Jan. 7, 1941. A. PRANGER 2,227,912

CONTROL HEAD PACKER

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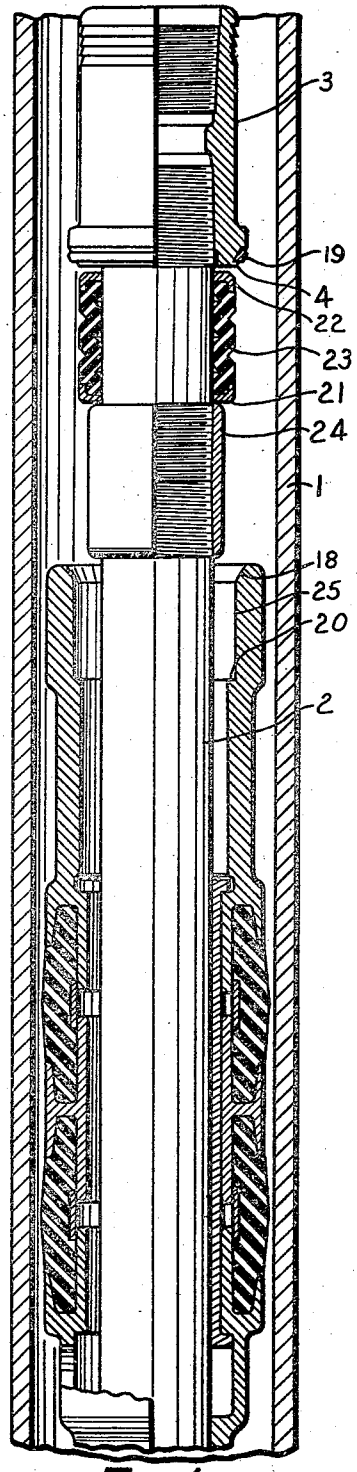


FIG. 1

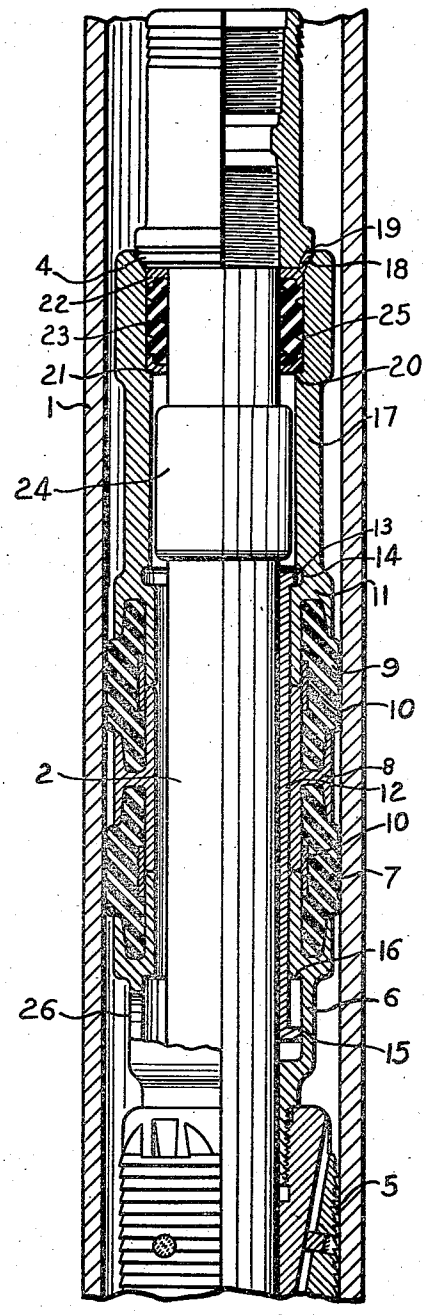


FIG. 2

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CONTROL HEAD PACKER

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11 Claims. (Cl. 166—12)

This invention relates to an improved control head packer and more specifically relates to a means to positively close the circulation valve even if dirt, grit or small rocks should be on the valve seat when the valve was being lowered.

In the Crowell Patent 1,432,674 a structure was shown whereby the packer could be lowered into the well into the position where it was desired to seat the packer and means were shown to positively hold the valve 23, as shown in the said patent, elevated above its valve seat while thus being lowered. In the said patent the gripping slips 30 were connected to slip cage springs 32 which were connected at their lower ends to a slip cage 28 having a hook 33 and the holding pin 34 would be above the hook 33 when the packer was being lowered. When it was desired to seat the packer, the pipe extending to the top of the well would be rotated so as to remove the pin 34 from above the hook 33 and, if the pipe 11 were then lowered, the slips 30 would be set so that upon further lowering the pipe 11 the packer would be expanded into engagement with the well casing and the valve would be closed. The present invention constitutes an improvement over what was shown in the said patent for the structure shown in the said patent was objectionable in that dirt or grit might lodge on the valve seat so that the valve would not properly be seated on the valve seat. With the structure constituting the subject matter of the present invention, an additional resilient sealing means is provided so that the well will be sealed when the packer is set and the valve lowered even if grit should be on the valve seat.

