

MEDICAL DEVICE STABILIZING SYSTEMS

RELATED APPLICATION

[0001] The present application claims the benefit of U.S. provisional patent application no. 63/073,392 filed September 1, 2020, which is incorporated herein by reference in its entirety for all purposes.

BACKGROUND

[0002] The native heart valves (i.e., the aortic, pulmonary, tricuspid, and mitral valves) serve critical functions in assuring the forward flow of an adequate supply of blood through the cardiovascular system. These heart valves can be damaged, and thus rendered less effective, for example, by congenital malformations, inflammatory processes, infectious conditions, disease, etc. Such damage to the valves can result in serious cardiovascular compromise or death. Damaged valves can be surgically repaired or replaced during open heart surgery. However, open heart surgeries are highly invasive, and complications may occur. Transvascular techniques can be used to introduce and implant prosthetic devices in a manner that is much less invasive than open heart surgery. As one example, a transvascular technique useable for accessing the native mitral and aortic valves is the trans-septal technique. The trans-septal technique comprises advancing a catheter into the right atrium (e.g., inserting a catheter into the right femoral vein, up the inferior vena cava and into the right atrium). The septum is then punctured, and the catheter passed into the left atrium. A similar transvascular technique can be used to implant a prosthetic device within the tricuspid valve that begins similarly to the trans-septal technique but stops short of puncturing the septum and instead turns the delivery catheter toward the tricuspid valve in the right atrium.

[0003] A healthy heart has a generally conical shape that tapers to a lower apex. The heart is four-chambered and comprises the left atrium, right atrium, left ventricle, and right ventricle. The left and right sides of the heart are separated by a wall generally referred to as the septum. The native mitral valve of the human heart connects the left atrium to the left ventricle. The mitral valve has a very different anatomy than other native heart valves. The mitral valve includes an annulus portion, which is an annular portion of the native valve tissue surrounding the mitral valve orifice, and a pair of cusps, or leaflets, extending downward from the annulus into the left ventricle. The mitral valve annulus can form a “D”-shaped, oval, or otherwise out-of-round cross-sectional shape having major and minor axes. The anterior leaflet can be larger than the posterior leaflet, forming a generally “C”-shaped boundary between the abutting sides of the leaflets when they are closed together.

[0004] When operating properly, the anterior leaflet and the posterior leaflet function together as a one-way valve to allow blood to flow only from the left atrium to the left ventricle. The left atrium receives oxygenated blood from the pulmonary veins. When the muscles of the left atrium contract and the left ventricle dilates (also referred to as “ventricular diastole” or “diastole”), the oxygenated blood that is collected in the left atrium flows into the left ventricle. When the muscles of the left atrium relax and the muscles of the left ventricle contract (also referred to as “ventricular systole” or “systole”), the increased blood pressure in the left ventricle urges the sides of the two leaflets together, thereby closing the one-way mitral valve so that blood cannot flow back to the left atrium and is instead expelled out of the left ventricle through the aortic valve. To prevent the two leaflets from prolapsing under pressure and folding back through the mitral annulus toward the left atrium, a plurality of fibrous cords called chordae tendineae tether the leaflets to papillary muscles in the left ventricle.

[0005] Valvular regurgitation involves the valve improperly allowing some blood to flow in the wrong direction through the valve. For example, mitral regurgitation occurs when the native mitral valve fails to close properly and blood flows into the left atrium from the left ventricle during the systolic phase of heart contraction. Mitral regurgitation is one of the most common forms of valvular heart disease. Mitral regurgitation can have many different causes, such as leaflet prolapse, dysfunctional papillary muscles, stretching of the mitral valve annulus resulting from dilation of the left ventricle, more than one of these, etc. Mitral regurgitation at a central portion of the leaflets can be referred to as central jet mitral regurgitation and mitral regurgitation nearer to one commissure (i.e., location where the leaflets meet) of the leaflets can be referred to as eccentric jet mitral regurgitation. Central jet regurgitation occurs when the edges of the leaflets do not meet in the middle and thus the valve does not close, and regurgitation is present. Tricuspid regurgitation can be similar, but on the right side of the heart.

SUMMARY

[0006] This summary is meant to provide some examples and is not intended to be limiting of the scope of the invention in any way. For example, any feature included in an example of this summary is not required by the claims, unless the claims explicitly recite the features. Also, the features, components, steps, concepts, etc. described in examples in this summary and elsewhere in this disclosure can be combined in a variety of ways. Various features and steps as described elsewhere in this disclosure may be included in the examples summarized here.

[0007] In some implementations, stabilizing apparatuses, devices, and systems are described for holding and maneuvering medical devices. Some apparatuses include one or more of a base plate, a carriage, and a clamp, or a combination of some or all of these. The base plate can be

attached to one or more tables. The carriage can be moveably attached to the base plate or can be integrally formed with the base plate. The carriage can receive one or more clamps. The one or more clamps can be moveably attached to the carriage or the base and configured to receive one or more medical devices.

[0008] In some implementations, an example stabilizing system or device for holding a medical device comprises an integrally formed base plate portion and carriage portion having a clamp mounting channel. The stabilizing system/device includes one or more clamps for receiving the medical device. The one or more clamps are slidably disposable in the clamp mounting channel.

[0009] In some implementations, the clamp includes a foot (e.g., an extension) configured to engage the channel to lock the position of the clamp in the channel.

[0010] In some implementations, the channel comprises a first mounting rail and a second mounting rail.

[0011] In some implementations, the clamp includes a fixed mounting flange and a movable mounting flange.

[0012] In some implementations, the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.

[0013] In some implementations, an actuator (e.g., a button, knob, latch, lever, etc.) is actuatable to retract the moveable mounting flange.

[0014] In some implementations, the movable mounting flange is biased away from the fixed mounting flange.

[0015] In some implementations, an actuator (e.g., a button, knob, latch, lever, etc.) is actuatable to move the foot into engagement with the channel.

[0016] In some implementations, the clamp includes a cam configured to move the foot into engagement with the channel.

[0017] In some implementations, the foot is biased to a retracted position.

[0018] In some implementations, the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.

[0019] In some implementations, the clamp further comprises an actuator (e.g., a button, knob, latch, lever, etc.) that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0020] In some implementations, an example stabilizing system for holding a medical device comprises an integrally formed base plate portion and carriage portion having a clamp mounting channel and at least one clamp for receiving the medical device, wherein the clamp is slidably disposable in the clamp mounting channel.

[0021] In some implementations, the clamp includes a foot configured to engage the channel to lock the position of the clamp relative to the channel.

[0022] In some implementations, the system includes a table comprising a platform. In some implementations, the platform can comprise side walls for receiving first and second retaining tabs of the base plate portion.

[0023] In some implementations, the table includes one or more legs (e.g., a plurality of legs) for supporting the platform.

[0024] In some implementations the channel comprises a first mounting rail and a second mounting rail.

[0025] In some implementations, the clamp includes a fixed mounting flange and a movable mounting flange.

[0026] In some implementations, the fixed mounting flange and the movable mounting flange are disposed in recesses in the first mounting rail and the second mounting rail.

[0027] In some implementations, an actuator (e.g., a latch button, etc.) is configured to retract the moveable mounting flange.

[0028] In some implementations, the movable mounting flange is biased away from the fixed mounting flange.

[0029] In some implementations, a locking knob is configured to move the foot into engagement with the channel.

[0030] In some implementations, the clamp includes a cam configured to move the foot into engagement with the channel.

[0031] In some implementations, the foot is biased to a retracted position.

[0032] In some implementations, the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.

[0033] In some implementations, the clamp further comprises a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0034] In some implementations, an example stabilizing apparatus or stabilizing device for one or more medical devices includes a base plate and a clamp. The base plate has a channel. The clamp is slidably disposable in the channel.

[0035] In some implementations, the clamp includes a foot that is configured to engage the channel to lock the position of the clamp relative to the base plate.

[0036] In some implementations, the channel includes a first mounting rail and a second mounting rail.

[0037] In some implementations, the clamp includes a fixed mounting flange and a movable mounting flange.

[0038] In some implementations, the fixed mounting flange and the movable mounting flange are disposed in recesses in the first mounting rail and the second mounting rail.

[0039] In some implementations, a latch button retracts the moveable mounting flange.

[0040] In some implementations, the movable mounting flange is biased away from the fixed mounting flange.

[0041] In some implementations, a locking knob is configured to move the foot into engagement with the channel.

[0042] In some implementations, a cam is configured to move the foot into engagement with the channel.

[0043] In some implementations, the foot is biased to a retracted position.

[0044] In some implementations, the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.

[0045] In some implementations, the clamp includes a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0046] In some implementations, the stabilizing device is used in a stabilizing system that includes a table. The table includes a platform and a plurality of legs. In some implementations, the platform can include side walls for receiving first and second retaining tabs of the base plate.

[0047] In some implementation, an example stabilizing apparatus, device, or system comprises a base plate, a carriage, and at least one clamp for receiving one or more medical devices. At least one of the base plate and the carriage includes at least one rail.

[0048] In some implementations, the at least one clamp is attachable to the at least one rail such that the at least one clamp can slide along the rail but is prevented from detaching from the rail.

[0049] In some implementations, the base plate includes the at least one rail, and the carriage is moveably attachable to the at least one rail of the base plate such that it is prohibited from moving away from the base plate by the at least one rail.

[0050] In some implementations, the at least one rail comprises a plurality of locking teeth for engaging a latch member of at least one of the carriage and the at least one clamp.

[0051] In some implementations, at least one of a release button, knob, and/or lever is actuatable to enable the carriage and/or the at least one clamp to move laterally along the at least one rail.

[0052] In some implementations, the base plate comprises two mounting rails, and the carriage comprises fixed and moveable retaining lips for securing the carriage between the two mounting rails.

[0053] In some implementations, the carriage comprises an adjustment mechanism for moving (e.g., sliding) the at least one clamp laterally along the carriage (e.g., along a channel or at least one rail of the carriage).

[0054] In some implementations, actuating a button, knob, and/or lever of the at least one clamp disengages the at least one clamp from the adjustment mechanism of the carriage.

[0055] In some implementations, the adjustment mechanism comprises a worm drive that engages a pin of a traveler for attaching the clamp.

[0056] In some implementations, the clamp further comprises at least one of release button, knob, and/or lever for disengaging the clamp from the adjustment mechanism.

[0057] In some implementations, the carriage comprises a first mounting rail and a second mounting rail.

[0058] In some implementations, the clamp includes a fixed mounting flange and a movable mounting flange.

[0059] In some implementations, the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.

[0060] In some implementations, an example stabilizing apparatus or stabilizing system for one or more medical devices includes a base plate, a carriage, and one or more clamps.

[0061] In some implementations, the base plate and carriage can be separate components that are attachable to each other.

[0062] In some implementations, the base plate and carriage integrally formed. In some implementations, the carriage can be a channel formed in or on the base plate (e.g., which can be the same as or similar to other channels described herein).

