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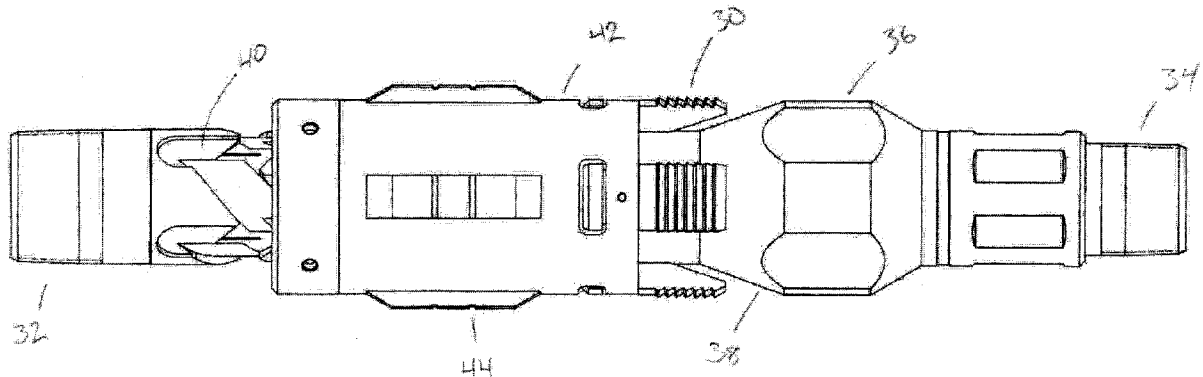
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(54) **Titre : ANCRAGE POUR OUTIL DE FRACTURATION**

(54) **Title: FRACTURING TOOL ANCHOR**



(57) **Abrégé/Abstract:**

The present invention is directed to a fracturing tool anchor adapted for use with a work string in a wellbore. In a preferred embodiment, the anchor has a housing with a central passage and an uphole and downhole end. The housing has a plurality of ports positioned circumferentially around the housing and along the length of the housing. The ports each contain an engagement member, such as a piston, and a return spring. The engagement member is adapted to extend radially outward when the anchor is pressure activated, to engage the wall of the casing or wellbore. The present application is also directed to a fracturing tool anchor that does not need to be pressure activated and utilizes slips as the engagement members.

Abstract

The present invention is directed to a fracturing tool anchor adapted for use with a work string in a wellbore. In a preferred embodiment, the anchor has a housing with a central passage and an uphole and downhole end. The housing has a plurality of ports positioned circumferentially around the housing and along the length of the housing. The ports each contain an engagement member, such as a piston, and a return spring. The engagement member is adapted to extend radially outward when the anchor is pressure activated, to engage the wall of the casing or wellbore. The present application is also directed to a fracturing tool anchor that does not need to be pressure activated and utilizes slips as the engagement members.

Fracturing Tool Anchor

Field of the Invention

The present invention relates generally to a downhole tool for use in oil field applications. In particular, this invention relates to an anchor for use with a work string, such as coiled tubing, in a wellbore, such as a horizontal wellbore.

Background of the Invention

In recent years there has been a large increase in the number of wells that have been drilled with horizontal portions. When servicing or completing these kinds of wells it is common to use coiled tubing to convey the tools or instruments to the portion of the wellbore of interest, owing to its flexibility and speed of deployment compared to other methods. Compared to traditional drill pipe, coiled tubing is quite thin walled, and subject to buckling if a large compressive force is applied to it.

If the bottom sealing elements on a selective frac packer fail, a net upward force is generated due to the pressure contained between the upper sealing device(s) and the toe of the well. This upward force can result in the coiled tubing buckling under the compressive loading. The upward force can be mitigated in wells comprised of 4.5" casing or smaller, however in wells with 5.5" casing or larger the hydraulic forces can easily exceed 200,000 lbs. In order to prevent buckling of the coiled tubing, it is necessary to provide a device that can transmit the upward compressive force in the event of a seal failure away from the coiled tubing and to the casing and thereby to the earth, rather than allowing the coiled tubing to be subjected to the compressive force.

