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(54) **Title**: CANNULA LOCK CAPABLE OF LOCKING THE CANNULA AT A USER-SET ANGLE RELATIVE TO THE LOCK ANCHOR

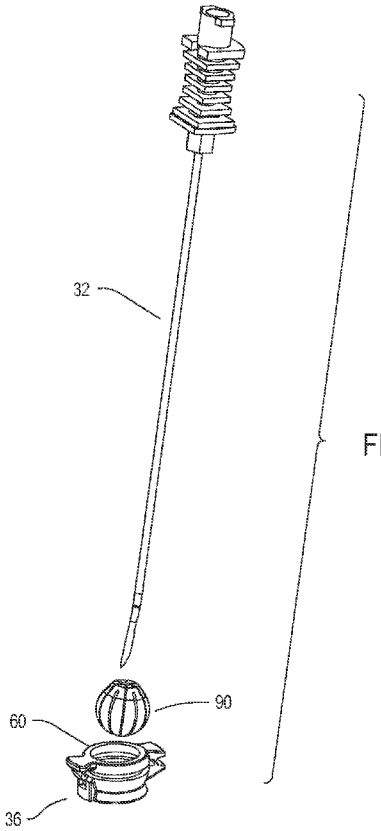

FIG. 2

(57) **Abstract**: A lock (30) for holding a cannula (32) or other medical device static relative to the patient. The lock includes an anchor (36) that is fixed to the patient and a clamping unit (90) to which the medical is fitted. The clamping unit is fitted to the anchor and able to rotate in one if not more axes relative to the anchor. A latch both holds the device to the clamping unit and the clamping unit static relative to the anchor.

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CANNULA LOCK CAPABLE OF LOCKING THE CANNULA AT A USER-SET ANGLE RELATIVE TO THE LOCK ANCHOR

Field Of The Invention

[0001] This invention relates generally to a cannula lock used to hold a cannula or other device to a patient. More particularly, the cannula lock of this invention allows the user to both before and after the lock is latched, set the orientation device relative to the lock.

Background Of The Invention

[0002] There are a number of medical and surgical procedures during which an elongated tube like device is inserted into a portal formed in the patient. The device is directed to tissue or an organ or tissue internal to the patient. For example, a particular type of pain management procedure involves inserting a cannula through the skin of the patient and positioning the open end of the cannula adjacent a nerve bundle. An electrode is inserted in the cannula. Initially, a relatively small current is applied to the electrode. This current is applied to the nerve bundle. The current is applied to determine through which nerve the perception of pain is being transmitted to the brain of the patient. Once this nerve is identified, the electrode is withdrawn. An anesthetic is introduced through the cannula to the nerve bundle. The electrode is reintroduced into the cannula. At this time a high current signal is sourced through the electrode. This current ablates the nerve through which the pain signal is being transmitted through the patient.

[0003] During this procedure it is desirable to prevent the position of the cannula from shifting. This increases the likelihood that, when the electrode is reinserted into

the patient, the cannula and electrode are at the desired target position, adjacent the nerve that is to be subjected to the ablation process.

[0004] A cannula lock, as implied by its name, is a device that holds a cannula or other similar device static when it is inserted into a patient. Generally a cannula lock has two parts, an anchor and a clamp. The anchor is a block like structure. The anchor has a face that is adhesively secured to the skin of the patient. The anchor also has a bore through which the cannula or similar component is inserted. The clamp is attached to the anchor. The clamp, when engaged, holds the cannula or other component static to the anchor.

[0005] A cannula lock is fitted over the component with which it is used prior to the start of the procedure. Once the component is inserted through the skin and at least partially positioned, the anchor pressed against the skin. Upon the final positioning of the component, the clamp is engaged. Given that the anchor is static relative to the patient and the clamp holds the component static relative to the anchor, the anchor lock thus holds the component in a static position relative to the patient.

[0006] Many cannula locks are constructed to hold the cannula fitted to them in a fixed angle relative to a reference plane on the anchor. To lock the cannula in place, the practitioner, after establishing the desired position and orientation for the cannula, secures the anchor to the skin in such an orientation that the cannula will be in the desired orientation. Depending on the orientation of the cannula, it may be difficult to secure the anchor to the patient.

[0007] Further, once the anchor is secured to the skin of the patient it may be difficult to, if necessary, reset the

position and especially the orientation of the cannula. If such resetting of the cannula is necessary, it may be necessary to release the lock anchor from the skin of the patient. Since the adhesive used to secure the anchor is spent, it can then be necessary to place a new cannula lock over the cannula before attempting to reset the position of the cannula. Having to take these steps and introduce this additional lock can increase the overall time and expense associated with having to perform the procedure.

Summary Of The Invention

[0008] This invention is related to a new and useful cannula lock. One feature of the cannula lock of this invention is constructed to allow the practitioner to set the orientation of the cannula or other device relative to the lock. It is a further feature of this invention is that, once the lock of this invention is in place, the practitioner has the ability to reset the position and orientation of the device relative to the lock. It is a further feature of some versions of the lock of this invention to hold the device to the lock at two spaced apart locations along the length of the cannula.

[0009] The cannula lock of this invention includes an anchor and clamp. The anchor has a distal end face adapted to be secured to the skin of the patient to which the lock is affixed. The clamp is moveably attached to the anchor. The clamp includes a bore or other void space for receiving the cannula or other device intended for insertion into the patient. In some, but not all, versions of the invention the clamp is a component that is separate from and moveably to the anchor. In some, but not all, versions of the inventions, the clamp is approximately spherical in shape. The clamp is formed to have a number of spaced apart

clamping members. When the clamp is approximately spherical in shape, these clamping members are sometimes referred to as wedges.