[0063] In some implementations, the base plate has at least one rail extending upward. In some implementations, the carriage can be moveably attached to the at least one rail of the base plate and can be prohibited from moving away from the base plate by the at least one rail.

[0064] The one or more clamps are configured to receive one or more medical devices.

[0065] In some implementations, the one or more clamps can each be moveably (e.g., slidably) attached to the carriage. The one or more clamps can be configured to be removable from or attachable to the carriage by the end user.

[0066] In some implementations, the at least one rail of the base plate includes a plurality of locking teeth for engaging a latch member of the carriage.

[0067] In some implementations, the at least one rail of the base plate is received within a mounting channel of the carriage.

[0068] In some implementations, depressing a release button of the carriage enables the carriage to move laterally along the at least one rail.

[0069] In some implementations, depressing the release button of the carriage enables the carriage to be removed from the at least one rail.

[0070] In some implementations, the base plate includes two mounting rails, and the carriage includes fixed and moveable retaining lips for securing the carriage between the two mounting rails.

[0071] In some implementations, the carriage further includes an adjustment mechanism for moving the clamp laterally along the carriage.

[0072] In some implementations, depressing a release button of the clamp disengages the clamp from the adjustment mechanism of the carriage.

[0073] In some implementations, the adjustment mechanism includes a worm drive that engages a pin of a traveler for attaching the clamp.

[0074] In some implementations, the clamp further includes a release lever for disengaging the clamp from the adjustment mechanism.

[0075] In some implementations, the release lever can be retained in a released condition.

[0076] In some implementations, the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.

[0077] In some implementations, the clamp includes a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0078] In some implementations, the stabilizing apparatus is used in a stabilizing system.

[0079] In some implementations, the stabilizing system includes a table. In some implementations, the table includes a platform and one or more legs (e.g., a plurality of legs).

[0080] In some implementations, the platform includes side walls for receiving first and second retaining tabs of the base plate.

[0081] In some implementations, an example stabilizing system for holding a medical device comprises a clamp mounting channel defined by first and second mounting rails, and a clamp for receiving the medical device. The clamp is slidably disposable (e.g., positionable) in the clamp mounting channel.

[0082] In some implementations, the clamp includes a foot that engages the channel to lock the position of the clamp in the channel.

[0083] In some implementations, the channel comprises a gripping strip for engaging the locking foot.

[0084] In some implementations, the clamp includes a fixed mounting flange and a movable mounting flange.

[0085] In some implementations, the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.

[0086] In some implementations, an actuator (e.g., a button, knob, latch, lever, etc.) is actuatable to retract the moveable mounting flange.

[0087] In some implementations, the movable mounting flange is biased away from the fixed mounting flange.

[0088] In some implementations, an actuator (e.g., a button, knob, latch, lever, etc. is actuatable to move the foot into engagement with the channel.

[0089] In some implementations, the system includes a cam for moving the foot into engagement with the channel. In some implementations, the foot is biased to a retracted position.

[0090] In some implementations, the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.

[0091] In some implementations, the clamp further comprises an actuator (e.g., a button, knob, latch, lever, etc.) that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0092] In some implementations, an example clamp for holding a medical device comprises a fixed jaw and a movable jaw. In some implementations, the moveable jaw is opened and closed by pivoting the moveable jaw relative to the fixed jaw.

[0093] In some implementations, a movable retaining flange extends from a first side of the clamp. In some implementations, a fixed retaining flange extending from a second side of the clamp that is opposite the first side.

[0094] In some implementations, a movable locking foot extending from a bottom of the clamp.

[0095] In some implementations, the movable retaining flange includes a beveled edge.

[0096] In some implementations, an actuator (e.g., a button, knob, latch, lever, etc.) is actuatable to retract the moveable retaining flange.

[0097] In some implementations, the movable retaining flange is biased away from the fixed retaining flange.

[0098] In some implementations, an actuator (e.g., button, knob, latch, lever, etc.) is actuatable to move the foot into engagement with the channel.

[0099] In some implementations, the clamp comprises a cam for moving the foot into engagement with the channel. In some implementations, the foot is biased to a retracted position.

[0100] In some implementations, the clamp further comprises an actuator (e.g., a button, knob, latch, or lever) that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

[0101] In some implementations, an example clamp mounting channel of a stabilizing system comprises a first mounting rail and a second mounting rail. The first mounting rail and the second mounting rail are configured to receive a clamp for holding a medical device, such that the clamp is slidably disposable in the clamp mounting channel between the first mounting rail and the second mounting rail, and such that a foot of the clamp can engage the clamp mounting channel to lock the position of the clamp in the clamp mounting channel.

[0102] In some implementations, the channel comprises a gripping strip for engaging the locking foot.

[0103] In some implementations, the channel comprises recesses in the first mounting rail and the second mounting rail, wherein the recesses are configured to receive at least one of a first flange and a second flange of the clamp.

[0104] In some implementations, the recesses include top surfaces configured to engage the first flange and the second flange of the clamp when the locking foot presses down on the bottom of the clamp mounting channel such that the position of the clamp in the clamp mounting channel is locked.

[0105] A further understanding of the nature and advantages of the present invention are set forth in the following description and claims, particularly when considered in conjunction with the accompanying drawings in which like parts bear like reference numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

[0106] To further clarify various aspects of examples of the present disclosure, a more particular description of the certain examples will be made by reference to various aspects of the appended drawings. It is appreciated that these drawings depict only typical examples of the present disclosure and are therefore not to be considered limiting of the scope of the disclosure. Moreover, while the figures can be drawn to scale for some implementations, the figures are not necessarily drawn to scale for all examples. Examples and other features and advantages of the present disclosure will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

[0107] Figures 1–8 show an example of a stabilizer for holding a delivery device used to implant an implantable prosthetic;

[0108] Figure 9 shows a perspective view of multiple stabilizers of Figures 1–8 connected together;

[0109] Figures 10–12 show an example table for stabilizer devices disclosed herein;

[0110] Figures 13–34 show various views of components of an example of a stabilizer for holding a delivery device used to implant an implantable prosthetic;

[0111] Figure 35 shows a perspective view of multiple stabilizers of Figures 13–22 connected together;

[0112] Figures 36–58 show various views of components of an example of a stabilizer for holding a delivery device used to implant an implantable prosthetic;

[0113] Figures 59–75 show various views of components of an example of a stabilizer for holding a delivery device used to implant an implantable prosthetic;

[0114] Figures 76–116 show various views of components of an example of a stabilizer for holding a delivery device used to implant an implantable prosthetic; and

[0115] Figures 117–119 show various views of an example of an integrally formed baseplate and carriage of a stabilizer for holding a delivery device used to implant an implantable prosthetic.

DETAILED DESCRIPTION

[0116] The following description refers to the accompanying drawings, which illustrate specific examples of the present disclosure. Other implementations having different structures and operation do not depart from the scope of the present disclosure.

[0117] Examples of the present disclosure are directed to devices and methods for stabilizing medical devices. It should be noted that various examples of medical device stabilization devices are disclosed herein, and any combination of the features of these examples can be made unless specifically excluded. In other words, individual components of the disclosed devices and systems can be combined unless mutually exclusive or otherwise physically impossible.

[0118] As described herein, when one or more components are described as being connected, joined, affixed, coupled, attached, or otherwise interconnected, such interconnection may be direct as between the components or may be indirect such as through the use of one or more intermediary components. Also as described herein, reference to a "member," "component," or "portion" shall not be limited to a single structural member, component, or element but can include an assembly of components, members, or elements. Also as described herein, the terms "substantially" and "about" are defined as at least close to (and includes) a given value or state (preferably within 10% of, more preferably within 1% of, and most preferably within 0.1% of).

[0119] During surgical procedures using a catheter, it typically is beneficial for the operator to be able to precisely control the operation of the catheter because the catheter must be directed through a patient's vasculature. This includes mechanisms that allow the catheter to be bent to assist in navigating the vasculature, and mechanisms that control deployment of the prosthetic valve. During a procedure, the operator can control the catheter using a handle, which can provide controls for extending, retracting, and bending the catheter, including during navigating the patient's vasculature to the delivery or repair site.

[0120] Transcatheter procedures can have a long duration, and it may be inconvenient for an operator to manually maintain the position of the catheter handle during the entire procedure. While it may be desirable to adjust the location of the catheter handle relative to the patient at some points during the procedure, at other times it can be desirable to maintain the position of the catheter handle relative to the patient, such as to maintain the depth of insertion of the catheter or the rotational position of the handle.

[0121] A catheter handle can be secured to a table proximate the patient using a locking mechanism. Typically, locking mechanisms require a user to actively engage or disengage a locking device to secure or release the catheter handle from a stand or mount. For example, a clamping mechanism may be advanced, such as by advancing a clamp over a threaded shaft, to secure the clamp against the catheter handle and thus secure the catheter handle during a procedure. If it is desired to adjust the position of the catheter handle, the clamp can be released, the position of the catheter handle and/or mount adjusted, and the clamp re-secured. However, these processes can be time consuming and inconvenient.

[0122] Stabilizing systems, devices, and tables for supporting the same can be used to hold a medical device—such as a catheter delivery system for implanting an implantable prosthetic device—above a patient during a surgical procedure. The table can also be used as a work surface to hold other tools, implements, or materials, or the like that are needed for the particular procedure. Example stabilizing systems/devices support and position the medical device in a desired location so that the medical device does not move without the direction of the operator of the device. The stabilizing systems/devices disclosed herein can also be easily adjusted so that when the operator does want to reconfigure or move the medical device, such movements are easily accomplished. The example stabilizing systems/devices and tables disclosed herein can also accommodate a sterile barrier, such as a drape, arranged between the stabilizing system/device and the table and remain adjustable without removing the sterile barrier. This arrangement provides a significant advantage over prior art methods of fixing stabilizing systems/devices to tables using clamps that must be opened and moved to adjust the position of the stabilizing system/device relative to the table. To accommodate medical devices of different lengths, the example stabilizing systems/devices disclosed herein can span multiple tables, thereby enabling an operator to configure work surfaces of different lengths using the same components.

[0123] The stabilizing systems/devices can be configured to be assembled to a table with a sterile barrier provided between the two. A base plate of the stabilizing system/device engages the table to securely attach the stabilizing system/device to the table. A carriage and a clamp of

the stabilizing system/device remain movable relative to the base plate and table to provide customizability of the clamp position to the operator. Various mechanisms can be employed to connect the clamp, carriage, and base plate to facilitate adjustment of the relative positions of these components, and the locking or release thereof. The stabilizing methods for various examples can be different and are more fully discussed below with respect to each example. Additional information regarding these and other stabilization devices can be found in US Provisional Application No. 62/491392 and US Patent Application Serial No. 15/905257 each of which is incorporated herein by reference in its entirety.

