

May 9, 1933.

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1,907,862

PIPE ADJUSTING APPARATUS

Original Filed March 29, 1929

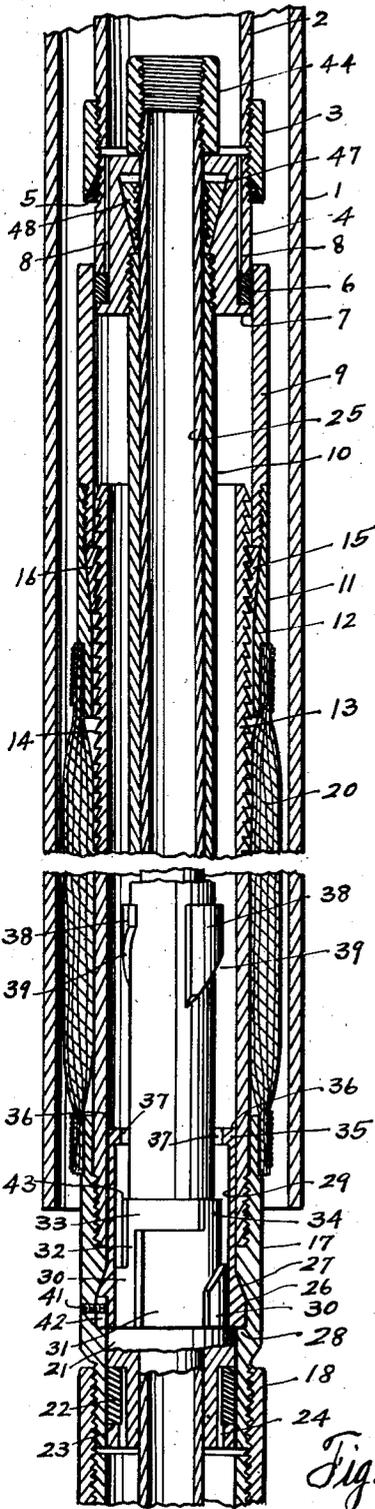


Fig. 1.

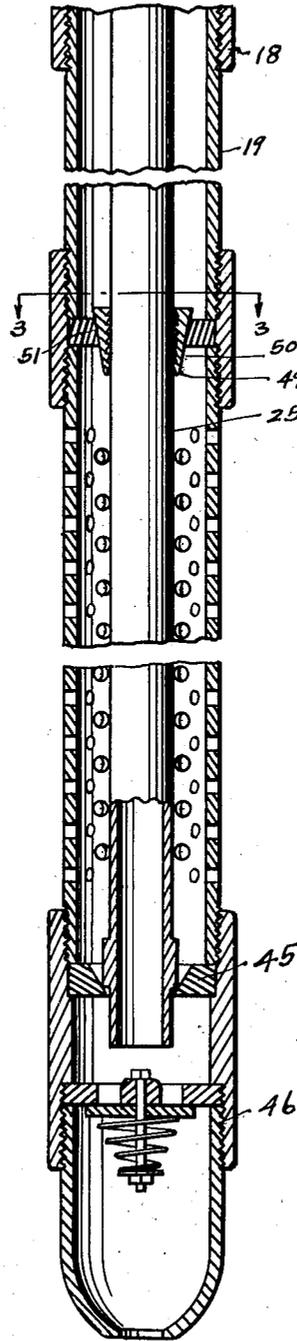


Fig. 2.

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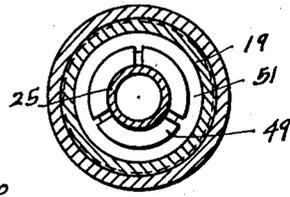


Fig. 3.

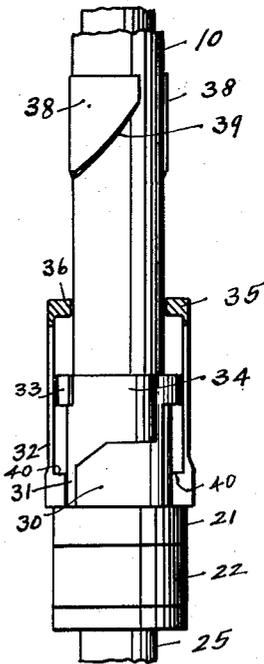


Fig. 4.

