

SPLIT LOCKING RING FOR WELLHEAD COMPONENTS

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention is generally related to wellhead components, and, more particularly, to a split locking ring for wellhead components.

2. DESCRIPTION OF THE RELATED ART

Oil and gas well typically comprise a number of different components that must be coupled together. For example, such components can include a casing head, a Christmas tree, a tubing head, a blowout preventer, etc. There are many known methods for securing one well component to another. For example, externally mounted clamping devices, that may be actuated either hydraulically or mechanically, are well known in the art. Such devices are usually relatively large, heavy and expensive.

There are other methods of connecting such components together. For example, as shown in Figure 1, a first component 12 is coupled to a second component 14 via a flanged connection 15. More specifically, the flange 17 of the first component 12 and the flange 18 of the second component 14 are provided with openings 19 wherein a plurality of bolts or studs 20 and nuts are used to secure the first component 12 to the second component 14. The first component 12 is secured to a third component 16 via a single piece lock ring 22. The single piece lock ring 22 has an internal lip 26 that is adapted to engage a surface 27 of a flange 28 of the first component 12. The single piece lock ring 22 is threadingly coupled to the flange 32 of the third component 16 via a plurality of threads 30 (internal threads on the

lock ring 22 and external threads on the flange 32). By threadingly coupling the single piece lock ring 22 to the flange 32, the first component 12 and second component 14 are securely coupled to one another.

5 One problem with the single piece lock ring 22 depicted in Figure 1 is that it must be physically large enough in diameter to fit over the flanged connection 15, *e.g.*, the upper flange 18 of the second component 14, or any other features of the components 12, 14 as the single piece lock ring 22 is installed. In general, this design constraint requires that the flange 28 on the first component 12 be large enough in diameter, *i.e.*, oversized, such that the
10 single piece lock ring 22 may be made large enough to be readily installed over the first and second components 12, 14. The requirement to make the single piece lock ring 22 large enough to be positioned over the first and second components 12, 14 can create various problems. More specifically, among other things, requiring the use of an oversized single piece lock ring 22 means that the various components, *e.g.*, flanges 28, 32, are larger and
15 heavier than would otherwise be required and thus more costly to manufacture and handle. Moreover, the requirement that the single piece lock ring 22 be of a relatively large size can be problematic in some applications in which there is limited space available, *e.g.*, such as in a multiple completion well.

20 The present invention is directed to an apparatus and methods for solving, or at least reducing the effects of, some or all of the aforementioned problems.

SUMMARY OF THE INVENTION

The present invention is directed to a split locking ring for wellhead components. In
25 one illustrative embodiment, the device comprises a first internally threaded wellhead

component, a second wellhead component, at least a portion of which is positioned within an opening in the first wellhead component, and a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of the sections of the split lock ring are positioned between the first and second wellhead components and rotated to thread-
5 ingly couple the sections of the split lock ring to the first wellhead component and thereby secure the second wellhead component to the first wellhead component.

In another illustrative embodiment, the device comprises a first internally threaded wellhead component, a second wellhead component, at least a portion of which is positioned
10 within an opening in the first wellhead component, the second wellhead component having a flange, and a rotatable split lock ring comprised of two externally threaded sections, the sections having an end surface, wherein at least a portion of the sections of the split lock ring are positioned between the first and second wellhead components and rotated to threadingly couple the sections of the split lock ring to the first wellhead component and engage the end
15 surface of the sections of the split lock ring with the flange on the second wellhead component, the sections thereby securing the second wellhead component to the first wellhead component.

In a further illustrative embodiment, the device comprises a first externally threaded
20 wellhead component, an internally threaded sleeve threadingly coupled to the externally threaded first wellhead component, a second wellhead component, at least a portion of which is adapted to be positioned within an opening in the internally threaded sleeve, and a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of the sections of the split lock ring are positioned between the internally
25 threaded sleeve and the second wellhead component and rotated to threadingly couple the

sections of the split lock ring to the internally threaded sleeve and thereby secure the second wellhead component to the first wellhead component.

