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CONTROL HEAD PACKER

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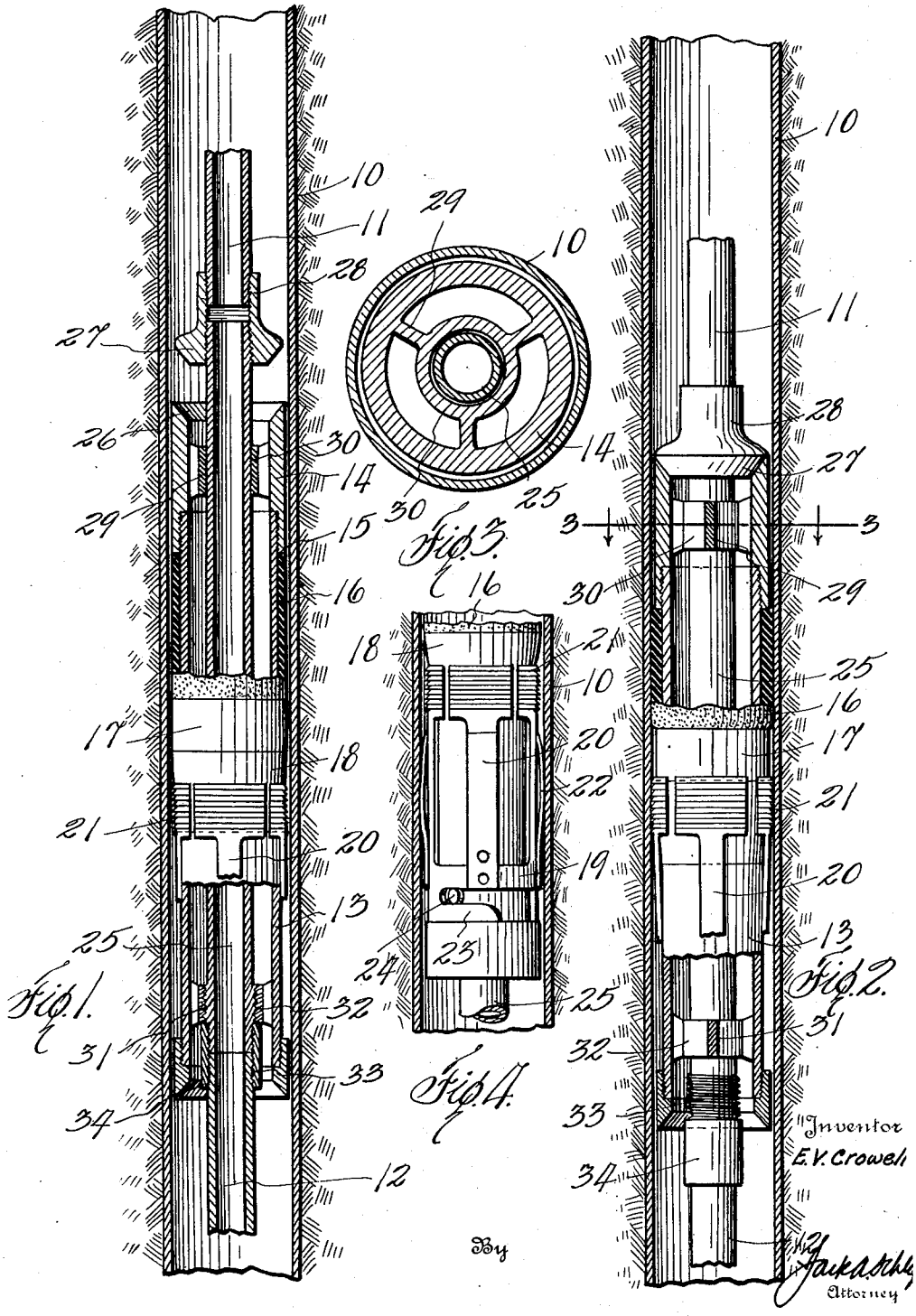


Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

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CONTROL-HEAD PACKER.

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This invention relates to new and useful improvements in control head packers.

The invention has particularly to do with improvements in the type of devices set forth in my former patents No. 1,354,027, issued September 28, 1920, and No. 1,432,674 issued October 17th, 1922.

The object of the invention is to provide a device equipped with a packer element held under restraint or inactive while going into the well; together with a flow controlling valve and means of a particular type for positively holding said valve open while the device is being lowered into the well.

An important object of the invention is to provide a threaded connection acting as a positive medium in holding the valve open and arranged to release the valve when disconnected.

Another object is to provide a packer with a longitudinally movable discharge stem carrying a flow valve and having screw threads for engaging the packer body to fasten the stem against longitudinal displacement whereby the valve is held open.

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:

Fig. 1 is a view, partly in vertical section and partly in elevation of a device constructed in accordance with my invention, the parts being in the position occupied when the device is being lowered into the well,

Fig. 2 is a similar view showing the position occupied by the device when the same is anchored in the well,

Fig. 3 is an enlarged cross-sectional view on the line 3—3 of Fig. 2, and

Fig. 4 is a partial elevation showing the hook wall anchor.

In the drawings the numeral 10 designates the usual well casing and 11 the upper section of the tubing which constitutes a flow pipe or discharge tubing and extends vertically in the well casing. The device is attached to a lower section of tubing 12 which constitutes a swinging anchor or intake for the oil.

