CLAIMS

What is claimed is:

1. A barrel slip that comprises a radially expandable barrel slip body that is movable from an unexpanded position to an expanded position;

wherein the body includes a plurality of circumferentially spaced slip anchors, each slip anchor has an outer surface that, when the body is in the unexpanded position, defines ~~a first~~ an outer radius having a center that is circumferentially offset from outer radius centers of other slip anchors in the plurality of circumferentially spaced slip anchors;

~~wherein the first radius is associated with a first curvature;~~ and

~~wherein, when in the expanded position, portion(s) of the outer surface have a second curvature that is less than the first curvature~~

wherein, when the body is in the expanded position, the outer radius centers of the circumferentially spaced slip anchors converge at a common center of the body such that the body defines a circular cross section in the expanded position.

2. The barrel slip of claim 1, wherein, when in the unexpanded position, the outer surface of each of the slip anchors ~~has the first curvature~~ is radially displaced from the casing center by a radial distance less than the outer radius.

3. The barrel slip of claim 1, wherein, when in the unexpanded position, ~~portion(s) of~~ the outer surface of each of the slip anchors have ~~the second~~ a curvature associated with the circular cross section in the expanded position.

4. The barrel slip of claim 1, wherein the ~~second curvature~~ outer radius is associated with an internal radius of a casing string, and wherein the internal radius of the casing string has a center at the common center of the body at which the outer radius centers of the circumferentially spaced slip anchor converge.

5. The barrel slip of claim ~~1~~ 4,

wherein ~~the body~~ each slip anchor has an internal surface that, when the body is in the unexpanded position, defines ~~a third~~ an inner radius having a center that is circumferentially offset from inner centers of other slip anchors in the plurality

of circumferentially spaced slip anchors and radially offset from the common center of the body at which the outer radius centers of the circumferentially spaced slip anchor converge;

~~wherein the third radius is associated with a third curvature;~~ and

wherein, when the body is in the expanded position, ~~portion(s) of the internal surface have a fourth curvature that is less than the third curvature~~ the inner radius centers of the circumferentially spaced slip anchors converge at the common center of the body.

6. The barrel slip of claim 1,

wherein, when in the unexpanded position, a first plurality of teeth formed by a first portion of the ~~outer surface~~ body is positioned at a first angle relative to a second plurality of teeth formed by a second portion of the ~~outer surface~~ body;

wherein, when in the expanded position, the first plurality of teeth is positioned at a second angle relative to the second plurality of teeth; and

wherein the second angle is less than the first angle.

7. The barrel slip of claim 1, wherein the body is an integrally formed single-component body that defines:

an external surface defining an entire exterior surface of the body; and

an internal chamber isolated from the external surface such that the internal chamber does not penetrate the external surface.

8. The barrel slip of claim 1,

wherein, when in the unexpanded position, the body is an integrally formed single component body that defines:

a first ~~anchor~~ slip anchor of the plurality of slip anchors;

a second ~~anchor~~ slip anchor of the plurality of slip anchors, the second slip anchor positioned in a first position relative to the first ~~anchor~~ slip anchor; and

a frangible connection that extends between the first ~~anchor~~ slip anchor and the second ~~anchor~~ slip anchor; and

wherein, when in the expanded position, the second ~~anchor~~ slip anchor is positioned in a second position relative to the ~~second~~ first ~~anchor~~ slip anchor; and the frangible connection is severed.

9. The barrel slip of claim 1,
wherein an inner surface of the body defines cones that extend along a length of the body;
wherein a portion of the inner surface defining the cones is a loading surface; and
wherein the loading surface has a variable curvature along a portion of the length of the body.

10. The barrel slip of claim 1,
wherein, when in the unexpanded position, the body is an integrally formed single-component body defining:
a first cylindrical portion;
a second cylindrical portion disposed about the first cylindrical portion and positioned at a first position relative to the first cylindrical portion; and
a fracture tab connecting the first cylindrical portion and the second cylindrical portion; and
wherein, when in the expanded position, the fracture tab is broken and the second cylindrical portion is at a second, different position relative to the first cylindrical portion.

