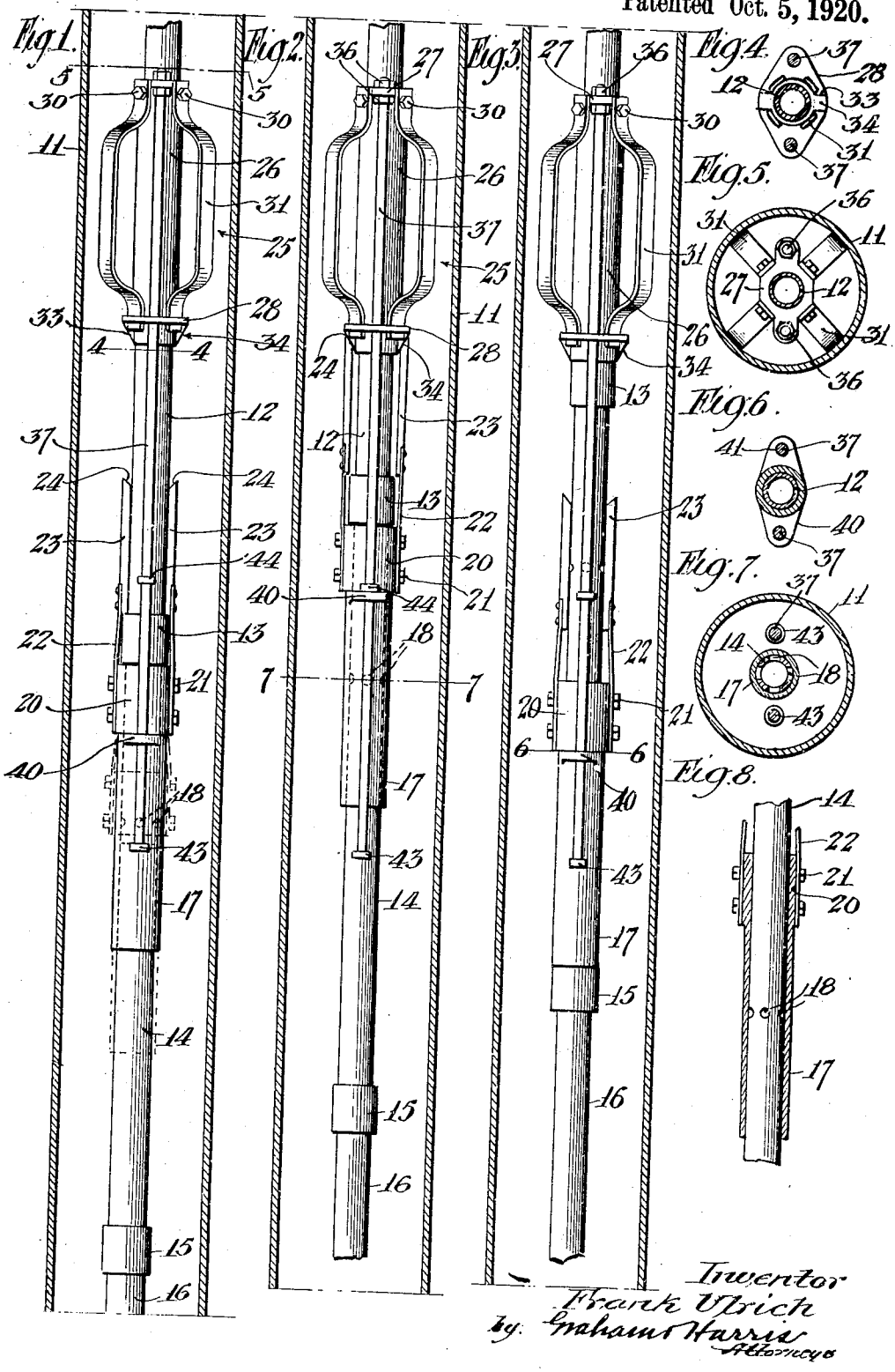
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TUBING DRAINER.

APPLICATION FILED FEB. 21, 1920.

1,354,862.

Patented Oct. 5, 1920.



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UNITED STATES PATENT OFFICE.

FRANK ULRICH, OF HUNTINGTON BEACH, CALIFORNIA.

TUBING-DRAINER.

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Application filed February 21, 1920. Serial No. 360,448.

To all whom it may concern:

Be it known that I, FRANK ULRICH, a citizen of the United States, residing at Huntington Beach, in the county of Orange and State of California, have invented a new and useful Tubing-Drainer, of which the following is a specification.

