和远端之间的轴线延伸的轴;无刀尖端设置在轴的远端并且具有带有外表面的大致锥形结构，外表面向远侧延伸到钝点，其中一对侧部具有共同的形状并被至少一个中间件分开该部分，其中每个侧部从钝点径向向外延伸，沿着轴向近侧具有渐进位置，并且轴的尺寸和构造适于接收具有远端的光学仪器以接收身体组织的图像。在这方面，锥形构造有利于身体组织的不同层的分离，并提供层之间的尖端的适当对准。侧部包括远端部分和近端部分，侧部的远端部分相对于侧部的近端部分径向扭转。中间区段包括远侧部分和近侧部分，中间区段的远侧部分沿第一径向方向扭转，并且中间区段的近侧部分沿与第一径向方向相反的第二径向方向扭转。

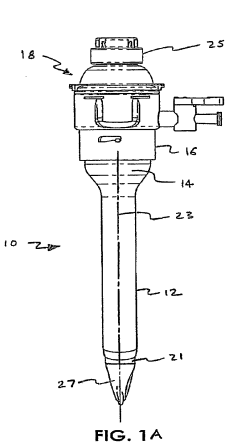

FIG. 1A

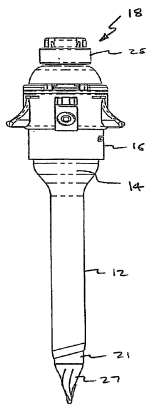

FIG. 1B