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RETAINER ASSEMBLY FOR SECURING A COVERING ON A TUBULAR MEMBER

Filed July 29, 1960

Fig. 1

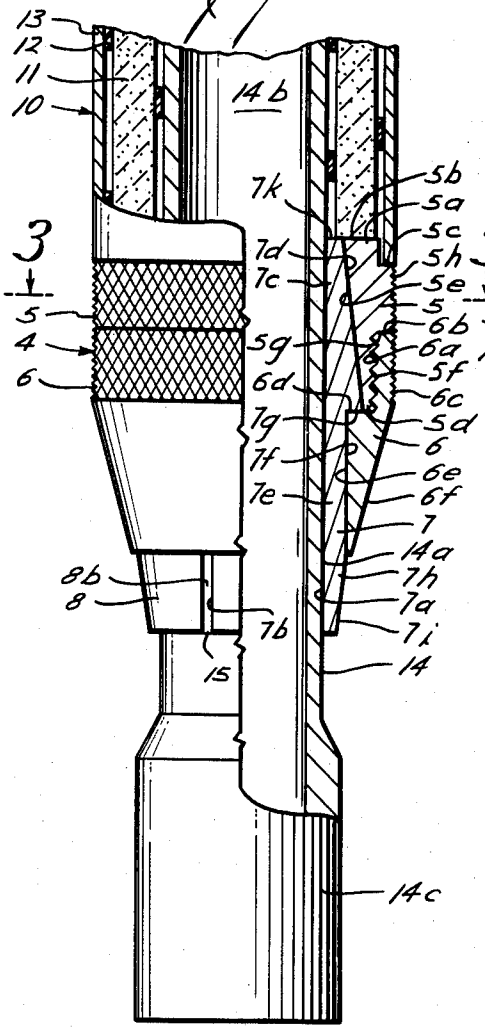


Fig. 2

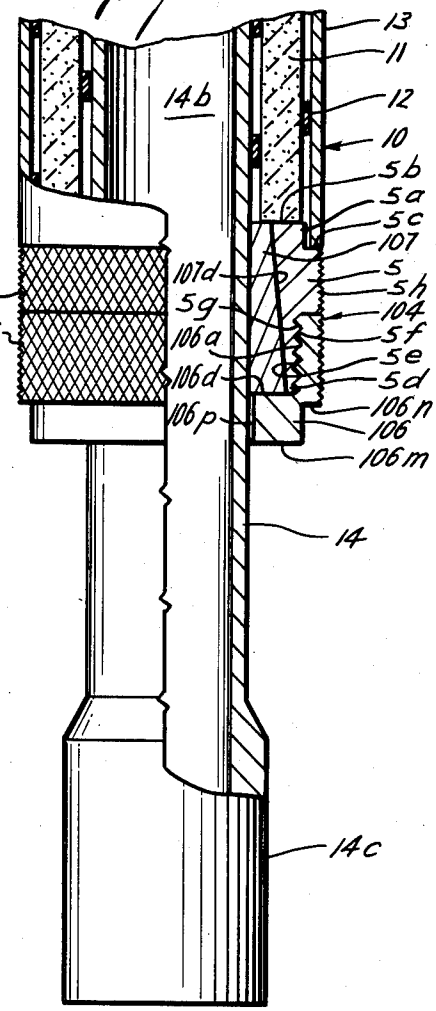
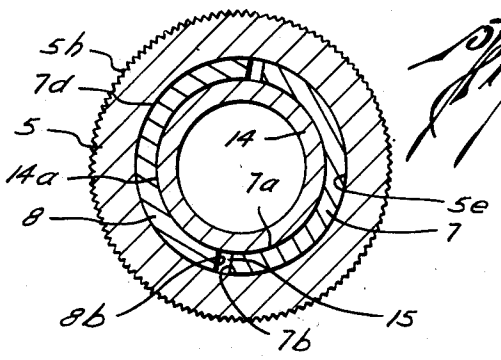


Fig. 3



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RETAINER ASSEMBLY FOR SECURING A COVERING ON A TUBULAR MEMBER

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The present invention relates to a retainer assembly for securing concentric tubular members in position on an elongated tubular member.