In yet a further illustrative embodiment, the device comprises a first externally threaded wellhead component, an internally threaded sleeve threadingly coupled to the externally threaded first wellhead component, the sleeve comprising a counterbore formed adjacent an end surface of the internally threaded sleeve, a second wellhead component, at least a portion of which is adapted to be positioned within an opening in the internally threaded sleeve, and a rotatable split lock ring comprised of at least two externally threaded sections, each of the sections having a flange, wherein at least a portion of the sections of the split lock ring are positioned between the internally threaded sleeve and the second wellhead component and rotated to threadingly couple the sections of the split lock ring to the internally threaded sleeve and thereby secure the second wellhead component to the first wellhead component, wherein at least a portion of the flange on each of the sections is positioned in the counterbore.

In one illustrative embodiment, the method comprises positioning at least a portion of a first wellhead component within an opening in a second internally threaded wellhead component, positioning a split lock ring comprised of at least two externally threaded sections proximate the first and second wellhead components, and rotating the sections of the split lock ring to threadingly couple the externally threaded sections to the internally threaded second wellhead component and position at least a portion of the split lock ring sections between the first and second wellhead components, thereby securing the first wellhead component to the second wellhead component.

In another illustrative embodiment, the method comprises positioning at least a portion of a first wellhead component within an opening in a second internally threaded wellhead component, the first wellhead component having a flange, positioning a split lock ring comprised of at least two externally threaded sections proximate the first and second wellhead components, and rotating the sections of the split lock ring to threadingly couple the externally threaded sections to the internally threaded second wellhead component and position at least a portion of the split lock ring sections between the first and second wellhead components, an end surface of each of the sections engaging the flange on the first wellhead component, the rotating of the sections being continued until the first wellhead component is securely coupled to the second wellhead component.

In a further illustrative embodiment, the method comprises threadingly coupling an internally threaded sleeve to an externally threaded first wellhead component, positioning at least a portion of a second wellhead component within an opening in the internally threaded sleeve, positioning a split lock ring comprised of at least two externally threaded sections proximate the internally threaded sleeve and the second wellhead component, and rotating the sections of the split lock ring to threadingly couple the sections to the internally threaded sleeve and position at least a portion of the split lock ring sections between the internally threaded sleeve and the second wellhead component, thereby securing the first wellhead component to the second wellhead component.

In yet a further illustrative embodiment, the method comprises threadingly coupling an internally threaded sleeve to an externally threaded first wellhead component, the internally threaded sleeve having a counterbore formed therein, positioning at least a portion of a second wellhead component within an opening in the internally threaded sleeve, the

second wellhead component having a flange, positioning a split lock ring comprised of at least two externally threaded sections proximate the internally threaded sleeve and the second wellhead component, each of the sections having an end surface, and rotating the sections of the split lock ring to threadingly couple the sections to the internally threaded sleeve and position at least a portion of the split lock ring sections between the internally threaded sleeve and the second wellhead component, the end surfaces on the sections engaging the flange on the first wellhead component, the rotation being continued until such time as the first wellhead component is secured to the second wellhead component and at least a portion of a flange on each of the sections is positioned in the counterbore.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements, and in which:

Figure 1 is an illustrative depiction of various wellhead components that may be coupled together in accordance with a variety of prior art methods and techniques;

Figures 2A-2B depict one illustrative embodiment of the present invention wherein the split lock ring is employed to connect wellhead components to one another;

Figures 3A-3C are plan, front and cross-sectional side views, respectively, of one illustrative embodiment of a split lock ring in accordance with the present invention; and

Figure 4 depicts yet another illustrative embodiment of the present invention.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such actual embodiment, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure.