My invention relates to the art of pumping oil wells. In this art as commonly practised the interior of the well is lined with a casing which is left permanently in place for the purpose of preventing the sides of the well caving in. Inside the casing is placed what is known as the tubing which consists of a pipe of smaller diameter, formed of a number of sections, which sections are joined by suitable collars. Upon the lower end of the tubing is placed the pump, the pump being connected through a string of pump rods which extend upwardly from the pump through the tubing to suitable mechanism at the surface of the ground. The tubing is left in place in the well as long as the well is pumping properly. It is often necessary, however, to "pull" the tubing for the purpose of repairing the pump, or in case the pump rods break. It is also necessary to pull the tubing when the pump sands up, which is caused by the entry of fine silt or sand into the pump barrel in sufficient quantity to entirely shut off or seriously interfere with the operation of the pump. In cases where the pump entirely sands up or in cases in which the rod breaks, the lower end of the tubing is closed, and as the tubing is withdrawn from the well, all of the oil in the tubing, being confined by the closed lower end of the tubing, is withdrawn with the tubing. As each joint of tubing is disconnected in the derrick above the surface of the ground, the oil carried therein gushes out of the bottom of the joint of pipe as soon as the connection with the next lower joint is broken, thus flooding the derrick and thus seriously interfering with the work of handling the pipe. The oil men appropriately refer to such a condition as "a wet job."

The principal object of my invention is to provide a simple form of device to be placed upon the tubing by means of which the lower end of the tubing will automatically open whenever the tubing is pulled, whereby the tubing will automatically drain itself of the oil carried therein so that when the tubing is disconnected in the derrick there will be no discharge of oil from the tubing at that point.

Other objects and advantages will be evident hereinafter from the following specification.

Referring to the drawings which are for illustrative purposes only,

Figure 1 is a vertical sectional view through the lower portion of an oil well, showing a device embodying my invention upon the tubing, the casing being shown in section and the device in closed position.

Fig. 2 is a view similar to Fig. 1 showing the parts of the device about to be released to open the tubing.

Fig. 3 is a view similar to Fig. 1 showing the parts of the device in open position.

Fig. 4 is an inverted sectional plan view on line 4—4, Fig. 1.

Fig. 5 is a sectional plan view on line 5—5, Fig. 1.

Fig. 6 is a sectional plan view on line 6—6, Fig. 3.

Fig. 7 is a sectional plan view on line 7—7, Fig. 2, and

Fig. 8 is a vertical sectional view of the valve portion of the device.

In the drawings the casing is indicated at 11, this casing extending from a point at or near the surface of the well to a point at or near the bottom of the well. It is to be understood that the oil enters this casing through perforations or through the bottom of the casing as is the common practice. Hanging inside the casing 11 is a string of tubing 12, the lower end of the tubing being provided with an upper collar 13 into which the valve barrel 14 is threaded. The valve barrel 14 may be connected by means of a lower collar 15 with other joints of tubing 16. The valve barrel 14 is turned or ground so that it is an accurate cylinder, and a slidable valve member 17 is placed thereon, this valve member being bored or turned so that it has an accurate sliding fit on the barrel 14. Perforations 18 are placed in the valve barrel 14 in such a position that when the valve 17 is in closed position the valve shuts off or closes the perforations 18.

Secured to a head 20 formed on the valve member 17, by means of suitable bolts 21, are two spring arms 22. To the upper end of each arm is secured a jaw 23 tapered at its upper end as indicated at 24. Freely slidable on the tubing 12 above the collar 13 is a cage 25 consisting of a sleeve 26 having a

flange 27 at its upper end and a flange 28 near its lower end. Secured to the flange 27 by means of suitable bolts 30 is a plurality of friction blades 31, the intermediate portion of each blade being bent outwardly into engagement with the inner face of the casing 11 and the lower ends of each blade slidably extending through openings formed in the flange 28.

Ribs 33 are formed on the lower end of the sleeve 26 extending from the sleeve to the flange 28, the faces of the ribs being inclined as indicated at 34 for the purpose of spreading the jaws 23 as hereinafter described.

Secured to the flange 27 by means of suitable nuts 36 are rods 37 which extend downwardly through the flange 28 and through ears 40 formed on the valve member 17, such ears 40 being provided with openings 41 to receive the rods 37 and permit the rods to extend freely therethrough. The lower end of each rod 37 terminates in a head 43 and each rod is provided with an enlargement or collar 44 fixed thereto for the purpose hereinafter described.

