[0005] Embodiments of the present disclosure generally relate to locking assemblies and sealing packoffs that can be installed within a bore of a wellhead. In one embodiment, a locking assembly includes an actuator that can be driven between a lock ring and another component within the bore to cause the lock ring to expand into a recess in a wall of the bore. In another embodiment, a sealing packoff includes inner and outer annular seals and an energizing ring arranged such that the energizing ring can be wedged between the inner and outer annular seals to apply a radially inward biasing on the inner annular seal and a radially outward biasing force on the outer annular seal. In at least some embodiments, the sealing packoff and the locking assembly can be axially set within the bore without requiring rotation.

[0006] Various refinements of the features noted above may exist in relation to various aspects of the present embodiments. Further features may also be incorporated in these various aspects as well. These refinements and additional features may exist individually or in any combination. For instance, various features discussed below in relation to one or more of the illustrated embodiments may be incorporated into any of the above -described aspects of the present disclosure alone or in any combination. Again, the brief summary presented above is intended only to familiarize the reader with certain aspects and contexts of some embodiments without limitation to the claimed subject matter.

[0006A] According to a first aspect, there is provided a system comprising: a wellhead component having a bore; an inner component disposed within the bore of the wellhead component; a locking assembly disposed within the bore between the inner component and the wellhead component to secure the inner component within the bore of the wellhead component, the locking assembly including: a lock ring that extends into a recess in a wall of the bore of the wellhead component; and an actuator radially disposed between the inner component and the lock ring to retain the lock ring within the recess; wherein the actuator has an interference fit with the inner component to inhibit movement of the actuator between the lock ring and the inner component; and a packoff disposed in the bore of the wellhead component, the packoff including: an inner annular seal; an outer annular seal; and an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal.

[0006B] According to a second aspect, there is provided a packoff for a bore of a wellhead component, the packoff including: an inner annular seal; an outer annular seal; an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal; an additional inner annular seal; an additional outer annular seal; an additional energizing ring shaped to be wedged between the additional inner annular seal and the additional outer annular seal so as to apply a radially inward biasing force on the additional inner annular seal and a radially outward biasing force on the additional outer annular seal; a first shear component for holding the energizing ring in a relaxed state during running of the packoff into a bore of a wellhead component; and a second shear component for holding the additional energizing ring in a relaxed state during running of the packoff into the bore of the wellhead component, wherein the first shear component is configured to shear before the second shear component upon application of a setting force on the packoff once run into the bore so as to facilitate setting of the inner annular seal and of the outer annular seal via the energizing ring before setting of the additional inner annular seal and of the additional outer annular seal via the additional energizing ring.

[0006C] According to a third aspect, there is provided a method comprising: inserting a packoff into a bore of a wellhead component, the packoff including an inner annular seal, an outer annular seal, and an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal, the packoff also including an additional inner annular seal, an additional outer annular seal, and an additional energizing ring shaped to be wedged between the additional inner annular seal and the additional outer annular seal so as to apply a radially inward biasing force on the additional inner annular seal and a radially outward biasing force on the additional outer annular seal, wherein the packoff is inserted into the bore such that additional inner annular seal and the additional outer annular seal are positioned higher in the bore than the inner annular seal and the outer annular seal; positioning the packoff between the wellhead component and an inner component also present within the bore of the wellhead component; and applying an axial force to the packoff to first set the inner and outer annular seals and to then set the additional inner and outer annular seals after setting the inner and outer annular seals, wherein applying the axial force to the packoff includes applying the axial force so as to wedge the energizing ring between the inner annular seal and the outer annular seal such that the radially inward biasing force

applied by the energizing ring facilitates sealing of the inner annular seal against the inner component and the radially outward biasing force applied by the energizing ring facilitates sealing of the outer annular seal against a wall of the bore of the wellhead component, and to then wedge the additional energizing ring between the additional inner annular seal and the additional outer annular seal such that the radially inward biasing force applied by the additional energizing ring facilitates sealing of the additional inner annular seal against the inner component and the radially outward biasing force applied by the additional energizing ring facilitates sealing of the additional outer annular seal against the wall of the bore of the wellhead component.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] These and other features, aspects, and advantages of certain embodiments will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0008] FIG. 1 is a block diagram of a system having a wellhead with various components installed at a well in accordance with one embodiment of the present disclosure;

CLAIMS

1. A system comprising:

a wellhead component having a bore;

an inner component disposed within the bore of the wellhead component;

a locking assembly disposed within the bore between the inner component and the wellhead component to secure the inner component within the bore of the wellhead component, the locking assembly including:

a lock ring that extends into a recess in a wall of the bore of the wellhead component; and

an actuator radially disposed between the inner component and the lock ring to retain the lock ring within the recess;

wherein the actuator has an interference fit with the inner component to inhibit movement of the actuator between the lock ring and the inner component; and

a packoff disposed in the bore of the wellhead component, the packoff including:

an inner annular seal;

an outer annular seal; and

an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal.