The present invention will now be described with reference to the attached figures. The words and phrases used herein should be understood and interpreted to have a meaning consistent with the understanding of those words and phrases by those skilled in the relevant art. No special definition of a term or phrase, *i.e.*, a definition that is different from the ordinary and customary meaning as understood by those skilled in the art, is intended to be implied by consistent usage of the term or phrase herein. To the extent that a term or phrase is intended to have a special meaning, *i.e.*, a meaning other than that understood by skilled artisans, such a special definition will be expressly set forth in the specification in a

definitional manner that directly and unequivocally provides the special definition for the term or phrase.

In general, the present invention is directed to a split lock ring that may be used in connecting various wellhead components to one another. As used herein, the term “wellhead components” should be understood to include any of a variety of devices that are associated with oil and gas wells, including, but not limited to, a casing head, a tubing head, a wellhead, a Christmas tree, a blowout preventer, a riser, a diverter, a wellhead or tree adapter, a connector, a tool joint, etc. As will be recognized by those skilled in the art after a complete reading of the present application, the present invention may be employed to couple a variety of such wellhead components to one another, and the split lock ring of the present invention may be comprised of multiple pieces. Thus, the particular wellhead components to be joined using the split lock ring of the present invention, or the number of segments of such a split lock ring, should not be considered a limitation of the present invention, unless such limitations are expressly set forth in the appended claims. Moreover, the present invention may be employed with sub-surface or surface wellhead components.

As depicted in Figures 2A and 2B, a split lock ring 40 of the present invention is employed to couple a first wellhead component 50 to a second wellhead component 60. In the depicted embodiment, the first wellhead component 50 may be, for example, a tubing head assembly, whereas the second wellhead component 60 may be, for example, a casing head. Of course, other wellhead components may be coupled to one another using the split lock ring 40 of the present invention. Thus, the particular type of components connected to one another should not be considered to be a limitation of the present invention, unless such limitations are clearly set forth in the appended claims. Figure 2B is a cross-sectional view

of a split lock ring 40, as installed, that is used to couple two wellhead components 50, 60 to one another.

Figures 3A-3C are plan, front and cross-sectional side views, respectively, of one illustrative embodiment of the split lock ring 40 of the present invention. In one illustrative embodiment, the split lock ring 40 of the present invention is comprised of two sections 40a, 40b. However, the present invention is not so limited as the split lock ring 40 of the present invention may be comprised of more than two sections if desired, *e.g.*, three sections. The split lock ring 40 of the present invention is comprised of a plurality of threaded openings 44, each of which are adapted to receive a threaded bar 43 and/or a set screw 47. Only one illustrative threaded bar 43 and set screw 47 are depicted in Figure 3A. A plurality of the threaded bars 43 may be used to rotate the two sections 40a, 40b of the split lock ring 40. The set screw 47 has an end surface 47a that is adapted to engage a portion or surface of the first wellhead component 50 when the set screw 47 is completely installed in the threaded opening 44. The split lock ring 40 sections 40a, 40b comprise a flange 45 having a top surface 41, a bottom surface 46, an end surface 48 and external threads 49. In the embodiment depicted in Figures 2A and 2B, the external threads 49 on the split lock ring 40 are adapted to threadingly engage internal threads 61 formed on the component 60 (see Figure 2B). In the depicted embodiment, the threads 49, 61 are right-hand, standard ACME threads with an illustrative pitch of approximately four threads per inch.

The physical dimensions of the split lock ring 40 of the present invention may vary depending upon the particular application. In general, the components of the split lock ring 40 should be sized and configured to withstand the anticipated loadings to be applied to the split lock ring 40. In one illustrative embodiment, the axial length 51 (see Figure 3C) of the

split lock ring 40 may range from approximately 3-4 inches and the flange 45 may have thickness 53 that ranges from approximately 1.5-2.0 inches. When installed, the gap 42 between the sections 40a and 40b of the split lock ring 40 may be approximately 0.125 inches. The threaded holes 44 may have a diameter of approximately 1 inch. Of course, the present invention should not be considered as limited to a split lock ring 40 having such physical dimensions, unless such limitations are expressly set forth in the appended claims.

