

Jan. 25, 1938.

S. A. GUIBERSON, 3D

2,106,392

ANCHORING DEVICE

Filed Nov. 9, 1936

2 Sheets-Sheet 1

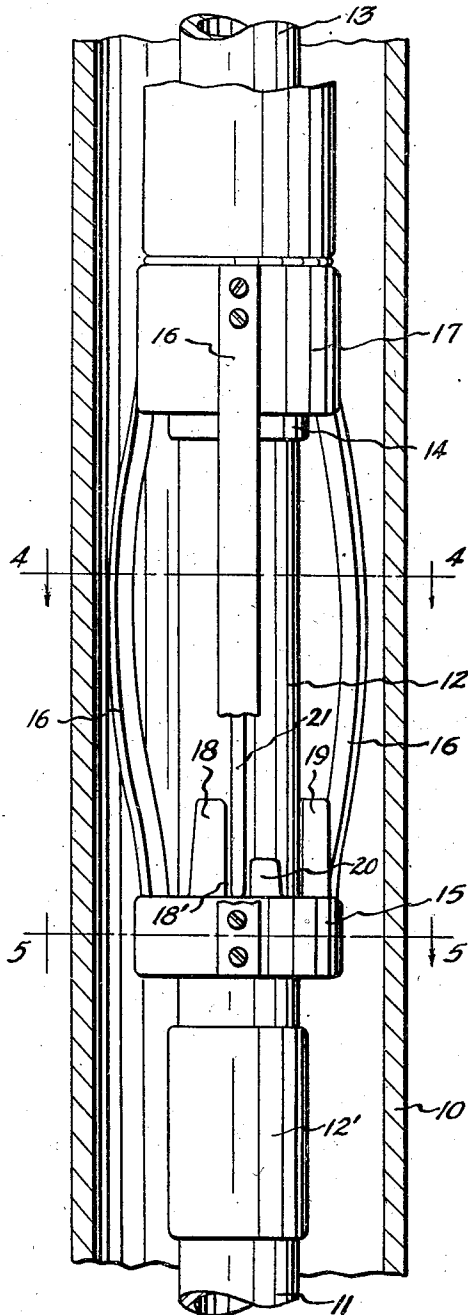


Fig. 1

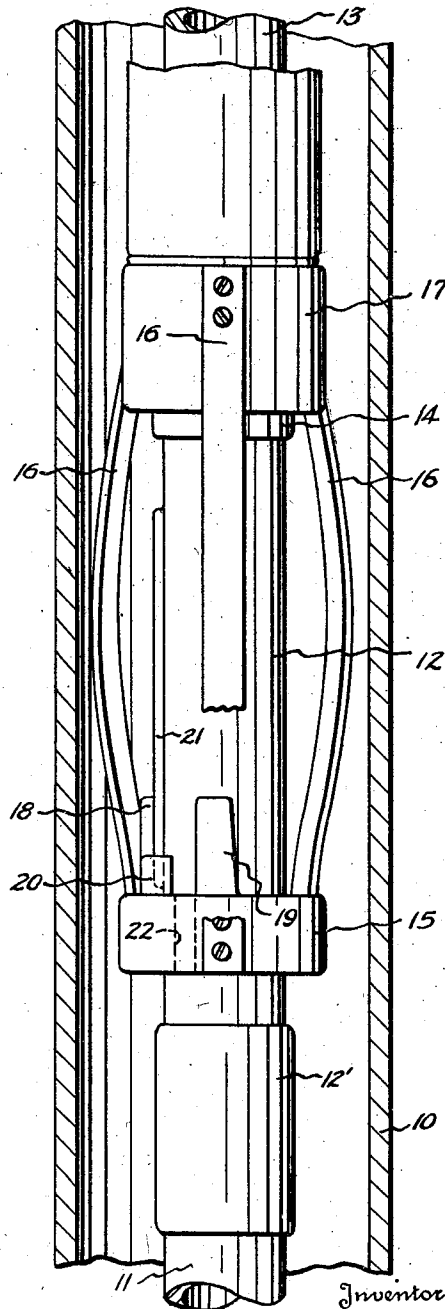


Fig. 2

Inventor
SAMUEL ALLEN GUIBERSON III

Jack A. Schuy

By

Attorney

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2 Sheets-Sheet 2

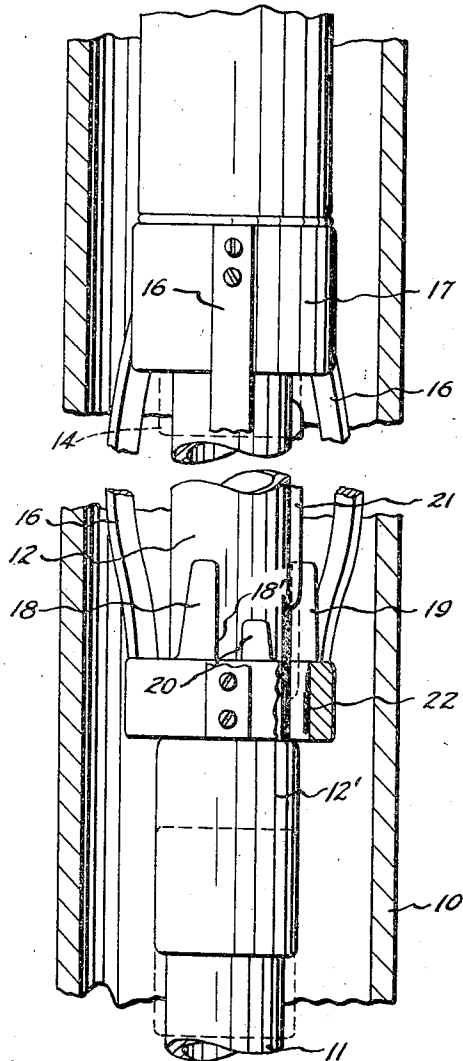


Fig. 3

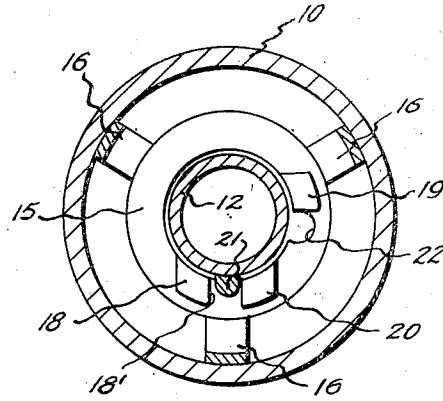


Fig. 4

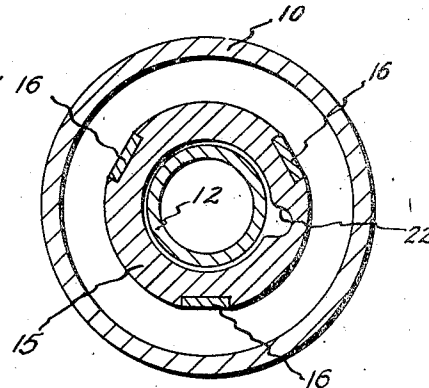


Fig. 5

Inventor
SAMUEL ALLEN GUIBERSON III

By

Jack W. Ahley

Attorney

UNITED STATES PATENT OFFICE

2,106,392

ANCHORING DEVICE

Samuel Allen Guiberson, III, Dallas, Tex., assignor to The Guiberson Corporation, Dallas, Tex., a corporation of Delaware

Application November 9, 1936, Serial No. 109,903

4 Claims. (Cl. 166—12)

This invention relates to new and useful improvements in anchoring devices.

One object of the invention is to provide an improved anchoring device particularly adapted for use with the usual slips, or other gripping means, of a well packer, or similar device.

An important object of the invention is to provide an improved anchoring device which is simple in structure and which is constructed to readily actuate the gripping means of a well packer, or similar device, which is lowered into a well casing and set in position therein.