11. The barrel slip of claim 10,
wherein the first cylindrical portion is a wedge portion with an external surface forming first cones; and
wherein the second cylindrical portion comprises ~~anchor slips~~ slip anchors of the plurality of slip anchors and has an internal surface forming second cones that correspond with the first cones.

12. The barrel slip of claim 1, wherein the barrel slip is at least partially manufactured using an additive manufacturing process.

13. A method of deploying a barrel slip, the method comprising:
positioning the barrel slip within a casing string when the barrel slip is in an unexpanded position;
wherein the casing string has an inner surface having a first curvature defining an internal radius extending from a casing center;

wherein the barrel slip comprises a body includes a plurality of circumferentially spaced slip anchors, each slip anchor having an outer surface that, when in the unexpanded position, defines ~~a second~~ an outer radius extending from an outer center that is radially offset from the casing center; and

~~wherein the second radius is associated with a second curvature; and~~

expanding the body from the unexpanded position to an expanded position,

wherein expanding the body from the unexpanded position to the expanded position comprises radially displacing the slip anchors to converge the outer radius centers of the slip anchors at a common center of the body at the casing center and thereby engaging the outer surface of ~~the body~~ each of the slip anchors with the inner surface of the casing string; and

wherein, when in the expanded position, ~~portion(s) of~~ the outer surface of each of the slip anchors have the first curvature ~~that is less than the second curvature~~ of the inner surface of the casing string.

14. The method of claim 13, wherein, when in the unexpanded position, the outer surface of each of the slip anchors ~~has the second curvature~~ is radially displaced from the casing center by a radial distance less than the outer radius.

15. The method of claim 14, wherein the barrel slip is at least partially manufactured using an additive manufacturing process.

~~15~~16. The method of claim 13, wherein, when in the unexpanded position, ~~portion(s) of~~ the outer surface of each of the slip anchors have the first curvature of the inner surface of the casing string.

~~16~~17. The method of claim 13,

wherein, when in the unexpanded position, a first plurality of teeth formed by a first portion of the ~~outer surface~~ body is positioned at an angle relative to a second plurality of teeth formed by a second portion of the ~~outer surface~~ body; and

wherein expanding the body from the unexpanded position to the expanded position further comprises repositioning the first plurality of teeth relative to the second plurality of teeth to reduce the angle.

~~17~~18. The method of claim 13, wherein the body is an integrally formed single-component body that defines:

an external surface defining an entire exterior surface of the body; and

an internal chamber isolated from the external surface such that the internal chamber does not penetrate the external surface.

~~18~~19. The method of claim 13,

wherein, when in the unexpanded position, the body is an integrally formed single-component body that defines:

a first ~~anchor~~ slip anchor of the plurality of slip anchors;

a second ~~anchor~~ slip anchor of the plurality of slip anchors, the second slip anchor positioned in a first position relative to the first ~~anchor~~ slip anchor; and

a frangible connection that extends between the first ~~anchor~~ slip anchor and the second ~~anchor~~ slip anchor; and

wherein expanding the body from the unexpanded position to the expanded position further comprises:

severing the frangible connection; and

moving the first ~~anchor~~ slip anchor relative to the second ~~anchor~~ slip anchor.

~~19~~20. The method of claim 13,

wherein, when in the unexpanded position, the body is an integrally formed single-component body defining:

a first cylindrical portion;

a second cylindrical portion disposed about the first cylindrical portion and positioned at a first position relative to the first cylindrical portion; and

a fracture tab connecting the first cylindrical portion and the second cylindrical portion; and

wherein expanding the body from the unexpanded position to the expanded position further comprises:

severing the fracture tab; and

moving the first cylindrical portion relative to the second cylindrical portion.

~~20. The method of claim 14, wherein the barrel slip is at least partially manufactured using an additive manufacturing process.~~