CLAIMS

What is claimed is:

1. A tubular member connection system, comprising:

a box having an inner diameter surface, internal box threads, and an annular box shoulder on the inner diameter surface of the box;

a pin having an outer diameter surface, external pin threads, and an annular pin lip at an end surface of the pin, the pin threads shaped to mate with the box threads to releasably secure the pin to the box so that the pin and the box are aligned along a common central axis;

a slot in one of the inner diameter surface and the outer diameter surface, the slot having a pair of sidewalls and a back wall integral to the box or the pin;

an anti-rotation profile comprising an unsmooth surface and extending at least partially around the circumference of the other of the inner diameter surface and the outer diameter surface; and

a key sized to fit within the slot and having a key profile shaped to engage the anti-rotation profile and prevent relative rotational movement between the box and the pin, wherein the anti-rotation profile includes a plurality of grooves and the key profile includes a plurality of protrusions located to fit within the plurality of grooves.

2. The system according to claim 1, wherein a number of grooves is greater than a number of protrusions.

3. The system according to claim 1, wherein the slot extends generally parallel to the central axis.

4. The system according to claim 1, further comprising a retainer selectively retaining the key in the slot.

5. The system according to claim 1, wherein the slot is positioned such that the slot radially aligns with the anti-rotation profile when the pin is threaded to the box until the pin lip engages the box shoulder.

6. The system according to claim 1, wherein the slot extends radially inward from the outer diameter surface of the pin.

7. The system according to claim 1, wherein the anti-rotation profile includes a plurality of grooves extending radially through a sidewall of the box from an end of the box.

8. A tubular member connection system, comprising:

a pin having an outer diameter surface, external pin threads, and an annular pin lip at a first end of the pin;

a first tubular member extending from the pin in a direction opposite the first end of the pin;

a box having an inner diameter surface, internal box threads, and an annular box shoulder facing towards a first end of the box on the inner diameter surface of the box, the box threads shaped to mate with the pin threads to releasably secure the pin to the box so that the pin and the box are aligned along a common central axis;

a second tubular member extending from the box in a direction opposite the box shoulder;

a slot in the outer diameter surface of the pin;

an anti-rotation profile comprising an unsmooth surface and extending at least partially around the circumference of the inner diameter surface of the box; and

a key sized to fit within the slot and having a key profile extending radially outward from the key and shaped to engage the anti-rotation profile when the key is located in the slot, wherein the anti-rotation profile includes a plurality of grooves and the key profile includes a plurality of protrusions located to fit within the plurality of grooves.

9. The system according to claim 8, wherein a number of protrusions is less than a number of grooves and each protrusion engages one of the slots when the key is located in the slot.

10. The system according to claim 8, wherein the slot is positioned on the pin such that the slot rotationally aligns with the anti-rotation profile when the pin is threaded to the box until the pin lip engages the box shoulder.

11. The system of claim 8, wherein the first tubular member has a second box at an opposite end of the first tubular member from the pin, the second box being releasable secured to a second pin to form a tubular string.

12. A method for connecting tubular members, the method comprising:

providing a box having an inner diameter surface, internal box threads, and an annular box shoulder on the inner diameter surface of the box;

providing a pin having an outer diameter surface, external pin threads, and an annular pin lip at an end surface of the pin,

mating the pin threads with the box threads to releasably secure the pin to the box so that the pin and the box are aligned along a common central axis; and

locating a key within a slot so that a key profile of the key engages an anti-rotation profile comprising an unsmooth surface and extending at least partially around the circumference of the box or the pin, thereby preventing relative rotational movement between the box and the pin, the slot having a pair of sidewalls and a back wall integral to the box or the pin; wherein

the slot is located in one of the inner diameter surface and the outer diameter surface and the anti-rotation profile is located in the other of the inner diameter surface and the outer diameter surface; and

the anti-rotation profile includes a plurality of grooves and the key profile includes a plurality of protrusions and locating the key within the slot includes fitting the protrusions within the plurality of grooves.

13. The method according to claim 12, wherein a number of protrusions is less than a number of grooves, and wherein locating the key within the slot includes locating each protrusion within one of the grooves.

14. The method according to claim 12, wherein the slot extends generally parallel to the central axis and locating the key within the slot includes sliding the key in a generally axial direction into the slot.

15. The method according to claim 12, further comprising retaining the key within the slot with a retainer.

16. The method according to claim 12, wherein mating the pin threads with the box threads to releasably secure the pin to the box includes mating the pin threads with the box threads

until the pin lip engages the box shoulder and the slot is rotationally aligned with the anti-rotation profile.

17. The method according to claim 12, wherein the slot extends radially inward from the outer diameter surface of the pin.

18. The method according to claim 12, wherein the anti-rotation profile includes a plurality of grooves extending radially through a sidewall of the box from an end of the box.