For a more complete disclosure of the structure heretofore employed, reference is made to the above-mentioned patent as well as the patent to Crowell 1,591,366, dated July 6, 1926, the patent to A. Pranger, 2,160,515, dated May 30, 1939, and the patent to Thaheld 2,165,687, dated July 11, 1939.

The invention also contemplates the use of a structure which is simple to construct, is efficient in operation and which will make a perfect seal when the valve is set under conditions under which by structures heretofore employed a perfect seal would not be possible.

Other objects and advantages of the invention will appear in the detailed description and claims which follow.

The invention as shown in the drawing is shown by way of illustration so as to enable one skilled in the art to make and use the same, but it is realized that many changes may be made in the specific form of the invention herewith shown by way of illustration.

In the drawing,

Fig. 1 is a vertical elevational view, largely in cross-section, showing the valve open or in the position in which it would be used when the valve mechanism and packer are being lowered in the well,

Fig. 2 is a similar view showing the packer in set position and the valve closed.

Referring to the drawing in detail, the usual well casing 1 is provided and the packer is raised or lowered and set at the desired elevations in the said well casing. The usual flow line 2 extends to the top of the well and in this flow line is a collar 3 provided with a valve 4. As is customary, this valve 4 is provided with a resilient sealing ring 19 which may be made of neoprene, rubber, or other resilient material. The usual slips 5 are provided with external teeth as is fully explained in the above-mentioned patents and when the slips are set so as to engage the inner walls of the tubing, the lower thimble 6 is prevented from moving downwardly. This thimble 6 receives the lower end of the lower packer 7 and above the packer 7 is an intermediate spacer 8 which receives the upper end of the packer 7 and the lower end of the packer 9. The usual metallic rings 10 are inserted behind the mid-portion of the packers so as to prevent the said packers from being pinched between the lower thimble 6 and the spacer 8 and between the spacer 8 and the upper thimble 11 which receives the upper end of the packer 9. The customary tie bars 12 are provided which have hooks 13 received in a recess 14 of the upper thimble 11 and hooks 15 which underlie the shoulder 16 of the lower thimble 6, which structure is fully explained in the patent to Pranger 2,160,515, dated May 30, 1939. The upper thimble 11 is provided with an upwardly extending tubular extension 17 which at its upper end is provided with a beveled valve seat 18 which receives the valve 4 and the sealing ring 19 when the valve is closed as shown in Fig. 2.

This extension 17 is also provided with a shoulder 20 which receives the metallic ring 21 when the valve is being closed. Metallic rings 22 and 21 are slidably mounted on the flow line between the valve 4 and the coupling 24. Interposed between the rings 21 and 22 is a packer 23 preferably made corrugated in vertical cross-section as shown in the drawing: The packer 23 and rings 21 and 22 form a sealing means between

the flow line and the shell. I prefer to have this packer 23 vulcanized or otherwise secured to the ring 22 and likewise secured to the ring 21. When the valve is opened, the lower ring 21 rests against the upper end of a coupling 24 forming a part of the flow line. Since the valve 4 and coupling 24 are rigid with or form a part of the flow line, the distance between the valve 4 and the coupling 24 is a fixed distance so that the upper ring 22, being mounted on the flow line, limits the upward movement of the packer 23 relative to the valve and the lower ring 21 resting on the coupling 24 positively limits the downward movement of the packer relative to the flow line. When the slips have been set and the flow line is lowered, the packers 7 and 9 will be set and likewise the valve 4 will rest on the valve seat 18, thereby making an effective seal between the flow line and the casing. Heretofore, however, difficulty has been experienced in that grit or particles of dirt might lodge between the valve seat 18 and the valve 4 and prevent an effective or perfect seal. However, with the packer 23 an effective seal is provided even if there is such foreign matter between the valve seat 18 and the valve, for when the flow line is being lowered the packer 23 will be lowered with it, while the packers 7 and 9, the slips 5, the upper and lower thimbles, and the spacer 8 are held stationary so that the lower thimble 21 and packer 23 pass in the enlarged opening 25 which extends from the lower end of the valve seat 18 to the shoulder 20 and as the flow line is further lowered, the lower thimble 21 will engage the shoulder 20. Since the lower thimble 21 is thus stopped by engaging the shoulder 20, the packer 23 will be compressed as the flow line is further lowered and will make a positive seal between the flow line and the extension 17 of the upper thimble which forms a part of the packing arrangement, thereby forming an effective and positive seal even if a particle of rock should be between the valve 4 and the valve seat 18.