2. The system of claim 1, wherein the packoff includes an additional inner annular seal, an additional outer annular seal, and an additional energizing ring shaped to be wedged between the additional inner annular seal and the additional outer annular seal so as to apply a radially inward biasing force on the additional inner annular seal and a radially outward biasing force on the additional outer annular seal.

3. The system of claim 1, wherein the inner annular seal has a pair of arms that extend radially inward and the outer annular seal has a pair of arms that extend radially outward to facilitate sealing of an annular space by the packoff.

4. The system of claim 1, wherein the inner annular seal is concentric with the outer annular seal.

5. The system of claim 4, wherein the inner annular seal is axially aligned with the outer annular seal.

6. The system of claim 1, wherein the packoff includes a landing ring.

7. The system of claim 6, wherein the landing ring is positioned within the bore on the actuator of the locking assembly.

8. The system of claim 6, wherein the packoff includes a retaining ring between the landing ring and the inner annular seal.

9. The system of claim 1, wherein the energizing ring is wedged between the inner annular seal and the outer annular seal.

10. The system of claim 1, wherein the energizing ring includes a tapered portion that facilitates wedging of the energizing ring between the inner annular seal and the outer annular seal.

11. The system of claim 1, wherein the inner component is a hanger.

12. The system of claim 1, wherein the locking assembly includes a load ring between the lock ring and a shoulder of the inner component.

13. The system of claim 1, wherein the lock ring cooperates with the recess in the wall of the bore to preload the inner component.

14. The system of claim 1, wherein both the locking assembly and the packoff are configured to be axially set in the bore without rotation.

15. A packoff for a bore of a wellhead component, the packoff including:
an inner annular seal;

an outer annular seal;

an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal;

an additional inner annular seal;

an additional outer annular seal;

an additional energizing ring shaped to be wedged between the additional inner annular seal and the additional outer annular seal so as to apply a radially inward biasing force on the additional inner annular seal and a radially outward biasing force on the additional outer annular seal;

a first shear component for holding the energizing ring in a relaxed state during running of the packoff into a bore of a wellhead component; and

a second shear component for holding the additional energizing ring in a relaxed state during running of the packoff into the bore of the wellhead component, wherein the first shear component is configured to shear before the second shear component upon application of a setting force on the packoff once run into the bore so as to facilitate setting of the inner annular seal and of the outer annular seal via the energizing ring before setting of the additional inner annular seal and of the additional outer annular seal via the additional energizing ring.

16. The packoff of claim 15, wherein the first and second shear components include shear pins.

17. The packoff of claim 15, wherein the energizing ring includes a tapered portion that facilitates wedging of the energizing ring between the inner annular seal and the outer annular seal.

18. A method comprising:

inserting a packoff into a bore of a wellhead component, the packoff including an inner annular seal, an outer annular seal, and an energizing ring shaped to be wedged between the inner annular seal and the outer annular seal so as to apply a radially inward biasing force on the inner annular seal and a radially outward biasing force on the outer annular seal, the packoff also including an

additional inner annular seal, an additional outer annular seal, and an additional energizing ring shaped to be wedged between the additional inner annular seal and the additional outer annular seal so as to apply a radially inward biasing force on the additional inner annular seal and a radially outward biasing force on the additional outer annular seal, wherein the packoff is inserted into the bore such that additional inner annular seal and the additional outer annular seal are positioned higher in the bore than the inner annular seal and the outer annular seal;

positioning the packoff between the wellhead component and an inner component also present within the bore of the wellhead component; and

applying an axial force to the packoff to first set the inner and outer annular seals and to then set the additional inner and outer annular seals after setting the inner and outer annular seals, wherein applying the axial force to the packoff includes applying the axial force so as to wedge the energizing ring between the inner annular seal and the outer annular seal such that the radially inward biasing force applied by the energizing ring facilitates sealing of the inner annular seal against the inner component and the radially outward biasing force applied by the energizing ring facilitates sealing of the outer annular seal against a wall of the bore of the wellhead component, and to then wedge the additional energizing ring between the additional inner annular seal and the additional outer annular seal such that the radially inward biasing force applied by the additional energizing ring facilitates sealing of the additional inner annular seal against the inner component and the radially outward biasing force applied by the additional energizing ring facilitates sealing of the additional outer annular seal against the wall of the bore of the wellhead component.

19. The method of claim 18, wherein inserting the packoff into the bore of the wellhead component includes inserting the energizing ring, the inner annular seal, the outer annular seal, the additional energizing ring, the additional inner annular seal, the additional outer annular seal, and a landing ring of the packoff together as a single unit.

20. The method of claim 19, comprising assembling the packoff such that the inner and outer annular seals are withdrawn inside recessed portions of the energizing ring prior to inserting the packoff into the bore of the wellhead component.