[00010] In some versions of the invention, the clamp is seated in the anchor. The clamp is able to rotate around at least one axis if not two or three axes that are fixed relative to the anchor. In most versions of the invention, at least one of the axes around which the clamp rotates is in a plane that intersects, is off angle to, a proximal to distal longitudinal axis through the anchor. In some versions of the invention the anchor includes a bolt and a latch. The bolt is selectively pressed against the clamp. When the bolt is so positioned, the bolt holds the clamp in a fixed position relative to the anchor and urges the clamping members against the cannula. The latch releasably holds the bolt in the fixed position against the clamp. When the bolt is so held in place, the bolt holds the clamp static relative to the anchor, the clamp holds the cannula static to the clamp.

[00011] The cannula lock of this invention is used by fitting the lock over the cannula or other elongated device that is to be inserted into the patient. The elongated device is inserted into the patient and properly position. Here, the positioning of the device is understood to mean the insertion of the device so extends the correct distance into the patient and extends at the correct angle (orientation) relative to the skin. Once the device is so positioned, the distally directed face of the anchor is secured to the skin of the patient. Since the clamp and anchor are not fixed together, the anchor pivots to ensure that inserted device maintains the correct the orientation. Once the position of the inserted device is finally set, the latch is engaged. This results in the bolt and clamp

cooperating to hold the inserted device static in the both the desired position and orientation relative to the anchor.

[00012] A further feature of this invention is that the latch can be released and reset. Upon release of the latch the bolt can be repositioned. This, in turn, allows repositioning of the position and orientation of the inserted device relative to the anchor.

[00013] Another feature of this invention is that clamp bears against the inserted device at two locations along the device. This increases the ability of the clamp to, in the face of forces placed on the device, hold the device static.

Summary Of The Invention

[00014] The invention is pointed out with particularity in the claims. The above and further features and advantages of this invention are understood from the following Detailed Description taken in conjunction with the following drawings in which;

[00015] Figure 1 is a perspective view of how a device, here a cannula, is held in place with the lock of this invention;

[00016] Figure 2 is an exploded view of lock of Figure 1;

[00017] Figure 3 is a plan view of the anchor;

[00018] Figure 4 is a perspective view of the anchor showing the distally directed portion of the anchor;

[00019] Figure 5 is a cross sectional view of the anchor;

[00020] Figure 6 is a side view of the clamp;

[00021] Figure 7 is a perspective view of the top of the clamp;

[00022] Figure 8 is a perspective view of the bottom of the clamp; and

[00023] Figure 9 is a cross sectional view of the clamp.

Detailed Description

[00024] Figures 1 and 2 depict a lock 30 of this invention. Lock 30 holds a medical or surgical device in a static position and orientation relative to the skin of the patent on which the device is used. The depicted device is a cannula 32. Accordingly, lock 30 is sometimes referred to as a cannula lock. It is understood that the lock is used to hold a device other than a cannula static relative to the patient.

[00025] Lock 30 includes an anchor 36 and a clamp 90. Anchor 36 is fixedly held to the skin of the patient. Clamp 90 is moveably mounted to the anchor. More specifically, the clamp is able to rotate around at least one fixed axis relative to the anchor 36. Preferably, the clamp 90 is able to at least partially rotate, pivot, around to two axes that are fixed relative to the anchor 36. The cannula 32 extends through clamp 90. In the depicted version of the invention, the cannula 32 also extends through the anchor 36. Anchor 36 includes a bolt and latch assembly as described below. When the bolt and latch are in the latch state, clamp 90 is fixedly held to the anchor 36 and the cannula 32 is fixedly to the clamp. In this manner the cannula 32 is held in a fixed position and orientation relative to the lock 30. This orientation is understood to be fixed relative a plane through the anchor. Arbitrarily, this plane is the distal surface of the foot 40 that is disposed against the skin of the patient. In Figure 3 this plane is depicted as line 41, the plane goes in and out of the Figure.

[00026] Anchor 36 is formed from a single piece of plastic such as ABS, polypropylene or polyethylene. The anchor 36 is shaped to have a base 38 as seen in Figures 3-5. More particularly, the base 38 has a foot 40 that is generally

circular in shape. In the depicted version of the invention, the base 38 is formed so that extending proximally from the distal face of the foot, the diameter of the outer surface of the foot slightly decreases. (Here, "distal" is understood to mean away from the practitioner and toward the location at which the procedure is to be performed. "Proximal" is understood to mean towards the practitioner performing the procedure, away from the site on/in the patient at which the procedure is to be performed.) A pedestal 42 extends proximally upwardly from anchor foot 40. The pedestal 42 is generally circular in shape. Extending upwardly from the foot 40, the outer diameter of the pedestal 42 increases.

[00027] Anchor base 38 is formed to have a series of void spaces that are generally centered on the longitudinally extending axis through the base that extends between the proximal and distal ends of the base. A first one of these voids is a circular opening 44 in the base. Above and contiguous with opening 44, base pedestal 42 defines a center void, void 46. Void 46 is generally in the form of a slice section through a sphere. The inner circular surface of the pedestal 42 that defines void 46 has a concave profile from the proximal end to the distal end of the surface.

[00028] A rib 48 projects outwardly from one portion of the base pedestal. Rib 48 is generally rectangular in shape. The rib is, however formed, so as to have a tapered surface 50 adjacent the proximal end of the rib. More specifically, the rib is formed so that extending distally from the top of rib, surface 50 tapers distally and outwardly from the center of anchor base 38. Distal to surface 50, The rib 48 is formed with a notch 52.

[00029] The anchor 36 is further formed to have a bolt 60. Bolt 60 is generally ring shaped. The bolt 60 has a center void 62 that extends proximally to distally through the bolt. Bolt 60 is shaped so that inner surface of the bolt that defines void 62 has a shape that is generally in the form of a slice section through a sphere. More particularly the inner surface of the base pedestal 42 and the inner surface of the bolt have are shaped to have same radius of curvature.