Summary of the Invention

In a first aspect of the present invention there is provided a fracturing tool anchor adapted for use in a wellbore, the fracturing tool anchor comprising:

- an housing having an uphole and a downhole end;
- the housing having a central passage between the uphole and downhole end;
- a plurality of engagement members positioned between the uphole and downhole end;
- the engagement members adapted to extend radially outwards to engage a casing or wellbore wall;
- wherein, upon setting, the engagement members extend radially outwards to engage the casing or wellbore wall.

In a preferred embodiment of the present invention, the engagement members are pistons located in ports, positioned circumferentially around the housing and along the length of the housing. The anchor is pressure activated in order to engage the wall of the casing or wellbore.

In another aspect of the present invention, there is provided a fracturing tool anchor that does not need to be pressure activated and utilizes slips as the engagement members.

Brief Description of the Drawings

The embodiments of the present invention are described below with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of an anchor embodying the invention;

Fig. 2 is a cross-section of an anchor embodying the invention; and

Fig. 3 is a view of another embodiment of the invention.

Description of the Invention

As shown in Figures 1 and 2, a fracturing tool anchor 15 consists of a housing 10, which is preferably cylindrical in shape. The housing 10 has an uphole and downhole end. Positioned on the ends are threads 12 for attaching the anchor 15 to a work string, which may be coiled tubing, jointed pipe. The threads 12 may also be used for attaching other tools to the anchor 15. In the illustrated embodiment, the threads are 2.750-10 Stub Acme threads.

In the embodiment illustrated in Figures 1 and 2, the fracturing tool anchor 15 has a plurality of ports 14 positioned circumferentially around the housing 10. The ports 14, in the illustrated embodiment, are also spaced longitudinally along the housing 10 between the downhole and uphole ends. Within each port 14 is an engagement member, which is preferably a piston 2. Also located in each port 14 is a return spring 5. The piston port is angled toward the uphole direction of the anchor 15 to provide stronger engagement between the piston face and the wellbore or casing when an upward force is applied to the anchor 15.

Covering the piston 2 to ensure that its range of travel does not exceed the bore in the housing is a spring retainer 3. Spring retainer 3 is secured to the housing 10 with a pair of cap screws 4. Piston 2 is sealingly engaged with the bore machined in housing 10 by O rings 6 and 7. In the illustrated embodiment, the O rings 6 and 7 are highly-saturated nitrile 80 durometer O-rings.

The outward facing surface of piston 2 is serrated to firmly engage the wall of the wellbore, or casing, and prevent relative movement between the anchor 15 and the earth. In this manner, any upward forces originating from downhole of the anchor 15 can be transmitted to the earth, rather than to the work string uphole of the anchor 15, thus ensuring no excessive loads are imposed upon the work string.

When the work string is positioned in the hole at the desired location, the anchor 15 is set by applying pressure to the central passage 20 of the anchor 15 and the pistons 2 are biased radially outward, wherein the serrated faces engage the casing or wellbore wall. When it is desired to remove the work string from the hole, the pressure is reduced in the central passage 20, and the springs 5 return the pistons 2 to their rest position and the anchor can be

removed from the hole. It may be necessary to move the work string up or down in the hole to release the "bite" the serrated face of the pistons 2 have on the casing, and then the spring 5 can return the pistons to their retracted position.

Illustrated in Figure 3 is an alternative embodiment of the present invention. This embodiment is purely mechanical, and does not require hydraulic pressure to set or release the engagement members, in this instance, slips 30, from the casing or wellbore wall. The anchor is connected to a work string, such as coiled tubing, by threads 32 on the uphole side, and connected to downhole tools or other apparatus as desired by threads 34. The central portion of the anchor consists of mandrel 36, which carries a taper 38. The upper portion of the mandrel 36 has a J slot mechanism, which is well known in downhole tools. Surrounding the mandrel 36 is a slip collar 42. Arranged circumferentially around the slip collar 42 are spring loaded drag blocks 44. The spring loaded drag blocks 44 contact the inside of the casing or wellbore and introduce a frictional force to partially arrest relative movement between the anchor assembly and the casing.