With respect to the embodiment depicted in Figures 2A-2B, at least a portion of the first wellhead component 50 may be positioned within the opening defined by the second wellhead component 60. Thereafter, the externally threaded sections 40a, 40b of the split lock ring 40 are threadingly engaged with the internally threaded portion of the second wellhead component 60. To threadingly couple the split lock ring 40 to the second component 60, a plurality of the threaded bars 43 may be inserted into the threaded openings 44 and used to rotate the split lock ring sections 40a, 40b as required. This rotation is continued until such time as the end surfaces 48 of the split lock ring sections 40a, 40b engage a surface 55 on a flange 57 of the first wellhead component 50. The split lock ring sections 40a, 40b are further tightened until such time as the first wellhead component 50 is properly seated within the second wellhead component 60. At that time, the threaded bars 43 may be removed from the threaded openings 44. Thereafter, the threaded set screws 47 may be positioned in the threaded openings 44 and tightened until the end surface 47a of the set screws 47 engage a surface or portion of the first wellhead component 50. The set screws 43 are employed to further secure the split lock ring 40 sections 40a, 40b in the installed position.

Figure 4 depicts yet another illustrative embodiment of the present invention. As shown therein, a first wellhead component 80, *e.g.*, a wellhead, is adapted to be coupled to a

second wellhead component 70, *e.g.*, a riser body. In this embodiment, an internally threaded sleeve 75, comprised of internal threads 76, is employed in connection with the split lock ring 40 of the present invention. More specifically, the internally threaded sleeve 75 is adapted to be threadingly coupled to the external threads 83 formed on the first wellhead component 80.

5 A counterbore 77 is formed in the upper end 79 of the threaded sleeve 75. Note that, the end surface 79 of the threaded sleeve 75 extends above the end surface 81 of the first wellhead component 80.

Initially, the sleeve 75 is threadingly coupled to the first wellhead component 80. Then, at least a portion of the second wellhead component 70 is positioned within the opening in the internally threaded sleeve 75. Note, that the second wellhead component 70 in this illustrative embodiment does not have any external threads for mating with the internal threads 76 on the internally threaded sleeve 75. The split lock ring sections 40a, 40b are positioned between the second wellhead component 70 and the sleeve 75. Then, the sections 10 40a, 40b are rotated (using the threaded bars 43 positioned in the threaded openings 44) to threadingly couple the externally threaded sections 40a, 40b with the internally threaded sleeve 75, *i.e.*, the split lock ring segments 40a, 40b are rotated to thereby engage the external threads 49 on the split lock ring segments 40a, 40b, with the internal threads 76 on the threaded sleeve 75. The split lock ring segments 40a, 40b are rotated until such time as the 15 end surfaces 48 of the split lock ring sections 40a, 40b engage a surface 73 on a flange 71 of the second wellhead component 70. Tightening of the split lock ring segments 40a 40b is continued until the first and second wellhead components 80, 70 are properly coupled to one another. The threaded bars 43 may then be removed. Thereafter, the threaded set screws 47 may be positioned in the threaded openings 44 to secure the split lock ring sections 40a, 40b 20 in the installed position. In some embodiments, at least a portion of the flange 45 of the split

lock ring sections 40a, 40b is positioned in the counterbore 77 in the threaded sleeve 75, as depicted in Figure 4.

The present invention is directed to a split locking ring for wellhead components. In one illustrative embodiment, the device comprises a first internally threaded wellhead component, a second wellhead component, at least a portion of which is positioned within an opening in the first wellhead component, and a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of the sections of the split lock ring are positioned between the first and second wellhead components and rotated to threadingly couple the sections of the split lock ring to the first wellhead component and thereby secure the second wellhead component to the first wellhead component.