The packer consists of an open ended cylindrical body 13. The upper end of the body is screwed into the lower end of a cylindrical head 14 which overhangs the body to form an abutment or shoulder 15 for the upper end of a rubber or equivalent packer sleeve 16 embracing the body. Suitable anchoring or supporting means is arranged on the body below the sleeve and consists of a metal collar 17 having a conical face 18 flaring upwardly. A slip cage 19 surrounds the body 13 below the collar and includes slips 20 having serrated or toothed faces 21 adapted for gripping engagement with the well casing.

The slips are carried by the cage so as to be free to swing outwardly under the action of the conical face 18. Slip springs 22 are mounted upon the slip cage and engage the slips and are adapted to frictionally engage the inner wall of the well casing. A plurality of hooks 23 carried by the cage co-operate with pins 24 carried by the body 13 to maintain the slips out of engagement with the wall of the well casing when the pins are received in the bights of the hooks.

A tubular stem 25 extends axially through the body and head 14. The upper end of the head is faced to form an inclined valve seat 26 and the stem is screwed into the bottom of a valve 27 finished to engage upon the the seat 26. The valve has an upstanding collar 28 screwed onto the lower end of the tubing 11. Of course the tubing and stem could be made integral and the valve fastened therein. Within the head is a spider 29 having a central hub 30 provided with a smooth bore through which the stem slides. These parts form a guide for the stem.

Near the bottom of the body a second spider 31 having a hub 32, is provided. This hub has internal screw threads for receiving the screw threads 33 formed upon the stem. The stem is connected with the tubing 12 by a collar 34. When the threads are screwed into the hub the stem is held against longitudinal displacement and the valve 27 is held elevated above the seat 26, as is shown in Fig. 1. By turning the stem in a counter-clockwise direction, the threads 33 being left hand, said stem is unscrewed and moved downwardly through said hub 32, after which the stem and valve may be raised and lowered at will.

The device is operated as follows:

In Fig. 1 I have shown the valve 27 open

and the device in the position in which it is inserted in the well. It will be seen that the slips 20 are held below the conical face 18 by the hooks 23 and pins 24, while the slip springs 22 ride down the casing wall. As the device is lowered gas may flow up through the body 13 around the stem and escape through the valve seat 24, no resistance thus being offered. The valve is positively held open and resistance offered to the packer will not close the valve.

When the device is in the desired position the tubing 11, stem 25 and head 14 are rotated about 180 degrees in a clockwise direction, thus turning the body 13 on which the pins 24 are carried. This movement releases the pins 24 from the hooks 23, whereby the slip cage is released. The slip springs which frictionally engage the wall of the casing 10, maintain the cage and slips stationary in the casing, so that as the lowering of the packer continues, the conical face 18 expands the slip 20 and forces their toothed faces 21 into binding engagement with the well casing, thus anchoring the whole device as well as the tubing 11 and 12.

As the weight of the body and tubing settle upon the rubber sleeve 16, through the agency of the shoulder 15, said sleeve is expanded and seals the annular space between the packer and the casing, whereby the outlet of oil or gas is restricted to the body 13. When the packer has been set the tubing 11 and stem 25 are rotated in a counter-clockwise direction, whereby the threads 33 are disengaged from the hub 32 and the stem is moved downwardly, thus engaging the valve 27 on the seat 26, as is shown in Fig 2. The stem may now be freely raised and lowered to unseat or seat the valve as might be desired. By suitably handling the tubing the position of the packer and control head in the well may be varied and the compression chamber which is defined thereby may be varied.

Thus, I not only provide a device that may be lowered against a heavy gas pressure, whereby a flowing oil well may be tubed and "packed-in" regardless of the gas pressure, but I provide means for changing the vertical position of the device in the well, at the will of the operator. It is therefore possible to regulate the "flow energy", as represented by the "gas energy", so that the flow of oil from the oil sand, through the tubing, is more steady, and a minimum amount of gas escaping with each barrel of oil produced and the gas energy consequently works at its maximum efficiency in moving oil through the sand toward the well, and subsequently expelling the oil through the tubing from the well.

Various changes in the size and shape of the different parts, as well as modifications and alterations, may be made within the scope of the appended claims.

What I claim, is:

1. In a control head packer, a cylindrical body, a valve seat at the upper end of the body, a packer member mounted on the body, anchoring means also mounted on the body, an interiorly threaded guide at the lower end of the body, a tubular stem passing through the body and guide and having a screw threaded portion below the guide, and a valve rigid on the stem and held in an elevated position above the valve seat when the screw-threaded portion of the stem is raised to engage in said guide.

2. In a control head packer, the combination of a cylindrical body, a cylindrical head mounted on the body, a packer sleeve mounted on the body under the head, an anchor on the body, means on the body for expanding the sleeve, a valve seat on the head, a stem extending through the body and head, a guide in the head supporting the stem, a valve rigid and immovable on the stem for engaging the seat, a spider in the body, a hub in the spider internally screw threaded and through which the stem passes, and screw threads on the stem beneath the hub to permit normal free operation of the valve but engageable with the hub threads to support the valve in open position.

3. In a control head packer, a cylindrical body, a valve seat at the upper end of the body, a packer member mounted on the body, anchoring means also mounted on the body, a threaded guide at the lower end of the body rigid therewith, a tubular stem passing through the body and guide and having a screw threaded portion spaced below the guide to permit free normal operation but engageable with the guide threads to hold the valve in open position, and a valve rigid on the stem.

In testimony whereof I affix my signature.

ERD V. CROWELL.