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PIPE ADJUSTING APPARATUS

Original application filed March 29, 1929, Serial No. 350,907. Divided and this application filed May 19, 1932. Serial No. 612,288.

This invention relates to a pipe adjusting apparatus.

An object of the invention is to provide means intended primarily for the purpose of adjusting the wash pipe which is employed for use in washing a well screen in the process of setting said screen preparatory to bringing in a well.

Another object of the invention is to provide means adapted to be used in connection with a packer and setting tool whereby the wash pipe employed may be adjusted, and if desired, withdrawn partly or entirely from the screen after the well has been washed and either before or after the packer has been set.

In the process of setting and washing a well screen, the screen is usually lowered through the casing into the oil bearing stratum and associated with the screen there is a packer and setting tool whereby a fluid tight joint may be formed between the screen and the casing and a wash pipe is usually carried by the setting tool which extends down through the screen and whose lower end extends through, and forms a fluid tight joint with, a wash ring at the lower end of the screen and through which wash pipe a washing fluid may be forced down through the screen and which will pass up about the screen and cleanse the same. Under certain conditions it is desirable to elevate the wash pipe so that its lower end will clear the wash ring whereby the oil flowing in through the screen, after it has been washed, may pass on upwardly through said wash pipe and from the well. It is the chief object of this invention to provide means in combination with this packer and setting tool whereby said wash pipe, after it has been used for said washing purposes, may be elevated the required distance above the wash ring.

The invention has been illustrated in combination with a packer and setting tool to be

used for the purpose of adjusting the wash pipe used in combination therewith but it is to be understood that the invention is capable of general application and use.

The subject matter of this invention has been divided out from my copending application on Setting tool, Serial No. 350,907, filed March 29, 1929.

With the above and other objects in view this 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 drawing, wherein:

Figure 1 shows a vertical sectional view of the upper end of the apparatus.

Figure 2 shows a vertical sectional view of the lower end thereof.

Figure 3 shows a cross sectional view taken on the line 3-3 of Figure 1, and

Figure 4 shows a fragmentary side elevation, partly in section.

Referring now more particularly to the drawing wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates a casing in the well bore and the numeral 2 designates an operating stem or string of pipe which extends up to the ground surface and through which the packer and the setting tool and wash pipe may be handled. A collar 3 is screwed on to the lower end of the stem 2 and connects the inside coupling 4 to said stem. The lower end of this collar may be flared and provided with a packing ring 5 therein, and the lower end of the coupling 4 has a packing ring 6 therearound which is seated in the groove 7 and there are the channels 8 which lead down from the upper end of said coupling through which fluid under pressure may enter said groove behind the ring 6 and force said packing ring into close contact with the surrounding setting nipple 9 within the upper end of

which the lower end of the coupling 4 is adapted to fit. There is a tubular mandrel 10 whose upper end is screwed into the coupling 4 and whose construction will be hereinafter described.

The lower end 11 of the setting nipple may be detachable and has an inside downwardly converging seat 12 and fits over the upper end of the tubular packer support 13. The upper end of said support has the external downwardly pitched annular teeth 14 and there are the downwardly tapering wedge-shaped slips 15 seated on the seat 12 and whose inner sides have the upwardly pitched teeth 16 adapted to engage the teeth 14. The lower end of the packer support is threaded into the upper end of a coupling 17 and a collar 18 connects said coupling to the upper end of the liner, or inside pipe 19 beneath, which extends to the bottom of the bore and which usually includes the conventional screen of any preferred construction and provided for the purpose of permitting the inflow of oil into the liner but excluding sand and the like.

The lower end of the packer support 13 is screwed into the upper end of the coupling 17 and an expansible sleeve-like packer 20 surrounds said support and has its lower end secured around the upper end of the coupling 17 and its upper end secured around the lower end 11 of the setting nipple 9.

