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Description

[0001] This is a divisional application of European Application No 02706494.8

Field of the Invention

[0002] This invention relates generally to trocar systems including obturators, and more specifically, bladeless obturators.

Background

[0003] 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 the case of the abdominal surgery where trocars have provided working channels across the abdominal wall to facilitate the use of instruments within the abdominal cavity. Particularly in this form of surgery, it is advantageous to insufflate, inflate, or pressurize the abdominal cavity in order to provide an increased working volume. In the interest of maintaining this insufflation, trocars have been provided with valves which form at least two seals: across the working channel a zero seal in the absence of an instrument, and an instrument seal in the presence of an instrument.

[0004] The trocar systems of the past typically includes a cannula, which defines 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 to result in penetration of the abdominal wall. Once the cannula is in place, the obturator can be removed.

[0005] In the past, obturators have been developed with an intent to provide a reduction in the force required for penetration. Sharp blades have typically been used to enable the obturator to cut its way through the abdominal wall. While the blades have facilitated a reduced penetration force, they have been of particular concern once the abdominal wall has been penetrated. Within the abdominal cavity, there are organs which need to be protected against any puncture by an obturator.

[0006] In some cases, shields have been provided with the obturators in order to sense penetration of the abdominal wall and immediately shield the sharp blades. These shielding systems have been very complex, have required a large amount of time to deploy, and have generally been ineffective in protecting the organs against the sharp blades.

[0007] Blunt-tip obturators have been contemplated with both symmetrical and asymmetrical designs. While the blunt tip tends to inhibit damage to interior organs, it also tends to increase the penetration force associated with the obturator.

[0008] In some cases, blunt tip obturators have been adjusted to take advantage of the known anatomy associated with the abdominal wall. This anatomy includes three layers of muscle, each layer having parallel fibers which extend in a particular direction that is different for each of the layers. Notwithstanding this knowledge of the anatomy, prior attempts to develop blunt-tip obturators have not taken full advantage of this anatomical structure.

[0009] US 5 817 061 A, US 5 593 402 A, US 5 735 867 A, WO 99/15084 A1, GB 2 313 316 A and WO 99/02089 A1 disclose various known surgical instrument tips which are arranged to penetrate the body wall. The preamble of the independent claims is based on the disclosure of US 5817061 A.

Summary

[0010] In accordance with one aspect of the present invention, there is provided a surgical obturator adapted to penetrate a body wall, comprising: an elongate shaft extending along an axis between a proximal end and a distal end; a bladeless tip disposed at the distal end of the shaft, the tip having a blunt distal portion with an outer surface having a generally conical configuration and a cylindrical mounting shaft at a proximal portion, the cylindrical mounting shaft at the proximal portion being adapted to closely fit with the elongate shaft to facilitate a fixed but removable relationship between the elongate shaft and the tip, the distal portion outer surface including a first cylindrical surface and a conical surface distal from the first cylindrical surface, the tip including ridges that extend radially outwardly from the outer surface, characterized by the tip further including a second cylindrical surface distal of the conical surface, wherein the ridges extend radially outwardly from the second cylindrical surface and the conical surface.

[0011] The blunt tip obturator has characteristics which take further advantage of the abdominal anatomy. The obturator has a blunt tip with a configuration that facilitates insertion with a reduced penetration force as the user moves the tip back and forth radially while applying an axial penetration force.

[0012] In accordance with the other aspect of the present invention, there is provided a surgical obturator according to claim 5.

[0013] The features and advantages of the invention will become more apparent with a discussion of preferred embodiments and reference to the associated drawings.

Description of the Drawings

[0014]

Figure 1 is a side elevation view 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;

Figure 2 is a perspective view of the blunt tip illus-

trated in Figure 1;

Figure 3 is a side elevation view of the blunt tip taken along lines 3-3 of Figure 2;

Figure 4 is a side elevation view taken along lines 4-4 of Figure 3;

Figure 5 is an end view taken along lines 5-5 of Figure 4;

Figure 6 is a radial cross-section view taken along line 6-6 of Figure 4;

Figure 7 is a radial cross-section view taken along line 7-7 of Figure 4;

Figure 8 is a radial cross section view taken along lines 8-8- of Figure 4;

Figure 9 is a radial cross section view taken along lines 9-9 of Figure 4;

Figure 10 is a radial cross section view taken along lines 10-10 of Figure 4;

Figure 11 is a schematic view illustrating each of the Figures of 5-10 super-imposed to facilitate an understanding of the twisted configuration of the blunt tip; and

Figures 12-18 show perspective views of other embodiments of the blunt tip, of which Figure 15 shows an embodiment according to the invention.

Description of Preferred Embodiments

[0015] A trocar system is illustrated in Figure 1 and designated by the 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 at 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, illustrated in Figure 1, the obturator functions to penetrate a body wall such as the abdominal wall 30 to provide the cannula with access across the wall 30 and into a body cavity, such as the peritoneal or abdominal cavity 32. The blunt tip 27, which initially facilitates penetration of the abdominal wall 30 can be removed with the obturator 18 once the cannula 12 is operatively disposed with the working channel 14 extending into the abdominal cavity 32.

[0016] In order to facilitate penetration of the abdominal wall 30 by the trocar system 10, a penetration force, represented by an arrow 34, is typically applied along the axis 23. It can be appreciated that the force required to move the system through the abdominal wall 30 drops significantly once the wall 30 is penetrated. Further application of the force 34, even for an instant of time, can result in injury to organs within the cavity 32. Where the obturators of the past have included blades facilitating penetration of the abdominal wall, these blades have been particularly threatening and detrimental to the interior organs following penetration.

[0017] Consequently, in accordance with the present invention, the tip 27 of the obturator 18 is provided with a blunt configuration. As noted, blunt tips have been used in the past to significantly reduce any potential for damage to interior organs. Unfortunately, these blunt tips have increased significantly the amount of force 34 required for penetration of the abdominal wall 30.

[0018] The blunt tip 27 of the present invention takes into account an anatomical configuration of the abdominal wall 30 with an improved structural design and method of insertion.

[0019] In order to fully appreciate the aspects of this invention, it is helpful to initially discuss the anatomy associated with the abdominal wall 30. This wall 30 typically includes the skin or fascia 35 and a series of muscles in the form of muscle layers 36, 38 and 41. These layers are each defined by muscle fibers which extend generally parallel to each other in a direction which is different for each of the layers. For example, the layer 38 is composed of fibers 43 which extend generally parallel in a particular direction. Fibers 45 associated with the layer 36 extend generally parallel at an angle such as 45 degrees to the particular direction of the fibers 43. Fibers 47 associated with the layer 41 also extend in a parallel direction but at an angle of about 45 degrees to the fibers 43 and an angle of about 90 degrees to the fibers 45.