In another illustrative embodiment, the device comprises a first internally threaded wellhead component, a second wellhead component, at least a portion of which is positioned within an opening in the first wellhead component, the second wellhead component having a flange, and a rotatable split lock ring comprised of two externally threaded sections, the sections having an end surface, wherein at least a portion of the sections of the split lock ring are positioned between the first and second wellhead components and rotated to threadingly couple the sections of the split lock ring to the first wellhead component and engage the end surface of the sections of the split lock ring with the flange on the second wellhead component, the sections thereby securing the second wellhead component to the first wellhead component.

In a further illustrative embodiment, the device comprises a first externally threaded wellhead component, an internally threaded sleeve threadingly coupled to the externally

threaded first wellhead component, a second wellhead component, at least a portion of which is adapted to be positioned within an opening in the internally threaded sleeve, and a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of the sections of the split lock ring are positioned between the internally threaded sleeve and the second wellhead component and rotated to threadingly couple the sections of the split lock ring to the internally threaded sleeve and thereby secure the second wellhead component to the first wellhead component.

In yet a further illustrative embodiment, the device comprises a first externally threaded wellhead component, an internally threaded sleeve threadingly coupled to the externally threaded first wellhead component, the sleeve comprising a counterbore formed adjacent an end surface of the internally threaded sleeve, a second wellhead component, at least a portion of which is adapted to be positioned within an opening in the internally threaded sleeve, and a rotatable split lock ring comprised of at least two externally threaded sections, each of the sections having a flange, wherein at least a portion of the sections of the split lock ring are positioned between the internally threaded sleeve and the second wellhead component and rotated to threadingly couple the sections of the split lock ring to the internally threaded sleeve and thereby secure the second wellhead component to the first wellhead component, wherein at least a portion of the flange on each of the sections is positioned in the counterbore.

In one illustrative embodiment, the method comprises positioning at least a portion of a first wellhead component within an opening in a second internally threaded wellhead component, positioning a split lock ring comprised of at least two externally threaded sections proximate the first and second wellhead components, and rotating the sections of

the split lock ring to threadingly couple the externally threaded sections to the internally threaded second wellhead component and position at least a portion of the split lock ring sections between the first and second wellhead components, thereby securing the first wellhead component to the second wellhead component.

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In another illustrative embodiment, the method comprises positioning at least a portion of a first wellhead component within an opening in a second internally threaded wellhead component, the first wellhead component having a flange, positioning a split lock ring comprised of at least two externally threaded sections proximate the first and second wellhead components, and rotating the sections of the split lock ring to threadingly couple the externally threaded sections to the internally threaded second wellhead component and position at least a portion of the split lock ring sections between the first and second wellhead components, an end surface of each of the sections engaging the flange on the first wellhead component, the rotating of the sections being continued until the first wellhead component is securely coupled to the second wellhead component.

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In a further illustrative embodiment, the method comprises threadingly coupling an internally threaded sleeve to an externally threaded first wellhead component, positioning at least a portion of a second wellhead component within an opening in the internally threaded sleeve, positioning a split lock ring comprised of at least two externally threaded sections proximate the internally threaded sleeve and the second wellhead component, and rotating the sections of the split lock ring to threadingly couple the sections to the internally threaded sleeve and position at least a portion of the split lock ring sections between the internally threaded sleeve and the second wellhead component, thereby securing the first wellhead component to the second wellhead component.

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In yet a further illustrative embodiment, the method comprises threadingly coupling an internally threaded sleeve to an externally threaded first wellhead component, the internally threaded sleeve having a counterbore formed therein, positioning at least a portion of a second wellhead component within an opening in the internally threaded sleeve, the second wellhead component having a flange, positioning a split lock ring comprised of at least two externally threaded sections proximate the internally threaded sleeve and the second wellhead component, each of the sections having an end surface, and rotating the sections of the split lock ring to threadingly couple the sections to the internally threaded sleeve and position at least a portion of the split lock ring sections between the internally threaded sleeve and the second wellhead component, the end surfaces on the sections engaging the flange on the first wellhead component, the rotation being continued until such time as the first wellhead component is secured to the second wellhead component and at least a portion of a flange on each of the sections is positioned in the counterbore.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. For example, the process steps set forth above may be performed in a different order. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. It is therefore evident that the particular embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the invention. Accordingly, the protection sought herein is as set forth in the claims below.

