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H. CALLAHAN

TUBING ANCHOR

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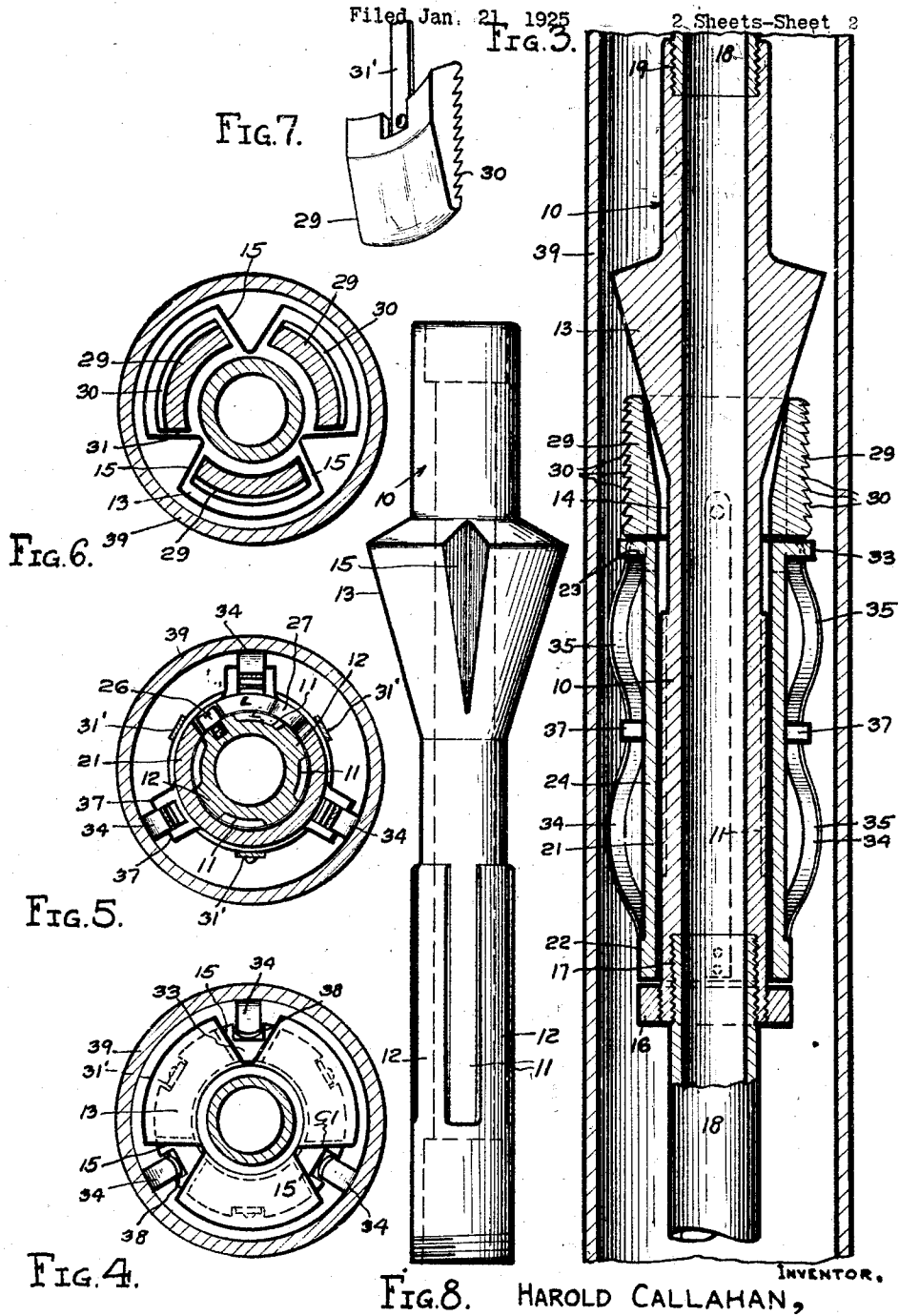


FIG. 8. HAROLD CALLAHAN, ^{INV}

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TUBING ANCHOR.

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To all whom it may concern:

Be it known that I, HAROLD CALLAHAN, a citizen of the United States, residing at Independence, in the county of Montgomery and State of Kansas, have invented certain new and useful Improvements in Tubing Anchors, of which the following is a specification.

