

## CLAIMS

1. — A device for implanting at a native heart valve of a heart of a patient, the device comprising an upper coil and a lower coil, and a central axis extending through the upper coil and the lower coil;

wherein the device is configured to assume an axially expanded state wherein the entire upper coil is positioned on a first side of the lower coil relative to the central axis; and

wherein the device is configured to assume an axially compressed state wherein at least a portion of the upper coil is positioned on a second side of at least a portion of the lower coil opposite to the first side relative to the central axis.

2. — The device of claim 1, wherein the device comprises a first set of one or more coils comprising the upper coil and a second set of one or more coils comprising the lower coil, wherein the first set of coils has a first inner diameter, and the second set of coils has a second inner diameter different from the first inner diameter.

3. — The device of claim 2, wherein the first set of coils comprises at least two coils and the second set of coils comprises at least two coils.

4. — The device of claim 2, wherein at least one of the coils of the first set of coils is positioned relative to the central axis between two coils of the second set of coils when the device is in the compressed state.

5. — The device of claim 2, wherein the first set of coils are configured to be positioned on a ventricular side of a native mitral valve, and the second set of coils are configured to be positioned on an atrial side of the native mitral valve.

6.——The device of claim 1, wherein the upper and lower coils each comprises a shape-memory material.

7.——The device of claim 1, wherein the upper and lower coils each comprises Nitinol.

8.——The device of claim 1, wherein the upper coil is positioned radially inward relative to the lower coil when the device is in the compressed state.

9.——The device of claim 8, wherein the upper coil is configured to exert a radially outwardly directed force against the lower coil when the device is in the compressed state.

10.——The device of claim 1, wherein an axial tension is applied to the device when the device is in the axially expanded state.

11.——A method of implanting a device comprising an upper coil and a lower coil at a native valve of a heart of a patient, the method comprising:

positioning the lower coil on a ventricular side of the native valve;

positioning the upper coil on an atrial side of the native valve, such that the entire upper coil is positioned on a first side of the lower coil relative to a central axis of the device;  
and

adjusting the device to a position where at least a portion of the upper coil is positioned on a second side of at least a portion of the lower coil opposite to the first side relative to the central axis.

12.——The method of claim 11, further comprising implanting a prosthetic heart valve in the device.

13.—The method of claim 12, wherein implanting the prosthetic heart valve comprises positioning the prosthetic heart valve in the device when the prosthetic heart valve is in a radially compressed state, and radially expanding the prosthetic heart valve such that a radial pressure is applied between the prosthetic heart valve and the device to anchor the prosthetic heart valve in the device.

14.—The method of claim 11, wherein the device comprises a first set of coils comprising the upper coil and a second set of coils comprising the lower coil, and wherein after adjusting the device, the upper coil is configured to be positioned between two coils of the second set of coils relative to the central axis.

15.—The method of claim 11, wherein the upper and lower coil of the device are configured to radially compress leaflets of the native valve.

16.—The method of claim 11, wherein implanting the device comprises advancing a distal end of a delivery catheter into the heart, and deploying the device from the delivery catheter such that the upper coil is deployed on the atrial side of the native valve and the lower coil is deployed on the ventricular side of the native valve.

17.—The method of claim 16, wherein implanting the device further comprises maintaining an axial tension on the device when the device is being deployed from the delivery catheter, such that the device is at least partially axially expanded, and releasing tension on the device to allow the device to compress axially.

~~18.——A system for securing a prosthetic heart valve at a native heart valve of a heart of a patient, the system comprising:~~

~~a helical docking device comprising an upper coil and a lower coil, and a central axis extending through the upper coil and the lower coil; and~~

~~a prosthetic heart valve configured to be held in the docking device;~~

~~wherein the docking device is configured to assume an axially expanded state wherein the entire upper coil is positioned on a first side of the lower coil relative to the central axis; and~~

~~wherein the docking device is configured to assume an axially compressed state wherein at least a portion of the upper coil is positioned on a second side of at least a portion of the lower coil opposite to the first side relative to the central axis.~~

~~19.——The system of claim 18, further comprising a delivery catheter, wherein the delivery catheter is configured to deploy the docking device at the native heart valve.~~

1. A delivery apparatus for a medical device implant comprising:

an outer catheter;

a flexible delivery catheter;

wherein the outer catheter comprises an axially extending shaft and a first lumen extending co-axially through the axially extending shaft.

2. The delivery apparatus of claim 1, wherein the flexible delivery catheter comprises an elongate shaft having a flexible section extending along a distal portion of the elongate shaft.

3. The delivery apparatus of claim 2, wherein the elongate shaft further comprises a relatively more rigid section located adjacent and proximal to the flexible section.

4. The delivery apparatus of any one of claim 2 or claim 3, wherein the flexible delivery catheter further comprises a second lumen that extends the length of the elongate shaft.

5. The delivery apparatus of any one of claims 2 or 3, wherein the flexible section of the elongate shaft can be positioned or adjusted between a first, delivery configuration and a second, activated configuration.

6. The delivery apparatus of claim 5, wherein in the delivery configuration, the flexible section is substantially straight.

7. The delivery apparatus of claim 5, wherein in the activated configuration, the delivery catheter forms a helically curved portion.

8. The delivery apparatus of claim 7, wherein the helically curved portion comprises a proximal section that curves radially away from the elongate shaft in a plane that is substantially perpendicular to the elongate shaft.

9. The delivery apparatus of claim 7 or 8, wherein the helically curved portion comprises a distal tip portion that is angled downwardly away from the plane of the proximal section.

10. The delivery apparatus of any one of claims 1 to 9, wherein the delivery catheter further comprises a pull wire.

11. The delivery apparatus of claim 10, wherein the elongate shaft comprises a centrally disposed and axially extending second lumen, and the pull wire extends co-axially through the second lumen of the elongate shaft.

12. The delivery apparatus of claim 11, wherein a distal end of the pull wire is fixedly secured or attached to the distal end of the elongate shaft.

13. The delivery apparatus of claim 1, wherein the elongate shaft comprises a plurality of axial sections, the plurality of axial sections comprising a relatively more rigid section located adjacent and proximal to a flexible section extending along a distal portion of the elongate shaft.

14. The delivery apparatus of claim 13, wherein the flexible section comprises a first plurality of circumferentially extending, axially spaced slots on a first side of the elongate shaft and a plurality of diagonally or generally helically extending slots on a second, opposing side of the elongate shaft.

15. The delivery apparatus of claim 14, wherein the circumferential slots are axially spaced apart from each other.

16. The delivery apparatus of claim 14 or claim 15, wherein the circumferential slots are angularly offset from each other.

17. The delivery apparatus of any one of claims 14 to 16, wherein the circumferential slots are spaced relative to each other in a spiral or helical configuration.

18. The delivery apparatus of any one of claims 14 to 17, wherein the diagonally extending slots extend axially and circumferentially in a helical shape.

19. The delivery apparatus of any one of claims 14 to 18, wherein the circumferential slots are generally diametrically opposed to the diagonally extending slots.

20. The delivery apparatus of any one of claims 14 to 19, wherein the flexible section further comprises a second plurality of circumferential slots and a third plurality of circumferential slots, which are positioned proximally relative to the first plurality of circumferential slots and the diagonally extending slots.