[00030] A hinge 54 pivotally connects bolt 60 to the anchor base 38 so the bolt is suspended above the proximally directed surface of pedestal 42. Hinge 54 consists of first and second tabs 56 and 58, respectively. The first tab 56 projects radially outwardly from the pedestal 42. The second tab 58 projects outwardly from bolt 60 and overlaps first tab 56. The hinge also includes a flexible web 57 that extends between the tabs 56 and 58. Web 57 extends between tabs 56 and 58 at a location adjacent the midpoints along the facing surfaces of the tabs. Web 57 thus suspends the anchor bolt 60 above the pedestal 42.

[00031] Anchor bolt 60 has a latch 64. Latch 64 includes a tab 68 that positioned to extend outwardly from the bolt 60. The anchor 36 is formed so that latch tab 68 is diametrically opposed to hinge tab 58. Given the material from which anchor 36 is formed, tab 68 is able to flex relative to bolt 60. A finger 70 that is approximately L-shaped extends downwardly from the undersurface of tab 68. The finger 70 is shaped so the free end of the finger can seat in anchor base notch 52. When the latch 64 is not so positioned, an outer surface of the finger 70 rests on anchor base tapered surface 50. When the anchor is in this state, the facing surfaces of the anchor pedestal and bolt are generally parallel. When the finger 70 is seated in

notch 52 the end of the bolt 60 closest to latch 64 is closer to the proximal surface of pedestal 42 than the end connected to the pedestal by the hinge 54.

[00032] A layer of adhesive material 74 is disposed around the distally directed ring shaped surface of anchor foot 40. The adhesive is the type of material that facilitates the securing of the anchor to the surface of the skin against which lock 30 is mounted. Not shown is the release sheet that normally covers the layer of adhesive material. The release sheet is removed as part of the process of readying lock 30 for use.

[00033] Clamp 90, as seen in Figures 6-10, is formed from a plastic that has some degree of flexibility. The clamp 60 may be formed from ABS, polycarbonate or polyester plastic. The clamp 90 is generally in the form of a truncated asymmetric oblate spheroid. Specifically, extending distally from the equator of the clamp 90, the clamp is generally in the form of a semi-sphere. Here the "equator" of the clamp 90 is understood to be the section of the clamp wherein, in a horizontal plane intersecting the clamp in Figure 6, the clamp has its widest diameter. Extending proximally from this equator, the radius of curvature of the clamp relative to center point within the circle defined by the equator increases. This radius of curvature increases so that distal to the proximal end of the clamp 90, the outer surface of the clamp has essentially a linear profile. The proximal end of the clamp has a face surface 92. Surface 92 which is has a circular perimeter, is perpendicular to the longitudinal axis through the clamp 90.

[00034] Relative to anchor, clamp 90 is shaped to have a radius at the equator that is approximately equal to the radius of the sphere defined by the surface of the anchor

that defines the pedestal void space 46 and the bolt opening 62.

[00035] The clamp 90 is formed with a number of voids. One of these voids is the bore 96. Bore 96 extends along the longitudinal axis of the clamp from proximal end face surface 92 to and through the distal end of the clamp. Bore 96 has a diameter that is slightly greater than the diameter of the device anchor is intended to hold in place. For example, if the lock is intended to hold a cannula 32 having an outer diameter of 1.25 mm in place, the clamp 90 is formed so that bore 96 has a diameter that is typically no more than 1.0 mm greater than the diameter of the cannula.

[00036] Clamp 90 is further shaped to have a number of slots that extend radially inwardly from the outer surface of the body of the clamp. Two slots, slots 102, are diametrically opposed from each other. At the proximal end of the clamp slots 102 are contiguous and extend radially outwardly from bore 96. Slots 102 extend distally through the clamp 90. Slots 102 do not extend the complete length of the clamp. Instead slots 102 terminate a short distance, appx. 1 mm, proximal to the distal end of the clamp.

[00037] There are six slots 104. Slots 104 are spaced 60° apart from each other around the circumference of the clamp 90. The clamp 90 is further formed so that on the opposed sides of each slot 102 the adjacent slots 104 are spaced 30° apart from the slot 102. Slots 104 extend proximally from the distal end of the clamp 90 and more particularly the distal end opening of bore 96. The slots 104 do not extend the complete length of the clamp 90. Instead, the slots 104 terminate approximately 1 mm distal to the clamp proximal surface 92.

[00038] The clamp 90 is further formed to have two pairs of slots 106. Each slot 106 is, relative to the longitudinal axis of the clamp, diametrically opposed to a complementary slot 106. Each slot 106 is spaced 60° from the closest slot 102. By extension, this means each slot 106 is located between a pair of slots 104 and spaced 30° from the adjacent slots 104. Clamp 90 is formed so that each slot 106 extends radially outwardly from a base that is spaced radially outwardly from the portion of proximal surface 92 that forms the proximal end opening into bore 96. Each slot 106 extends outwardly and distally. Slots 106 terminate at the same distal location along the length of the clamp at which slots 102 terminate. Thus, at no location along the length of the clamp 90 do slots 106 extend into or are contiguous with bore 96.

[00039] The slice sections of clamp 106 separated by slots 102, 104 and 106 are referred to as wedges 110. For ease of illustration not all wedges 110 are identified.

[00040] The cannula or other device with which lock 30 is used is typically but not always, configured to be inserted through the skin of the patient and into the interior of the patient. Thus the device is formed from a biocompatible material. These materials include plastic and metals such as stainless steel. In the depicted version of the invention, cannula 32 is designed receive an electrode. The electrode, not illustrated and not part of the present invention, when properly positioned, in the patient is used to flow a current through the patient. The current flow can be for diagnostic reasons, for example, to map tissue that forms a neural pathway. The current flow can be for therapeutic reasons. For example, current is flowed to ablate nerves through which pain signals are continually being transmitted to the brain. Alternatively, the

cannula 32 functions as a lumen through which an agent is introduced into specific tissue within the patient. This agent, may be an anti-viral medication, an antibiotic or an agent designed to treat cancer.