[0020] Having noted the directional nature of the fibers, such as the fibers 45, it can be appreciated that such a structure is most easily penetrated by a tip 27 having a narrow width which is capable of being moved generally parallel to and between the fibers associated with a particular muscle layer. This narrow width might be provided with a point configuration or in the case of a preferred embodiment, a line or rectangular configuration having the narrow width and a longer length. With the length oriented parallel to the fibers of a particular laser a reduced penetration force 34 is required to push the obturator 18 through the particular layer.

[0021] Unfortunately, with the fibers 45, 43 and 47 oriented at 45 degrees to each other, proper alignment of the tip 27 for penetration of one layer, such as the layer 36, will not necessarily result in proper alignment for penetration of the next layer, such as the layer 38. For this reason, the rectangular configuration for the tip 27 may be twisted slightly so that penetration of the first layer 36 begins to rotate the distal end of the tip 27 into proper orientation for penetration of the next layer 38.

[0022] A twisted configuration of the tip 27 also causes the tip 27 to function with the mechanical advantage of a screw thread. With this configuration, a preferred method of placement requires that the user grip the handle 25 of the obturator 18, and twist it about the axis 27. This twisting motion in combination with the screw configuration of the 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. Since all of the force supplied by the user is not directed axially along the arrow 34, this concept avoids the tendency of prior

trocar systems to jump forward upon penetration of the wall 30.

[0023] A tip 27 having a twisted and rectangular configuration is illustrated in the schematic view of Figure 2 and the side views of Figures 3 and 4. Here, the tip is composed generally of four surfaces: two opposing major surfaces 50 and 52, separated by two side surfaces 54 and 56 which extend between an end surface 58 and a proximal base 61. A plane drawn through the axis 23 would show the tip 27 in this case, to be composed of two symmetrical halves.

[0024] The major surfaces 50 and 52 and the side surfaces 54 and 56 generally define the cross section of the tip 27 to be rectangular from the end surface 58 to the proximal base 61. This configuration can best be appreciated with reference to the cross section views of Figures 5-10. In Figure 5, the distal end of the tip 27 is shown as a rectangle having its greatest length-to-width ratio. This rectangle, designated by the reference numeral 63, also has a twisted, S-shaped configuration at the distal-most end of the tip 27.

[0025] As views are taken along progressive proximal cross sections, it can be seen that the rectangle 63 becomes less twisted, and the width increases relative to the length of the rectangle 63. The spiral nature of the tip 27 is also apparent as the rectangle moves counterclockwise around the axis 23 in the embodiment of Figure 2. This is perhaps best appreciated in a comparison of the rectangle 63 in Figure 7 relative to that in Figure 6. With progressive proximal positions, the rectangle 63 begins to fatten 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 circular configuration most apparent in Figures 9 and 10. 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 Figures 8, 9 and 10. This rotation back and forth results from the configuration of the side surfaces 54 and 56, which in general, have a U-shape best illustrated in Figures 2 and 3.

[0026] The ratio of the length-to-width of the rectangle 63 is dependent on the configuration of the side surfaces 54 and 56, which defined the short sides of the rectangle 63, as well as the configuration of the major surfaces 50 and 52 which define the long sides of the rectangle 63. Again with reference to Figure 3, it can be seen that the side surfaces 50 and 52 are most narrow at the distal end of the tip 27. As these surfaces extend proximally, they reach a maximum width near the point of the most counterclockwise rotation, shown generally in Figure 8, and then reduce in width as they approach the proximal base 61. Along this same distal to proximal path, the major surfaces 50 and 52 transition from a generally flat configuration at the distal end to a generally conical configuration at the proximal end 61.

[0027] In the progressive views of Figures 6-10, the rectangle 63 is further designated with a lower case letter a, b, c, d, or e, respectively. In Figure 11, the rectangles 63 and 63a-63c are superimposed on the axis 23 to show their relative sizes, shapes, and angular orientations.

[0028] A preferred method of operating the trocar system 10 benefits significantly from this preferred shape of the blunt tip 27. With a rectangular configuration at the distal surface 58, the end of the tip 27 appears much like a flathead screwdriver. The length of the surface 58 is aligned parallel with the fibers 45 of the layer 36. With this shape, the simple back and forth twisting motion tends to separate the fibers 45 along natural lines of separation, opening the muscle layer 36 to accept the larger diameter of the cannula 12. By the time the first layer 36 is substantially penetrated, the twisted configuration of the blunt tip 27 turns the rectangle at the distal surface 58 more into a parallel alignment with fibers 43 in the next layer 48. Again, a twisting or dithering motion facilitates an easy separation of these fibers requiring a significantly reduced penetration force along the arrow 34.

[0029] When the muscle layer 38 is sufficiently penetrated, the twisted configuration of the tip 27 automatically rotates the rectangular end surface 58 into generally parallel alignment with the fibers 47 of the next layer 41. Again, the natural separation of these fibers 47 together with the unique configuration of the tip 27, accommodates the further penetration of the layer 41 until the cannula 12 is operatively disposed across the wall 30. It will be noted in particular that the fibers 45, 43, and 47 are naturally separated, not cut. This has two advantageous effects: 1) the abdominal wall 30 easily closes upon removal of the trocar system 10; and 2) without cutting, very little bleeding is encountered and very little healing is required to seal the wound permanently.

[0030] One of the primary purposes of the present invention described below is to maintain control and facilitate entry into the body cavity 32 while inhibiting any tearing or cutting of tissue. The tip 27 is bladeless, blunt, and atraumatic to organs and bowel within the peritoneal or abdominal cavity 32. The tip 27 also minimizes tenting of the peritoneum and allows for a safe entry. The device is used in conjunction with the cannula 12 to create an initial entry way into the peritoneal cavity 32. The obturator is first inserted through the valve housing 16 and into the cannula 12. The entire trocar system 10 is then inserted through the abdominal wall 30 and into the peritoneal cavity 32. Once the cannula 12 is properly placed, the obturator 18 can be removed.

[0031] The device can be rotated in alternating clockwise and counterclockwise directions while the downward penetration force is applied. When rotated 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 with safety and easy until the device enters the peritoneal cavity 32 and moves to its operative position.

[0032] When the cannula 12 is ultimately removed, the size of the opening left in the tissue is minimal. Importantly, this opening is left sealed due to a dilating effect

caused by the mere separation of fibers. Note that there are no blades or sharp edges to cut muscle fiber, and thereby prolong the healing process.