[0124] Referring now to Figures 1–9, an example of a stabilizing apparatus, system, or device 100 is shown. In some implementations, the stabilizing system or device 100 includes a table 110, a base plate 120 removably attached to the table 110, a carriage 140 attached to or formed on the base plate 120, and a clamp 160 attached to the carriage 140. The stabilizing system/device 100 can incorporate any of the features of stabilizing systems/devices disclosed herein and can be made from any suitable material, such as, for example, metal or plastic. In some implementations, the carriage can be a separate component or integrally formed with the base plate.

[0125] The table 110 has legs 112 for elevating a platform 114 above a patient undergoing a procedure with a medical device that is stabilized by the stabilizing system/device 100. The legs 112 can optionally be removed from the platform 114 so that the table 110 can be stored or transported in a compact manner. The legs 112 can include feet (not shown) so that fewer than four legs are needed to support the table 110 in a stable condition. (E.g., the table 200 shown in Figures 10–12.) The platform 114 can also include a variety of leg attachment locations for reconfiguring the legs 112, for example, to avoid obstacles.

[0126] The base plate 120 is removably attached to the table by any suitable means, such as, for example, with threaded fasteners, snaps, spring-loaded clamps, hook and loop fasteners, or the like. The base plate 120 can be configured to be entirely or partially retained by features of the table 110 so that when the table is covered by a sterile barrier (not shown), such as a drape, the base plate 120 can still be attached to the table 110. (See, e.g., the examples described below.) That is, the base plate 120 can be attached to the table 110 without attachment means, such as fasteners, that would pierce or puncture the sterile barrier arranged between the table 110 and the base plate 120. Also, the base plate 120 can be formed as a single piece or as multiple pieces that can be rearranged to change the size or length of the base plate 120.

[0127] In some implementations, the carriage 140 is moveably—and optionally, removably—attached to the base plate 120 so that the carriage 140 can be moved along the base plate 120 relative to the table 110 while the base plate 120 remains fixed relative to the table 110. For example, as can be seen in Figures 4–6, the carriage 140 can be moved to one side of the base plate 120 and can even extend beyond the edge of the base plate 120 if allowed by the means used to attach the carriage 140 to the base plate 120. The carriage 140 can be attached to one or more rails protruding from the base plate 120 or can include protrusions that are received within one or more grooves or channels formed in the base plate 120. The carriage 140 can be moved relative to the base plate 120 along a predetermined path and can be locked into position along the path in a desired location. The carriage 140 can be locked in place with a spring-loaded latch (not shown) or any other suitable locking means, such as, for example, a threaded fastener, a set screw, a locking pin, a cam lock, or the like. Also, the locking means can be configured to retain the carriage 140 on the base plate 120 so that the carriage 140 resists forces that would tend to pull the carriage 140 away from the base plate 120.

[0128] In some implementations, the clamp 160 includes a fixed jaw 162 and a moveable jaw 164 and is opened and closed by pivoting (Figures 7–8) and/or sliding relative to the fixed jaw 162, but the clamp can be the same as or similar to other clamps described herein. The moveable jaw 164 can optionally be biased—such as, for example, with a spring—toward the fixed jaw 162 so that the clamp 160 remains in a closed condition unless opened by an application of an opening force to the movable jaw 164. The opening force can be applied to the moveable jaw 164 directly or with an actuation device, such as a lever or actuator. A lever or actuator used to open the moveable jaw 164 can also be configured to hold the jaw 164 in an open or partially open position, to facilitate insertion and/or rotation of a medical device. In some implementations, the clamp 160 does not have a fixed jaw 162 and instead has two moveable jaws 164 that can optionally be biased toward each other. The jaws 162, 164 of the clamp 160 come together to form an opening 166 for receiving the medical device (not shown) to be stabilized by the stabilizing device 100.

[0129] The clamp 160 is moveably attached to the carriage 140 so that the position of the clamp 160 can be adjusted along the length of the carriage 140 (shown in Figures 4–6), thereby providing additional adjustability to the user. The clamp 160 can optionally be adjusted rotationally relative to the carriage 140 to accommodate different shaped medical devices. The adjustment of the position of the clamp 160 can be done directly or by way of an adjusting mechanism. The clamp 160 can also be locked in position by a locking mechanism (not shown) to secure the clamp 160 in a desired position. The locking mechanism can be opened or released to enable the clamp 160 to be moved along the carriage 140. Optionally, the locking

mechanism can be biased in a locking direction so that the clamp 160 remains locked in position unless the locking mechanism is actively released. The release mechanism for such a biased locking mechanism can also include a holding position that enables the locking mechanism to be held open without the operator having to continuously hold the locking mechanism open. In some implementations, the locking and adjustment mechanism are combined into a single mechanism that provides both functions to the clamp 160 and carriage 140 assembly. In some implementations, the carriage can include one or more rails (e.g., similar to rails 646 and 648 shown and described later herein) to which the clamp(s) can be slidably attached.

[0130] Referring now to Figures 10–12, an example table 200 for use with stabilizing devices disclosed herein is shown. The table 200 includes a platform or tabletop 210 supported by two legs 220. The platform has side walls or barriers 212 extending above the platform 210 to a plurality of latching protrusions 214 that are spaced apart by gaps 216 and configured to engage a baseplate of a stabilizing device such as the stabilizing devices disclosed herein and described in detail below. The platform 210 also includes two pairs of openings 218 for receiving and attaching to the legs 220. The openings 218 can be threaded, as shown in Figure 10, or can include a slot or other locking feature that would sufficiently secure the legs 220 to the platform 210, such as, for example, for a quarter-turn locking feature.

[0131] The legs 220 include horizontally extending feet 222 and vertical supports 224 that extend upward from the feet 222 toward the platform 210. A threaded connection (not shown) at the top of the vertical supports 224 can be used to connect the legs 220 to the platform 220. Optional extensions 226 can be attached to the top of the vertical supports 224 to further increase the height of the platform 210 of the table 200 relative to the bottom of the feet 222. The extensions 226 include a female thread portion (not shown) to engage the vertical supports 224 and a male thread portion (not shown) for engaging the threaded openings 218 of the platform 210. The male thread portion of the extensions 226 is the same as the male thread portion of the vertical supports 224. While threaded connections are used in the illustrated example, any suitable connection for removably connecting the legs 220 to the platform 210 can be used, such as, for example, slotted connections, quarter turn connections, pinned connections, spring-loaded latch or clamp connections, or the like.

[0132] Referring now to Figures 13–35, an example of a stabilizing device 300 is shown. The stabilizing device 300 includes a base plate 320. A carriage 340 can be attached to the base plate 320 or integrally formed therewith. One or more clamps 360 can be attached to the carriage 340 or the base plate 320. The stabilizing device 300 can incorporate any of the

features of stabilizing devices disclosed herein and can be made from any suitable material, such as metal or plastic.

[0133] Referring now to Figures 14–17, in some implementations, the stabilizing device 300 includes a release 342 (such as a release button, knob, latch, lever, etc.) (See Figure 14) for releasing the carriage 340 from the base plate 320 for disassembly and/or for lateral movement of the carriage 340 along the base plate 320. In some implementations, a knob 344 (or other actuator such as a button, latch, lever, etc.) arranged on a side of the carriage 340 can be actuated (e.g., turned) to move the clamp 360 back and forth along the carriage 340. In other words, the release 342 can operate as a coarse adjustment mechanism for the position of the clamp 360 relative to the base plate 320 and the actuator/knob 344 can operate as a fine adjustment mechanism for the position of the clamp 360 relative to the carriage 340.

[0134] Referring now to Figures 18–19, an example base plate 320 is shown. In some implementations, the base plate 320 has rigid tabs 322 and spring or flexible tabs 324 for attaching to the table 200. The tabs 322, 324 include alignment portions 326 that fit in the gaps 216 of the side walls 212 of the table 200 and retention shoulders 328 that fit underneath the latching protrusions 214 of the side walls 212 of the table 200 (See Figure 10). The base plate 320 is assembled to the table 200 by first inserting the alignment portions 326 of the rigid tabs 322 into the gaps 216 between the latching protrusions 214 of the side walls 212 so that the shoulders 328 of the rigid tabs 322 are retained by the latching protrusions 214. The other side of the base plate 320 is then pressed downward so that the alignment portions 326 and shoulders 328 of the flexible tabs 324 snap into the latching protrusions 214 of the opposite side wall 212. The flexible tabs 324 can include a ramp or inclined portion to provide a smoother engagement with the latching protrusions 214.

[0135] In some implementations, to remove the base plate 320 from the table 200, the upper ends of the flexible tabs 324 are pressed inward until the shoulders 328 are released from beneath the latching protrusions 214 to enable the base plate 320 to be lifted upward and removed from the table 200. Sufficient space is provided between the base plate 320 and table 200 so that a sterile barrier, such as a drape, can be provided between the two. That is, a sterile barrier can be laid on top of the table 200 before the base plate 320 is snapped into place between the side walls 212 of the table 200. As can be seen in Figures 13 and 35, the base plate 320 of the stabilizing device 300 can be configured to attach the stabilizing device 300 to one or more tables 200 described above and shown in Figures 10–12.

[0136] Referring now to Figures 20–30, various views of an example carriage 340 and mechanisms thereof are shown. In some implementations, the carriage 340 moveably and removably attaches to a mounting rail 330 that extends across the base plate 320. Though in some implementations, the carriage 340 may be a carriage portion or carriage feature of the base plate 320, e.g., an integral part of the base plate.

[0137] In some implementations, the mounting rail 330 is received within a guide channel 346 of the carriage 340 and latched in place. (See Figures 20–24.) Referring to Figure 22, a latch recess 332 in one or both sides of the mounting rail 330 receives a latch 348 of the carriage 340 that is opened by the release button 342. Referring to Figure 24, locking teeth 334 extending down from the upper surface of the latch recess 332 engage similar teeth 335 extending up from the latch 348. The locking teeth 334 and teeth of the latch 348 mesh together to prohibit longitudinal movement of the carriage 340 once the mounting rail 330 has been engaged by the latch 348.

[0138] The top of the mounting rail 330 (See Figure 18) includes a limiting recess 336 with ends 337 for receiving limiting tabs 356 (Figures 29–30) of the carriage 340 to prevent the carriage 340 from being moved beyond a position on the mounting rail 330 that would not be sufficiently stable to support the clamp 360.

[0139] Referring now to Figures 20–24, example release 342 and latch 348 mechanism are shown in greater detail. The carriage 340 can be attached or moved to any position on the mounting rail 330 (within the limit defined by the limiting recess 336 and tab 356) by depressing the release 342 to retract the latch 348 out of the latch recess 332 (See Figure 22). This allows the guide channel 346 to slide over the mounting rail 330 to adjust the position of the carriage 340 on the base plate 320. The latch 348 can optionally be biased to a closed position by a biasing member, such as, for example, a spring, shape memory material, elastic member, etc.

[0140] The latch 348 can also include a beveled bottom edge so that the carriage 340 can be attached to the base plate 320 by aligning the guide channel 346 with the mounting rail 330 and pressing down on the carriage 340 to snap the carriage 340 onto the mounting rail 330—that is, by causing the latch 348 to open via the application of force against the inclined portion. Once past the top of the mounting rail 330, the latch 348 springs closed and engages the latch recess and locking teeth 334.