CLAIMS**WHAT IS CLAIMED:**

1. A device, comprising:

a first internally threaded wellhead component;

a second wellhead component, at least a portion of which is positioned within an opening in said first wellhead component; and

a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of said sections of said split lock ring are positioned between said first and second wellhead components and rotated to threadingly couple said sections of said split lock ring to said first wellhead component and thereby secure said second wellhead component to said first wellhead component.

2. The device of claim 1, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

3. The device of claim 1, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

4. The device of claim 1, wherein each of said sections of said split lock ring comprises at least one threaded opening and said device further comprises a set screw threadingly positioned within said threaded opening, an end of said set screw engaging said second wellhead component.

5. The device of claim 1, wherein each of said sections of said split lock ring comprises a plurality of threaded openings and said device further comprises a set screw threadingly positioned within each of said plurality of threaded openings, an end of each of said set screws engaging said second wellhead component.

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6. The device of claim 1, wherein said internally threaded first wellhead component and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

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7. The device of claim 1, wherein said second wellhead component has a flange, and an end surface of each of said sections of said split lock ring engage said flange on said second wellhead component.

8. A device, comprising:

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a first internally threaded wellhead component;

a second wellhead component, at least a portion of which is positioned within an opening in said first wellhead component, said second wellhead component having a flange; and

a rotatable split lock ring comprised of two externally threaded sections, said sections

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having an end surface, wherein at least a portion of said sections of said split lock ring are positioned between said first and second wellhead components and rotated to threadingly couple said sections of said split lock ring to said first wellhead component and engage said end surface of said sections of said split lock ring with said flange on said second wellhead component, said

sections thereby securing said second wellhead component to said first wellhead component.

9. The device of claim 8, wherein said first wellhead component is selected from
5 a group consisting of a wellhead, a riser, a casing head and a tubing head.

10. The device of claim 8, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

10 11. The device of claim 8, wherein each of said sections of said split lock ring comprises at least one threaded opening and said device further comprises a set screw threadingly positioned within said threaded opening, an end of said set screw engaging said second wellhead component.

15 12. The device of claim 8, wherein each of said sections of said split lock ring comprises a plurality of threaded openings and said device further comprises a set screw threadingly positioned within each of said plurality of threaded openings, an end of each of said set screws engaging said second wellhead component.

20 13. The device of claim 8, wherein said internally threaded first wellhead component and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

25 14. A device, comprising:
a first externally threaded wellhead component;

an internally threaded sleeve threadingly coupled to said externally threaded first wellhead component;

a second wellhead component, at least a portion of which is adapted to be positioned within an opening in said internally threaded sleeve; and

5 a rotatable split lock ring comprised of at least two externally threaded sections, wherein at least a portion of said sections of said split lock ring are positioned between said internally threaded sleeve and said second wellhead component and rotated to threadingly couple said sections of said split lock ring to said internally threaded sleeve and thereby secure said second wellhead component
10 to said first wellhead component.

15. The device of claim 14, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

15 16. The device of claim 14, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

17. The device of claim 14, wherein an end surface of said sleeve is positioned above an end surface of said first externally threaded component.

20 18. The device of claim 14, wherein each of said sections of said split lock ring comprises at least one threaded opening and said device further comprises a set screw threadingly positioned within said threaded opening, an end of said set screw engaging said second wellhead component.

19. The device of claim 14, wherein each of said sections of said split lock ring comprises a plurality of threaded openings and said device further comprises a set screw threadingly positioned within each of said plurality of threaded openings, an end of each of said set screws engaging said second wellhead component.