[0033] In other embodiments, the tip 27 of the obturator can be fabricated of a translucent or clear material, and the handle provided with a passageway along the inside of the tip. With this configuration, a laparoscope can be inserted through the handle of the obturator and through the shaft to the tip. Insertion can then be monitored through the laparoscope, and the clear tip of the obturator, in order to further ensure safe entry.

[0034] The obturator 18 can be constructed or divided into two components such as the shaft 21 and the tip 27. Each component can be made either disposable or useable as desired for a particular configuration. In certain preferred embodiments, the obturator shaft 21 and handle are made of a reusable material, such as a metal or an autoclavable polymer in order to facilitate re-sterilization and reuse of these components. In this embodiment, the tip 27 is made of a material that is not autoclavable and therefore is adapted to be disposable.

[0035] The blunt tip 27 can be coated or otherwise constructed from a soft elastomeric material. In such a case, the material could be a solid elastomer or composite elastomer/polymer.

[0036] The obturator could also contain a spring-biased shield to cover the tip. On entry the shield could be retracted exposing the tip and then immediately and automatically moved distally back over the tip upon full entry into the peritoneal cavity 32. The action of the shield could also serve as an indicator to the surgeon that safe entry had been achieved. The obturator could be constructed in a manner wherein the tip 27 itself is spring biased and keyed to the shaft. The tip 27 would retract during insertion but would then deploy upon entry into the peritoneal cavity 32. This deployment action could also further serve as an indicator of safe entry.

[0037] The shaft 21 of the obturator 18 could be partially or fully flexible. With this configuration, the obturator 18 could be inserted through a passageway containing one or more curves of virtually any shape. A partially or fully flexed obturator 18 could then be used with a flexible cannula 12 allowing greater access to an associated body cavity 32.

[0038] The obturator 18 could also be used as an insufflation needle and provided with a passageway and valve to administer carbon dioxide or other insufflation gas to the peritoneal cavity 32. The obturator 18 could also be used with an insufflation needle cannula, in which cases removal of the obturator 18 upon entry would allow for rapid insufflation of the peritoneal cavity 32.

[0039] The obturator 18 could also be constructed to permit free spinning of the tip about the axis 23. This would allow the tip 27 to find its own way through the abdominal wall 30 rather than relying on the user for clockwise and counterclockwise rotation.

[0040] Alternative tips of obturators are illustrated in Figure 12-18 where elements of structure similar to those previously disclosed are designated with the same reference numeral followed by the lower case letters "b", "c", "i", "j", "w" and "y", respectively.

[0041] In the Figure 12 embodiment, the tip 27b also has a cylindrical mounting shaft 89b with mounting lugs 91b. This mounting shaft 89b is adapted to closely fit within the obturator shaft 21 (Figure 1). The mounting lugs 91b can engage holes or shoulders within the shaft 21 to facilitate a fixed but removable relationship between the shaft 21 and tip 27b.

[0042] In Figure 12, the tip 27b is also found with a conical surface 75b. The tip 27b is provided with ridges 93 which extend radially outwardly from the conical surface 75b. The ridges 93 can have a constant width or a width which increases proximally as in the illustrated embodiment. The height of the ridges above the conical surface 75b can be either constant or variable between the distal end 85b and the proximal end 87b.

[0043] The obturator tip 27c in Figure 13 is similar to that of Figure 12 except that the ridges 93c are not straight but rather curved as they extend between the distal end 85c and the proximal end 87c. In this case, the ridges have an angle with respect to the axis 77c which increases proximally both radially and axially.

[0044] In the embodiment of Figure 14, the tip 27i also includes recesses 79i extends from between ridges 93i and through the distal end 85i. In this embodiment the ridges 93i are disposed between the recesses 79i and extend toward the cylindrical surface 95i at the proximal end 87i. The recesses 79i in Figure 14 have individual widths which decrease proximally.

[0045] In the embodiment of Figure 15, in accordance with the present invention, the tip 27j includes the conical surface 75j which transitions proximally into the cylindrical surface 95j. Distally of the conical surface 75j a second cylindrical surface 99j is provided which extends to the distal end 85j. Ridges 93j extend radially outwardly from the second surface 99 and the conical surface 75j.

[0046] The tip 27w in Figure 16 is similar to that of Figure 14 in that it includes both the recesses 79w, as well as the ridges 93w. In this embodiment, which includes both a distal portion 134, as well as a proximal portion 136. These portions 124 and 136 have a generally common dimension along the axis 77w.

[0047] In Figure 17 the tip 27y includes concentric circular structures at the distal end 85y in the form of recesses 97y. This embodiment includes at least one ridge 93y, however, which extends radially outwardly with progressive proximal positions along the axis 77y.

[0048] It will be understood that many modifications can be made to the various disclosed embodiments without departing from the scope of the concept. 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. Those skilled in the art will envision other modifications within the scope of the present invention as defined by the following claims.

Claims

1. A surgical obturator (18) adapted to penetrate a body wall, comprising:

an elongate shaft (21) extending along an axis (23) between a proximal end and a distal end;
a bladeless tip (27j) disposed at the distal end of the shaft (21), the tip (27j) having a blunt distal portion with an outer surface having a generally conical configuration and a cylindrical mounting shaft (89b) at a proximal portion,
the cylindrical mounting shaft (89b) at the proximal portion being adapted to closely fit with the elongate shaft (21) to facilitate a fixed but removable relationship between the elongate shaft (21) and the tip (27j)
the distal portion outer surface including a first cylindrical surface (95j) and a conical surface (75j) distal from the first cylindrical surface (95j), the tip (27j) including ridges (93j) that extend radially outwardly from the outer surface **characterized by** the tip (27j) further including a second cylindrical surface (99j) distal of the conical surface, wherein the ridges (93j) extend radially outwardly from the second cylindrical surface (99j) and the conical surface (75j).

2. The surgical obturator of claim 1 wherein the tip (27j) further includes recesses (79i) and wherein the ridges (93j) are disposed between the recesses and extend toward the cylindrical surface (95j) at the proximal end (87i).

3. The surgical obturator of claim 1 wherein the ridges (93j) have a constant width or width that increases proximally.

4. The surgical obturator of any one of claims 1, 2 or 3 wherein the ridges lie in planes passing through the axis.

5. A surgical obturator (18) adapted to penetrate a body wall, comprising:

an elongate shaft (21) extending along an axis (23) between a proximal end and a distal end;
a bladeless tip (27) disposed at the distal end of the shaft (21), the tip (27) having an outer surface with a blunt distal portion and a proximal portion;
a cylindrical mounting shaft (89b) at the proximal portion adapted to closely fit within the elongate shaft (21) to facilitate a fixed but removable relationship between the elongate shaft (21) and the tip (27), **characterized in that** the tip has a twisted rectangular configuration (63).