[0141] Once attached, a rough or coarse adjustment of the position of the carriage 340 can be made by depressing the release 342 to move the latch 348 out from the latch recess 332 to disengage the teeth of the latch 348 from the locking teeth 334 to free the carriage 340 to be moved along the mounting rail 330.

[0142] Figures 25–30 illustrate the example carriage 340. In Figure 25 the carriage 340 is shown fully assembled and including the fine adjustment mechanism for adjusting the position of the clamp 360 relative to the carriage 340. Referring to Figure 26, a fine adjustment actuator or knob 344 is attached to a set of bevel gears 354 for translating the rotation of the knob 344 into rotation of a worm drive or gear 352 that extends through a traveler 350. While sometimes referred to as a knob, other actuators could also be used. The traveler 350 includes a pin (not shown) that fits within the groove of the worm drive 352 so that rotation of the worm drive 352 causes the traveler 350—and, consequently, the clamp 360—to translate along the worm drive 352 and thus, the length of the carriage 340.

[0143] Referring now to Figures 31–34, the clamp 360 is shown in closed (Figures 31–32) and open (Figures 33–34) positions. The clamp 360 includes a fixed jaw 362 and a moveable jaw 364 that is opened and closed by pivoting the moveable jaw 364 relative to the fixed jaw 362. The moveable jaw 364 is biased with a spring toward the fixed jaw 362 so that the clamp 360 remains in a closed condition unless opened by an application of an opening force to the movable jaw 364. The jaws 362, 364 of the clamp 360 come together to form an opening 366 for receiving the medical device (not shown), such as a catheter, to be stabilized by the stabilizing device 300. In the closed position, the fixed and moveable jaws 362, 364 might remain spaced apart so that the closing force of the clamp 360 is applied to the medical device to stabilize and prohibit rotation of the medical device.

[0144] The clamp 360 further includes a mounting recess 368 configured to receive and engage with a mounting portion of the traveler 350 so that the position of the clamp 360 can be adjusted along the length of the carriage 340 by rotation of the adjustment knob 344.

[0145] Referring to Figure 35, in one example, one or more base plates 320 can be used to attach two or more tables together. In the example illustrated by Figure 35, a base plate 320 spans between and attaches two tables 200 together. The spanning base plate 320 can be attached to the tables 200 in a wide variety of different ways. In one example, the spanning base plate attaches to the two connected tables 200 in the same manner as a base plate 320 is attached to a single table 200.

[0146] Referring now to Figures 36–58, an example of a stabilizing system or stabilizing device 400 is shown. The stabilizing device 400 can include a base plate 420, a carriage 440 attached to the base plate 420 (or a carriage-like feature formed in or as part of the base plate), and one or more clamps 460. The one or more clamps 460 can be attachable to the carriage 440. The stabilizing device 400 can incorporate any of the features of stabilizing devices disclosed herein and can be made from any suitable material, such as metal and/or plastic.

[0147] Referring now to Figures 36–39, in some implementations, the stabilizing device 400 includes a release 442 (e.g., a button, latch, knob, lever, etc.) for releasing the carriage 440 from the base plate 420 for disassembly and/or for lateral movement of the carriage 440 along the base plate 420. An actuator or knob 444 arranged on a side of the carriage 440 can be turned to move the clamp 460 back and forth along the carriage 440 or a carriage portion/feature of the base plate. In other words, the release 442 can operate as a coarse adjustment mechanism for the position of the clamp 460 relative to the base plate 420 and the actuator/knob 444 can operate as a fine adjustment mechanism for the position of the clamp 460 relative to the carriage 440.

[0148] Referring now to Figures 40–41, an example base plate 420 is shown. Like the base plate 320, in some implementations, the base plate 420 has rigid tabs 422 and spring or flexible tabs 424 for attaching to the table 200. The tabs 422, 424 include alignment portions 426 that fit in the gaps 216 of the side walls 212 of the table 200 and retention shoulders 428 that fit underneath the latching protrusions 214 of the side walls 212 of the table 200. The base plate 420 is assembled to the table 200 by first inserting the alignment portions 426 of the rigid tabs 422 into the gaps 216 between the latching protrusions 214 of the side walls 212 so that the shoulders 428 of the rigid tabs 422 are retained by the latching protrusions 214. The other side of the base plate 420 is then pressed downward so that the alignment portions 426 and shoulders 428 of the flexible tabs 424 snap into the latching protrusions 214 of the opposite side wall 212. The flexible tabs 424 can include a ramp or inclined portion to provide a smoother engagement with the latching protrusions 214.

[0149] In some implementations, to remove the base plate 420 from the table 200, the upper ends of the flexible tabs 424 are pressed inward until the shoulders 428 are released from beneath the latching protrusions 214 to enable the base plate 420 to be lifted upward and removed from the table 200. Other removal or release mechanisms are also possible.

[0150] In one example, sufficient space is provided between the base plate and table 200 so that a sterile barrier, such as a drape, can be provided between the two. That is, a sterile barrier

can be laid on top of the table 200 before the base plate 420 is snapped into place between the side walls 212 of the table 200. Like the base plate 320 shown in Figures 13 and 35, the base plate 420 is configured to attach the stabilizing device 400 to one or more tables 200 described above and shown in Figures 10–12.

[0151] As can be seen in Figures 45 and 46, in some implementations, the carriage 440 is moveably and removably attached to the base plate 420 by a first mounting rail 430 and a second mounting rail 432 and latched in place. The first and second mounting rails 430, 432 extend across the base plate 420 and are spaced apart by the width of the carriage 440 and each include a recess for receiving retaining features of the carriage 440—i.e., a retaining lip 456 that engages the first mounting rail 430 and a latch 448 that engages the second mounting rail 432. The latch 448 is opened by the release button or bar 442. The second mounting rail 432 also includes locking teeth 434 extending downward from the upper surface of the recess for engaging and meshing together with corresponding teeth extending upward from the latch 448 to prohibit longitudinal movement of the carriage 440 once the second mounting rail 432 has been engaged by the latch 448.

[0152] Referring now to Figures 42–58, various views of the carriage 440 and clamp 460 and mechanisms thereof are shown. In particular, Figures 42–46 show the latch mechanism in greater detail. The carriage 440 can be attached or moved to any position on the mounting rails 430, 432 by depressing the release button 442 to retract the latch 448 (See Figures 49 and 50) out of the recess of the second mounting rail 432. This retracting disengages the teeth of the latch 448 from the teeth 434 (See Figure 40) of the second mounting rail 432 so that the carriage 440 can be removed from or moved along the base plate 420.

[0153] The latch 448 can optionally be biased to a closed position by a biasing member, such as, for example, a spring, shape memory material, or an elastic member. The latch 448 can also include a beveled bottom edge so that the carriage 440 can be attached to the base plate 420 by inserting the retaining lip 456 in the recess of the first mounting rail 430 and then pressing down on the carriage 440 to snap the carriage 440 onto the second mounting rail 432—that is, by causing the latch 448 to open via the application of force against the inclined portion. Once past the second mounting rail 432, the latch 448 springs closed and engages the latch recess and locking teeth 434. Once attached, a rough or coarse adjustment of the position of the carriage 440 can be made by depressing the release button 442 to move the latch 448 out from the recess of the second mounting rail 432 to disengage the teeth of the latch 448 from the locking teeth 434 to free the carriage 440 to be moved along the mounting rails 430, 432.

[0154] Referring now to Figures 47–58, the carriage 440 is shown fully assembled (Figure 47) and with various components removed to show the fine adjustment mechanism for adjusting the position of the clamp 460 relative to the carriage 440. Figures 47-58 also show a multi-function or selection actuator or lever 468 and release 470 for interacting with the same. The fine adjustment actuator or knob 444 is attached to a set of bevel gears 454 for translating the rotation of the knob 444 into rotation of a worm drive or gear 452. The worm drive or gear extends through a traveler 450 and a clutch 472 that extends through the center of the traveler 450. The traveler 450 extends above the carriage 440 to attached to the clamp 460. The clutch 472 includes a pin 474 (Figures 51–52) that fits within the groove of the worm drive 452 so that rotation of the worm drive 452 causes the clutch 472 and traveler 450—and, consequently, the clamp 460—to translate along the worm drive 452 and thus, the length of the carriage 440. While particular actuators may be described, these are just examples and other actuators could be used, e.g., buttons, knobs, latches, levers, etc.

[0155] The clamp 460 includes a fixed jaw 462 and a moveable jaw 464 that is opened and closed by pivoting the moveable jaw 464 relative to the fixed jaw 462. The moveable jaw 464 is biased with a spring toward the fixed jaw 462 so that the clamp 460 remains in a closed condition unless opened by an application of an opening force to the movable jaw 464. The jaws 462, 464 of the clamp 460 come together to form an opening 466 for receiving the medical device (not shown) to be stabilized by the stabilizing device 400. In the closed position, the fixed and moveable jaws 462, 464 might remain spaced apart so that the closing force of the clamp 460 is applied to the medical device to stabilize and prohibit rotation of the medical device. The clamp 460 is configured to receive and engage with a mounting portion of the traveler 450 so that the position of the clamp 460 can be adjusted along the length of the carriage 440 by rotation of the adjustment knob 444.

[0156] The fine adjustment mechanism can be disengaged to facilitate free adjustment of the position of the clamp 460 along the length of the carriage 440 without requiring repeated turning of the fine adjustment knob 444. As can be seen in Figures 49–52, the release button 470 engages the clutch 472. Referring to Figure 52, pressing down on the release button 470 causes the clutch 472 to also move down, thereby disengaging the clutch pin 474 from the groove of the worm drive 452. While the release button 470 is held down, the clutch pin 474 remains disengaged from the worm drive 452 so that the clamp 460 can be moved along the carriage 440. The release button 470 is biased in an upward direction so that removing the actuation force from the release button 470 allows the release button 470 and clutch 472 to move upward, thereby re-engaging the groove of the worm drive 452 with the clutch pin 474 (See Figure 51). If the clutch pin 474 is not aligned with the groove of the worm drive 452, the

clamp 460 can be moved laterally or the worm drive 452 can be rotated by rotation of the fine adjustment knob 444 until the clutch pin 474 slips into place.

[0157] Referring now to Figures 53–58, an example multi-function or selection lever 468 is shown in greater detail. The selection lever 468 can be moved into three different positions that each correspond to a different operating state of the clamp 460 and carriage 440 mechanisms. The selection lever 468 can include retaining features, such as a ball detent (e.g., in Figures 57–58), to hold the selection lever 468 in each position. Other actuators are also possible.

[0158] Moving the lever 468 downward into the “free slide” position, shown in Figures 53–54 causes a cam portion 478 (e.g., a screw head in the illustrated example) to engage a protrusion or shelf 479 that is connected to the release button 470, thereby causing the release button 470 to move downward. The downward movement of the release button 470 disengages the fine adjustment mechanism so that the clamp 460 can be moved freely from along the length of the carriage 444. Thus, when the selection lever 468 is moved into the free slide position, the lever 468 remains in the free slide position and the clutch pin 474 remains disengaged from the worm drive 452 until the selection lever 468 is moved back into the neutral or “all locked” center position shown in Figures 55–56. In one example, the clamp is in the closed position when the selection lever 468 is in the free slide position.