When it is desired to set the anchor, it is run into the hole to the desired position. The outward force generated by the spring loaded drag blocks 44 will hold the slip collar 42 stationary relative to the casing, and the coiled tubing is then lifted upward a small amount, usually between 6 to 12 inches. As the mandrel 36 is attached to the coiled tubing by threads 32, it is displaced to the left as shown in Figure 3, and the taper 38 engages the mating taper on the inner surface of the slips 30, thus forcing them radially outward and into contact with the casing wall. The teeth on the face of the slips 30 then "bite" into the casing and prevent any further relative motion of the anchor relative to the casing. When it is desired to release the anchor, the mandrel 36 is displaced downward slightly, and the J slot mechanism allows the mandrel to move to the right in Figure 3, releasing the slips 30 from their engagement with the taper 38 and allowing them to move radially inward. This allows the slips to disengage from the casing wall, and allow the slip collar 42 to be held stationary only by the drag blocks 44. The force exerted by the drag blocks is only sufficient to hold the slip collar 42 stationary for the purposes of actuating the J slot mechanism to set and release the slips, it is not sufficient to prevent the anchor assembly from moving in and out of the hole.

Claims:

1. A fracturing tool anchor adapted for use in a wellbore, the fracturing tool anchor comprising:
 - a housing having an uphole end, a downhole end and a central passage between the uphole end and the downhole end;
 - a plurality of ports spaced circumferentially around the housing and/or spaced longitudinally along the length of the housing between the uphole end and the downhole end; and
 - a plurality of pistons positioned within the plurality of ports and in fluid communication with the central passage, the plurality of pistons, upon application of pressure through the central passage, extending radially outwards through the plurality of ports to engage a wall of the wellbore or casing;wherein each port is counterbored having a large diameter bore facing the wellbore and a small diameter bore adjacent the large diameter bore, and each of the plurality of pistons has a large diameter portion fit to the large diameter bore and a small diameter portion fit to the small diameter bore.
2. The fracturing tool anchor according to claim 1, wherein an outward face of each of the plurality of pistons is serrated to firmly engage the wall of the wellbore or casing.
3. The fracturing tool anchor according to any one of claims 1 to 2, wherein the fracturing tool anchor further comprises a spring retainer for returning the plurality of pistons to a rest position.
4. The fracturing tool anchor according to any one of claims 1 to 3, wherein the uphole end and the downhole end of the housing are configured to attach a work string and other downhole tools, respectively.
5. The fracturing tool anchor according to any one of claims 1 to 3, wherein the uphole end is adapted to connect to a work string and the downhole end is adapted to connect to downhole tools or other apparatuses.

6. The fracturing tool anchor according to any one of claims 1 to 5, wherein an annular shoulder is formed between the port's large and smaller diameter bores, a plurality of recesses being provided in the housing about the annular shoulder.
7. The fracturing tool anchor of claim 3 wherein the spring retainer extends longitudinally from the housing and across each of the plurality of pistons.
8. The fracturing tool anchor of claim 7 wherein an outward facing surface of each of the plurality of pistons is fit with a longitudinal slot aligned with the spring retainer.
9. The fracturing tool anchor of claim 7 wherein a return spring is fit between the spring retainer and each of the plurality of pistons.
10. The fracturing tool anchor of claim 9 wherein the return spring is fit into a pocket in the piston.