The lower end of the mandrel 10 is formed with an enlarged head 21 which fits closely within the coupling 17 and has the expansible ring 22, seated in the annular groove 23, therearound. Channels 24 lead up from the lower end of the mandrel into the groove 23 through which fluid under pressure may be admitted within said groove 23 to keep said packing ring 22 expanded out against the walls of the coupling 17.

The conventional wash pipe 25 extends down through the coupling 4 and mandrel 10 for the purpose of conveying a washing fluid down to wash the screen in the well known manner, said rings 6 and 22 serving to prevent leakage of said fluid.

The coupling 17 has an internal annular groove 26 whose upper side 27 converges upwardly and whose lower side forms an abrupt annular shoulder 28.

Around the mandrel there is a releasable locking sleeve designated generally by the numeral 29. The lower end of this sleeve rests on the shoulder 28 and the upper end of the head 21 as shown in Figure 1 when in locking position, and its said lower end is thickened and its external contour is of a form to fit snugly into and conform to the shape of the groove 26. This sleeve may be expansible, and its lower end is held expanded and locked in said groove 26 by said mandrel. When in the position above described and shown in Figure 1 the stem 2

and the liner 19 and the screen attached thereto will be held in rigid relation, through the mandrel 10 and there will be no danger of the packer 20 being set or expanded, prematurely, as the apparatus is being let down into the bore, the lower end of the locking sleeve being held locked in the groove 26 by said mandrel.

The lower end of the mandrel 10 has the oppositely disposed expander jaws 30, 30 immediately above the head 21 of a general arcuate form in cross sectional contour and integral with said mandrel and which normally serves to hold the lock sleeve in locking position in the groove 26 and between these expander jaws are the oppositely disposed recesses as 31 also of arcuate form in cross section. The corresponding ends of the jaws 30 are upwardly extended forming the vertical guides whose upper ends are turned in corresponding directions circumferentially around the mandrel over the respective depressions 31 forming the arcuate ribs or stops 33, with the arcuate spaces as 34 between or arranged in staggered relation with and which in effect form continuations of the recesses 31. The upper end of the locking sleeve 29 forms a continuous ring 35 having the inwardly extending arcuate flanges 36, 36 with the oppositely disposed arcuate notches 37, 37 between said flanges 36. On opposite sides of the mandrel and spaced above the upper end of the lever 49 and in approximately vertical alignment with the expander jaws 30, 30 are the guides 38, 38 having the spiralled or beveled lower guide edges 39, 39.

When the apparatus is let down into the bore with the liner set on the bottom of the bore and the packer 20 within the lower end of the casing 1 the packer is then located at the desired point to be set. The stem 2 and the mandrel 10 may then be lowered with the sleeve 29 until the inwardly projecting shoulders 40, 40 at the lower end of the locking sleeve 29 and which are located in the spaces 31, 31 are engaged by the corresponding ribs 33, 33 and the stem and mandrel are then turned to carry the notches 37, 37 above said shoulders 40, 40. Meanwhile the sleeve 29 is held against turning by the key 7 which projects inwardly from the coupling 17 into the vertical keyway 42 in the sleeve 32. The stem and mandrel may then be further lowered. When the external annular shoulder 43 of the mandrel passes beneath the lower end of the sleeve 29 said sleeve will be permitted to contact so that it will be released from the coupling 17 as hereinafter explained. As the stem is lowered the collar will force the setting nipple 9 downwardly and this will operate to set the packer 20 out against the outer casing 1 and form a fluid tight joint therewith. The dogs 15 will en-

gage the teeth of the packer support and hold the packer in expanded position.

As the mandrel is further lowered to expand the packer 20 as above stated, the guides 38 will pass through the notches 37 of the sleeve 29 and the guiding edges 39 thereof will ride against the corresponding ends of said notches which will operate to turn the mandrel to carry the ribs 33, in to alignment under the flanges 36 and by an upward movement the stem, mandrel and locking sleeve may be removed from the bore leaving the packer set. As the mandrel is withdrawn the collar 44 at the upper end of the wash pipe will be engaged by the coupling 4, and the wash pipe will also be withdrawn. After the guides 38 have passed through the notches 37 and the mandrel should be accidentally or inadvertently further turned, then the upper ends of said guide 38 will engage the flange 36 and the sleeve 29 will be thus carried out when the stem and the mandrel are withdrawn out of the bore.