[0159] In the all-locked position, the cam portion 478 is rotated out of the way so that the clutch 472 can be moved upward by a spring, thereby engaging the worm drive 452 with the clutch pin 474 (See Figure 56). In the “all locked” position, the clutch pin 474 remains engaged with the worm drive 452 unless overridden by actuation of the release button 470. As such, rotation of the worm drive 452 translates the clamp 460 along the length of the carriage 440. In one example, the clamp is in the closed position when the selection lever 468 is in the free slide position. From the “all locked” position, the selection lever 468 can be moved further upward to a “free rotate” position.

[0160] Referring to Figures 57 and 58, in the “free rotate” position, a cam portion 476 of the selection lever 468 engages an actuation portion 480 of the moveable jaw 464. This engagement causes the moveable jaw 464 to pivot in the opening direction, thereby partially opening the clamp 460. This partial opening allows a medical device, such as a catheter, that is retained in the clasp to freely rotate. The clutch 472 is unaffected by the “free rotate” position of the selection lever 468 and remains engaged with the worm drive 452 unless released by actuation of the release button 470.

[0161] Referring now to Figures 59–75, an example of a stabilizing system or device 500 is shown. The stabilizing system/device 500 can include one or more of a base plate 520, a carriage 540 attached to the base plate 520 (or carriage portion/feature formed in or as part of the base plate), and one or more clamps 560. The one or more clamps can be attachable to the carriage 540. The stabilizing system/device 500 can incorporate any of the features of stabilizing systems or devices disclosed herein and can be made from any suitable material, such as metal or plastic.

[0162] Referring now to Figures 59–62, the stabilizing device 500 includes a release or release button 542 for releasing the carriage 540 from the base plate 520 for disassembly and/or for longitudinal movement of the carriage 540 along the base plate 520. A release 570 arranged at the top of the clamp 560 can be depressed to allow the clamp 560 to be moved back and forth along the carriage 540. In other words, the release 542 can operate as a coarse adjustment mechanism for the position of the clamp 560 relative to the base plate 520 and the release 570 can operate as a fine adjustment mechanism for the position of the clamp 560 relative to the carriage 540.

[0163] The base plate 520 can be the same as or similar to the base plate 420 described above. For example, the base plate 520 can have rigid tabs 522 and spring or flexible tabs 524 for attaching to the table 200 (See Figures 10-13). The tabs 522, 524 include alignment portions 526 that fit in the gaps 216 of the side walls 212 of the table 200 and retention shoulders 528 that fit underneath the latching protrusions 214 of the side walls 212 of the table 200. The base plate 520 is assembled to the table 200 by first inserting the alignment portions 526 of the rigid tabs 522 into the gaps 216 between the latching protrusions 214 of the side walls 212. The shoulders 528 of the rigid tabs 522 are retained by the latching protrusions 214. The other side of the base plate 520 is then pressed downward so that the alignment portions 526 and shoulders 528 of the flexible tabs 524 snap into the latching protrusions 214 of the opposite side wall 212. The flexible tabs 524 can include a ramp or inclined portion to provide a smoother engagement with the latching protrusions 214.

[0164] To remove the base plate 520 from the table 200, the upper ends of the flexible tabs 524 are pressed inward until the shoulders 528 are released from beneath the latching protrusions 214 to enable the base plate 520 to be lifted upward and removed from the table 200. Sufficient space is provided between the base plate 520 and table 200 so that a sterile barrier, such as a drape, can be provided between the two. That is, a sterile barrier can be laid on top of the table 200 before the base plate 520 is snapped into place between the side walls 212 of the table 200. Like the base plate 320 shown in Figures 13 and 35, the base plate 520 can be configured to

attach the stabilizing device 500 to one or more tables 200 described above and shown in Figures 10–12.

[0165] The carriage 540 is moveably and removably attached to the base plate 520 by a first mounting rail 530 and a second mounting rail 532 and latched in place. The first and second mounting rails 530, 532 extend across the base plate 520 and are spaced apart by the width of the carriage 540. Each mounting rail includes a recess for receiving retaining features of the carriage 540—i.e., a retaining lip 556 that engages the first mounting rail 530 and a latch 548 that engages the second mounting rail 532.

[0166] The latch 548 is identical to the latch 448 and associated mechanisms disclosed above. The latch 548 is opened by the release button or bar 542. The second mounting rail 532 also includes locking teeth 534 extending downward from the upper surface of the recess to for engaging and meshing together with corresponding teeth extending upward from the latch 548. The engagement of the teeth prevents movement of the carriage 540 along the base plate 520 once the second mounting rail 532 has been engaged by the latch 548.

[0167] Referring now to Figures 63–75, various views of examples of carriage 540, clamp 560, and mechanisms thereof are shown. In some implementations, the latch mechanism for latching the carriage 540 to the mounting rails 530, 532 of the base plate 520 is the same as or similar to the mechanism shown in Figures 42–46 and described in detail above. The carriage 540 can be attached or moved to any position on the mounting rails 530, 532 by actuating the release 542. Actuating the release 542 retracts the latch 548 out of the recess of the second mounting rail 532 to disengage the teeth of the latch 548 from the teeth of the second mounting rail 532. As a result, the carriage 540 can be removed from or moved along the base plate 520.

[0168] The latch 548 can optionally be biased to a closed position by a biasing member, such as, for example, a spring, shape memory material, elastic member, etc. The latch 548 can also include a beveled bottom edge so that the carriage 540 can be attached to the base plate 520 by inserting the retaining lip 556 in the recess of the first mounting rail 530 and then pressing down on the carriage 540 to snap the carriage 540 onto the second mounting rail 532—that is, by causing the latch 548 to open via the application of force against the inclined portion. Once past the second mounting rail 532, the latch 548 springs closed and engages the latch recess and locking teeth 534.

[0169] Once attached, a rough or coarse adjustment of the position of the carriage 540 can be made by actuating the release 542. This moves the latch 548 out from the recess of the second

mounting rail 532 to disengage the teeth of the latch 548 from the locking teeth 534. As a result, the carriage 540 is free to be moved along the mounting rails 530, 532.

[0170] Optionally, in some implementations, the carriage can be formed in or as part of the base plate such that the rails 530, 532 are not necessary, and the clamp is moved within the carriage. The carriage need not be movable relative to the base plate in these implementations.

[0171] Referring now to Figures 63–71, the carriage 540 is shown fully assembled (Figure 63) and with various components removed to show the mechanism for adjusting the position of the clamp 560 relative to the carriage 540. For example, the position of the clamp 560 relative to the carriage 540 can be adjusted using an actuator or free slide lever 576 and/or a release 570. Though specific examples, such as levers, buttons, or knobs may be described, various types of actuators could be used in their place.

[0172] Referring to Figures 68 and 69, in some implementations, a traveler 550 extends above the carriage 540 for attachment to the clamp 560. When attached to the clamp 560, the traveler 550 secures the clamp 560 for movement along the top of the carriage 540. Referring to Figures 66 and 67, a clutch 572 extends through the center of the traveler 550. The clutch is biased upward to engage an inside top surface of the carriage 540. The clutch 572 includes an engagement portion 574 that includes teeth (See Figure 64) extending upward to engage teeth 544 (See Figure 70) arranged along the inside upper surface of the carriage.

[0173] Referring to Figures 72–75, an example clamp 560 includes a fixed jaw 562 and a moveable jaw 564 that is opened and closed by pivoting the moveable jaw 564 relative to the fixed jaw 562. The moveable jaw 564 is biased with a spring toward the fixed jaw 562 so that the clamp 560 remains in a closed condition unless opened by an application of an opening force to the movable jaw 564. The jaws 562, 564 of the clamp 560 come together to form an opening 566 for receiving the medical device (not shown), such as a catheter, to be stabilized by the stabilizing device 500. In the closed position, the fixed and moveable jaws 562, 564 might remain spaced apart so that the closing force of the clamp 560 is applied to the medical device to stabilize and prohibit rotation of the medical device. Similar clamps and/or features of this clamp 560 can be used for other clamps herein.

[0174] The clamp 560 is configured to receive and engage with a mounting portion of the traveler 550 so that the position of the clamp 560 can be adjusted along the length of the carriage 540 by actuating the release button 570 and sliding the clamp 560. As can be seen in Figures 64–71, the release button 570 engages the clutch 572 so that pressing down on the release button 570 causes the clutch 572 to also move down, thereby disengaging the

engagement portion 574 from the teeth 544 of the carriage 540. While the release button 570 is held down, the engagement portion 574 remains disengaged from the teeth 544 so that the clamp 560 can be moved along the carriage 540. The release button 570 is biased in an upward direction so that removing the actuation force from the release button 570 allows the release button 570 and clutch 572 to move upward, thereby re-engaging the teeth 544 of the carriage 540 with the engagement portion 574. If the teeth of the engagement portion 574 are not aligned with the teeth 544 of the carriage 540, the clamp 560 can be moved longitudinally until the engagement portion 574 slips into place.

[0175] Referring now to Figures 68–71, an example of an actuator configured as a free slide or slide release lever 576 is shown in greater detail. The free slide lever 576 can be moved from a disengaged position to a free slide position. The lever 576 can include retaining features, such as a ball detent (e.g., in Figures 72–75), to hold the lever 576 in each position. Moving the lever 576 downward from the disengaged position (Figures 68–69) into the “free slide” position (Figures 70–71) causes a cam portion 580 to engage a shelf or projection 571 of an actuation portion 582 of the release button 570, thereby causing the release button 570 to move downward. The downward movement of the release button 570 disengages the engagement portion 574 so that the clamp 560 can be moved freely along the carriage 540. Thus, when the lever 576 is moved into the free slide position, the lever 576 remains in the free slide position and the engagement portion 574 remains disengaged from the teeth 544 until the lever 576 is moved back into the disengaged position shown in Figures 68–69.

[0176] Referring now to Figures 72–75, an example actuator configured as a free rotate lever 568 is shown in greater detail. The free rotate lever 568 can be moved from a disengaged position (Figures 72–73) to a free rotate position (Figures 74–75). In the free rotate position, a cam portion 578 of the lever 568 engages an actuation portion 584 of the moveable jaw 564. This engagement causes the moveable jaw 564 to pivot in the opening direction, thereby partially opening the clamp 560 so that a medical device, such as a catheter, retained therein is able to freely rotate.

[0177] The free rotate lever 568 and the free slide lever 576 can be independently operated. As a result, the free rotate lever 568 and free slide lever 576 can be set to allow both free rotation of a medical device in the clamp and free sliding of the clamp on the carriage, set to allow free rotation of a medical device in the clamp, but fix the clamp on the carriage, set to fix the medical device in the clamp, but allow free sliding of the clamp on the carriage, or set to fix the medical device in the clamp and fix the clamp on the carriage.

