Jan. 23, 1934. W. T. WELLS 1,944,481

SETTING TOOL FOR SETTING A LINER IN AN OIL WELL OR THE LIKE

Filed Dec. 10, 1932

Fig. 1.

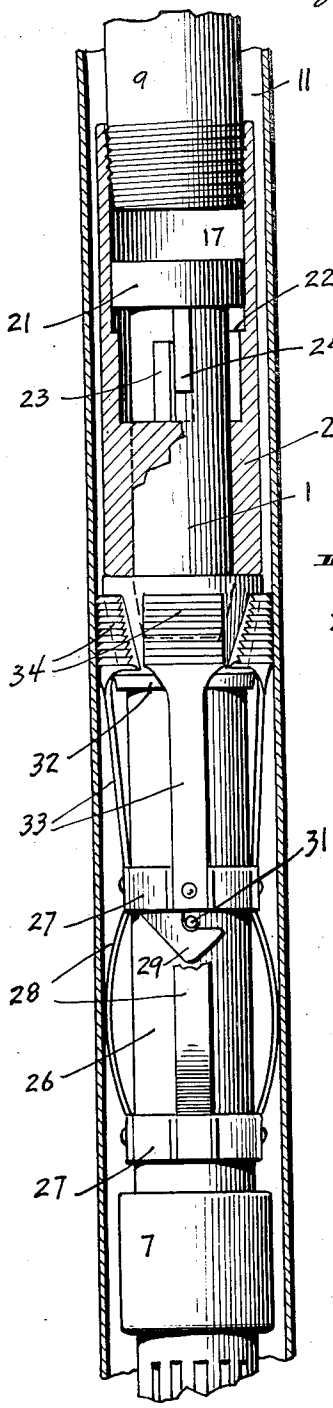


Fig. 2.

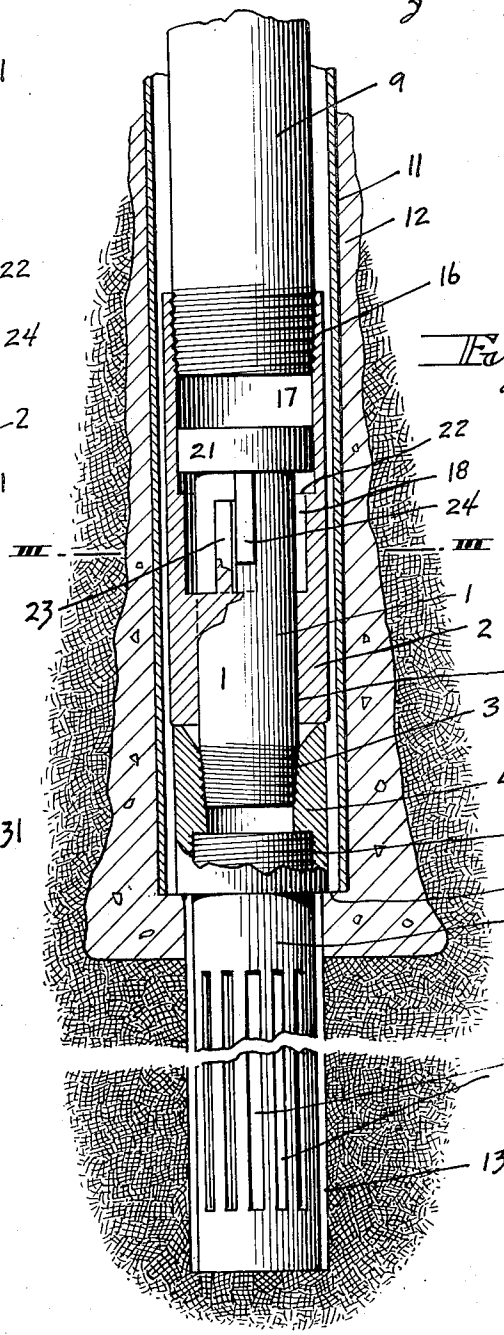
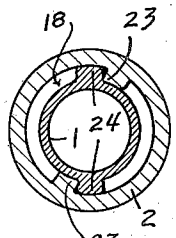


Fig. 3.