The lower end of the wash pipe is seated in the conventional wash ring 45 of the ordinary set shoe 46 at the bottom end of the screen and when so seated in said ring the fluid flowing into the screen can not enter said wash pipe. When the wash pipe is so seated in the wash ring the collar 44 may be some distance above the coupling 4 and in case the well comes in as above explained the lower end of the wash pipe should be lifted off the wash ring so as to permit the fluid to enter and flow upwardly through said wash pipe. To make provision for this the coupling 4 is provided with a downwardly converging seat 47 with wedge shaped slips 48 therein. When the stem is lowered as herein above explained to seat the collar 3 against the setting nipple 9 the slips 43 will permit the coupling 4 to move downwardly relative to the wash pipe and in order to lift the lower end of the wash pipe out of the wash ring 45 the stem 2 may be moved upwardly and the slips 48 will engage and move the wash pipe 45 upwardly with said stem and said wash pipe will be held in said upper position by means of the slips 49 which are seated in a downwardly converging seat 50 in the ring 51. This ring 51 is secured at a suitable place in or above the screen beneath the packer. The stem 2 may again be elevated and lowered successively carrying the wash pipe upwardly as the stem is elevated, through the slips 48, and said wash pipe being held in elevated position by the slips 49 as the stem is lowered. The wash pipe may thus be elevated to the desired position and this may be accomplished either before or after the packer 20 is set. The fluid may then flow from the surrounding stratum through the screen and thence up through the wash pipe and the stem 2 and the packing rings 6 and 22 will

prevent any leakage of the fluid out into the casing.

One form of the packer and setting tool has been shown and described for illustration only, but any selected form of packer and setting tool may be employed.

The drawings and description merely illustrate and describe a form of the invention by way of example and it is contemplated that mechanical changes and adaptations may be made therein within the scope of the appended claims.

What I claim is:

1. The combination with an upper and a lower pipe adapted to be located in a well bore, of a tube therein, operative connections for supporting said tube and which are formed to permit the independent downward movement of the upper pipe relative to the tube but to prevent the independent upward movement of such upper pipe relative to said tube, a slip ring fixed in the lower pipe having a downwardly converging seat and slips in said seat in engagement with said tube.

2. The combination with a liner for use in a well bore, of an operating stem, a wash pipe, a downwardly converging slip seat in the stem and liner respectively, slips in said seats for supporting the wash pipe therein said slips being formed to permit the downward movement of the stem, relative to the wash pipe and to permit the upward movement of the wash pipe relative to the liner but to prevent the independent upward movement of the stem relative to the wash pipe.

3. In combination an upper pipe and a lower pipe located in a well bore, a downwardly converging seat in the upper pipe, a downwardly converging seat in the lower pipe, said upper pipe being longitudinally movable relative to the lower pipe, slips on said seats and a wash pipe engaged and sustained by said slips.

4. In combination a liner for use in a well, an operating stem vertically movable relative to the liner, downwardly converging seats in the stem and liner, respectively, pipe engaging slips in said respective seats, the engaging slips in the stem being arranged to engage and elevate the wash pipe upon upward movement of the stem and to release the wash pipe upon downward movement of the stem, said engaging slips in the liner being arranged to permit the upward movement of the wash pipe relative to the liner but to prevent the downward movement of said wash pipe relative to said liner.

5. In combination an upper pipe and a lower pipe adapted to be located in a well bore, said upper pipe being longitudinally movable relative to the lower pipe, pipe engaging means in the upper pipe shaped to engage and lift a pipe held thereby upon up-

ward movement of the upper pipe and to
release said held pipe upon downward move-
ment of the upper pipe, pipe engaging means
in the lower pipe shaped to engage and hold
5 a pipe therein against downward movement
but to permit the upward movement of the
held pipe, and a pipe engaged and held by
said upper and lower pipe engaging means.

In testimony whereof I have signed my
10 name to this specification.

LOUIS M. PEARCE.

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