[0178] Referring now to Figures 76–116, an example of a stabilizing system or device 600 is shown. In some implementations, the stabilizing system/device 600 can include one or more of a base plate 620, a carriage 640 attached to the base plate 620 (or a carriage portion or carriage feature formed in or as part of the base plate), and one or more clamps 660. The one or more clamps are attachable to the carriage 640. The stabilizing system/device 600 can incorporate any of the features of stabilizing systems or devices disclosed elsewhere herein and can be made from any suitable material, such as metal, plastic, polymers, fibers, combinations of materials, etc.

[0179] Referring now to Figures 77–94, an example base plate 620 is shown assembled to the table 200 and details of the mechanisms of the base plate 620 are shown in greater detail. The base plate 620 can be the same as or similar to the base plates 420, 520 described above. For example, in some implementations, the base plate 620 can include rigid tabs 622 and spring or flexible tabs 624 for attaching to the table 200. The rigid tabs 622 fit underneath the latching protrusions 214 of the side walls 212 of the table 200 and are wide enough to engage multiple latching protrusions 214. The flexible tabs 624 include retention shoulders 626 that also fit underneath the latching protrusions 214 of the side walls 212 of the table 200.

[0180] In some implementations, the base plate 620 also includes alignment tabs 628 extending downward from each end of the base plate 620 to align the base plate 620 on the table 200. Optionally, the rigid and/or flexible tabs 622, 624 can include alignment portions like the base plates 320, 420, 520 described above.

[0181] As is shown in Figures 81 and 82, in some implementations, the base plate 620 is assembled to the table 200 by first inserting the rigid tabs 622 underneath the latching protrusions 214 of one of the side walls 212 and moving the base plate 620 laterally to align the alignment tabs 628 on the ends of the table 200. The other side of the base plate 620 is then pressed downward so that the retention shoulders 626 of the flexible tabs 624 snap into the latching protrusions 214 of the opposite side wall 212 (Figures 77–80). The flexible tabs 624 can include a ramp or inclined portion to provide a smooth engagement with the latching protrusions 214.

[0182] In some implementations, to remove the base plate 620 from the table 200, the upper ends of the flexible tabs 624 are pressed inward until the shoulders 626 are released from beneath the latching protrusions 214 to enable the base plate 620 to be lifted upward and removed from the table 200. Sufficient space can be provided between the base plate 620 and table 200 so that a sterile barrier, such as a drape, can be provided between the two. That is, a

sterile barrier can be laid on top of the table 200 before the base plate 620 is snapped into place between the side walls 212 of the table 200.

[0183] In some implementations, the base plate 620 is not configured to be assembled with more than one table 200. Rather, the carriage 640 of the stabilizing device 600 can be moved laterally along the base plate 620 and is also elongated sufficiently to receive two or more clamps 660.

[0184] In some implementations, the base plate 620 can be configured to be assembled or used with more than one table or a variety of tables or support surfaces. For example, the base plate can include one or more of a clamp(s), gripper(s), latch(es), keyed portions, interlocking portions, etc. In some implementations, one or more clamps or grippers can be configured to attach to a wide variety of tables or supports. For example, a clamp or clamps (or other grippers) can be arranged on the bottom and/or edges of the base plate that can be configured to slide or adjust to fit and clamp on different shapes and/or sizes of tables/supports.

[0185] In some implementations, the base plate 620 can include a mounting channel 630 for receiving and attaching to the carriage 640. In some implementations, retaining tabs 631 protrude into the channel 630 to engage and retain retaining edges or flanges 642 of the carriage 640 so that the carriage 640 is restrained to longitudinal movement along the mounting channel 630. The position of the carriage 640 within the mounting channel 630 can be locked in place by a side latch 632 (see Figures 85–88) and/or a bottom latch 634 (see Figures 91–94). That is, the side and bottom latches 632, 634 can be opened to allow the carriage 640 to slide relative to the base plate 620 and are closed to prohibit further movement of the carriage 640 within the mounting channel 630 of the base plate 620. The latches 632, 634 can be biased in a closed direction so that the latches 632, 634 close when an actuating or opening force is removed. Only one of the latches 632, 634 is needed to attach the carriage 640 to the base plate 620. Both latches 632, 634 are shown in the illustrated example to demonstrate the engagement of each of the latches 632, 634 with the carriage 640.

[0186] In some implementations, the carriage 640 can be formed in or as part of the base plate 620, e.g., such that the carriage is a carriage portion/feature of the base plate.

[0187] Referring now to Figures 83–94, example mechanisms of the side latch 632 and bottom latch 634 are shown in greater detail. In some implementations, the side latch 632 is operated by pressing outward on a cylindrical upper portion of the latch 632 that is arranged above and to one side of the mounting channel 630. As can be seen in Figures 83–86, in the closed condition, a latch member 636 of the side latch 632 protrudes into the mounting channel 630.

When the side latch 632 is opened, as shown in Figures 87 and 88, the latch member 636 retracts into the base plate 620 and out of the mounting channel 630.

[0188] Referring to Figures 89-94, in some implementations, the bottom latch 634 is operated by pressing downward on an actuator, such as the illustrated triangle shaped portion, arranged at one end of the base plate 620 and below the mounting channel 630. As can be seen in Figures 89-92, in the closed condition, a latch pin 638 of the bottom latch 634 protrudes into the mounting channel 630. When the bottom latch 634 is opened, as shown in Figures 93 and 94, the latch pin 638 retracts into the base plate 620 and out of the mounting channel 630. Other arrangements are also possible.

[0189] Referring now to Figure 95, one clamp 660 is shown assembled to the carriage 640 (which can be a separate carriage or a carriage portion/feature of a base plate). In some implementations, first and second mounting rails 646 and 648 extend upward and define a clamp mounting channel 654 for holding and positioning one or more clamps 660, as is shown in Figure 97.

[0190] In some implementations, the carriage can be configured to act as a base plate (e.g., as an integrated base plate and carriage portion), for example, the base plate can look and be configured to be similar to what is shown in Figures 95 and 96. In some implementations, the carriage can be configured to attach to a separate base plate. Referring to Figure 96, in some implementations, the carriage can include one or more retaining edges or flanges 642 on both sides for engaging the retaining tabs 631 of the base plate 620.

[0191] Referring to Figures 95 and 96, in some implementations, an optional lateral stop 644 extends below the carriage 640 to prevent movement of the carriage 640 beyond a desired amount.

[0192] Referring now to Figures 98-102, the carriage 640 is shown combined with the base plate 620. In some implementations, the carriage is formed in or as part of, e.g., integral with, the base plate. In these implementations, the carriage (which can also be referred to as a carriage portion or carriage feature of the base plate) need not be moveable relative to the base plate.

[0193] In some implementations, the carriage is held in place with side and bottom latches 632, 634. In some implementations, side positioning recesses 650 are arranged along one side of the carriage 640 and are configured to receive the latch member 636 of the side latch 632 of the base plate 620. The side positioning recesses 650 and side latch 632 enable an operator to slide

and lock the carriage 640 in a desired position in the mounting channel 630 of the base plate 620. The latch member 636 engages one of the positioning recesses 650—as can be seen in the cross-sectional view of Figure 101—to prohibit unwanted longitudinal movement of the carriage 640 relative to the base plate 620.

[0194] Referring to Figures 96 and 102, in some implementations, bottom positioning recesses 652 are also provided along the bottom of the carriage 640 leading up to the stop 644. The bottom positioning recesses 652 and bottom latch 634 enable an operator to slide and lock the carriage 640 in a desired position in the mounting channel 630 of the base plate 620. In some implementations, a latch pin 638 (or similar element) engages one of the bottom positioning recesses 652—as can be seen in the cross-sectional view of Figure 102—to prohibit unwanted movement of the carriage 640 relative to the base plate 620. Thus, the movement of the carriage 640 relative to the base plate 620 is restrained in two locations to provide a secure and stable connection for supporting the clamps 660.

[0195] Referring now to Figures 103–116, an example clamp 660 and the mechanisms for attaching and positioning the clamp 660 on the carriage 640 are shown in greater detail. As can be seen in Figures 103 and 104, in some implementations, the clamp 660 includes a fixed jaw 662 and a moveable jaw 664 that is opened and closed by pivoting the moveable jaw 664 relative to the fixed jaw 662. The moveable jaw 664 can be biased with a spring toward the fixed jaw 662 so that the clamp 660 remains in a closed condition unless opened by an application of an opening force to the movable jaw 664. The jaws 662, 664 of the clamp 660 come together to form an opening 666 for receiving the medical device (not shown), such as a catheter, to be stabilized by the stabilizing device 600. In the closed position, the fixed and moveable jaws 662, 664 might remain spaced apart so that the closing force of the clamp 660 is applied to the medical device to stabilize and prohibit rotation of the medical device.

[0196] In some implementations, an actuator 668, such as a latch button or bar, on one side of the clamp 660, shown in greater detail in Figures 105–110, is operably connected to a moveable retaining flange 670 that is configured to be received within a recess of the first mounting rail 646. In some implementations, a fixed retaining flange 674 extends from the side of the clamp 660 opposite the moveable retaining flange 670 and is configured to be inserted into a recess of the second mounting rail 648 when assembling the clamp 660 to the carriage 640.

[0197] Referring to Figures 108–110, in some implementations, actuating an actuator, such as pressing on the latch button 668, retracts the moveable retaining flange 670 so that the bottom

of the clamp 660 can be inserted into the clamp mounting channel 654. In some implementations, the actuator or latch button 668 and moveable retaining flange 670 are biased outward so that releasing pressure on the latch button moves the moveable retaining flange 670 outward and into the recess of the first mounting rail 646. The moveable retaining flange 670 can also include a beveled bottom edge so that the clamp 660 can be attached to the carriage 640 by inserting the fixed retaining flange 674 into the second mounting rail 648 and then pressing down on the clamp 660 to snap the clamp 660 onto the first mounting rail 646—that is, by causing the moveable retaining flange 670 to open via the application of force against the inclined portion. Once the clamp is bottomed in the clamp mounting channel 654, the moveable retaining flange 672 springs outward and engages the recess of the first mounting rail 646.

[0198] Once inserted into the clamp mounting channel 654, the clamp 660 can be freely moved (e.g., slid) along the length of the carriage 640 to a desired position. To hold the clamp 660 in a desired location, a locking knob 672 (or other actuator) can be rotated (or otherwise actuated) from a free slide position to a locked position. In some implementations, the locking knob 672 is connected to a rotating cam portion 676 so that rotating the locking knob 672 causes the rotating cam portion 676 to rotate. In some implementations, as the rotating cam portion 676 is rotated, an oblong portion of the rotating cam portion 676 engages a locking foot 678 (the term “foot” can refer to a variety of types of extensions of various sizes and shapes that can function similarly) and causes the locking foot 678 to move downward to an extended position (Figures 114–116). When the locking knob 672 is further rotated, or rotated in the reverse direction, the oblong portion of the rotating cam portion 676 allows the locking foot 678 to move upward to return to a retracted position (Figures 111–113). In some implementations, the locking foot 678 includes a biasing member, such as a spring, so that the locking foot 678 remains in the retracted position until the locking knob 672 is actuated. Other mechanisms to accomplish similar results can also be used. For example, in some implementations, one or more of gears, worm gears, pulleys, levers, motors, etc. can be used to extend or retract the foot 678.

