

SUMMARY

[0005a] According to a first aspect of the present invention, there is provided a prosthetic heart valve, including: a support structure having a plurality of struts and a plurality of rivets, wherein the struts have openings formed therein, wherein the rivets have first portions and second portions, wherein the first portions extend through the openings of the struts, and the second portions are larger than the first portion and the openings of the struts, and wherein the struts are pivotable about the rivets to radially expand and compress the support structure; an actuator member coupled to the struts of the support structure and configured to selectively actuate expansion and compression of the support structure; and a plurality of leaflets coupled to the support structure and configured to allow unidirectional blood flow through the prosthetic heart valve.

[0005b] According to a second aspect of the present invention, there is provided a prosthetic heart valve, including: a support structure having a plurality of struts and a plurality of rivets, wherein the struts have openings formed therein, wherein the rivets have first portions and second portions, wherein the first portions extend through the openings of the struts, and the second portions are larger in a radial dimension than the first portion and the openings of the struts, and wherein the struts are pivotable about the rivets to radially expand and compress the support structure; an actuator member coupled to the struts of the support structure and configured to selectively actuate expansion and compression of the support structure; a plurality of leaflets coupled to the support structure and configured to allow unidirectional blood flow through the prosthetic heart valve; and a skirt sandwiched between the struts of the support member.

[0005c] According to a third aspect of the present invention, there is provided a prosthetic heart valve, including: a support structure having a plurality of struts and a plurality of mounts coupled to the struts, wherein the struts include openings formed therein, wherein adjacent struts are coupled together by a plurality of rivets, wherein the rivets have shaft portions and flange portions, wherein the shaft portions extend through the openings of the struts, and the flange portions are larger in a radial dimension than the shaft portion and the openings of the struts, and wherein the struts are pivotable about the rivets to radially expand and compress the support structure; an actuator member coupled to the mounts of the support structure and configured to selectively actuate expansion and compression of the support structure, wherein rotating the actuator member in a first direction relative to the mounts expands the support structure, and wherein rotating the actuator member in a second direction relative to the mounts compresses the support structure; a plurality of leaflets coupled to the support structure and configured to allow unidirectional blood flow through the prosthetic heart valve; and a skirt coupled to the struts, wherein at least one of the struts is disposed on a first side of the skirt, and at least one other of the struts is disposed on a second side of the skirt.

[0006] An endoluminal support structure or stent in accordance with certain embodiments of the invention solves certain deficiencies found in the prior art. In particular, the support structure can be repositioned within the body lumen or retrieved from the lumen.

[0007] A particular embodiment of the invention includes a support apparatus implantable within a biological lumen. The support apparatus can include a plurality of elongated strut members interlinked by a plurality of rotatable joints, wherein the rotatable joints can cooperate with the stent members to adjustably define a shaped structure between a compressed orientation and an expanded orientation.

[0008] More particularly, the shaped structure can be one of a cylindrical, a conical, or an hourglass shape. A rotatable joint can form a scissor mechanism with a first strut member and a second strut member. Furthermore, the strut members can be arranged as a series of linked scissor mechanisms. The apparatus can further include an actuator to urge the rotatable joints within a range of motion.

[0009] The apparatus can also include a prosthetic valve coupled to the shaped structure.

[0010] Another particular embodiment of the invention can include a medical stent implantable within a biological lumen. The medical stent can include a plurality of elongated strut members, including a first strut member and a second strut member, and an articulated joint connecting the first strut member and the second strut member.

[0011] In particular, the articulated joint can form a scissor mechanism with the first strut member and the second strut member. The articulated joint can bisect the first strut member and the second strut member. The articulated joint can interconnect a first end of the first strut member with a first end of the second strut member.

[0012] The plurality of strut members can be arranged as a series of linked scissor mechanisms. The strut members can also be non-linear. The strut members can be arranged to form one of a cylindrical, a conical, or an hourglass shape.

[0013] The stent can further include an adjustment mechanism to exert a force to urge the strut members about the articulated joint within a range of motion.