6. The surgical obturator of claim 5 wherein the tip is twisted in a first direction.

7. The surgical obturator of claim 6 wherein the tip is twisted in a second direction opposite the first direction.

8. The surgical obturator of claim 5 wherein the outer surface includes a pair of opposed side sections separated by an intermediate section; the side sections appear as a pair opposed lines in radial cross-sections of the tip and intermediate section appears as a pair of opposed lines in radial cross-sections of the tip, with at least one of pair of lines becoming increasingly arcuate in progressively proximal radial cross-sections.

9. The surgical obturator of claim 5 wherein the rectangle (63) has a twisted S-shaped configuration at the distal-most end of the tip (27).

10. The surgical obturator of claim 5 wherein the width of the rectangle increases relative to the length of the rectangle.

11. The surgical obturator of claim 5 wherein the tip includes side surfaces (54, 56) which define the short sides of the rectangle (63) and major surfaces (50, 52) which define the long sides of the rectangle (63) and the major surfaces (50, 52) transition from a generally flat configuration at the distal end to a generally conical configuration at the proximal end.

12. The surgical obturator of claim 5 wherein the tip includes a passageway configured for the insertion of a laparoscope.

13. The surgical obturator of any preceding claim wherein the shaft (21) is made from a reusable material to facilitate re-sterilization and the tip (27) is made of a disposable material that is not autoclavable.

14. The surgical obturator of any preceding claim wherein the cylindrical mounting shaft (89b) of the tip is adapted to closely fit within the elongate shaft and includes mounting lugs (91b) configured to engage holes or shoulders within the shaft (21).

Patentansprüche

1. Ein chirurgischer Obturator (18), angepasst zum

Durchdringen einer Körperwand, der umfasst:

einen länglichen Schaft (21), der sich entlang einer Achse (23) zwischen einem proximalen Ende und einem distalen Ende erstreckt;
eine klingenlose Spitze (27j), die an dem distalen Ende des Schafts (21) angeordnet ist, wobei die Spitze (27j) einen stumpfen distalen Anteil mit einer Außenfläche aufweist, die eine im Allgemeinen konisch zulaufende Konfiguration und einen zylindrischen Befestigungsschaft (89b) an einem proximalen Anteil aufweist,
wobei der zylindrische Befestigungsschaft (89b) an dem proximalen Anteil dazu angepasst ist, eng mit dem länglichen Schaft (21) zu passen, um eine fixierte, aber entfernbare Beziehung zwischen dem länglichen Schaft (21) und der Spitze (27j) zu ermöglichen;
wobei die Außenfläche des distalen Anteils eine erste zylindrische Oberfläche (95j) und eine konisch zulaufende Oberfläche (75j) distal von der ersten zylindrischen Oberfläche (95j) einschließt, wobei die Spitze (27j) Rippen (93j) einschließt, die sich von der Außenfläche radial nach außen erstrecken, **dadurch gekennzeichnet dass** die Spitze (27j) weiterhin eine zweite zylindrische Oberfläche (99j) distal zu der konisch zulaufenden Oberfläche einschließt, wobei die Rippen (93j) sich von der zweiten zylindrischen Oberfläche (99j) und der konisch zulaufenden Oberfläche (75j) radial nach außen erstrecken.

2. Der chirurgische Obturator gemäß Anspruch 1, wobei die Spitze (27j) weiterhin Aussparungen (79i) einschließt, wobei die Rippen (93j) zwischen den Aussparungen angeordnet sind und sich zu der zylindrischen Oberfläche (95j) an dem proximalen Ende (87i) erstrecken.

3. Der chirurgische Obturator gemäß Anspruch 1, wobei die Rippen (93j) eine konstante Breite oder eine proximal zunehmende Breite aufweisen.

4. Der chirurgische Obturator gemäß einem der Ansprüche 1, 2 oder 3, wobei die Rippen in Ebenen liegen, die durch die Achse verlaufen.

5. Ein chirurgischer Obturator (18), angepasst zum Durchdringen einer Körperwand, der umfasst:

einen länglichen Schaft (21), der sich entlang einer Achse (23) zwischen einem proximalen Ende und einem distalen Ende erstreckt;
eine klingenlose Spitze (27), die an dem distalen Ende des Schafts (21) angeordnet ist, wobei die Spitze (27) eine Außenfläche mit einem stumpfen distalen Anteil und einem proximalen Anteil aufweist;
einen zylindrischen Befestigungsschaft (89b) an dem proximalen Anteil, der dazu angepasst ist, eng in den länglichen Schaft (21) zu passen, um eine fixierte, aber entfernbare Beziehung zwischen dem länglichen Schaft (21) und der Spitze (27) zu ermöglichen, **dadurch gekennzeichnet, dass** die Spitze eine verdrehte rechteckige Konfiguration (63) aufweist.

6. Der chirurgische Obturator gemäß Anspruch 5, wobei die Spitze in einer ersten Richtung verdreht ist.

7. Der chirurgische Obturator gemäß Anspruch 6, wobei die Spitze in einer der ersten Richtung entgegengesetzten, zweiten Richtung verdreht ist.

8. Der chirurgische Obturator gemäß Anspruch 5, wobei die Außenfläche ein Paar von gegenüberliegenden Seitenabschnitten einschließt, die durch einen Zwischenabschnitt getrennt sind; wobei die Seitenabschnitte als ein Paar gegenüberliegender Abschnitte in radialen Querschnitten der Spitze erscheinen und der Zwischenabschnitt als ein Paar entgegengesetzter Linien in radialen Querschnitten der Spitze erscheint, wobei mindestens eines der Paare von Linien in den progressiven proximalen radialen Querschnitten zunehmend bogenförmiger wird.

9. Der chirurgische Obturator gemäß Anspruch 5, wobei das Rechteck (63) am distalsten Ende der Spitze (27) eine verdrehte S-förmige Konfiguration aufweist.

10. Der chirurgische Obturator gemäß Anspruch 5, wobei die Breite des Rechtecks relativ zu der Länge des Rechtecks zunimmt.

11. Der chirurgische Obturator gemäß Anspruch 5, wobei die Spitze Seitenflächen (54, 56), die die kurzen Seiten des Rechtecks (63) definieren, und Hauptflächen (50, 52), die die langen Seiten des Rechtecks (63) definieren, einschließt und die Hauptflächen (50, 52) von einer im Allgemeinen flachen Konfiguration am distalen Ende zu einer im Allgemeinen konisch zulaufenden Konfiguation am proximalen Ende übergehen.

