

Sept. 4, 1934.

J. D. NIXON

1,972,408

TUBING DRAIN

Filed Sept. 21, 1931

2 Sheets-Sheet 1

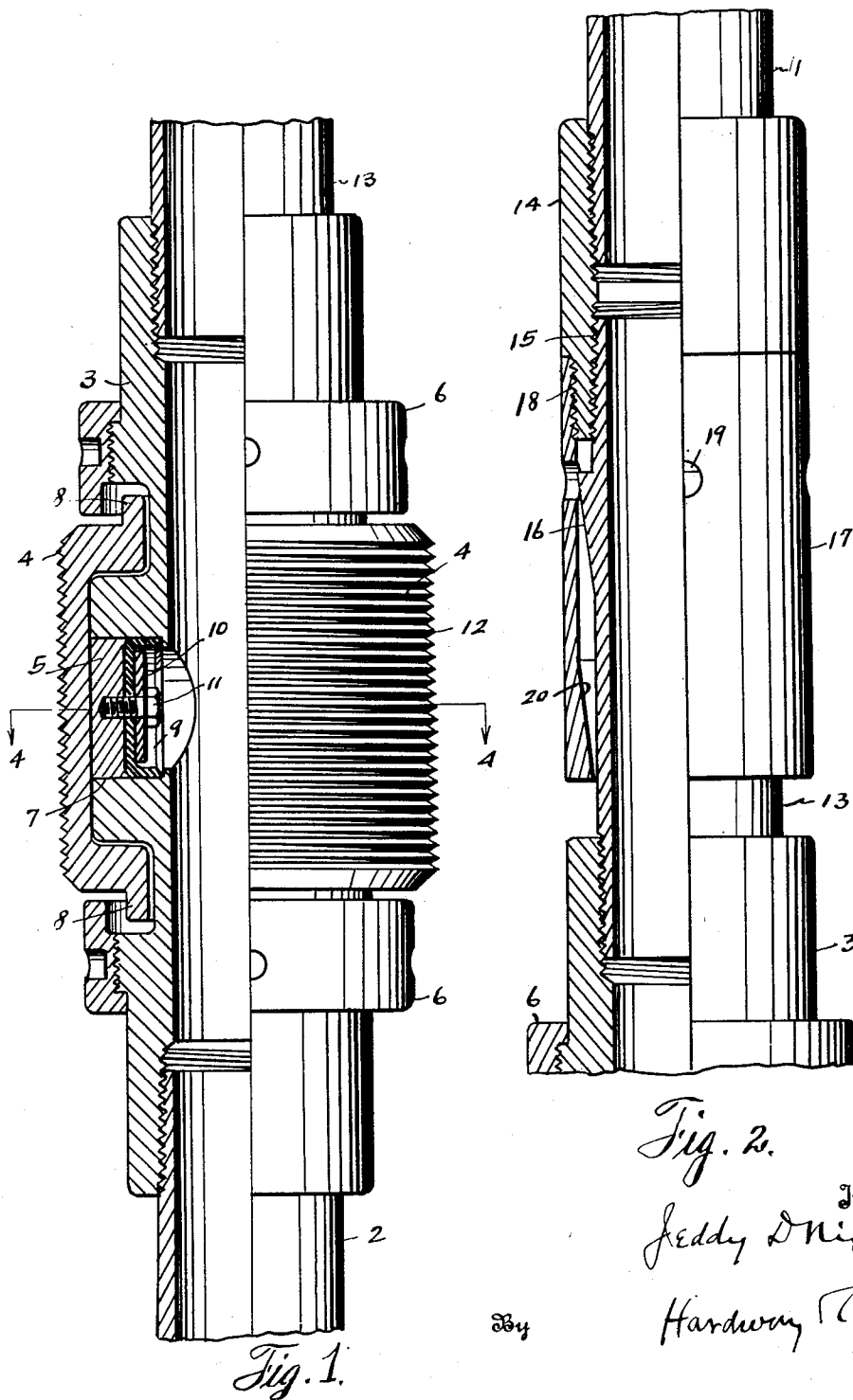


Fig. 2.

Inventor
Jeddy D. Nixon.

Hardway Tathen

Attorneys

By

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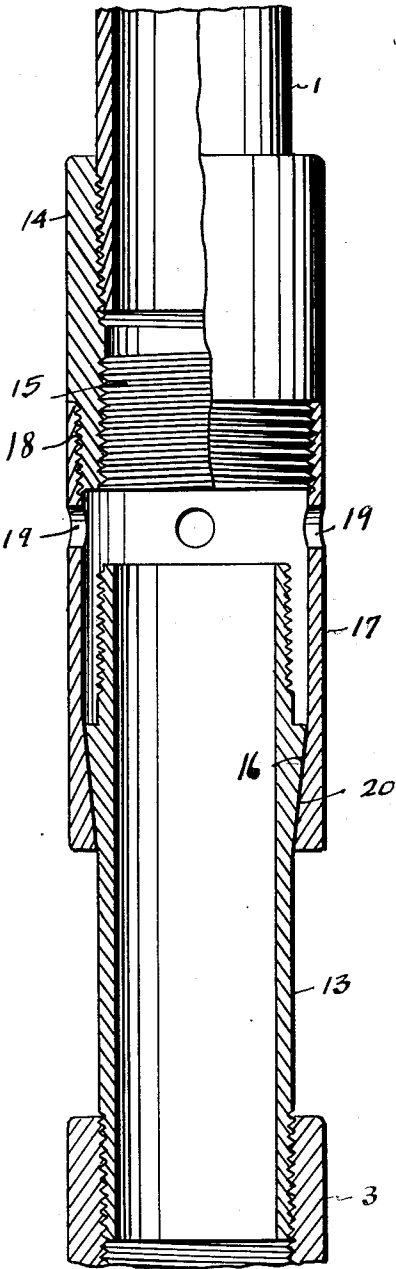