My invention relates to improvements in tubing anchors, for use with well tubing.

As is well known, it is the practice in the operation of oil wells, to suspend the tubing at the top of the well, by means of some device attached to the casing head. The tubing is ordinarily not supported at its lower end on the bottom of the well, owing to the uncertainty of the foundation. The weight of the suspended tubing, with the action of the sucker rods, and fluid moving therein, produces a great strain on the tubing, and it frequently happens that the tubing stretches or elongates, or parts at the couplings, due to the stripping of the threads. A great deal of difficulty is encountered by the parting and dropping of the tubing.

It is customary to employ tubing catchers, and the function of these catchers is to catch the tubing when or while it is dropping after parting. The tubing catcher is ordinarily arranged within the casing, near its bottom, so as to catch the whole load in case the tubing drops. A tubing catcher is normally inactive, and does not ordinarily support or suspend the tubing, but only catches and supports it in the event that it parts and drops.

In accordance with my invention, I provide a device which is primarily an anchor or suspension device, which is designed to be connected with the tubing at any selected point throughout its length, and engage with the casing to support or suspend the tubing, prior to the parting of the same, and after the parting of the same, should it occur.

Important objects of the invention are to provide means for minimizing the chances of tubing parting and dropping with the resultant breakage to the tubing and sucker rods, which requires the use of an expensive fishing operation; to anchor or suspend the

tubing at any point within the casing, between the top and bottom; to anchor or suspend the tubing at two or more points within the casing, by the use of one or more anchors; to provide a firm foundation for the tubing by anchoring or suspending the same within the casing; to prevent strains and subsequent parting and dropping of tubing, by anchoring near the bottom of the tubing, thereby supporting the tubing from the bottom instead of suspending the same from the top; to prevent strains and subsequent parting and dropping of the tubing, by anchoring or suspending the same at two or more points within the casing thereby distributing the weight of the tubing to two or more points of anchorage; to provide means for taking up the slack of the tubing, between the points of anchorage or suspension; to provide for a tool neck for the purpose of fishing the device from wells; to provide clearance in the device, for relieving gas pressure and for the passage of fluid, or paraffin or the like; to provide means for raising or lowering the tubing, and anchoring or suspending the same at different points, without removing the tubing from the well; to provide an anchor of the above mentioned character which is inexpensive and easy to operate; to improve the construction of the anchor or suspension device as a whole whereby its efficiency is increased; to provide an improved arrangement of friction springs, which will have the maximum friction engagement within the casing; to connect the slips or jaws with the outer member in a manner to prevent the liability of twisting of the jaws with respect to the outer member.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of an anchor or suspension device embodying my invention, showing the jaws or slips retracted,

Figure 2 is a similar view, showing the jaws or slips expanded,

Figure 3 is a central vertical longitudinal section through the device, showing the jaws retracted,

Figure 4 is a transverse section taken on line 4—4 of Figure 1,

Figure 5 is a similar view taken on line 5—5 of Figure 1,

Figure 6 is a similar view taken on line 6—6 of Figure 1,

Figure 7 is a perspective view of one of the jaws or slips, and,

Figure 8 is a side elevation of the inner tubular member.

In the drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates the inner member or unit which is preferably formed integral. This inner member or unit 10 is tubular and is provided in its lower portion with longitudinal exterior grooves 11, producing ribs 12, which terminate at a point spaced from the conical spreader 13. These ribs produce a circumferentially reduced portion 14. The conical spreader 13 decreases in diameter downwardly and is provided with three passages 15, through which the gases, fluids, or the like, may readily pass, thus providing suitable clearance for the same. At its lower end, the inner body portion 10 is provided with a ring 16, serving as a stop. The lower end of the tubular body portion 10 is internally screw threaded, as indicated at 17, for engagement with the tubing 18 or tube line, and the upper end of the same is also internally screw threaded as indicated at 19, for the reception of the tubing 18. It is thus seen that the tubular body portion 10 is connected in the tubing, and any suitable number of the members 10 may be so connected.