12. Der chirurgische Obturator gemäß Anspruch 5, wobei die Spitze einen Durchgang aufweist, der zum Einführen eines Laparoskops konfiguriert ist.

13. Der chirurgische Obturator gemäß einem der vorhergehenden Ansprüche, wobei der Schaft (21) aus einem wiederverwendbaren Material gefertigt ist, um die Resterilisation zu ermöglichen, und die Spitze (27) aus einem Einwegmaterial gefertigt ist, das nicht

autoklavierbar ist.

14. Der chirurgische Obturator gemäß gemäß einem der vorhergehenden Ansprüche, wobei der zylindrische Befestigungsschaft (89b) der Spitze dazu angepasst ist, eng in den länglichen Schaft zu passen, und Befestigungsansätze (91 b) einschließt, die zum Eingriff mit Löchern oder Schultern innerhalb des Schafts (21) konfiguriert sind.

Revendications

1. Obturateur chirurgical (18) adapté de manière à pénétrer dans une paroi corporelle, comprenant :

un corps allongé (21) s'étendant le long d'un axe (23) entre une extrémité proximale et une extrémité distale ; et
un embout sans lame (27j) disposé à l'extrémité distale du corps (21), l'embout (27j) ayant une partie distale mousse avec une surface externe ayant une configuration généralement conique et un corps de montage cylindrique (89b) à une partie proximale,
le corps de montage cylindrique (89b) à la partie proximale étant adapté de manière à s'adapter étroitement au corps allongé (21) pour faciliter un rapport fixe mais amovible entre le corps allongé (21) et l'embout (27j),
la surface externe de la partie distale incluant une première surface cylindrique (95j) et une surface conique (75j) en position distale par rapport à la première surface cylindrique (95j), l'embout (27j) incluant des arêtes (93j) qui s'étendent radialement et vers l'extérieur à partir de la surface externe **caractérisé en ce que** l'embout (27j) comprend, en outre, une seconde surface cylindrique (99j) en position distale par rapport à la surface conique, dans lequel les arêtes (93j) s'étendent radialement et vers l'extérieur à partir de la seconde surface cylindrique (99j) et de la surface conique (75j).

2. Obturateur chirurgical selon la revendication 1, dans lequel l'embout (27j) comprend, en outre, des renfoncements (79i), dans lequel les arêtes (93j) sont disposées entre les renfoncements et s'étendent vers la surface cylindrique (95j) à l'extrémité proximale (87i).

3. Obturateur chirurgical selon la revendication 1, dans lequel les arêtes (93j) ont une largeur constante ou une largeur qui augmente proximalement.

4. Obturateur chirurgical selon l'une quelconque des revendications 1, 2 ou 3, dans lequel les arêtes se couchent sur des plans traversant l'axe.

5. Obturateur chirurgical (18) adapté de manière à pouvoir pénétrer dans une paroi corporelle, comprenant :

un corps allongé (21) s'étendant le long d'un axe (23) entre une extrémité proximale et une extrémité distale ;
un embout sans lame (27) disposé à l'extrémité distale du corps (21), l'embout (27) ayant une surface externe munie d'une partie distale mousse et d'une partie proximale ;
un corps de montage cylindrique (89b) à la partie proximale adapté de manière à s'adapter étroitement dans le corps allongé (21) pour faciliter un rapport fixe mais amovible entre le corps allongé (21) et l'embout (27), **caractérisé en ce que** l'embout a une configuration rectangulaire tordue (63).

6. Obturateur chirurgical selon la revendication 5, dans lequel l'embout est tordu dans un premier sens.

7. Obturateur chirurgical selon la revendication 6, dans lequel l'embout est tordu dans un second sens opposé au premier sens.

8. Obturateur chirurgical selon la revendication 5, dans lequel la surface externe comprend une paire de sections latérales opposées séparées par une section intermédiaire ; les sections latérales apparaissent comme une paire de lignes opposées dans les sections transversales radiales de l'embout, et la section intermédiaire apparaît comme une paire de lignes opposées dans les sections tranversales radiales de l'embout, avec au moins une paire de lignes devenant de plus en plus arquée dans les sections transversales radiales progressivement proximales.

9. Obturateur chirurgical selon la revendication 5, dans lequel le rectangle (63) a une configuration tordue en forme de S à l'extrémité de l'embout (27) la plus distale.

10. Obturateur chirurgical selon la revendication 5, dans lequel la largeur du rectangle augmente par rapport à la longueur du rectangle.

11. Obturateur chirurgical selon la revendication 5, dans lequel l'embout inclut des surfaces latérales (54, 56) qui définissent les côtés courts du rectangle (63) et des surfaces majeures (50, 52) qui définissent les côtés longs du rectangle (63) et les surfaces majeures (50, 52) font transition entre une configuration généralement plate à l'extrémité distale et une configuration généralement conique à l'extrémité proximale.

12. Obturateur chirurgical selon la revendication 5, dans

lequel l'embout comprend un passage configuré pour l'introduction d'un laparoscope.

13. Obturateur chirurgical selon l'une quelconque des revendications précédentes, dans lequel le corps (21) est construit avec une matière réutilisable pour faciliter la re-stérilisation et l'embout (27) est construit en un matériau jetable qui ne peut pas passer à l'autoclave.

14. Obturateur chirurgical selon l'une quelconque des revendications précédentes, dans lequel le corps de montage cylindrique (89b) de l'embout est adapté pour s'adapter étroitement dans le corps allongé et comprend des ergots de montage (91 b) configurés de manière à s'engager dans des trous ou des épaulements à l'intérieur du corps (21).