[00041] Lock 30 of this invention is used when it is desirable to hold a device, here cannula 32, static relative to the patient to which the device is fitted. The lock and cannula are prepared for use by fitting the lock to the cannula by inserting the device in clamp bore 96. At this time, latch finger 70 is not seated in notch 54. Lock 30 is thus in an unlatched state. When lock 30 is in the unlatched state the clamp wedges 110 on the opposed sides of slots 102 at the proximal end of the clamp are spaced relatively far apart. Similarly, at this time opposed wedges at on the opposed sides of slots 104 at the distal end of the clamp are likewise spaced relatively far apart. Owing to the dimensioning of the lock components relative to the cannula 32, the cannula 32 and clamp 90 are able to move freely relative to each other. This means the cannula 32 can be moved both longitudinally relative to the clamp 90 and rotated around the axis that extends through the clamp bore 96. It should also be able understood that when the lock is unlatched, clamp 90 is able to rotate around three perpendicular axis that extend through the anchor base 38. More particularly, the benefit of this invention is obtained because two of the axes around which the clamp 90 rotates are in the plane of the anchor bolt 60. This is a plane that is spaced proximally from and parallel to the plane of the surface of foot 40 that is disposed against the skin of the patient. Stated another way, this is a plane that intersects the distal-to-proximal longitudinal axis of the anchor 36 that extends proximally away from the surface of the base that seats against the tissue against which the

anchor is disposed. A first one of these axes can be considered the axis along a first line between tab 58 and tab 68. The second one of these axes can be considered to be along a second line that is perpendicular to the first line. The third axis around which clamp 90 is able to rotate is the proximal to distal axis that extends longitudinally through pedestal void 46.

[00042] As part of the process of preparing the lock 30 for use, the release sheet covering the anchor adhesive material 74 is removed.

[00043] Cannula 32 is then inserted into the patient. Once the cannula is inserted into the patient, the cannula is positioned adjacent the tissue against which the cannula is to be placed. This process is the process associated with using the cannula.

[00044] Once the cannula 32 or other device is in the desired position and orientation, lock 30 of this invention is set to so hold the device. This process begins by the pressing of the anchor 36 against the patient. More particularly the anchor is pressed against the patient so that the adhesive material 74 contacts the skin to hold anchor 36 in place. It should be appreciated that, as a consequence of the positioning and orienting of the cannula, the cannula may or may not have an orientation that is substantially perpendicular to the surface of the skin through which the cannula is inserted into the patient. When anchor 36 is actually pressed against skin, assuming the cannula 32 is held static by the practitioner, the clamp 90 assumes a specific position and orientation relative to the fixed plane of the anchor and, by extension, the patient. Here, orientation of the clamp is understood to be the angle of the clamp, for example the angle of bore 96, relative the adjacent skin of the patient.

Anchor 36 essentially rotates around the clamp 90 so that the when the anchor foot 40 presses against the skin, the face of the foot is essentially parallel to the skin.

[00045] Once the anchor is so positioned, the practitioner completes the locking of the cannula 32 in place by the pressing down on latch 64. This results in latch finger 70 seating in anchor base notch 52. As a result of this latching of the anchor, the end of bolt 60 adjacent the latch is displaced towards anchor pedestal 42. This results in the compression of the clamp 90 between the pedestal 38 and the bolt 60. More particularly at least some if not all of the clamp wedges 110 are urged towards each other. Adjacent the proximal end of the clamp this results in at least two of the wedges 110 between at least one of the slots 102 moving inwardly toward each other. This results in the arcuate inner surfaces of these wedges that define the proximal end of bore 96 moving inwardly toward each other. Thus at the top of the clamp 90 the cannula is compressed in place between the proximal portions of these wedges. At the distal end of the clamp, at least some of the wedges 110 between slots 104 are simultaneously urged inwardly towards each other. This results in the portion of the cannula adjacent the distal portions of these wedges from likewise being compressed in place. Thus, when anchor 30 of this invention is in the latched state, clamp wedges 110 hold the cannula static relative to the clamp and the anchor and bolt hold the clamp static relative to the anchor. In this manner the anchor 36 holds the cannula 32 or other device in a static position on and in static orientation relative to the skin of the patient.

[00046] There is a time during the performance of the procedure at which the use of the cannula or other device is no longer required. Cannula 32 is removed by flexing latch

tab 68 so as to pivot finger 70 out of notch 54. This returns the anchor the unlatched state. Bolt 60 is pivoted away from anchor pedestal 42. This results in the release of the forces that compress clamp wedges 110 together. The cannula is then withdrawn from the clamp. Anchor 36 is then removed from the skin of the patient.

[00047] When the anchor 36 of this invention is pressed against the patient, the rotation of the anchor 36 relative to the clamp 90 ensures that essentially the whole of the distally directed face of the anchor foot 40 and, by extension, adhesive material 74 press against the skin. This substantially ensures that the anchor will hold fast to the patient at the desired position.

[00048] Lock 30 of this invention is further designed so that, once the lock is latched, the cannula is compressed between the clamp 90 at two locations; the proximal end of the clamp and the distal end. These locations are often spaced 1 cm or more apart from each other and more often 2 cm or more apart from each other. This feature of the invention, holding the cannula tightly to the clamp at two locations, reduces the likelihood that should a destabilizing force be applied to the cannula that the cannula will work loose from the lock.

[00049] It is a further feature of this invention that once the lock is latched, it is still possible to adjust the position and orientation of the clamped device. Specifically, if such adjustment is necessary, the latch is released to return the lock 30 to the unlatched state. Then, while the anchor 36 remains bonded to the patient and the clamp 90 seated in the anchor, the practitioner is able to both reset the orientation of the clamp and, by extension, the orientation of the cannula. Likewise when the anchor is in this state, since the clamp 90 is no longer

compressed against the cannula the extent to which the cannula is extends/retracted relative to the clamp can be reset. Thus, lock 30 of this invention provides a means to after being deployed, unlatched so as to allow at least some adjustment of the device the anchor is used to hold static.

[00050] The above is directed to one specific version of the invention. Alternative versions of the invention may have alternative constructions.

