

CLAIMS:

1. A suture lock assembly for a delivery system for an implantable medical device, comprising:

a spool configured to receive a suture and including a gear;
a rotatable handle coupled to the spool and configured to rotate the spool and gear;
a pawl configured to engage with teeth of the gear and allow rotation of the gear, spool, and handle in only one direction; and
a directional selector coupled to the pawl and movable between two positions, each of the two positions corresponding to a different direction of rotation of the gear, the directional selector configured to pivot the pawl to adjust an orientation of the pawl relative to the gear and adjust a direction of rotation of the gear.

2. The suture lock assembly of claim 1, wherein the pawl is pivotable between a first orientation which allows rotation of the gear in only a first direction and a second orientation which allows rotation of the gear in only an opposite, second direction.

3. The suture lock assembly of claim 2, wherein the first direction is counterclockwise and the second direction is clockwise.

4. The suture lock assembly of any of claims 2 and 3, wherein the pawl is held in the first orientation and the second orientation by a spring plunger engaged with the pawl at a back side of the pawl and wherein in the first orientation the pawl is arranged on a first side of the spring plunger and in the second orientation the pawl is arranged on a second side of the spring plunger.

5. The suture lock assembly of claim 4, wherein the pawl includes two teeth spaced apart from one another and arranged on a front side of the pawl and wherein the two teeth of the pawl are configured to engage with teeth of the gear.

6. The suture lock assembly of any of the preceding claims, further comprising hard stops arranged within a housing of the suture lock assembly, the gear and pawl arranged within the housing, and wherein the pawl is configured to interface with one of the hard stops

when the gear is rotated in a direction that is opposite a selected direction of rotation set by the directional selector.

7. The suture lock assembly of any of the preceding claims, further comprising a housing including a top housing and a bottom housing coupled to one another, the gear and pawl arranged within a space arranged between the top housing and bottom housing and the rotatable handle and the directional selector extending outward from the top housing, wherein the top housing includes a first icon indicating a slack position of the directional selector and a second icon indicating a tension position of the directional selector, and wherein the directional selector is movable between a first of the two position that points toward the first icon and a second of the two positions that points toward the second icon.

8. The suture lock assembly of any of the preceding claims, further comprising a release bar including a suture cutting location arranged at a distal end of the release bar, the release bar configured to receive a suture through an interior of the release bar and across the suture cutting location, the suture extending from the spool.

9. The suture lock assembly of claim 8, wherein the release bar includes one or more supporting ribs arranged on a center portion of the release bar, the center portion arranged between the distal end and proximal end of the release bar.

10. The suture lock assembly of any of claims 8 and 9, wherein distal end of the release bar is shaped to form a first keyed connection with an adaptor of the delivery system and a proximal end of the release bar is shaped to form a second keyed connection with a bottom housing of the suture lock assembly, wherein the spool is arranged within an interior of the bottom housing.

11. The suture lock assembly of claim 10, further comprising a flushing port coupled to the bottom housing and extending outward from the bottom housing in an opposite direction from a direction which the release bar extends from the bottom housing.

12. The suture lock assembly of any of claims 8-11, further comprising a plurality of annular sealing elements, including a first annular sealing element arranged around a distal end portion of the release bar, proximate to the suture cutting location, and a second annular

sealing element arranged around a proximal end portion of the release bar, the second annular sealing element arranged between, in a radial direction, the release bar and a bottom housing of the suture lock assembly, wherein the spool is arranged within the bottom housing.

13. The suture lock assembly of claim 12, wherein the plurality of annular sealing elements further includes a third annular sealing element arranged around a portion of the spool and arranged between the portion of the spool and the bottom housing.

14. The suture lock assembly of any of claims 8-13, wherein a proximal end of the release bar is bonded to a bottom housing of the suture lock assembly.

15. The suture lock assembly of any of claims 8-14, wherein the release bar includes a divider arranged within the suture cutting location, wherein the divider is configured to separate two lines of a suture extending longitudinally through the release bar and expose only one line of the two lines of the suture to an exterior of the suture lock assembly at the suture cutting location.

16. The suture lock assembly of any of the preceding claims, wherein the spool includes a gap in a flange arranged around a bottom of the spool and wherein the rotatable handle includes an indicator on its outer surface configured to track a number of turns applied to the spool and locate the gap.

17. The suture lock assembly of claim 16, wherein the gap is arranged adjacent to one or more apertures arranged within the spool, the one or more apertures configured to route the suture from inside the spool to an exterior surface of the spool that is configured to receive the suture thereon.

18. The suture lock assembly of any of the preceding claims, wherein the rotatable handle is coupled to the spool via a central screw extending longitudinally through the rotatable handle and the spool, further comprising one or more friction pads arranged around the central screw, adjacent to the central portion of the spool, and a friction nut coupled to the central screw, below a lower friction pad of the one or more friction pads, and wherein the one or more friction pads are configured to increase friction on the central screw

to stop rotation of the central screw and the rotatable handle when a tension in the suture increases above a predetermined threshold.

19. The suture lock assembly of any of claims 1-17, further comprising a pin-based clutch system including a spring plunger extending longitudinally through and coupled to a portion of the rotatable handle, the spring plunger including an end extending into the gear and configured to extend into and mate with a plurality of detents arranged in an outer-facing surface of the gear to allow rotation of the gear by the rotatable handle, and wherein the spring plunger is configured to slip out of the detents in response to a tension in the suture above a predetermined threshold.