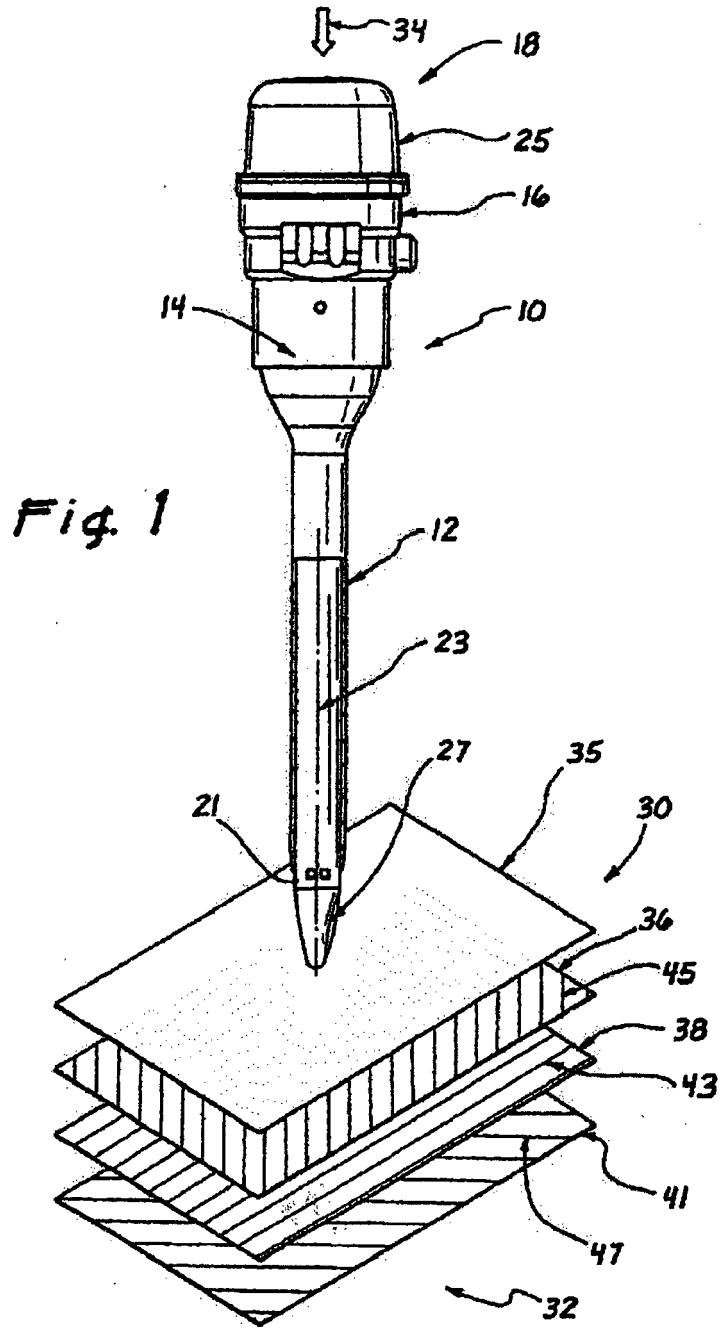


Fig. 1

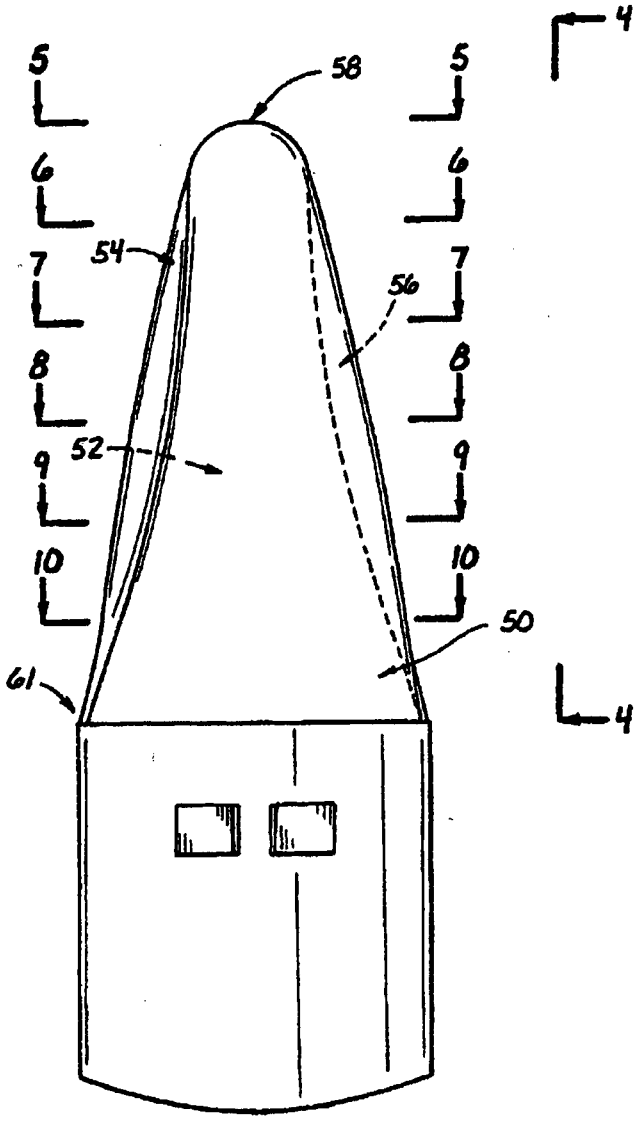


Fig. 3

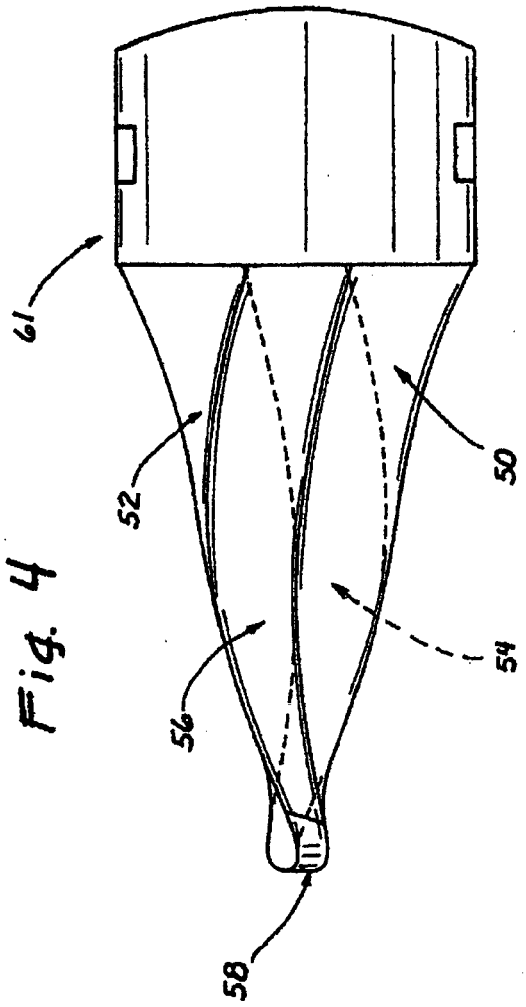


Fig. 4

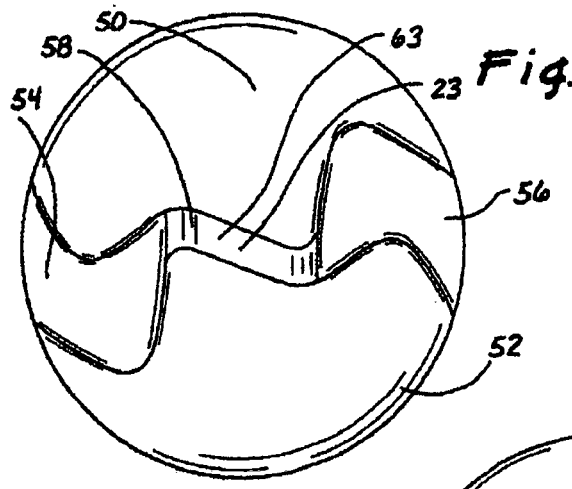
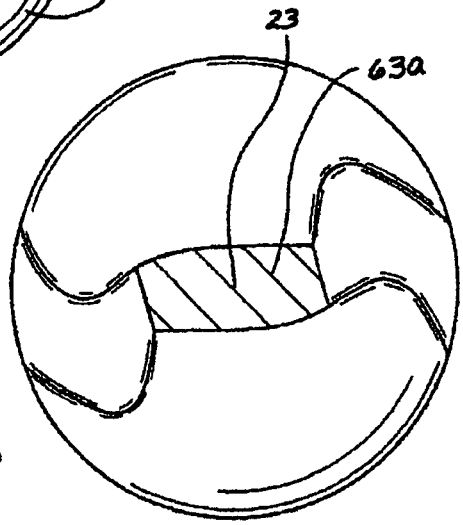


