

What is claimed is:

1. A prosthetic valve comprising:
a radially expandable and compressible frame comprising a plurality of interconnected struts, each strut having a first end, a second end, and a length extending from the first end to the second end, each strut comprising a plurality of linear segments that are laterally offset from each other in a direction perpendicular to the lengths of the struts; and
a valvular structure mounted to the frame and configured to regulate the flow of blood through the prosthetic valve.
2. The prosthetic valve of claim 1, wherein each of the plurality of struts is hingeably connected to at least another of the plurality of struts.
3. The prosthetic valve of any previous claim, further comprising a spacer disposed between a pair of connected struts.
4. The prosthetic valve of any previous claim, wherein the struts are connected to each other by pins extending through the struts.
5. The prosthetic valve of any previous claim, wherein the frame comprises a plurality of circumferentially spaced locking units configured to lock the frame in a radially expanded state.
6. An assembly comprising:
a prosthetic valve as claimed in any one of claims 1 to 5;
at least one linear actuator assembly coupled to the frame and configured to apply a distally directed force and/or a proximally directed force to the frame to radially expand or compress the frame; and

at least one locking mechanism coupled to the frame comprising a first sleeve member connected to the frame at a first location, a second sleeve member having internal threads and being connected to the frame at a second location, and a first screw configured to engage the internal threads of the second sleeve member to retain the frame in a radially expanded state.

7. The assembly of claim 6, wherein the at least one linear actuator assembly comprises an actuator member configured to be releasably coupled to the frame.

8. The assembly of claim 7, wherein the at least one linear actuator assembly comprises a first threaded member connected to a distal end portion of the actuator member, the first threaded member being configured to releasably engage a second threaded member connected to the frame.

9. The assembly of claim 8, wherein the first threaded member comprises a second screw and the second threaded member comprises an internally threaded nut.

10. The assembly of any of claims 7-9, wherein the at least one linear actuator assembly further comprises a sleeve positioned annularly around the actuator member.

11. The assembly of any of claims 7-10, further comprising:
an annular stopper connected to the frame, wherein the actuator member extends through the stopper;
wherein the at least one linear actuator assembly comprises a support tube positioned annularly around the actuator member and the stopper is configured to engage a distal end of the support tube and prevent the support tube from moving distally beyond the stopper in an axial direction.

12. The assembly of any of claims 6-11, further comprising a locking tool configured to be releasably coupled to the first screw, the locking tool comprising a tool head configured to engage and produce rotation of the first screw when the locking tool is coupled to the first screw such that the first screw moves axially through the first sleeve member and the second sleeve member.

13. The assembly of claim 12, wherein the first screw has a screw head at its proximal end and wherein a shape of the tool head is configured to correspond to a shape of the screw head such that the tool head is operable to couple with the screw head such that rotation of the tool head causes rotation of the first screw.

14. The assembly of claim 13, wherein the screw head and the first sleeve member are configured such that the screw head is prevented from moving distally beyond the first sleeve member in an axial direction.

15. The assembly of any of claims 12-14, wherein the at least one locking mechanism further comprises an inner shaft extending partly within a lumen of the tool head, the inner shaft having a threaded surface at its distal end, the screw head having internal threads, and the inner shaft being configured such that its threaded surface engages the internal threads of the screw head.

16. The assembly of any of claims 6-15, wherein the frame comprises a plurality of interconnected struts, each strut having a first end, a second end, and a length extending from the first end to the second end, each strut comprising a plurality of linear segments that are laterally offset from each other in a direction perpendicular to the lengths of the struts.

17. An assembly comprising:
a prosthetic valve as claimed in any one of claims 1 to 5; and
at least one expansion and locking mechanism comprising:

a linear actuator connected to the frame, wherein the linear actuator is configured to apply a distally directed force and/or a proximally directed force to the frame to radially expand or compress the frame; and
a rotating member coaxially positioned relative to the linear actuator configured to retain the frame in a radially expanded state.

18. The assembly of claim 17, further comprising:
a first sleeve member connected to the frame at a first location; and
a second sleeve member having internal threads and being connected to the frame at a second location;
wherein the linear actuator is releasably coupled to the frame;
wherein the rotating member is a screw configured to engage the internal threads of the second sleeve member; and
wherein the linear actuator extends through a lumen of the screw.

19. The assembly of claim 18, further comprising a locking tool that is configured to be releasably coupled to the screw and rotate the screw such that the screw moves axially through the first sleeve member and the second sleeve member when the locking tool is coupled to the screw.

20. The assembly of claim 19, wherein the locking tool and the first sleeve member are configured such that the locking tool is prevented from moving distally beyond the first threaded member in an axial direction.

21. The assembly of any of claims 18-20, wherein the screw has a screw head at its proximal end and wherein the screw head and the first member are configured such that the screw head is prevented from moving distally beyond the first sleeve member in an axial direction

22. The assembly of claim 17, wherein the linear actuator is an actuator screw having external threads and is connected to the frame at a first location;
wherein the assembly further comprises a sleeve connected to the frame at a second location;
wherein the actuator screw extends through a lumen of the sleeve;
wherein the rotating member is a locking nut having internal threads configured to engage the threads of the actuator screw; and
wherein the sleeve and the locking nut are configured such that the locking nut is prevented from moving distally beyond the sleeve in an axial direction.

23. The assembly of claim 22, wherein the actuator screw comprises a first portion and a second portion, wherein a diameter of the second portion is less than a diameter of the first portion.

24. The assembly of claim 23, wherein the assembly further comprises an annular actuator member having internal threads configured to engage the threads of the second portion of the actuator screw such that when the internal threads of the actuator member are engaged with the threads of the second portion of the actuator screw, axial movement of the actuator member results in axial movement of the actuator screw.

25. The assembly of any of claims 22-24, further comprising a locking tool positioned within a lumen of the sleeve, wherein the locking tool has a notched portion at its distal end configured to engage a corresponding notched portion at a proximal end of the locking nut such that rotation of the locking tool in a clockwise direction causes rotation of the locking nut in a clockwise direction.

26. The assembly of claim 25, wherein the locking tool has an internally threaded surface to engage the threads of the actuator screw.

27. The assembly of claim 25, further comprising a support tube positioned annularly around the locking tool, wherein a proximal end of the sleeve is configured to engage a distal end of the support tube such that the support tube is prevented from moving distally beyond the proximal end of the sleeve in an axial direction.

28. The assembly of any of claims 17-27, wherein the frame comprises a plurality of interconnected struts, each strut having a first end, a second end, and a length extending from the first end to the second end, each strut comprising a plurality of linear segments that are laterally offset from each other in a direction perpendicular to the lengths of the struts