Fig. 3.

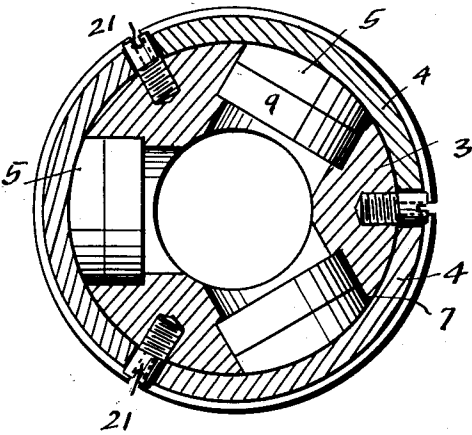


Fig. 4.

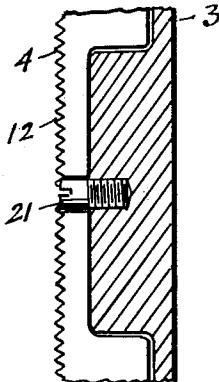


Fig. 5.

Jeddy D. Nixon
Inventor

By

Hardway, Kather
Attorneys

UNITED STATES PATENT OFFICE

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TUBING DRAIN

Jeddy D. Nixon, Houston, Tex.

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3 Claims. (Cl. 103—221)

This invention relates to a tubing anchor.

An object of the invention is to provide means for anchoring a tubing, particularly a pump tubing, in a well, whereby the tubing may be anchored to the well casing or walls of the well through means which are operative by the pressure of the column of fluid in the tubing above.

Another object of the invention is to provide an anchoring device for anchoring a pump in a well to the end that the string of tubing will maintain a substantially uniform length during the operation of the pump. Unless the tubing is so anchored, the variation in the load to which the tubing is subjected during the operation of the pump, causes a variation in the length of the tubing, thus decreasing the capacity of the pump and causing an unnecessary wear on the pump tubing as well as the well casing.

Another object of the invention is to provide means for limiting the outward movement of the respective gripping jaws of the anchor.

Another object of the invention is to provide in a tubing anchor a novel type of drain whereby the fluid column in the tubing above may be drained from said tubing in order to permit the release of the gripping jaws so that the anchor will release the casing or walls of the well to the end that the pump may be withdrawn therefrom.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a fragmentary side elevation of the pump and anchor, shown partly in section.

Figure 2 shows a side elevation partly in section of the apparatus for draining the tubing, shown in closed position.

Figure 3 shows a side elevation thereof, shown partly in section, shown in open position.

Figure 4 shows a cross sectional view taken on the line 4—4 of Figure 1, and

Figure 5 shows a fragmentary, vertical, sectional view of the anchor.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the pump tubing which includes also the pump working barrel 2. It is contemplated that the working barrel will have the usual standing valve at the lower end thereof and traveling valve reciprocable therein, and of the usual and well known construction, and

which for that reason, have not been shown herein.

Means are provided for anchoring the tubing or casing in the well bore. The anchoring means referred to is of such construction that the weight or pressure of the column of tubing in the tubing above will effect the engagement of the said anchoring means with the casing or bore walls.

As illustrated the anchoring means referred to comprises a tubular insert 3, incorporated into and forming a part of the tubing 1; the expandible gripping jaws 4 thereon; the outwardly movable plungers 5 mounted in said insert and the retaining collars 6 mounted on said insert, provided to hold the jaws in assembled relation and to limit their outward movement.

The tubular insert 3 as shown, has its central portion outwardly thickened and provided with the radial cylinders 7 in which the plungers 5 are mounted. The jaws 4 are shaped to conform to the contour of and to fit closely against the external surface of the insert 3 and at their ends the said jaws are reduced, forming the end extensions 8, 8 and the adjacent ends of the collars 6 are shaped to surround, and are spaced from said extensions to permit a limited radial movement of the jaws 4. The plungers 5 bear against the inner sides of the jaws 4 and the inner ends of said plungers carry the inwardly opening cup rings 9 which are clamped in place by the clamp plates 10 and the set bolts 11. The inner ends of the plungers as thus constructed are exposed to the pressure of the fluid in the tubing.