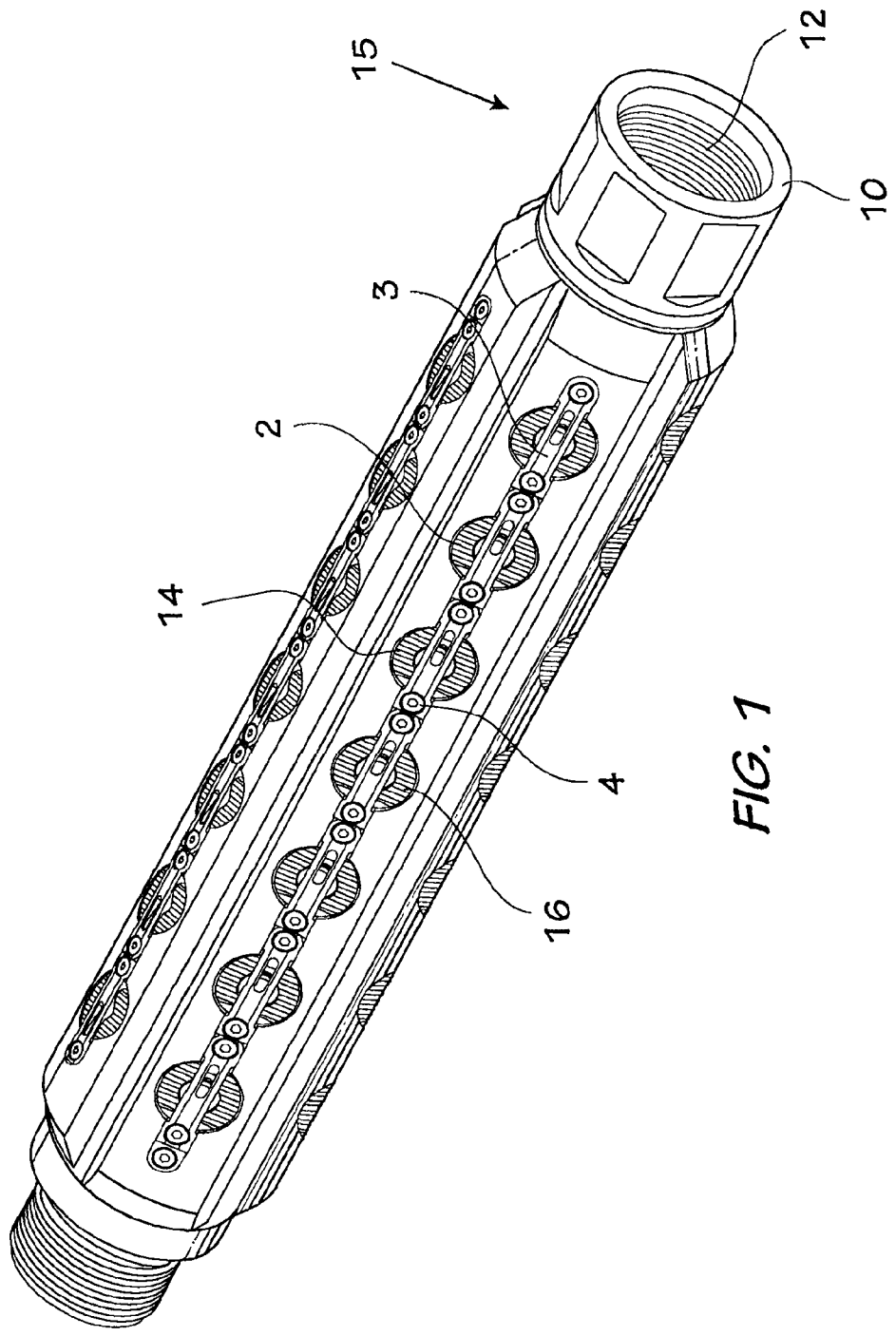


FIG. 1

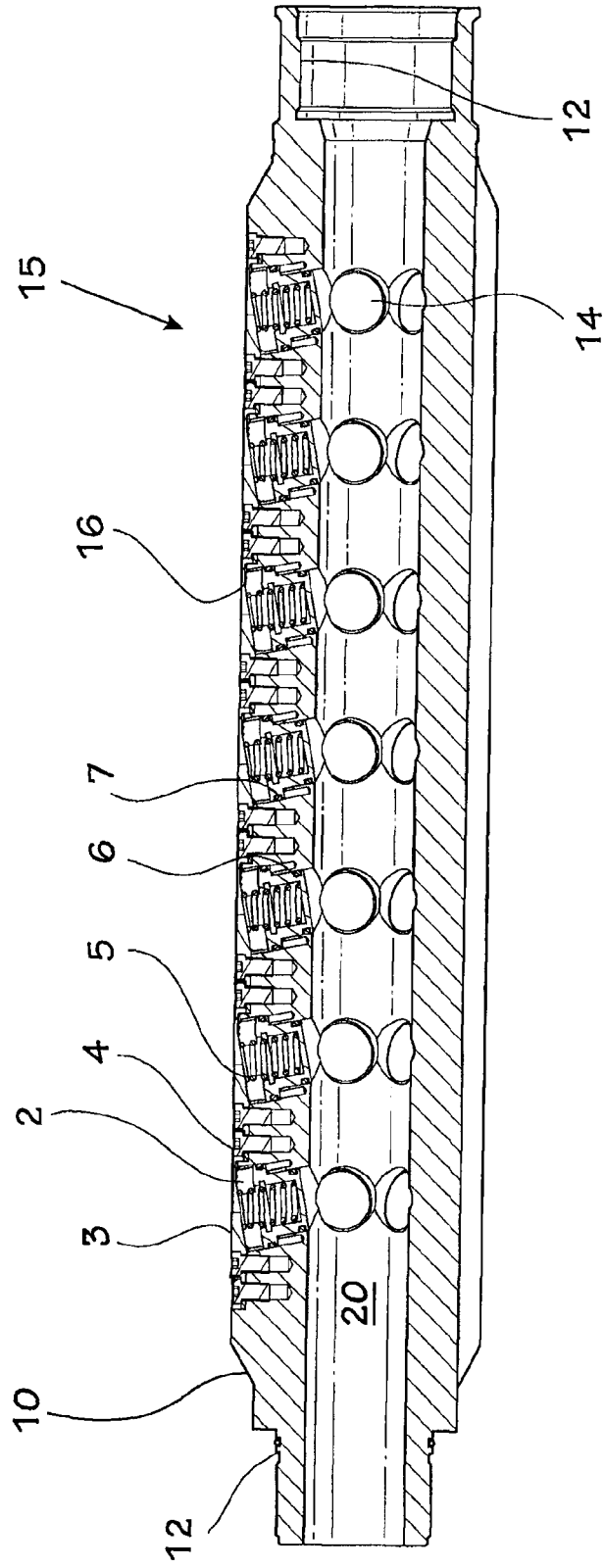