The anchor device embodies an outer tubular member 21, which is slidably mounted upon the inner tubular member 10, between the conical spreader 13 and the stop ring 16. This outer tubular member embodies lower and upper rings 22 and 23, connected by intermediate material 24, formed with openings 25, to render the same light and to permit of the passage of the oil or the like through the same, and through the grooves 11. By this construction, it is not probable that outer tubular member would bind upon the inner tubular member.

The inner member 10 is provided with a radial pin 26, adapted to engage in a notch 27 formed in the horizontal arm of an inverted L-shaped slot 28, which is formed in the outer member. It is thus seen that when the inner member is raised slightly with respect to the outer member that the inner member may then be turned with relation to the outer member until the pin 26 is in alignment with the vertical arm of the L-shaped slot 28, at which time the inner member may

be lowered, with relation to the outer member.

The numeral 29 designates three grips or jaws, the outer faces of which are serrated, as shown at 30. These grips or jaws correspond in number and arrangement with the segmental portions of the spreader 13, and the grips or jaws 29 are spaced, to afford passages 31. It might be stated at this point that when the inner tubular member 10 is turned with respect to the outer tubular member, to either extreme position, the passages 31 are in alignment with the passages 15, thus providing for the proper clearance of gases and fluids. The inner faces of the jaws or grips 29 are inclined, for co-action with the inclined faces of the spreader 13. The jaws or grips 29 are attached to the upper ends of leaf springs 31', which are attached at their lower ends to the ring 22. The leaf springs 31' are normally held within notches 32, formed in a flange 33, of the upper ring 23.

The numeral 34 designates friction springs, which are attached to the ring 22 by rivets or the like. I prefer to employ three of these friction springs, equidistantly spaced between the leaf springs 31. Each friction spring is bent to provide a pair of outwardly curved or bulging portions 35, adapted to contact with the inner side of the casing. Each friction spring, between the outwardly bulging curved portions 35 is provided with an intermediate straight portion 36, which is slidably held within a notch, formed in a lug 37, cast integral with the outer tubular member 24. The upper or free end of each friction spring is slidably mounted within a notch 38, formed in the flange 33. These lugs and notches serve to prevent the twisting of the friction springs, and permit of their relative longitudinal movement, toward their free ends, when they are compressed.

In operation, the tubing 18 with any suitable number of anchor devices connected therein, the jaws 29 being in the inner or retracted position, is lowered into the casing 39, to the desired elevation. The friction springs 34 engage with the casing 39, and hence retard the downward movement of the anchor device, which is moved downwardly by the pin 26, which may engage within the notch 27. When it is desired to expand the anchor device for anchoring the tubing to the casing, the tubing is first raised slightly with respect to the outer tubular member 21, whereby the pin 26 is withdrawn from the notch 27. The tubing 18 and tubular member 10 is now turned with respect to the outer tubular member 21, to bring the pin 26 at the upper end of the vertical arm of the L-shaped slot, at which time the tubing and tubular member 10 may be lowered, with respect to the outer tubular member 21.

The tapered spreader 13 now engages the jaws 29, forcing them outwardly into clamping engagement with the casing. The weight or down pull of the tubing further clamps the jaws 29 to the casing, whereby the tubing will be suspended or supported from the casing, at the anchor device.

The device thus functions as an anchor, when lowering the tubing into the casing. The device may also function as a tubing catcher, when raising the tubing from the casing, if the pin 26 is retained in alinement with the vertical arm of the L-shaped slot, and for this purpose I provide a notch 26', at the top of said vertical arm, which notch may receive the pin, when the tubing is being raised.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a device of the character described, an inner member provided with a tapered spreader, an outer tubular member slidable upon the inner member, a stop carried by the inner member and adapted to limit the downward movement of the outer tubular member, a plurality of leaf springs secured to the outer tubular member and extending longitudinally thereof, a corresponding number of jaws carried by the leaf springs and arranged to engage with the spreader, a plurality of friction springs having corresponding ends attached to the outer tubular member, and opposite ends free, each friction spring extending longitudinally of the outer tubular member and having a pair of outwardly bulging curved portions to engage with the inner face of the casing, and an intermediate depressed portion, and guide means engaging the intermediate portion and free end of each friction spring to hold the same against lateral displacement and to permit of a relative longitudinal movement of portions of the spring toward its free end.