During the operation of the pump in the well, the tubing above the standing valve will be constantly filled with the fluid being pumped. Usually the pump will be located in the well several thousand feet beneath the ground surface and the column of fluid above will exert great pressure against the plungers 5 and will force them outwardly, forcing the jaws into secure engagement with the casing or other surrounding walls of the well and will thus hold the pump tubing securely anchored so that the length thereof will not vary during the operation of the pump as above explained. The outward movement of each jaw is limited by the surrounding collars 6 to the end that the jaws 4 will move out equally thus holding the pump tubing centered in the bore and preventing the plungers from moving entirely out of their respective cylinders.

Preferably the external surfaces of the jaws 4 are toothed so as to more securely engage the

casing. These teeth are preferably formed by providing left hand threads 12 on said jaws.

Provision has been made for draining the fluid from the tubing above when it is desired to pull the pump from the well. The construction provided for this purpose will now be described:—Incorporated into the tubing 1 there is a tubular nipple 13, which is attached to the upper end of the insert 3 and whose upper end is screwed into the lower end of the collar 14 by means of left hand threads 15 and beneath said thread said nipple has the external upwardly flared seat 16. There is a sleeve 17 whose upper end is threaded onto the lower end of the coupling 14 by means of the left hand threads 18 and beneath said threads said sleeve has the drain ports 19. The lower end of the sleeve 17 has the internal downwardly converging seat 20.

In operation the upper end of the nipple 13 is connected into the coupling 14 and the sleeve 17 is connected onto the lower end of said coupling and is in its lower position with its seat 20 spaced beneath the seat 16 as shown in Figure 2. In this position the drain ports 19 will be closed.

In releasing the anchor from the well casing the traveling valve may be pulled from the pump and it may be found practical to withdraw the standing valve and thus permit the tubing to drain. If for any reason this can not be done, the tubing 1 may be turned to the right, thus breaking and unscrewing threads 15 and the tubing may then be pulled upwardly to the position shown in Figure 3 to uncover the ports 19 to permit the fluid to drain from the tubing and to thus release the pressure against the plungers 5 to permit the release of the jaws 4 from the well casing.

It may happen that sand will collect about the anchor above the jaws 4, which will interfere with the release of said jaws, and the removal of the anchor from the well. In such case when the ports 19 have been opened as above explained fluid may be pumped down through the ports 19 and circulated about the anchor so as to wash out the sand which may have become packed about the anchor as above explained. Ordinarily the tubing may then be readily pulled. If for any reason, the jaws 4 fail to release the casing the tubing 1 may be placed under tension so as to cause the seat 20 to tightly grip the seat 16 and hold the sleeve 17 against turning and while under tension, the tubing 1 may be turned to the right so as to break and unscrew the threads 18 and the tubing 1 may then be withdrawn from the well.

While the nipple 13 is being subjected to a torsional strain as hereinabove explained said nipple and the insert 3 are held against turning by means of the set bolts 21 which are threaded into the insert 3 and whose outer ends project out between the jaws 4.

When the tubing 1 has been removed, a suitable fishing tool of any selected type may be lowered into the well attached to the lower end of a suitable operating string and the anchor en-

gaged by said fishing tool and forceably released and removed, with the working barrel of the pump attached thereto, from the well. This is necessary for the reason that the pump tubing 1 is usually not of sufficient strength to pull the anchor in cases where the later refuses to release the casing and for that reason the fishing tool must be attached to an operating string of sufficient strength to accomplish the intended work.

The drawings and description disclose what is now considered to be a preferred form of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What I claim is:—

1. A tubing having adjacent sections threaded together, one of said sections having a tapering external seat, a sleeve having a threaded connection with the other section and having a tapering internal seat and a drain port above said seat, said seats being arranged to interengage, upon the disconnection of said sections, to prevent their complete separation and said seats being of such taper as to forming means for holding said sleeve against rotation relative to one section to permit the disconnection of the other section from said sleeve upon an appropriate rotation of said other section.

2. A tubing having adjacent sections connected by left hand threads, one of said sections having a tapering external seat, a sleeve having a left hand threaded connection with the other section and having a tapering internal seat and a drain outlet, said seats being arranged to interengage upon the disconnection of said sections to prevent the complete separation of said sections, the said seat also forming means for holding said sleeve against rotation relative to one section to permit the unscrewing of the other section from said sleeve upon an appropriate rotation of said other section.

3. In a tubing, a tubular nipple, means for anchoring the nipple in a well, a coupling screwed on to the upper end of said nipple, an upwardly flared seat on the nipple beneath said coupling, a sleeve whose upper end is threaded onto the lower end of the coupling and surrounding said nipple and having a drain port, the lower end of said sleeve having an internal downwardly converging seat normally spaced beneath but shaped to closely engage the seat on said nipple the threads connecting said coupling to said nipple and the threads connecting said sleeve to said coupling being correspondingly pitched whereby upon an appropriate turning of the tubing the coupling may be unscrewed from said nipple, to permit the elevation of said tubing and sleeve relative to the nipple whereby said port is uncovered to permit fluid to drain from the tubing, said seat being effective upon such elevation to frictionally engage and to hold the sleeve against turning relative to the nipple, whereby a continued rotation of the tubing in the same direction will cause said coupling to unscrew from said sleeve.

JEDDY D. NIXON.