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20. The device of claim 14, wherein said internally threaded sleeve and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

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21. The device of claim 14, wherein said second wellhead component has a flange, and an end surface of each of said sections of said split lock ring engages said flange on said second wellhead component.

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22. The device of claim 14, further comprising a counterbore formed adjacent an end surface of said internally threaded sleeve and wherein at least a portion of a flange on said sections is positioned in said counterbore.

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23. A device, comprising:

a first externally threaded wellhead component;

an internally threaded sleeve threadingly coupled to said externally threaded first wellhead component, said sleeve comprising a counterbore formed adjacent an end surface of said internally threaded sleeve;

a second wellhead component, at least a portion of which is adapted to be positioned within an opening in said internally threaded sleeve; and

a rotatable split lock ring comprised of at least two externally threaded sections, each of said sections having a flange, wherein at least a portion of said sections of said split lock ring are positioned between said internally threaded sleeve and said second wellhead component and rotated to threadingly couple said sections of said split lock ring to said internally threaded sleeve and thereby secure said second wellhead component to said first wellhead component, wherein at least a portion of said flange on each of said sections is positioned in said counterbore.

24. The device of claim 23, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

25. The device of claim 23, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

26. The device of claim 23, wherein an end surface of said sleeve is positioned above an end surface of said first externally threaded component.

27. The device of claim 23, wherein each of said sections of said split lock ring comprises at least one threaded opening and said device further comprises a set screw threadingly positioned within said threaded opening, an end of said set screw engaging said second wellhead component.

28. The device of claim 23, wherein each of said sections of said split lock ring comprises a plurality of threaded openings and said device further comprises a set screw

threadingly positioned within each of said plurality of threaded openings, an end of each of said set screws engaging said second wellhead component.

29. The device of claim 23, wherein said internally threaded sleeve and said
5 externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

30. The device of claim 23, wherein said second wellhead component has a
flange, and an end surface of each of said sections of said split lock ring engages said flange
10 on said second wellhead component.

31. A method, comprising:

positioning at least a portion of a first wellhead component within an opening in a
second internally threaded wellhead component;

15 positioning a split lock ring comprised of at least two externally threaded sections
proximate said first and second wellhead components; and

rotating said sections of said split lock ring to threadingly couple said externally
threaded sections to said internally threaded second wellhead component and
position at least a portion of said split lock ring sections between said first and
20 second wellhead components, thereby securing said first wellhead component
to said second wellhead component.

32. The method of claim 31, further comprising positioning a threaded set screw
in a threaded opening formed in each of said sections of said split lock ring until an end
25 surface of said set screw engages a portion of said first wellhead component.

33. The method of claim 31, wherein said step of rotating said sections of said split lock ring comprises positioning a threaded bar in a threaded opening formed in each of said sections of said split lock ring and applying a force to each of said threaded bars to thereby rotate said sections of said split lock ring.

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34. The method of claim 31, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

35. The method of claim 31, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

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36. The method of claim 31, wherein said internally threaded second wellhead component and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

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37. The method of claim 31, wherein said first wellhead component has a flange, and an end surface of each of said sections of said split lock ring engages said flange on said first wellhead component.

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38. A method, comprising:

positioning at least a portion of a first wellhead component within an opening in a second internally threaded wellhead component, said first wellhead component having a flange;

positioning a split lock ring comprised of at least two externally threaded sections

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proximate said first and second wellhead components; and

rotating said sections of said split lock ring to threadingly couple said externally threaded sections to said internally threaded second wellhead component and position at least a portion of said split lock ring sections between said first and second wellhead components, an end surface of each of said sections engaging said flange on said first wellhead component, said rotating of said sections being continued until said first wellhead component is securely coupled to said second wellhead component.

39. The method of claim 38, further comprising positioning a threaded set screw in a threaded opening formed in each of said sections of said split lock ring until an end surface of said set screw engages a portion of said first wellhead component.