2. In a device of the character described, an inner member provided with a tapered spreader, an outer tubular member slidable upon the inner member, a stop carried by the inner member to limit the upward movement of the outer tubular member, a plurality of leaf springs secured to the outer tubular member and extending longitudinally thereof, a corresponding number of jaws carried by the leaf springs and adapted to engage with the spreader, a plurality of friction springs having corresponding ends attached to the outer tubular member, and

having opposite ends 3, each friction spring extending longitudinally of the outer tubular member and having a pair of outwardly bulging curved portions and an intermediate relatively straight portion, guide means carried by the outer tubular member slidably receiving said intermediate portions, and guide means carried by the outer tubular member for slidably receiving the free ends of the friction springs.

3. In a device of the character described, an inner member provided with a tapered spreader having longitudinal passages formed therein, an outer tubular member slidable upon the inner member, means to limit the downward movement of the outer tubular member with relation to the inner member, guide means formed upon one end of the outer tubular member and having notches, leaf springs secured to the opposite end of the outer tubular member and having corresponding ends free and adapted to enter the notches when the leaf springs are retracted, jaws carried by the free ends of the leaf springs and adapted to engage with the tapered spreader, said jaws being spaced laterally for affording passage ways adapted to register with the passages in the tapered spreader, means to limit the relative movement of the outer tubular member with relation to the inner member for maintaining said passage ways and passages in registration, friction leaf springs attached at one end to the outer tubular member, and having opposite ends free, each friction leaf spring having outwardly bulging portions and an intermediate depressed portion, and guide means carried by the outer tubular member and having notches to receive the intermediate depressions, the free ends of the friction leaf springs being held within certain notches of the first named guide means.

4. In a device of the character described, an inner member having a plurality of longitudinally extending grooves, providing a plurality of longitudinal ribs, a tapered spreader carried by the inner member and spaced from the ends of the ribs, the portion of the inner member between the ribs and the spreader being circumferentially reduced, an outer tubular member slidable upon the longitudinal ribs and having an inverted L-shaped slot formed therein, said outer tubular member being provided near one end with notches, leaf springs attached at one end to the outer tubular member and having their opposite ends free and extending into certain of the notches, jaws carried by the free ends of the leaf springs and adapted to engage the tapered spreader, friction leaf springs attached at one end to the outer tubular member, and having their opposite ends free, each friction leaf spring having outwardly bulging portions and

an intermediate depressed portion, guide means carried by the outer tubular member and having notches to receive the intermediate depressed portions, the free ends of the friction leaf springs being held within certain of the first named notches.

5. In a device of the character described, an inner member having a tapered spreader provided with equi-distantly spaced longitudinal passages, said member also having a radial pin, an outer tubular member mounted to slide upon the inner member and having an inverted L-shaped slot to receive the pin, the horizontal arm of the L-shaped slot having a notch in its lower wall at the free end thereof and a notch in its upper wall at the top of the vertical arm of the L-shaped slot, a plurality of jaws corresponding in number to the passages in the spreader and arranged to engage with the spreader, means for connecting the jaws with the outer tubular member, the horizontal arm of the L-shaped slot being of substantially the same length as the distance between the adjacent passages in the spreader, whereby such passages will register with the passage ways between the jaws when the inner member is turned to the extreme position in either direction with relation to the outer member, and friction springs carried by the outer tubular member.

6. In a device of the character described, an inner member provided with a tapered

spreader, an outer member movable longitudinally upon the inner member, jaws carried by the outer member and arranged to engage with the spreader, and one or more friction springs carried by the outer member, each friction spring having one end attached to the outer member and its opposite end free, each spring having a plurality of outwardly bulging portions and a depressed intermediate portion, said intermediate portion and free end having slidable engagement with the outer member.

7. In a device of the character described, an inner member having a tapered spreader provided with spaced passages, said member also having a pin, an outer member slidable upon the inner member and having a substantially L-shaped slot to receive the pin, the substantially horizontal arm of the substantially L-shaped slot being of substantially the same length as the distance between the passages in the spreader, a plurality of jaws to engage with the spreader and being spaced to afford passages therebetween, means for connecting the jaws with the outer member, the passages between the jaws being adapted to approximately register with the passages in the spreader when the inner member is turned to the extreme position in either direction with relation to the outer member, and friction means carried by the outer member.

In testimony whereof I affix my signature.
HAROLD CALLAHAN.