INVENTOR

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SETTING TOOL FOR SETTING A LINER IN AN OIL WELL OR THE LIKE

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Application December 10, 1932
Serial No. 646,614

6 Claims. (Cl. 255—35)

The present invention is an improved setting tool for setting a liner or the like in an oil well or in a well casing.

The objects of my invention include; the provision of a tool of simple and rugged structure, which is readily adaptable to conventional equipment, and which will operate unfailingly to lower, suspend and disengage from, packers, liners, and other devices employed in drilling, and producing from, oil wells and the like; the provision of means in a setting tool whereby the connection, which is to be broken when parts are left in the well cavity, can be relieved of the weight of the tubing string before disconnection is made; and the provision of a jar for facilitating the disengagement of the parts.

Fig. 1 is an elevation with parts broken away of an embodiment of my invention applied to a "hook wall" screen in a casing.

Fig. 2 is a similar view of a modification of my invention applied to another type of screen at the bottom of the well.

Fig. 3 is a cross sectional view of the structure of the tool proper taken along the line 3—3 of Fig. 2.

Referring to the drawing, Fig. 2, the numeral 1 indicates a mandrel and 2 a sleeve slidable over same, the two constituting, with their co-acting parts, my invention.

Mandrel 1 is provided at the bottom, Fig. 2, with an external left-hand thread 3 for engagement with a liner-hanger or collar 4 into which is threaded at 6 a liner 7 perforated at 8.

The liner 7 has been lowered on a tubing string 9, through a casing 11 which has been cemented at 12. A rat-hole 13, of reduced diameter, forms a ledge 14 on which rests collar 4.

Sleeve 2 is threaded at 16 to the tubing string 9. The internal bore of sleeve 2 is reduced, successively, in diameter to form a major cavity 17, an intermediate cavity 18, and a smaller cavity 19 through which extends the body portion of the mandrel 1.

The mandrel 1 is provided with an annular flange or head 21 which is slidable in chamber 17 between the lower end of tubing 9 and a shoulder 22 formed by the intermediate bore 18.

When the device is run into the casing 11, weight of the liner 7 causes flange 21 to rest on shoulder 22, but as soon as said liner contacts bottom or when the liner-hanger 4 encounters cement shoulder 14, the lower members halt and weight of the tubing string 9 moves sleeve 2 downwardly until it encounters the collar 4, flange 21 moving upwardly in chamber 17, as indicated in Fig. 2.

This movement provides a space for slight upward movement of the tubing string 9 to relieve the left-hand thread 16 of undue weight.

When the weight has thus been relieved, the tubing string 9 is rotated to the left and said movement is imparted to the mandrel 1 by the abutment of lugs 23 and 24.

Said lugs are formed of a bar of metal, rectangular in cross section, and two are welded at diametrically opposite points to the periphery of mandrel 1, and two are similarly welded at opposite points to the inner wall of sleeve 2, as shown in cross section in Fig. 3.

It will be seen that, when so welded, the lugs 23 and 24 rotate within cavity 18 when sleeve 2 and mandrel 1 are rotated, and that, if either of said members be rotated one half turn, said lugs will come into abutment and impart motion to the other of said members.

The spaced relation of said lugs makes it possible to jar the joint 3 to facilitate its disengagement from the liner-hanger 4.

In Fig. 1 I show the same structure as applied to a casing wherein no support is provided for the liner-hanger, which, in this case, is to be set and suspended off bottom.

In this case a length of tubing 26 is interposed between the liner 7 and the setting tool. A cage slidable on said tubing is composed of collars 27 and how bow springs 28. A hook integral with said cage engages a stud 31 extending outwardly from said tubing 26.

Springs 28 frictionally engage the inner wall of casing 11. Tubing string 9 is rotated to disengage hook 29 from stud 31, whereupon lower movement of the tubing string depresses a conical head 32, spreading slips 33 into engagement with the casing wall in a well known manner.