[00051] For example, in the described version of the invention, the clamp is formed with 12 slots/12 wedges. Alternative clamps of this invention may have fewer or more slots and wedges. The disclosed clamp is not spherical. In other versions of the invention, the clamp may be spherical. The disclosed clamp is a single piece component. In alternative versions of the invention, the clamp comprise plural jaw like elements that are separate pieces. This, the clamp could comprise two semi-spherical components each of which is formed with a groove. In this version of the invention the anchor includes fingers that are selectively moved together. The clamping components are rotatably disposed between the fingers. The movement of the anchor fingers together results in the clamping components being held static by the fingers and the clamping components holding the device disposed between the clamping components static relative to the clamping components.

[00052] Further, in some constructions of this invention a single piece clamp may be formed from material that, instead of being rigid, is compliant. One such material may be rubber or an elastomer. In these versions of the invention, the clamp may not have any slots that separate adjacent sections of the clamp. Instead, the action of the bolt pressing against the clamp, compresses the material forming the clamp inwardly. The material thus compresses against

the device seated in the clamp so as to hold the device static.

[00053] Further in the described version of the invention, the anchor and clamp are two separate components. In some versions of the invention, the clamp, the components that bear against the device the lock is intended to hold static may be at least partially built into the anchor. Likewise, the anchor may not always be a single piece component.

[00054] The disclosed clamp is not spherical. In other versions of the invention, the clamp may be spherical. Still in other versions of the invention, the clamp may not even have a shape that approaches that of a spheroid. For example, an alternative lock of this invention could be constructed to allow the anchor to rotate along only single axis that is static relative to the anchor. In these versions of the invention, the clamp may be cylindrical in shape. In other versions of the invention the clamp may include plural links. Each of the links pivots in a separate axis.

[00055] In the described version of the invention a single bolt and latch assembly both holds the clamp static and causes the clamp to hold the cannula in static. In some versions of the invention a first latch assembly may be provided that holds the clamp static and a second latch assembly holds the associated device static to the clamp. An advantage of this construction of the invention is that it enables the practitioner to, by setting one but not both of the latches initially semi-secure the device in place. The practitioner by setting the unlatched component, the clamp or the device, then is able to perform a final positioning of the device. Once this final positioning is performed, the second latch is set.

[00056] There is no requirement that in all versions of the invention, the clamp 90 be able to rotate around three axes that are fixed relative to the anchor 36. The clamp may only rotate around a single axis or two axes. It is believed that in most preferred versions of the invention, at a minimum, the clamp be able to pivot around at least one axis that is static relative to the anchor. This allows the angular orientation of the medical device 32 to be selectively set along one angle relative to the fixed plane of the anchor. In preferred versions of the invention, the clamp 90 rotates around two axes that are fixed relative to the anchor. This allows the orientation of the medical device 32 relative to the fixed plane of the anchor 36 to be set relative to two separate angles (along two separate planes that intersect each other and the fixed plane). In still other preferred versions of the invention, when the anchor 36 is unlatched, the longitudinal position of the medical device relative to the clamp 90 can be set and/or the orientation of the medical device relative to an axis extending through the medical device can be set. Alternatively, in addition to or instead of rotating the medical device 32 relative to the clamp 90, the clamp can be rotated to set the rotational orientation of the medical device around an axis that extends through the fixed plane of the anchor. In the most preferred versions of the invention, such as the version described above, that the medical device 32 engages in each of the above described movements relative to the clamp 90 and the clamp engages in each of the above described movements relative to the anchor 36.

[00057] Likewise, the structure of the latch itself may vary from what has been described. In some versions of the

invention the latch may be similar to trunk or luggage latch.

[00058] Likewise there is no requirement that all versions of the invention be constructed so that the bolt's movement is pivotal about an axis parallel to the surface against which the anchor is to be mounted. In some versions of the invention, anchor is constructed so that the bolt moves about axis that is perpendicular to the plane of the surface against which the anchor is to be mounted. By extension, this means that the latch need not always be set/released in movements that take place along an axis perpendicular to the surface against which the anchor is to be mounted.

[00059] Further there is no requirement in all versions of the invention that the anchor base and anchor bolt be formed as a single component. In versions of this invention wherein these two components are separate, both components are formed with features that facilitate the locking of the bolt to the anchor base. Typically these features also allow the relatively simple unlocking of the bolt from the base. For example, the bolt may be provided with one or more flexible fingers or tabs that seat in complementary slots or notches formed in the anchor base.

[00060] In the described version of the invention, the clamp bears against the device at two spaced locations. In some versions of the invention, the clamp may hold the device static at only a single location or at three or more locations.

[00061] Likewise there is no requirement that all versions of the invention be constructed so that that device being held static enters the skin of the patient through an opening in the anchor. In an alternative version of the invention, the anchor may include a post that extends from the base of the anchor. The clamp is fitted to the post so

as to hold the attached device at a location away from the anchor. A benefit of this version of the invention is that the after the device is inserted into the patient and fixed in place, the practitioner is able to continuously view the puncture in the skin through which the device enters the patient.

[00062] Also, while the device shown being held static using the lock of this invention, is a cannula used for RF ablation procedures, the lock of this invention may be used to hold other devices static. These devices include, but are not limited to: cannulae used to introduce therapeutic agent adjacent tissue; and tubes used to introduce fluids into or drain fluids from a site internal to a patient.

[00063] It is thus an object of the appended claims to cover all such modifications and variations that come within the true spirit and scope of this invention.

What is claimed is:

1. A lock (30) for holding a medical device (32) in a fixed position and orientation relative to the skin of the living being to which the medical device is applied, the lock including:

an anchor (36) having a base (38) that is secured to the skin of the being; and

a clamp (90) fitted to the anchor, the clamp having at least one clamping member (110) capable of pressing against the medical device (32) to hold the device static relative to the clamp,

characterized in that:

the clamp (90) is moveable relative to the anchor (36) such that the clamp can pivot around at least one axis that is static relative to the anchor so that the angular orientation of the medical device relative to a fixed plane of the anchor can be set; and

a latch assembly (52, 60. 70) is mounted to the anchor and clamp and is adapted to hold the clamp fixed relative to the axis around which the clamp pivots and press the clamping member (110) against the medical device to hold the medical device (32) static relative to said clamp.