Fig. 5



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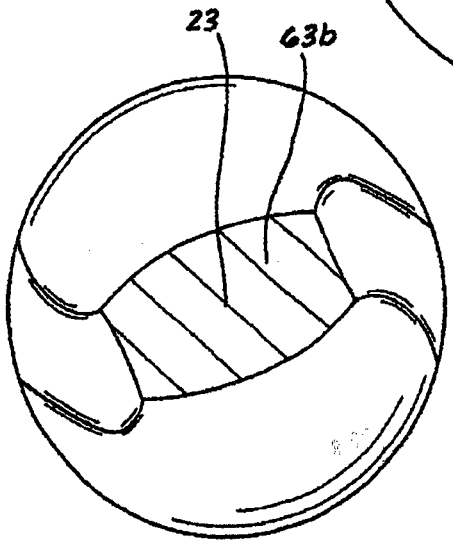


Fig. 7

Fig. 8

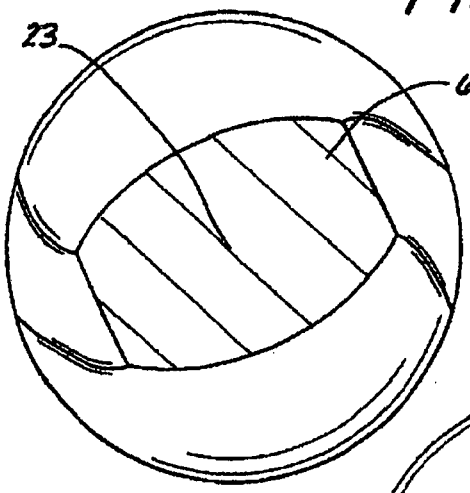
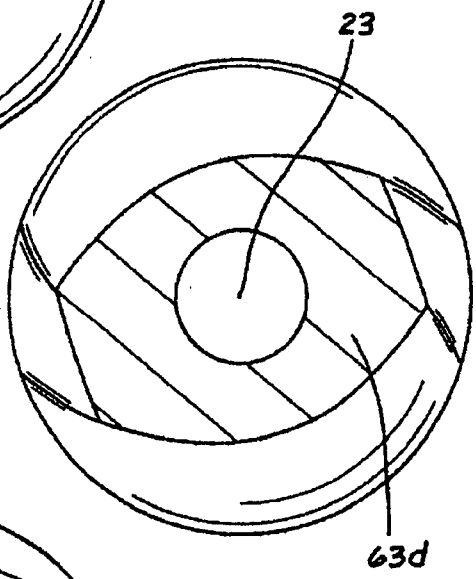