Quite often in the drilling of an oil or gas well, a plurality of producing strata or formations is uncovered. In order to recover the maximum amount of oil from the well, it is desirable to produce oil from any formation which indicates that it can produce oil or gas in commercial quantity. In order to flow the well fluid to the earth's surface from the various formations an outer casing is provided in the well bore and conduits are arranged within the casing for communicating separately with each producing formation to convey the well fluids to the earth's surface.

It can be appreciated that any conduits which extend to producing formations in the well bore located below the upper producing formation is exposed to the action of the producing fluid from all the formations in the well bore thereabove. Quite often the oil and gas fluids enter the casing with substantial velocity which tends to cut out the conduits which are exposed to the well fluids as they enter the casing. The cutting action of the well fluids in some situations necessitates repair and replacement of the conduit or tubing at frequent intervals.

In order to overcome this problem, a protective covering such as that disclosed in U.S. Letters Patent 2,925,097 has been provided for the conduits which solves the above problem quite satisfactorily.

It is desirable to secure the protective covering on the tubular member in a manner so as to firmly lock or secure the protective covering on the tubular member, but which permits the removal of such protective covering from the tubular member with a minimum of effort. It can be appreciated that the protective covering must be firmly positioned on the conduit or well tubing in order to inhibit longitudinal movement of such protective covering on the conduit. Protective coverings of the type disclosed in the above referred to patent have normally been secured to well pipe by means of welding. Even protective coverings eventually become worn or eroded and must be replaced. The device of the present invention provides a retainer means which may be quickly and easily removed thereby permitting the worn covering to be readily removed and a new covering to be quickly placed on the well pipe and firmly locked in position thereon. Such removal and replacement of the covering is accomplished without any damage to the well pipe or conduit.

The present invention is directed to a retainer assembly for securing concentric tubular members on another tubular member to enable them to be firmly locked on the tubular member, but which facilitates removal of the concentric tubular covering when desired.

Other objects and advantages of the present invention will become more readily apparent from a consideration of the following description and drawings wherein:

FIG. 1 is fragmentary sectional view showing an enlarged end portion of a tubular member with the present invention positioned thereon for securing concentric tubular members about the tubular member;

FIG. 2 is a fragmentary sectional view showing an enlarged portion of a tubular member with another modification of the present invention positioned thereon for

securing concentric tubular members about the tubular member; and

FIG. 3 is a sectional view on the line 3—3 of FIG. 1.

Referring now to FIG. 1 of the drawings, the device of the present invention is illustrated as being used to retain a protective covering, of the type disclosed in U.S. Patent No. 2,925,097, on tubing positioned in a well string and is indicated generally at **4**. The retainer assembly **4** includes the upper retainer ring **5**, the lower lock ring **6**, and a pair of semi-cylindrical or annular segments **7** and **8**, the details of which will be described hereinafter.

The proetctive covering or concentric tubular member, indicated generally at **10**, consists of a ceramic shell **11** or the like with a plurality of cushioning members **12** secured internally and externally on the ceramic shell and an outer protective member **13** covering the outer cushioning members **12**.

The retainer ring **5**, on its upper end **5***a*, has a plurality of annular vertically extending and longitudinally spaced end faces **5***b* and **5***c* for abutting the concentric tubular member **10**. As illustrated in FIG. 1 the end face **5***b* abuts the tubular covering or ceramic shell **11** while the end face **5***c* abuts the end portion of the outer protective shell **13**. It should also be noted that the faces **5***b* and **5***c* are longitudinally spaced relative to each other, so that the retainer end portion **5***a* is in effect stepped.

The retainer ring **5** as an inner diameter at end **5***a* larger than the diameter of the tubular member **14** on which the ring **5** is positioned and an inner diameter at end **5***d* larger than the inner diameter at end **5***a* thereby providing an annular sloping or tapered surface **5***e* in the ring **5** in spaced relation to the tubular member **14**.