Slips 33 are secured at the bottom to collar 27 and their free ends are serrated at 34 on their annular faces to grip the casing wall.

When the anchoring means has been set as described, the disconnection of the left-hand thread on mandrel 1, from the conical head 32, is effected as before by rotation, to the left, of the tubing string 9.

It will be seen that I have provided a means for connection and disconnection of tubing sections, joined by threads, means whereby a joint to be broken can be relieved of weight of a string above, and means for imparting a jar, up or down, by reciprocation of the tubing string, as

well as rotatively, by turning the tubing to the right or left.

Due to the fact that both mandrel 1 and sleeve 2 are tubular, circulation of fluid therethrough is possible at all times to facilitate setting of a liner by playing a jet of fluid ahead of the liner, as it is lowered, to remove accumulated sand or other obstructions.

I claim:—

1. A device of the character disclosed comprising a sleeve provided at one end with means for connection with a tubing string and having its central longitudinal bore successively reduced in diameter toward its other end, a mandrel, slidable within said sleeve, having an annular flange thereon coinciding substantially in diameter with the major bore of said sleeve, forming a means limiting the degree of relative longitudinal movement of the sleeve and tube, and a thread on said mandrel for engagement with a liner to be set.

2. A device of the character disclosed comprising a sleeve provided at one end with means for connection with a tubing string and having its central longitudinal bore successively reduced in diameter toward its other end, a mandrel, slidable within said sleeve, having an annular flange thereon coinciding substantially in diameter with the major bore of said sleeve, forming a means limiting the degree of relative longitudinal movement of the sleeve and tube, a left-hand thread on said mandrel for engagement with a liner to be set, and interengaging means on said sleeve and said mandrel for imparting rotary movement from one of said members to the other.

3. A device of the character disclosed comprising a sleeve provided at one end with means for connection with a tubing string and having its central longitudinal bore successively reduced in diameter toward its other end, a mandrel, slidable within said sleeve, having an annular flange thereon coinciding substantially in diameter with the major bore of said sleeve, forming a means limiting the degree of relative longitudinal movement of the sleeve and tube, a left hand thread on said mandrel for engagement with a liner to be set, interengaging means on said sleeve and said mandrel for imparting rotary movement from one of said members to the other, and means for providing a degree of lost motion between said interengaging means whereby, when said sleeve is rotated rapidly a jar will be imparted to said tube for disengaging said left-hand thread from a member with which it is engaged.

4. The combination with a liner and a hanger therefor, of a setting tool comprising a mandrel provided with a left-hand thread for connection with said hanger, a sleeve, slidable longitudinally with respect to said mandrel, and provided with means for connection with a tubing string, means providing a limited degree of longitudinal movement of said sleeve, with respect to said mandrel, when said hanger, mandrel, sleeve and tubing string are connected, and means for imparting rotary movement of said sleeve to said mandrel.

5. The combination with a liner and a hanger therefor, of a setting tool comprising a mandrel provided with a left-hand thread for connection with said hanger, a sleeve, slidable longitudinally with respect to said mandrel, and provided with means for connection with a tubing string, means providing a limited degree of longitudinal movement of said sleeve, with respect to said mandrel, when said hanger, mandrel, sleeve and tubing string are connected, means for imparting rotary movement of said sleeve to said mandrel, and jar means, responsive to rotation of said sleeve for disengaging said left-hand thread.

6. In combination, a well casing, a liner, means for anchoring said liner to the wall of said casing, and a setting tool comprising a mandrel left-hand threaded for connection to said liner, a sleeve, slidable over said mandrel, provided with means for connection to a tubing string and adapted, when so connected, to support said mandrel and said liner, means providing a limited degree of longitudinal movement of said sleeve, with respect to said mandrel, when said anchoring means is set, and means for imparting rotative movement to said mandrel when said sleeve is rotated.

WALTER T. WELLS.