FIG. 2

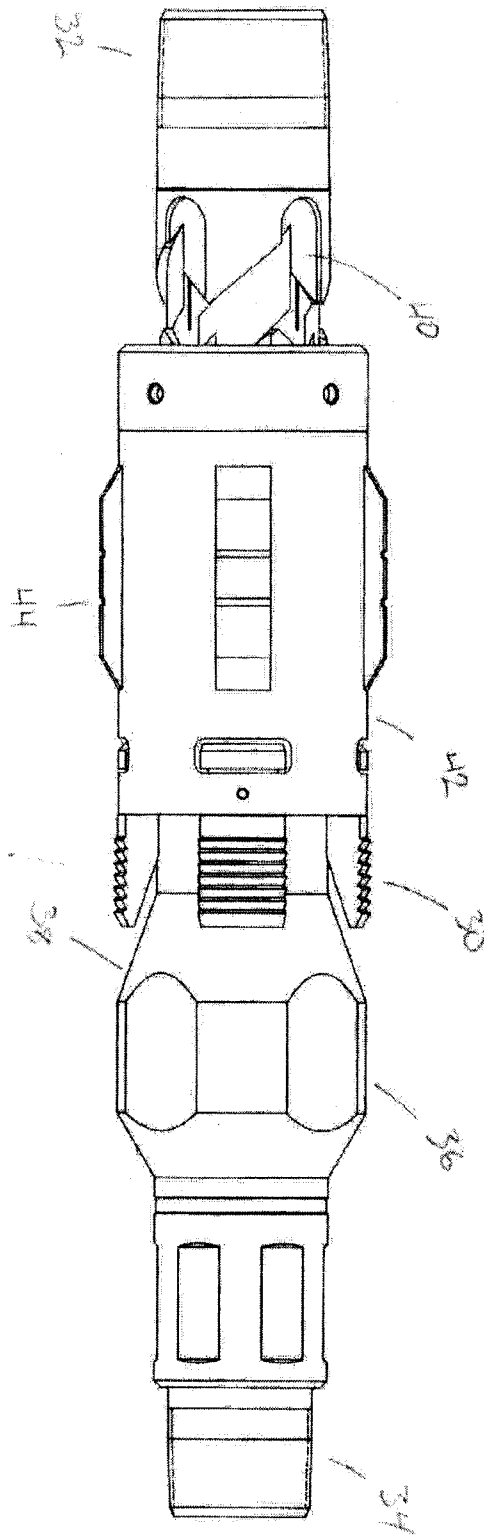


FIG. 3