The outer surface of the ring **5** adjacent the end **5***d* is threaded as indicated at **5***f* and is adapted to engage the inner threaded surface **6***a* of the lock ring **6**. The retainer ring **5** has an annular face **5***g* which abuts with the end face **6***b* of the lock ring **6** with the width of the face **5***g* being such that when the rings **5** and **6** are assembled together the outer surfaces **5***h* and **6***c* are in substantial alignment with each other.

To enable the rings **5** and **6** to be more readily gripped for facilitating assembling and disassembling, the outer surfaces **5***h* and **6***c* of the rings **5** and **6**, respectively, are knurled or scored.

The lock ring **6** has an annular inner end surface **6***d* for holding annular segments **7** and **8** in the retainer ring **5** and locking ring **6**. The inner surface **6***e* of the ring **6** is spaced apart from the tubular member **14** and is substantially parallel thereto. The outer surface of the ring **6** below the knurled portion **6***b* is tapered inwardly at **6***f*.

The segments **7** and **8** are substantially identical and are adapted to fit within the retainer ring **5** and the lock ring **6**. The inner surface **7***a* of the segment **7** is of substantially the same configuration as the outer surface **14***a* of the tubing **14** on which the segment **7** is adapted to be positioned. When the segments **7** and **8** are each positioned on the tubing **14**, a longitudinal gap or space **15** is formed between the adjacent edges **7***b* and **8***b*. This permits the segments **7** and **8** to be forced tightly on the tubing member **14** when the rings **5** and **6** are screwed together and firmly secured on the segments **7** and **8**.

The upper portions **7***c* of the segments **7** and **8** each has a tapered outer surface **7***d* which is adapted to fit adjacent the inner annular surface **5***e* of the retainer ring **5** and which is substantially the same length as the surface **5***e*. The lower portion **7***e* has an outer annular surface **7***f* which is adapted to fit adjacent the inner surface **6***e* of the lock ring **6**. The annular segments **7** and **8** each has an annular face **7***g* which is adapted for seating on the annular inner face **6***d* of the lock ring **6**. The end portions **7***h* of the segments **7** and **8** which extend below

or beyond the lock ring **6** when the device **4** is positioned on the tubular member **14** have an inwardly tapering surface *7i*. The overall construction of the device **4** is such that a relatively unobstructed outer surface is formed after the device **4** is secured on the tubular member **14** to retain the protective covering **10** in position. "Hanging up" or snagging of the retainer assembly **4** is thereby inhibited when moving the tubular member **14** longitudinally in a well hole or the like.

When the rings **5** and **6** are threaded or secured together with the segments **7** and **8** therein and all positioned on the tubular member **14**, the segments **7** and **8** provide a wedging action which locks the ring assembly **4** on the member **14**, thereby inhibiting longitudinal movement of the device **4** on the tubular member **14**.

In using the device **4** as a retaining ring assembly for securing the protective covering **10** on the tubular member **14** in a well flow pipe, the retaining ring **5** is first placed on the member **14** from the male end *14b* of the member **14** with the threaded end *5d* of the ring **5** being positioned facing the female or upset end *14c*. The internal diameter of the ring **5** at the end portion *5a* is smaller than the upset end *14c* of the member **14**, but larger than the male end *14b* thereby permitting the ring **5** to be quickly and easily placed on the member **14** and retained thereon by the female end *14c*. The covering **10** is then positioned on the tubing **14** in a manner well known in the art, after which the segments **7** and **8** are placed on the tubing **14** and within the ring **5** with the surface *7d* of the segments **7** and **8** adjacent the surface *5e* of the ring **5**. The lock ring **6**, the internal diameter of which is just sufficiently greater than the outside diameter of the upset end *14c* to easily slide thereover, is positioned over the end *14c*, on to the tubing **14** and over segments **7** and **8**. The ring **6** is then tightened or threaded onto the retaining ring **5**, thus firmly wedging the device **4** on the tubing **14** thereby inhibiting longitudinal movement of the device **4** on the tubing **14**.

With the device **4** secured in its lower position, a second device **4** is secured on the tubing **14** above the covering **10**, thereby locking the covering **10** securely in position on the member **14**.

Variations in the installation procedure may be made without departing from the scope of the invention, however the face *5b* of the ring **5** should abut the covering **10** and the face *7k* of the members **7** and **8** should also abut the covering **10**.