Another object of the invention is to provide an improved anchoring device including the usual spring assembly movably mounted on a mandrel, said assembly having a notch adapted to receive the lower end of a rib on said mandrel, whereby the assembly and mandrel move as a unit on the down-stroke, with means for disengaging said rib from the notch for permitting a downward movement of the mandrel with relation to the assembly, the structure being such that the usual spring assembly and mandrel may be used, whereby manufacturing costs are materially reduced.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Figure 1 is a view, partly in elevation and partly in section, of an anchoring device constructed in accordance with the invention and disposed within a well casing,

Figure 2 is a similar view taken at right angles to the view shown in Figure 1,

Figure 3 is a view, partly in section and partly in elevation, of the device in position for operating the slips or other gripping means (not shown),

Figure 4 is a horizontal, cross-sectional view taken on the line 4—4 of Figure 1, and

Figure 5 is a horizontal, cross-sectional view taken on the line 5—5 of Figure 1.

In the drawings, the numeral 10 designates the usual well casing within which the tubing 11 extends. It is the common practice to place certain tools, such as packers and the like, within the well casing at a desired point, and it frequently becomes necessary to remove or to reposition these tools in the casing. These tools ordinarily include a lower mandrel 12 and an

upper mandrel 13 which are connected by a coupling collar 14. The mandrels are connected in the tubing string by the usual coupling collars 12', and it is the common practice to control the setting of the tool by some means which is carried by the tubing and actuated by the motion of said tubing. It is the purpose of this invention to provide a simple anchoring device for controlling the setting of the gripping means, such as slips (not shown), which are commonly used to hold the packers or other tools in a set position in the well casing.

As clearly shown in Figure 1, the anchoring device is mounted on the lower mandrel 12, while the packer or other tool, including the gripping slips (not shown), is mounted thereabove on the upper mandrel 13.

The anchoring device includes a ring 15, which is slidably mounted on the mandrel 12 at its lower end, being supported on the upper end of the lower coupling collar 12'. This ring has the lower ends of outwardly bowed or curved friction springs 16 secured thereto in spaced relation therearound. The upper ends of said springs are similarly secured to an upper control collar or sleeve 17. This control collar surrounds the coupling 14 and has an inside diameter greater than the outside diameter of said coupling, whereby the collar may freely pass thereover. Three friction springs are shown, but any desired number may be employed, and these springs engage the walls of the casing 10 and by such frictional engagement prevent turning of the spring assembly within the casing.

Elongate vertically extending lugs 18 and 19 are secured to and extend upwardly from the upper end of the ring 15 and are spaced from each other. A shorter lug 20 also extends upwardly from the ring 15 and is positioned between the elongate lugs at a point close to the lug 18, whereby a vertical notch 18' is formed therebetween. It is obvious that the side of the notch 18' formed by the elongate lug 18 is greater than that side formed by the shorter lug 20.

The mandrel 12 is provided with an elongate rib or key 21 which is welded, or otherwise secured or formed, on the outer surface of said mandrel and extends parallel to its axis. The lower end of the rib is spaced from the coupling 12' and is adapted to engage in the notch 18' formed between the lugs 18 and 20 whereupon movement of the mandrel is imparted to the ring 15 and the spring assembly. When the rib is engaged in the notch, as clearly shown in Figure 1, the lower end of the ring 15 is spaced from

the upper end of the coupling 12' a distance slightly greater than the height of the shorter lug 20. It will be obvious, therefore, that, when the mandrel is moved upwardly, the lower end of the rib will be raised above the upper end of the shorter lug 20 before the ring 15 engages the coupling and upon rotation of the mandrel the rib will move out of alignment with the notch 18'. However, this space between the collar 12' and lower end of the ring 15 is less than the height of the elongate lugs 18 and 19, whereby the lower end of the rib, while clearing the top of the shorter lug 20, will be confined between said elongate lugs.