40. The method of claim 38, wherein said step of rotating said sections of said split lock ring comprises positioning a threaded bar in a threaded opening formed in each of said sections of said split lock ring and applying a force to each of said threaded bars to thereby rotate said sections of said split lock ring.

41. The method of claim 38, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

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42. The method of claim 38, wherein said second wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

43. The method of claim 38, wherein said internally threaded first wellhead component and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.

5 44. A method, comprising:
threadingly coupling an internally threaded sleeve to an externally threaded first
wellhead component;
positioning at least a portion of a second wellhead component within an opening in
said internally threaded sleeve;
10 positioning a split lock ring comprised of at least two externally threaded sections
proximate said internally threaded sleeve and said second wellhead
component; and
rotating said sections of said split lock ring to threadingly couple said sections to said
internally threaded sleeve and position at least a portion of said split lock ring
15 sections between said internally threaded sleeve and said second wellhead
component, thereby securing said first wellhead component to said second
wellhead component.

20 45. The method of claim 44, further comprising positioning a threaded set screw
in a threaded opening formed in each of said sections of said split lock ring until an end
surface of said set screw engages a portion of said second wellhead component.

46. The method of claim 44, wherein said step of rotating said sections of said
split lock ring comprises positioning a threaded bar in a threaded opening formed in each of

said sections of said split lock ring and applying a force to each of said threaded bars to thereby rotate said sections of said split lock ring.

47. The method of claim 44, wherein said first wellhead component is selected
5 from a group consisting of a wellhead, a riser, a casing head and a tubing head.

48. The method of claim 44, wherein said second wellhead component is selected
from a group consisting of a wellhead, a riser, a casing head and a tubing head.

10 49. The method of claim 44, wherein said internally threaded sleeve and said
externally threaded sections of said split lock ring are comprised of ACME threads having a
pitch of approximately four threads per inch.

15 50. The method of claim 44, wherein said second wellhead component has a
flange, and an end surface of each of said sections of said split lock ring engage said flange
on said second wellhead component.

20 51. The method of claim 44, wherein said sleeve has a counterbore formed
therein, and said step of rotating said sections of said split lock ring is continued until at least
a portion of a flange on each of said sections is positioned in said counterbore.

52. A method, comprising:

threadingly coupling an internally threaded sleeve to an externally threaded first
wellhead component, said internally threaded sleeve having a counterbore
25 formed therein;

positioning at least a portion of a second wellhead component within an opening in said internally threaded sleeve, said second wellhead component having a flange;

positioning a split lock ring comprised of at least two externally threaded sections proximate said internally threaded sleeve and said second wellhead component, each of said sections having an end surface; and

rotating said sections of said split lock ring to threadingly couple said sections to said internally threaded sleeve and position at least a portion of said split lock ring sections between said internally threaded sleeve and said second wellhead component, said end surfaces on said sections engaging said flange on said second wellhead component, said rotation being continued until such time as said first wellhead component is secured to said second wellhead component and at least a portion of a flange on each of said sections is positioned in said counterbore.

53. The method of claim 52, further comprising positioning a threaded set screw in a threaded opening formed in each of said sections of said split lock ring until an end surface of said set screw engages a portion of said second wellhead component.

54. The method of claim 52, wherein said step of rotating said sections of said split lock ring comprises positioning a threaded bar in a threaded opening formed in each of said sections of said split lock ring and applying a force to each of said threaded bars to thereby rotate said sections of said split lock ring.

55. The method of claim 52, wherein said first wellhead component is selected from a group consisting of a wellhead, a riser, a casing head and a tubing head.

56. The method of claim 52, wherein said second wellhead component is selected
5 from a group consisting of a wellhead, a riser, a casing head and a tubing head.

57. The method of claim 52, wherein said internally threaded sleeve and said externally threaded sections of said split lock ring are comprised of ACME threads having a pitch of approximately four threads per inch.