The method of operation is as follows:

The pump (not shown) being attached to the lower end of the tubing 16, the tubing and various parts carried thereby are lowered into the casing by adding successive joints of tubing 12 to the upper end of the string. During the passage of the tubing downwardly through the casing the parts are in the dotted line position shown in Fig. 1, the cage 25 being frictionally retarded in its downward movement by the engagement of the blades 31 with the casing, but the downward movement of the tubing draws the cage downwardly due to the engagement of the heads 43 on the rods 37 with the lower face of the ears 40 on the valve member 17.

While the tubing is being lowered as just described, the valve member 17 is in closed position, the upper face of the valve member being against the under face of the collar 13 and the lower ends of the jaws 23 engaging over the upper face of the collar 13, the valve 17 being in such position as to cover the perforations or outlet holes 18 in the valve barrel. The tubing, having been lowered until it strikes the bottom of the well, is raised slightly from the bottom and remains in suspended position in the casing, in which position the parts of the device are as shown in full lines in Fig. 1. While in this position the tubing is free to move slightly up and down without interfering or dislocating the valve member on the valve barrel.

When the tubing has sanded or the valve rod broken and it is desired to pull the tubing, the tubing is moved upwardly, the cage 25 at the beginning of such movement remaining stationary in the casing due to the frictional engagement of the blades 31 with the casing. The tubing, however, through the medium of the collar 13 and its engagement under the jaws 23, moves the valve barrel upwardly with the tubing until the upper ends of the jaws engage the cam faces of the ribs 33 which spread apart the jaws into the full line position shown in Fig. 2, and at this point the collars 44 on the rods 37 engage the upper face of the ears 40 and start the valve member downwardly on the valve barrel. The tubing continues its upward movement and the valve member drops down upon the tubing until the lower end of the valve member engages the upper face of the collar 15 as shown in Fig. 3, automatically opening the perforations 18 so that the oil within the tubing is discharged through such perforations into the well thereby emptying the tubing of oil. The continued upward movement of the tubing moves the cage 25 upwardly as the lower end of the sleeve 26 is engaged by the collar 13 and the valve member is carried upwardly on the tubing by the engagement of the valve member with the collar 15.

I claim as my invention:—

1. In an oil well, a casing, a string of tubing, a valve barrel forming part of said tubing, upper and lower collars connecting said barrel in said tubing, said barrel having a discharge opening therein, a cylindrical valve member slidably mounted on the valve barrel, jaws elastically mounted on said barrel member arranged to engage the upper collar on said barrel, a cage slidably mounted on the tubing frictionally engaging said casing, and means on said cage for spreading said jaws to release the valve member.

2. In an oil well, a casing, a string of tubing, a valve barrel forming part of said tubing, upper and lower collars connecting said barrel in said tubing, said barrel having a discharge opening therein, a cylindrical valve member slidably mounted on the valve barrel, jaws elastically mounted on said valve member arranged to engage the upper collar on said barrel, a sleeve slidably mounted on said tubing, elastic blades on said sleeve arranged to frictionally engage said casing, and means on said sleeve arranged to engage the jaws in the valve and disengage said jaws from the upper collar.

3. In an oil well, a casing, a string of tubing, a valve barrel forming part of said tubing, upper and lower collars connecting said barrel in said tubing, said barrel having a discharge opening therein, a cylindrical valve member slidably mounted on the valve barrel, jaws elastically mounted on said valve member arranged to engage the upper collar on said barrel, a cage slidably mounted on the tubing frictionally engaging said cas-

ing, means on said cage for spreading said jaws to release the valve member, and means on said cage for resetting said valve member.

4. In an oil well, a casing, a string of tubing, a valve barrel forming part of said tubing, upper and lower collars connecting said barrel in said tubing, said barrel having a discharge opening therein, a cylindrical valve member slidably mounted on the valve barrel, jaws elastically mounted on said valve member arranged to engage the upper collar on said barrel, a cage slidably mounted on the tubing frictionally engaging said casing, means on said cage for spreading said jaws to release the valve member, rods extending downwardly from said cage, and means on said rods arranged to engage said valve member to move said valve member into closed position.

5. In an oil well, a casing, a string of tubing, a valve barrel forming part of said tubing, upper and lower collars connecting said barrel in said tubing, said barrel having a discharge opening therein, a cylindrical valve member slidably mounted on the valve barrel, releasable means on said valve member arranged to engage the upper collar, and means slidably mounted on said tubing in frictional engagement with said casing arranged to release said releasable means from the collar.

6. In a well, a casing, a string of tubing in said casing, a valve barrel in said tubing forming a section thereof, having a discharge outlet, a valve member on said valve barrel independent of the casing, means for releasably holding said valve member in closed position over the discharge outlet in the barrel, and means frictionally engaging said casing for operating said valve member to open the discharge outlet.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 16th day of February, 1920.

FRANK ULRICH.