[0199] When the clamp 660 has been moved along the clamp mounting channel 654 to a desired position, the locking knob 672 can be actuated to extend the locking foot 678. In some implementations, the locking foot 678 presses down on the bottom of the clamp mounting channel 654 and, consequently, causes the moveable and fixed retaining flanges 670, 674 to move upward to engage the top surface of the recesses in the first and second mounting rails 646, 648, respectively. The friction generated between the locking foot 678 and the clamp mounting channel 654 and between the retaining flanges 670, 674 and the mounting rails 646, 648 retain the clamp 660 in the desired location. To reposition the clamp 660, the locking knob 672 can be rotated to disengage the locking foot 678 so that the clamp 660 can slide along the

channel. If another clamp 660 is in the way, the latch button 668 (or another similar actuator) can be pressed (or actuated) and the clamp removed from the clamp mounting channel 654 altogether and placed back into the channel 654 in another location. Thus, the stabilizer 600 can be easily adjusted or configured for use with various medical devices.

[0200] Any of the components of the stabilizing devices described herein can be integrally formed as a single component. For example, a stabilizing device 700 can include any of the features of any of the baseplates disclosed herein integrally formed with any of the features of any of the carriages disclosed herein. For example, as can be seen in Figures 117–119, an example of a stabilizing device 700 can be integrally formed and include features of the baseplate 620 and features of the carriage 640. The stabilizing device 700 can include the features of the baseplate 620 that facilitate connection and/or adjustment of the stabilizing device to a platform, such as the platform 210 disclosed herein. The stabilizing device 700 can include the features of the carriage 640 that facilitate connection and/or adjustment of the clamp(s), such as the clamp(s) 660, to the stabilizing device. The features that facilitate connection of the baseplate 620 and the carriage 640 are eliminated, since the baseplate 620 and the carriage 640 are integrally formed. The device 700 can otherwise be the same as or similar to the device 600, but with an integrally formed base plate portion 720 and a clamp attachment portion 740 that replaces the features of the moveable carriage portion 640.

[0201] In some implementations, the base plate need not include portions extending from the sides thereof. For example, the base plate can instead be an integral base plate and carriage portion that looks similar to what is shown in Figures 95 and 96. In some implementations, the carriage shown in Figures 95 and 96 acts as the base plate and can attach to (e.g., as described below) or be placed directly on a table or other support surface.

[0202] The system can include a table to which the base plate can be attached or placed thereon. In some implementations, the base plate portion 720 attaches to the table 200 in the same manner as the base plate 620, described above. For example, the base plate portion 720 can include rigid tabs 722 and spring or flexible tabs 724 including retention shoulders 726. In some implementations, alignment tabs 728 extend below the base plate portion 720 to engage the ends of the table (not shown) so that the base plate portion 720 is properly arranged on the table and is prohibited from moving laterally on the table.

[0203] Other ways of sitting on or attaching to a table or support are also possible, which need not include any of tabs 722, tabs 724, tabs 728, or shoulders 726. In some implementations, the base plate portion 720 can include one or more different types of attachments means. For

example, the base plate portion can include one or more of a clamp(s), gripper(s), latch(es), keyed portions, interlocking portions, etc. In some implementations, one or more clamps or grippers can be configured to attach to a wide variety of tables and/or support surfaces. For example, a clamp or clamps (or other grippers) can be arranged on the bottom and/or edges of the base plate that can be configured to slide or adjust to fit and clamp on different shapes and/or sizes of tables/support surfaces. In some implementations, one or more extensions similar to one of tabs 728 (but these can be different shapes, sizes, and designs, e.g., potentially one or more of longer, wider, contoured to fit with an edge of a table, etc.) can be positioned on the bottom of the base plate to act as one or more sides of a clamp or gripper that can be adjusted to grip or attach the base plate to a variety of different tables/supports of different sizes and shapes. In some implementations, one extension from the bottom of the base plate (which can be similar to one of tabs 728 but configured to interact with a side of a table) can remain stationary relative to the base plate, and another extension from the bottom of the base plate can be movable/slidable relative to the base plate and configured to interact with a side of a table/support, such that the two extensions act as a clamp or gripper that can be adjusted to different sized tables/supports and moved into tight contact with the sides of the table/support to hold the base plate in position on the table/support. The table/support can include one or more legs and include one or more features of other tables herein.

[0204] The clamp attachment portion 740 is similar to the carriage 640 and includes first and second mounting rails 746 and 748 that extend upward and define a clamp mounting channel 754 for holding and positioning one or more clamps 660. In some implementations, the clamp mounting channel 754 includes a friction or gripping strip 756 for engaging the locking foot 678 of the one or more clamps 660.

[0205] While various inventive aspects, concepts and features of the disclosures may be described and illustrated herein as embodied in combination in the examples herein, these various aspects, concepts, and features may be used in many alternative examples, either individually or in various combinations and sub-combinations thereof. Unless expressly excluded herein all such combinations and sub-combinations are intended to be within the scope of the present application. Still further, while various alternative examples as to the various aspects, concepts, and features of the disclosures—such as alternative materials, structures, configurations, methods, devices, and components, alternatives as to form, fit, and function, and so on—may be described herein, such descriptions are not intended to be a complete or exhaustive list of available alternative examples, whether presently known or later developed. Those skilled in the art may readily adopt one or more of the inventive aspects,

concepts, or features into additional examples and uses within the scope of the present application even if such examples are not expressly disclosed herein.

[0206] Additionally, even though some features, concepts, or aspects of the disclosures may be described herein as being a preferred arrangement or method, such description is not intended to suggest that such feature is required or necessary unless expressly so stated. Still further, example or representative values and ranges may be included to assist in understanding the present application, however, such values and ranges are not to be construed in a limiting sense and are intended to be critical values or ranges only if so expressly stated.

[0207] Moreover, while various aspects, features and concepts may be expressly identified herein as being inventive or forming part of a disclosure, such identification is not intended to be exclusive, but rather there may be inventive aspects, concepts, and features that are fully described herein without being expressly identified as such or as part of a specific disclosure, the disclosures instead being set forth in the appended claims. Descriptions of example methods or processes are not limited to inclusion of all steps as being required in all cases, nor is the order that the steps are presented to be construed as required or necessary unless expressly so stated. The words used in the claims have their full ordinary meanings and are not limited in any way by the description of the examples in the specification.

Claims

What is claimed is:

1. A stabilizing device for holding a medical device, the stabilizing device comprising:
an integrally formed base plate portion and carriage portion having a clamp mounting channel;
a clamp for receiving the medical device, wherein the clamp is slidably disposable in the clamp mounting channel; and
wherein the clamp includes a foot configured to engage the channel to lock the position of the clamp in the channel.
2. The stabilizing device of claim 1 wherein the channel comprises a first mounting rail and a second mounting rail.
3. The stabilizing device of claim 2 wherein the clamp includes a fixed mounting flange and a movable mounting flange.
4. The stabilizing device of claim 3 wherein the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.
5. The stabilizing device of claim 4 further comprising an actuator that is actuatable to retract the moveable mounting flange.
6. The stabilizing device of any one of claims 3-5 wherein the movable mounting flange is biased away from the fixed mounting flange.
7. The stabilizing device of any one of claims 1-6 further comprising an actuator actuatable to move the foot into engagement with the channel.
8. The stabilizing device of any one of claims 1-7 further comprising a cam for moving the foot into engagement with the channel.

9. The stabilizing device of any one of claims 1-7 wherein the foot is biased to a retracted position.
10. The stabilizing device of any one of claims 1-9 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
11. The stabilizing device of any one of claims 1-10 wherein the clamp further comprises an actuator that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
12. A stabilizing system for holding a medical device, the stabilizing system comprising:
an integrally formed base plate portion and carriage portion having a clamp mounting channel;
a clamp for receiving the medical device, wherein the clamp is slidably disposable in the clamp mounting channel;
wherein the clamp includes a foot configured to engage the channel to lock the position of the clamp relative to the channel;
a table comprising:
a platform comprising side walls for receiving first and second retaining tabs of the base; and
a plurality of legs for supporting the platform.
13. The stabilizing system of claim 12 wherein the channel comprises a first mounting rail and a second mounting rail.
14. The stabilizing system of claim 13 wherein the clamp includes a fixed mounting flange and a movable mounting flange.
15. The stabilizing system of claim 14 wherein the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.
16. The stabilizing system of claim 15 further comprising a latch button that retracts the moveable mounting flange.

17. The stabilizing system of any one of claims 14-16 wherein the movable mounting flange is biased away from the fixed mounting flange.
18. The stabilizing system of any one of claims 12-17 further comprising a locking knob for moving the foot into engagement with the channel.
19. The stabilizing system of any one of claims 12-18 further comprising a cam for moving the foot into engagement with the channel.
20. The stabilizing system of any one of claims 12-18 wherein the foot is biased to a retracted position.
21. The stabilizing system of any one of claims 12-20 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
22. The stabilizing system of any one of claims 12-21 wherein the clamp further comprises a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
23. A stabilizing device, the stabilizing device comprising:
 - a base plate;
 - a carriage;
 - at least one clamp for receiving one or more medical devices; and
 - wherein at least one of the base plate and the carriage includes at least one rail.
24. The stabilizing device of claim 23 wherein the at least one clamp is attachable to the at least one rail such that the at least one clamp can slide along the rail but is prevented from detaching from the rail.
25. The stabilizing device of claim 23 wherein the base plate includes the at least one rail, and wherein the carriage is moveably attached to the at least one rail of the base plate and is prohibited from moving away from the base plate by the at least one rail.

26. The stabilizing device of any one of claims 23-25 wherein the at least one rail comprises a plurality of locking teeth for engaging a latch member of at least one of the carriage and the at least one clamp.
27. The stabilizing device of any one of claims 23-25 wherein at least one of a release button, knob, and/or lever is actuatable to enable the carriage and/or the at least one clamp to move laterally along the at least one rail.
28. The stabilizing device of any one of claims 23-27 wherein:
the base plate comprises two mounting rails; and
the carriage comprises fixed and moveable retaining lips for securing the carriage between the two mounting rails.
29. The stabilizing device of any one of claims 23-28 wherein the carriage comprises an adjustment mechanism for moving the at least one clamp laterally along the carriage.
30. The stabilizing device of claim 29 wherein actuating a button, knob, and/or lever of the at least one clamp is configured to disengage the at least one clamp from the adjustment mechanism of the carriage.
31. The stabilizing device of any one of claims 29-30 wherein the adjustment mechanism comprises a worm drive that engages a pin of a traveler for attaching the clamp.
32. The stabilizing device of any one of claims 29-31 wherein the clamp further comprises at least one of release button, knob, and/or lever for disengaging the clamp from the adjustment mechanism.
33. The stabilizing device of any one of claims 23-32 wherein the carriage comprises a first mounting rail and a second mounting rail.
34. The stabilizing device of claim 33 wherein the clamp includes a fixed mounting flange and a movable mounting flange.