15 An internal longitudinal slot or groove 22 is provided in the inner periphery of the ring 15 contiguous to one side of the other elongate lug 19, whereby, when the rib 21 is removed from the notch 18' and rotated into engagement with the lug 19, a downward movement of the mandrel will cause the lower end of said rib to be guided into the slot 22. This permits downward movement of the mandrel with relation to the spring assembly, which is held stationary due to the frictional engagement of the springs 16 with the casing wall. Upon continued downward movement of the mandrel, the slips or other gripping means (not shown) which are supported upon the collar 17 are expanded in the usual manner and the tool is set. It is noted that the length of the rib 21 is such that the upper end thereof remains in constant engagement with the slot 22 as the gripping means (not shown) moves to its set position before said rib passes entirely through the slot.

When it is desired to reposition or remove the tool, it is only necessary to lift the mandrel until the lower end of the rib 21 is removed from the slot 22, whereupon the rib and mandrel may be rotated and said rib reengaged in the notch 18'. With the mandrel in this position the slips or other gripping means (not shown) are moved thereby to their retracted position and the tool may be lifted from the well casing.

45 It will be seen that the device is simple in structure and economical in manufacture since it is only necessary to mount the lugs 18, 19 and 20 on the ring 15 and to provide the groove 22 therein, and to secure the rib 21 on the mandrel 12. This structure obviates the necessity of having an additional sleeve, in which a J-slot of the usual type is formed, for operating the spring assembly and greatly reduces the cost of manufacture.

55 What I claim and desire to secure by Letters Patent, is:

1. An anchoring device including, a mandrel, an elongate rib on the mandrel, a spring assembly slidably mounted on the mandrel and including a ring surrounding the mandrel, elongate

lugs on the ring for confining the rib within predetermined limits therebetween, a shorter lug on the ring adjacent one of the elongate lugs forming a notch therebetween for receiving the rib to connect the mandrel and assembly whereby they move downwardly as a unit, said ring having a slot formed therein for receiving the rib and spaced from the notch, whereby the mandrel may move downwardly with relation to the assembly.

2. An anchoring device including, a mandrel, an elongate rib on the mandrel, a spring assembly slidably mounted on the mandrel and including a ring surrounding the mandrel, elongate lugs on the ring for confining the rib within predetermined limits therebetween, a shorter lug on the ring adjacent one of the elongate lugs forming a notch therebetween for receiving the rib to connect the mandrel and assembly whereby they move downwardly as a unit, said ring having a slot formed therein for receiving the rib and adjacent the other elongate lug whereby when the rib has been disengaged from the notch and the mandrel rotated to engage said rib with this lug, said lug will act to guide the rib into said slot upon downward movement of the mandrel.

3. An anchoring device including, a mandrel, an elongate rib on the mandrel, a spring assembly slidably mounted on the mandrel and including an upper ring and a lower ring surrounding the mandrel and friction springs connecting the rings, elongate lugs on the lower ring for confining the rib within predetermined limits therebetween, a shorter lug on said ring adjacent one of the elongate lugs and forming a notch therebetween for receiving the rib to connect the mandrel and assembly whereby they move downwardly as a unit, said lower ring also having a slot formed therein adjacent the other elongate lug and adapted to receive the rib whereby when the rib has been disengaged from the notch and the mandrel rotated to engage the rib with this lug, said lug will act to guide the rib into said slot upon downward movement of the mandrel.

4. An anchoring device including a mandrel, a ring slidable on said mandrel, friction devices connected to said ring, a rib secured to the mandrel, elongate lugs projecting from said ring for confining the rib within predetermined limits therebetween, a shorter lug on the ring between said elongate lugs forming a notch between the shorter lug and one of the elongate lugs for receiving the rib when the mandrel is being lowered, said ring having a slot between the shorter lug and the other elongate lug through which the rib may slide when the mandrel is moved downwardly relative to the ring.

SAMUEL ALLEN GUIBERSON, III.