2. The lock (30) for holding a medical device (32) of Claim 1, wherein the clamp (90) is moveable relative to the anchor (36) so that the clamp can pivot about two separate axes that are static relative to the anchor so that the angular orientation of the medical device relative to the fixed plane of the anchor can be set along two separate angles.

3. The lock (30) for holding a medical device (32) of Claims 1 or 2, wherein when the clamp (90) is in an unlatched state, the medical device (32) can be moved longitudinally relative to the clamp.

4. The lock (30) for holding a medical device of any one of Claims 1 to 3, wherein, when the clamp (90) is in an unlatched state, the medical device (32) can be rotated around an axis that extends through the clamp or the clamp can rotate around an axis that extends through the fixed plane of the anchor (36).

5. The lock (30) for holding a medical device of any one of Claims 1 through 4, wherein:

the anchor (36) is formed with a void (46) and the clamp is curved in at least two axes and is dimensioned to seat in the anchor void and rotate in at least two axes in the anchor void.

6. The lock (30) for holding a medical device (32) of any one of Claims 1 through 5, wherein the latch assembly has a bolt (60) that is moveable relative to the anchor (36) and the clamp (90) and that is positioned to move against said clamp to hold the clamp in a fixed orientation relative to said anchor.

7. The lock (30) for holding a medical device (32) of Claim 6, wherein said clamp (90) at least clamping member is moveable towards and away from the medical device and is positioned so that when bolt (60) is positioned against said clamp, said bolt bears against the at least one clamping member (110) so that the clamping member holds the medical device fixed relative to said clamp.

8. The lock (30) for holding a medical device (32) of Claims 6 or 7, wherein the latch assembly includes a single said bolt (60).

9. The lock (30) for holding a medical device (32) of Claims 6, 7 or 8, wherein the anchor and the latch assembly bolt (60) are a single piece unit.

10. The lock (30) for holding a medical device (32) of any one of Claims 1 through 9, wherein the clamp is formed with a bore (96) for receiving the medical device, the bore being at least partially defined by the at least one clamping member (110), and the clamping member being moveable so as to compressively secure the medical device in the bore.

11. The lock (30) for holding a medical device (32) of Claim 10, wherein: the clamp has plural clamping members that define the bore (96) and the clamping members are arranged to move inwardly towards a center of the bore such that the inward movement of the clamping members secures the medical device disposed in the bore to the clamp (90).

12. The lock (30) for holding a medical device (32) of Claims 10 or 11, wherein the clamp has plural clamping members that define the bore wherein a first set of clamping members are spaced apart from each other at one end the bore and a second set of clamping members are spaced apart from each other at a second end of the bore opposite the first end of the bore and said clamping members are configured to move inwardly towards each other such that when the clamping members are so displaced, at the first end of the bore, the first set of clamping members compress against the medical

device (32) and, at the second end of the bore, the second set of clamping members compress against the medical device.

13. The lock (30) for holding a medical device (32) of any one of Claims 1 through 12, wherein the anchor is formed with an opening (44) through the anchor through which the medical device (32) is inserted into the living being.