Fig. 9



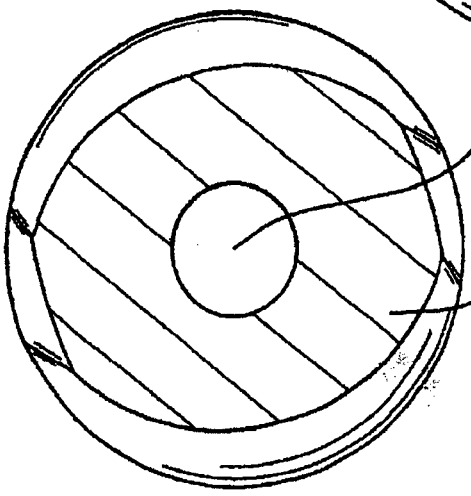


Fig. 10

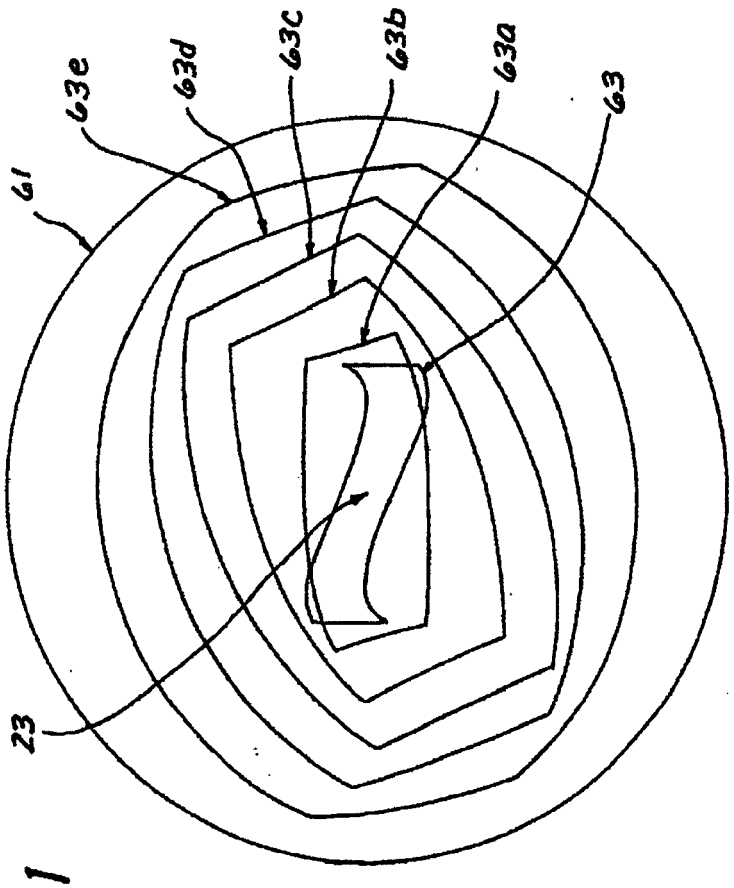


Fig. 11

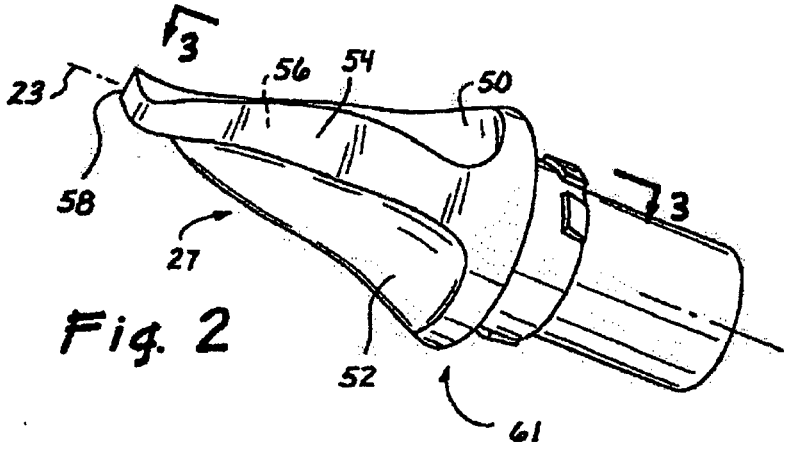


Fig. 2

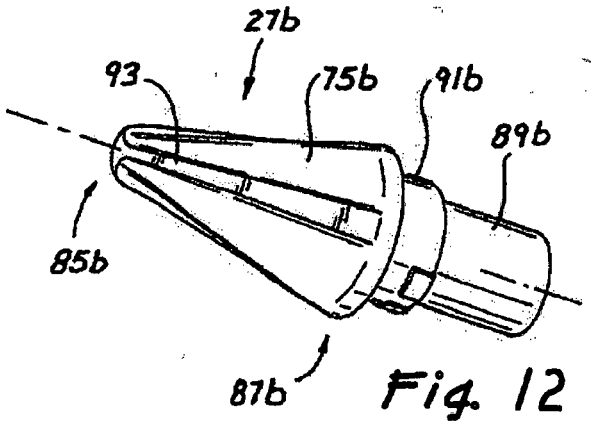


Fig. 12

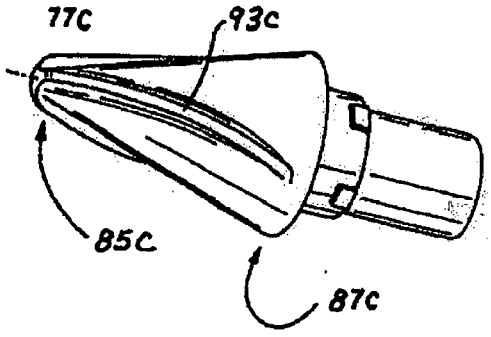


Fig. 13

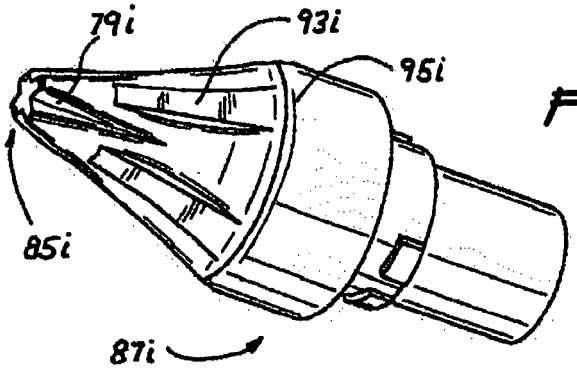


Fig. 14

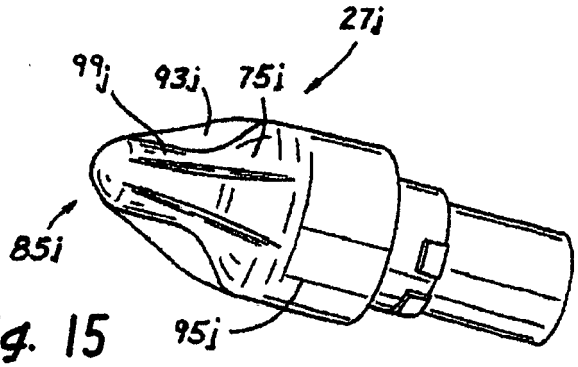


Fig. 15

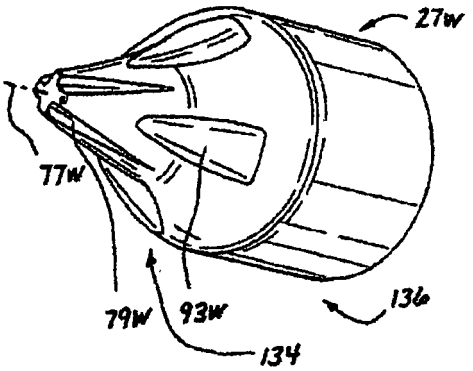


Fig. 16

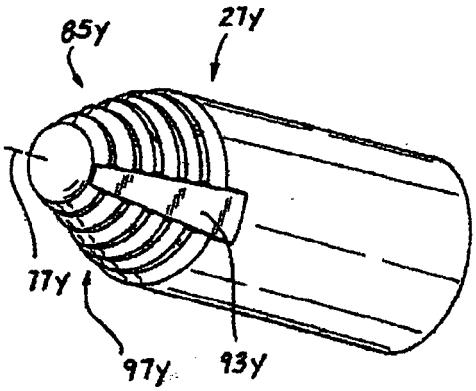


Fig. 17

REFERENCES CITED IN THE DESCRIPTION

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当前申请(专利权)人(译)	应用医疗资源CORPORATION		
[标]发明人	PINGLETON EDWARD D WIXEY MATTHEW A KAHLE HANK		
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外部链接	Espacenet		

摘要(译)

本发明涉及一种用于楔入肌纤维层（41,43,45）以安全切入腹腔（32）以便施加套管（12）的填塞器（18）。本发明包括无刀片填塞器（18），其具有尖端，该尖端具有近端部分，该近端部分具有紧密配合在填塞器的细长轴（21）内的圆柱形安装轴（89）。