FIG. 2 of the drawings illustrates another embodiment **104** of the present invention wherein the retaining ring **5** is substantially the same as the retaining ring **5** in the FIG. 1 device and the ring **5** is similarly lettered in each figure. Parts of the embodiment **104** which are similar to parts of the device **4** are identified by similar members except that the numbers identifying the device **104** are in the 100 series.

Substantially identical segments **107** and **108** (not seen) are similar to the portions *7c* of the segments **7** and **8** of the FIG. 1 form. Also, the arcuate segments **107** and **108** (not seen) are substantially the length of the surface *5e* of the ring **5**, and the surface *107d* of the segments **107** and **108** is adjacent to such surface *5e*.

The locking ring **106** is threaded internally at *106a* similarly to the member **6** at *6a* for receiving the threaded portion *5f* of the retaining ring **5**. The exterior of the locking ring **106** is substantially like that of the retaining ring **5**, with the ring **106** having annular faces *106m* and *106n* corresponding to annular faces *5b* and *5c*, respectively. The inner seating surface *106d* extends internally to the tubing **14** with the annular surface *106p* adjacent the tubing **14**. The wedges or annular segments **107** and **108** in effect are seated on the annular face *106d* of the locking ring **106**.

The device **104** is used in a similar manner to that of the device **4** as explained above. The ring **5** is positioned on the tubing **14** as before while the segments **107** and **108** are placed in the ring **5** and on the tubing **14** in much the same fashion as the segments **7** and **8**. The locking ring **106** is also secured in the ring **5** similarly to the locking ring **6**.

Although the device of the present invention has been illustrated as a retaining assembly for a protective covering on well tubing, it can be appreciated that the device may be used whenever it is desired to retain one concentric tubing member over another tubing member.

The device of the present invention provides a retainer assembly which may be quickly and easily assembled on a tubular member to hold another concentric tubular member or covering thereon and which may be readily removed therefrom. Worn out coverings or the like may be quickly replaced as necessary or desired and the device of the present invention may be continually used to retain new coverings or the like.

Broadly the invention relates to a retainer assembly for securing coverings over tubular members.

What is claimed is:

1. A retainer assembly for positioning concentric tubular members on a tubular member comprising, a retainer ring for fitting about a tubular member and having a pair of annular vertical end faces for abutting concentric tubular members to be retained by the assembly, said retainer ring having an inner diameter at one end larger than the outer diameter of the tubular member on which it is positioned, said retainer ring having an inner diameter at its other end larger than the diameter on said first end to thereby provide an annular sloping surface in said retainer ring in spaced relation to the tubular member on which the ring is positioned, a threaded outer surface on said ring adjacent the end of said ring opposite said vertical end faces, annular segments fitting within said ring and having one surface for engaging the tubular member on which said retainer ring is positioned and an outer annular tapered surface abutting the sloping surface in said retainer ring, and a lock ring having an inner threaded surface adjacent one end for engaging the outer threaded surface on said retainer ring, an annular inner end surface on said lock ring for holding said segments in said retainer ring, said lock ring adapted to threadedly engage said retainer ring and hold said retainer ring in engagement with the concentric tubular members and to retain said segments within the assembly to engage the surface of the tubular member.

2. A retainer assembly for securing concentric tubular members on a tubular member including a retainer ring having stepped vertical end surfaces for abutting the concentric tubular members, a portion of reduced diameter on said ring, an upstanding end surface on said portion, a threaded surface on said portion extending from said upstanding end surface to the other end of said ring, a tapered surface portion on said ring extending from said retainer end having said stepped surfaces and sloping outwardly toward the other end of said ring, tapered segments for abutting said tapered ring surface and for securing said ring against the concentric tubular members and on the tubular member, and a lock ring for locking said retainer ring and segments against the concentric tubular members and on the tubular member.

3. The combination recited in claim 2 including a threaded inner surface on said lock ring, an upstanding end surface on said ring at the termination of said threaded surface for engaging said upstanding surface adjacent said threaded surface on said retainer ring to aid in securing said retainer ring and lock ring together.

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