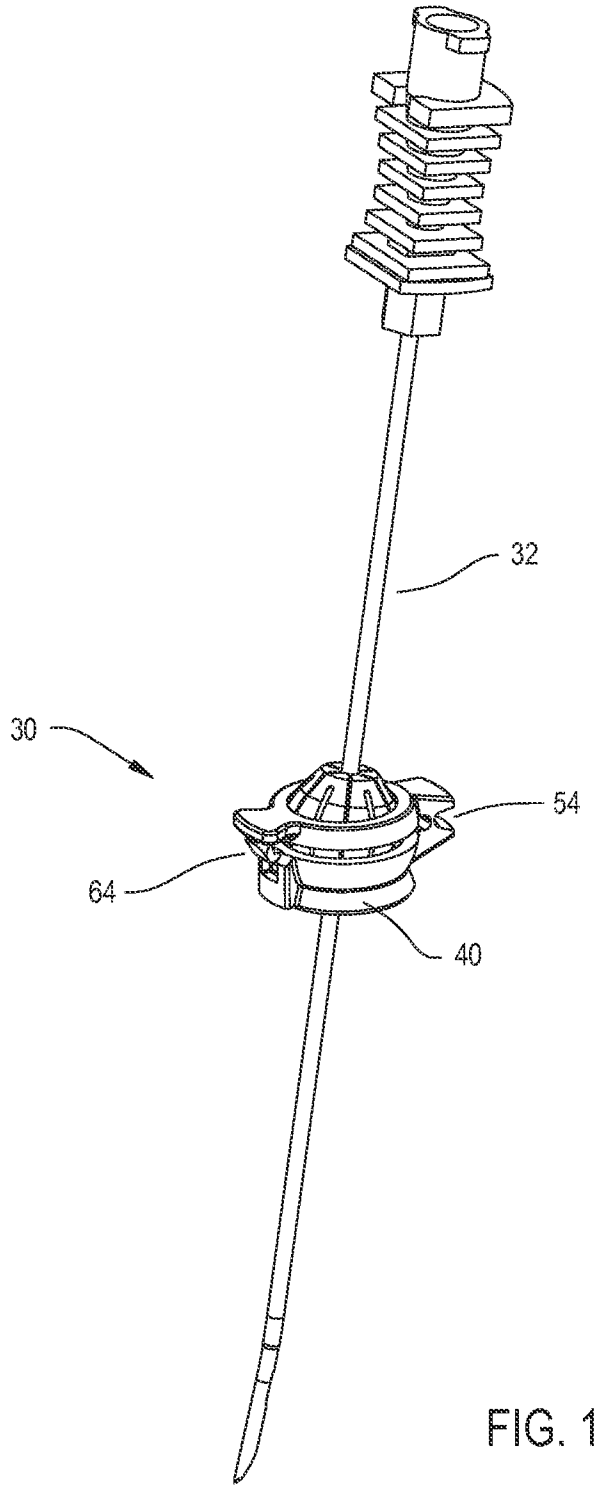

FIG. 1

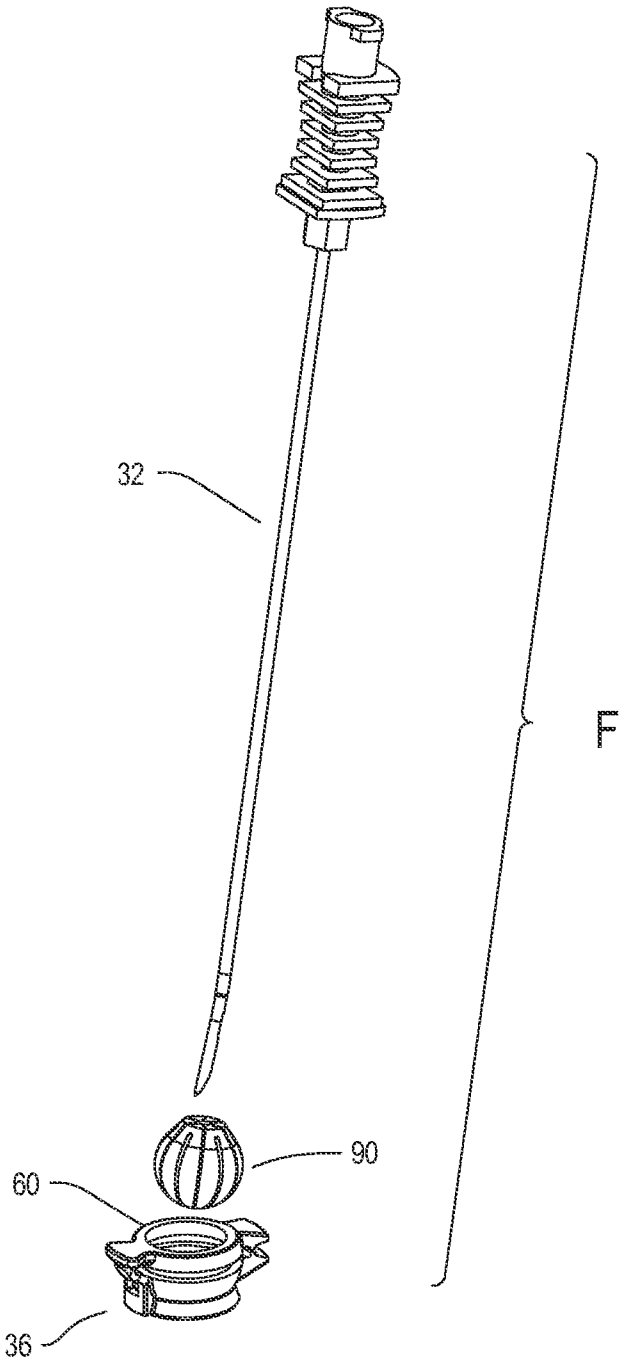

FIG. 2

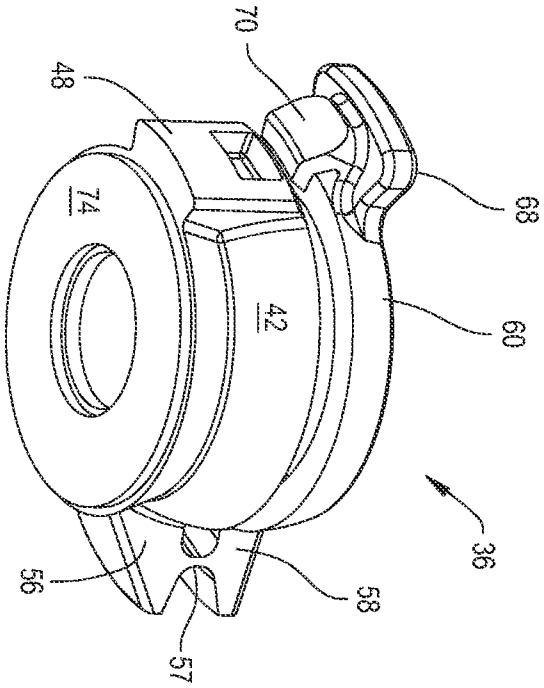

FIG. 4

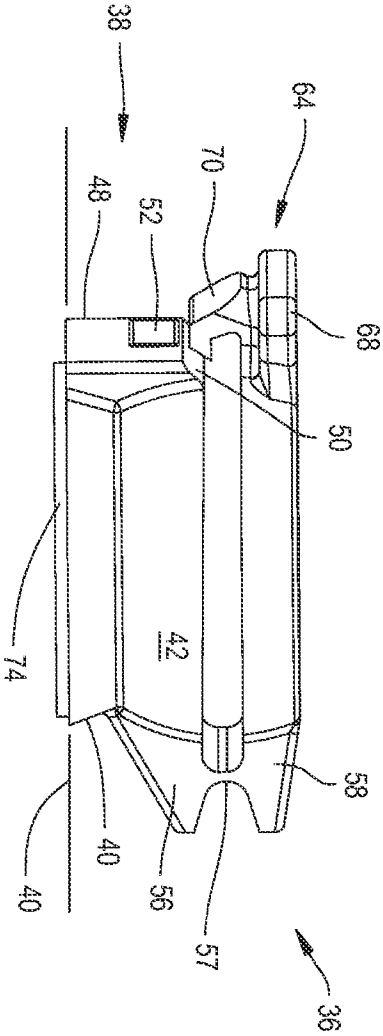

FIG. 3

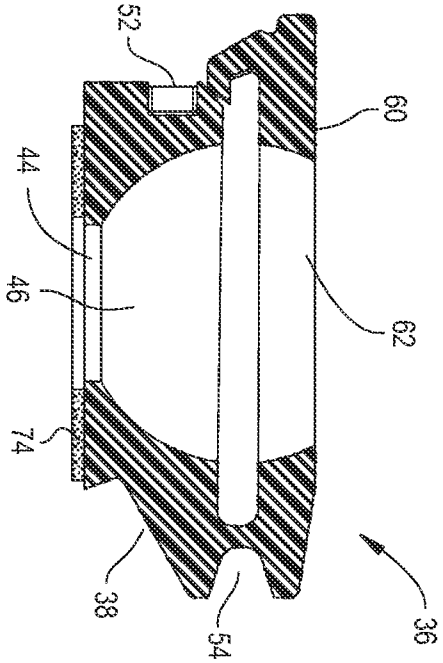

FIG. 5

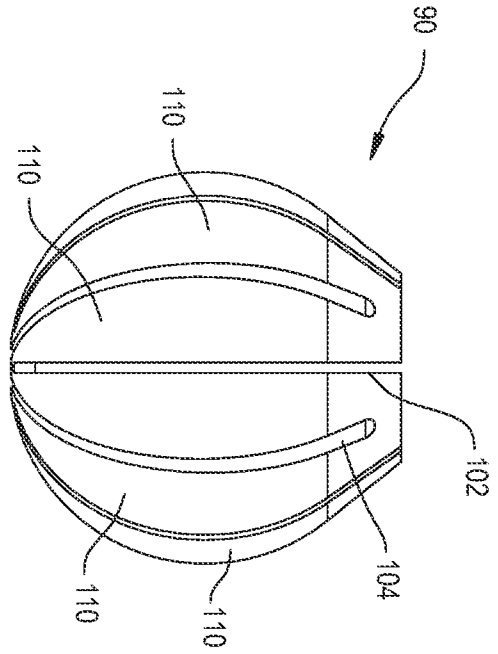

FIG. 6

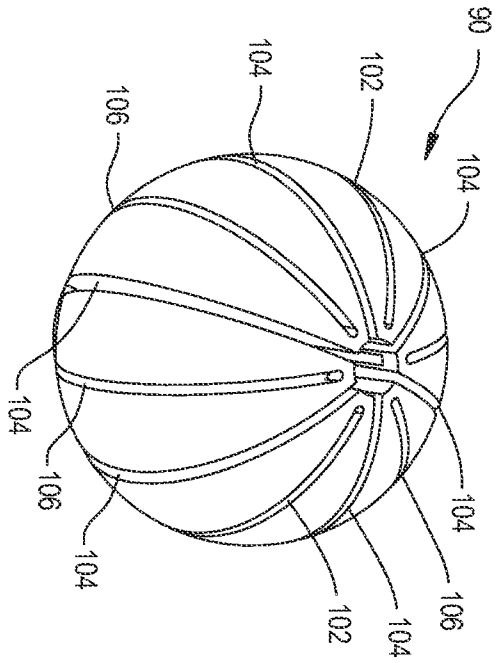

FIG. 8

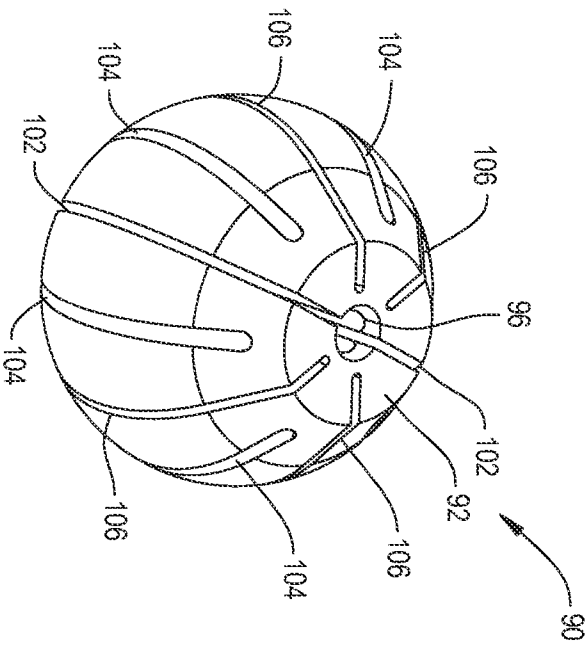

FIG. 7

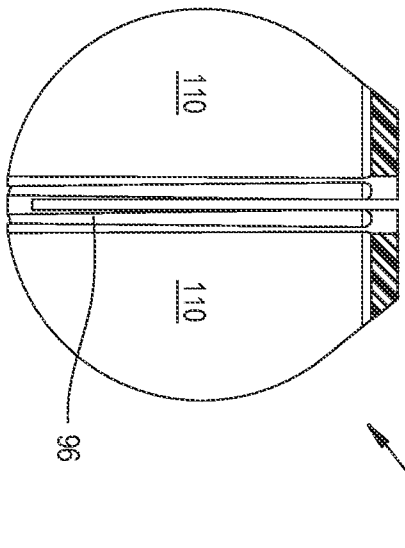

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/050850

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/34 A61B19/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2010/292724 A1 (RAVIKUMAR ET AL.) 18 November 2010 (2010-11-18) abstract; figures 21A- 21G paragraphs [0093] - [0096] -----	1-11,13 12
Y	US 2002/042606 A1 (CASTANEDA ET AL.) 11 April 2002 (2002-04-11) paragraph [0157]; figures 16,17 -----	12
A	WO 2012/018814 A2 (CAREFUSION, 2200 INC.) 9 February 2012 (2012-02-09) paragraphs [0009] - [0023]; figures -----	1,12
A	WO 2006/132955 A2 (BUSER ET AL.) 14 December 2006 (2006-12-14) abstract; figures -----	1
	-/--	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 2014	28/11/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Giménez Burgos, R

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/050850

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 809 694 A (FERRARA) 7 March 1989 (1989-03-07) abstract; figures -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2014/050850

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