35. The stabilizing device of claim 34 wherein the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.

36. A stabilizing system for holding a medical device, the stabilizing system comprising:
a stabilizer comprising:
a base plate comprising at least one rail extending upward and first and second retaining tabs;
a carriage moveably attached to the at least one rail of the base plate and is prohibited from moving away from the base plate by the at least one rail;
a clamp for receiving the medical device, wherein the clamp is moveably attached to the carriage;
a table comprising:
a platform comprising side walls for receiving the first and second retaining tabs of the base plate; and
a plurality of legs for supporting the platform.

37. The stabilizing system of claim 36 wherein the at least one rail of the base plate comprises a plurality of locking teeth for engaging a latch member of the carriage.

38. The stabilizing system of any one of claims 36-37 wherein the at least one rail of the base plate is received within a mounting channel of the carriage.

39. The stabilizing system of any one claims 36-38 wherein depressing a release button of the carriage enables the carriage to move laterally along the at least one rail.

40. The stabilizing system of any one of claims 36-39 wherein depressing the release button of the carriage enables the carriage to be removed from the at least one rail.

41. The stabilizing system of any claims 36-40 wherein:
the base plate comprises two mounting rails; and
the carriage comprises fixed and moveable retaining lips for securing the carriage between the two mounting rails.

42. The stabilizing system of any of claims 36-41 wherein the carriage further comprises an adjustment mechanism for moving the clamp laterally along the carriage.

43. The stabilizing system of claim 42 wherein depressing a release button of the clamp disengages the clamp from the adjustment mechanism of the carriage.
44. The stabilizing system of any one claims 42-43 wherein the adjustment mechanism comprises a worm drive that engages a pin of a traveler for attaching the clamp.
45. The stabilizing system of any one of claims 42-44 wherein the clamp further comprises a release lever for disengaging the clamp from the adjustment mechanism.
46. The stabilizing system of claim 45 wherein the release lever can be retained in a released condition.
47. The stabilizing system of any one of claims 45-46 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
48. The stabilizing system of any one of claims 36-47 wherein the clamp further comprises a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
49. The stabilizing system of any one of claims 36-48 wherein at least one of the first side wall and the second side wall of the table comprises alignment gaps for receiving alignment portions of at least one of the first retaining tabs and the second retaining tabs of the base plate.
50. The stabilizing system of any of claims 36-49 wherein the first and second side walls of the table comprise latching protrusions for retaining shoulders of the first and second retaining tabs of the base plate.
51. The stabilizing system of any of claims 36-50 wherein the base plate is configured to attach to two tables.
52. A stabilizing device for holding a medical device, the stabilizing device comprising: a base plate having at least one rail extending upward;

a carriage moveably attached to the at least one rail of the base plate and is prohibited from moving away from the base plate by the at least one rail; and
a clamp for receiving the medical device, wherein the clamp is moveably attached to the carriage.

53. The stabilizing device of claim 52 wherein the at least one rail of the base plate comprises a plurality of locking teeth for engaging a latch member of the carriage.

54. The stabilizing device of any one of claims 52 and 53 wherein the at least one rail of the base plate is received within a mounting channel of the carriage.

55. The stabilizing device of any one of claims 52-54 wherein depressing a release button of the carriage enables the carriage to move laterally along the at least one rail.

56. The stabilizing device of any one of claims 52-55 wherein depressing the release button of the carriage enables the carriage to be removed from the at least one rail.

57. The stabilizing device of any one of claims 52-56 wherein:
the base plate comprises two mounting rails; and
the carriage comprises fixed and moveable retaining lips for securing the carriage between the two mounting rails.

58. The stabilizing device of any one of claims 52-57 wherein the carriage further comprises an adjustment mechanism for moving the clamp laterally along the carriage.

59. The stabilizing device of claim 58 wherein depressing a release button of the clamp disengages the clamp from the adjustment mechanism of the carriage.

60. The stabilizing device of any one of claims 58-59 wherein the adjustment mechanism comprises a worm drive that engages a pin of a traveler for attaching the clamp.

61. The stabilizing device of any one of claims 58-60 wherein the clamp further comprises a release lever for disengaging the clamp from the adjustment mechanism.

62. The stabilizing device of claim 61 wherein the release lever can be retained in a released condition.
63. The stabilizing device of any one of claims 58-62 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
64. The stabilizing device of any one of claims 58-63 wherein the clamp further comprises a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
65. A stabilizing device for holding a medical device, the stabilizing device comprising:
a base plate having a clamp mounting channel;
a clamp for receiving the medical device, wherein the clamp is slidably disposed in the channel; and
wherein the clamp includes a foot that engages the channel to lock the position of the clamp relative to the base plate.
66. The stabilizing device of claim 65 wherein the channel comprises a first mounting rail and a second mounting rail.
67. The stabilizing device of claim 66 wherein the clamp includes a fixed mounting flange and a movable mounting flange.
68. The stabilizing device of claim 67 wherein the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.
69. The stabilizing device of claim 68 further comprising an actuator that is actuatable to retract the moveable mounting flange.
70. The stabilizing device of any one of claims 67-69 wherein the movable mounting flange is biased away from the fixed mounting flange.

71. The stabilizing device of any one of claims 65-70 further comprising an actuator actuatable to move the foot into engagement with the channel.
72. The stabilizing device of any one of claims 65-71 further comprising a cam for moving the foot into engagement with the channel.
73. The stabilizing device of any one of claims 65-71 wherein the foot is biased to a retracted position.
74. The stabilizing device of any one of claims 65-73 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
75. The stabilizing device of any one of claims 65-74 wherein the clamp further comprises an actuator that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
76. A stabilizing system for holding a medical device, the stabilizing system comprising:
a base plate having a clamp mounting channel;
a clamp for receiving the medical device, wherein the clamp is slidably disposed in the channel; and
wherein the clamp includes a foot that engages the channel to lock the position of the clamp relative to the base plate;
a table comprising:
a platform comprising side walls for receiving first and second retaining tabs of the base plate; and
a plurality of legs for supporting the platform.
77. The stabilizing system of claim 76 wherein the channel comprises a first mounting rail and a second mounting rail.
78. The stabilizing system of claim 77 wherein the clamp includes a fixed mounting flange and a movable mounting flange.

79. The stabilizing system of claim 78 wherein the fixed mounting flange and the movable mounting flange are disposed in recesses in the first mounting rail and the second mounting rail.
80. The stabilizing system of claim 79 further comprising a latch button retracts the moveable mounting flange.
81. The stabilizing system of any one of claims 78-80 wherein the movable mounting flange is biased away from the fixed mounting flange.
82. The stabilizing system of any one of claims 76-81 further comprising a locking knob for moving the foot into engagement with the channel.
83. The stabilizing system of any one of claims 76-82 further comprising a cam for moving the foot into engagement with the channel.
84. The stabilizing system of any one of claims 76-82 wherein the foot is biased to a retracted position.
85. The stabilizing system of any one of claims 76-84 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
86. The stabilizing system of any one of claims 76-85 wherein the clamp further comprises a free rotate lever that can be moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
87. A stabilizing system for holding a medical device comprising:
a clamp mounting channel defined by first and second mounting rails;
a clamp for receiving the medical device, wherein the clamp is slidably disposed in the clamp mounting channel; and
wherein the clamp includes a foot that engages the channel to lock the position of the clamp in the channel.
88. The stabilizing system of claim 87 wherein the channel comprises a gripping strip for engaging the locking foot.

89. The stabilizing system of any one of claims 87-88 wherein the clamp includes a fixed mounting flange and a movable mounting flange.
90. The stabilizing system of claim 89 wherein the fixed mounting flange and the movable mounting flange are disposable in recesses in the first mounting rail and the second mounting rail.
91. The stabilizing system of claim 90 further comprising an actuator that is actuatable to retract the moveable mounting flange.
92. The stabilizing system of any one of claims 89-91 wherein the movable mounting flange is biased away from the fixed mounting flange.
93. The stabilizing system of any one of claims 87-92 further comprising an actuator actuatable to move the foot into engagement with the channel.
94. The stabilizing system of any one of claims 87-93 further comprising a cam for moving the foot into engagement with the channel.
95. The stabilizing system of any one of claims 87-93 wherein the foot is biased to a retracted position.
96. The stabilizing system of any one of claims 87-95 wherein the clamp comprises a fixed jaw and a moveable jaw that is biased in a closing direction toward the fixed jaw.
97. The stabilizing system of any one of claims 87-96 wherein the clamp further comprises an actuator that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.
98. A clamp for holding a medical device, the clamp comprising:
a fixed jaw;
a movable jaw that is opened and closed by pivoting the moveable jaw relative to the fixed jaw;

a movable retaining flange extending from a first side of the clamp;
a fixed retaining flange extending from a second side of the clamp that is opposite the first side; and
a movable locking foot extending from a bottom of the clamp.

99. The clamp of claim 98 wherein the movable retaining flange includes a beveled edge.

100. The clamp of claim 98 further comprising an actuator that is actuatable to retract the moveable retaining flange.

101. The clamp of any one of claims 98-100 wherein the movable retaining flange is biased away from the fixed retaining flange.

102. The clamp of any one of claims 98-101 further comprising an actuator actuatable to move the foot into engagement with the channel.

103. The clamp of any one of claims 98-102 further comprising a cam for moving the foot into engagement with the channel.

104. The clamp of any one of claims 98-103 wherein the foot is biased to a retracted position.

105. The clamp of any one of claims 98-104 wherein the clamp further comprises an actuator that can be actuated or moved into an engaged condition where the clamp is partially opened to facilitate the rotation of the medical device within the clamp.

106. A clamp mounting channel of a stabilizing system comprising:

a first mounting rail;

a second mounting rail;

wherein the first mounting rail and the second mounting rail are configured to receive a clamp for holding a medical device, such that the clamp is slidably disposable in the clamp mounting channel between the first mounting rail and the second mounting rail, and such that a foot of the clamp can engage the clamp mounting channel to lock the position of the clamp in the clamp mounting channel.

107. The clamp mounting channel of claim 106 further comprising a gripping strip for engaging the locking foot.

108. The clamp mounting channel of any one of claims 106-107 further comprising recesses in the first mounting rail and the second mounting rail, wherein the recesses are configured to receive at least one of a first flange and a second flange of the clamp.

109. The clamp mounting channel of claim 108 wherein the recesses include top surfaces configured to engage the first flange and the second flange of the clamp when the locking foot presses down on the bottom of the clamp mounting channel such that the position of the clamp in the clamp mounting channel is locked.