The upper thimble 11 with its extension 17, the spacer 8 and the lower thimble 6 constitute a shell which is spaced from the flow line. When the flow line and packer are being lowered in the casing the valve 4 is positively held separated from the valve seat 18 as is shown in Fig. 1, or as fully described in Patent 1,432,674 heretofore mentioned. This, of course, means that the packer 23 is held elevated above the extension 17 forming the upper part of the shell so that as the flow line is lowered in the well carrying the shell and the packers 7 and 9, the well fluid may pass between the packers 7 and 9 and the casing for the said packers are not in engagement with the casing while the device is being lowered. Also the well fluid can pass from the casing into the interior of the shell through the holes 26 and thence travel upwardly between the tie bars 12 within the shell and pass outwardly above the valve seat 18 so that there is a passageway for this well fluid between the shell and the flow line and this passageway may be closed when the slips 5 have been set and the flow line is further lowered so as to bring the packer 23 into packing engagement with the enlarged tubular surface 25 and the passageway would be further closed by the engagement of the valve 4 with the valve seat 18.

While I have not abandoned the use of the valve 4 and the valve seat 18, it is obvious that the packer 23 would form an effective seal even if there were no valve 4 or valve seat 18. I, therefore, contemplate that the packer 23 may be used supplementary to the valve 4 and valve seat 18 or it may be used without the said valve and valve seat, and in this case, the packer 23 would in itself constitute a valve mechanism when used in conjunction with a shoulder 20 and the extension 17 of the upper thimble.

I realize that many changes may be made in specific form of the invention shown by way of illustration herein. I, therefore, desire to claim the same broadly except as I may limit myself in the appended claims.

Having now described my invention, I claim:

1. In a control head packer, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder in said shell, an upper and a lower retaining ring slidable on said flow line, a resilient member secured to both of said rings, means to set said shell, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member so as to positively close said passageway.

2. In a control head packer, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder within and a packer on said shell, an upper and a lower retaining ring on said flow line, a resilient member secured to both of said rings, means to seat said shell and packer, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member and packer so as to positively close said passageway and set said packer.

3. In a control head packer, a casing, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder within and a packer on said shell, an upper and a lower retaining ring slidable on said flow line, a resilient member secured to both of said rings, means to set said shell and packer, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member so as to positively close said passageway and to compress said packer so as to positively close the space between said shell and casing.

4. In a control head packer, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder in said shell, a cylindrical wall forming a part of said shell and extending upwardly from said shoulder, an upper and a lower retaining ring on said flow line, a resilient member secured to both of said rings, means to set said shell, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member against the flow line and the cylindrical wall so as to positively close said passageway.

5. In a control head packer, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder in said shell, a cylindrical wall forming a part of said shell and extending upwardly from said valve seat, two retaining rings on said flow line, a resilient member having a corrugated vertical cross-section secured to both of said rings, means to set said shell, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member against the flow line and

the cylindrical wall so as to positively close said passageway.

6. In a control head packer, a flow line, a shell surrounding the flow line, there being a passageway between the shell and flow line, a shoulder in said shell, a cylindrical wall forming a part of said shell and extendling upwardy from said valve seat, two retaining rings slidable on said flow line, a resilient member having a corrugated vertical cross-section secured to both of said rings, means to set said shell, means to limit the downward movement of the lower retaining ring, the lower retaining ring engaging said shoulder when the flow line is lowered after the shell has been set and compressing said resilient member against the flow line and the cylindrical wall so as to positively close said passageway.

7. In a control head packer, a shell, means whereby said shell may be held stationary, a valve seat on the upper end of said shell, a flow line, a valve on said flow line so positioned that when the shell is held stationary and the flow line is lowered said valve will be seated on the valve seat and close a passageway between the shell and flow line, a shoulder in the shell spaced below the first valve seat and a packer carried by said flow line and adapted to be projected into the upper end of said shell to engage said shoulder and close said passageway independently of said valve when the flow line is lowered as above described.

8. In a control head packer, a shell and a flow line, there being a passageway between the shell and the flow line, a valve seat on the upper end of the shell and a shoulder on the inside of said shell and positioned a substantial distance below the valve seat, a valve and a packer on the flow line so positioned that when the flow line is lowered relatively to the shell said packer will be projected into the shell and will seat on said shoulder and said valve will seat on said valve seat thereby closing said passageway.

9. In a control head packer, a shell and a flow line, there being a passageway between the shell and the flow line, a valve seat on the upper end of the shell and a shoulder on the inside of said shell and positioned a substantial distance below the valve seat, a valve and a corrugated packer on the flow line so positioned that when the flow line is lowered relatively to the shell said corrugated packer will be projected into the shell and will seat on said shoulder and said valve will seat on said valve seat thereby closing said passageway.

10. In a control head packer, a shell and a flow line, there being a passageway between the shell and the flow line, a valve seat on the upper end of the shell and a shoulder on the inside of said shell and positioned a substantial distance below the valve seat, a valve on the flow line so positioned that when the flow line is lowered relatively to the said shell, said valve will be seated on said valve seat thereby closing said passageway, two retaining rings slidable on said flow line, a packer secured to both of said rings and so positioned that when the flow line is lowered relatively to the shell the packer will be projected into the shell and will set on said shoulder thereby closing said passageway.

11. In a control head packer, a shell and a flow line, there being a passageway between the shell and flow line, said shell being provided with an inner cylindrical wall extending downwardly from its upper end and terminating at its lower end in a shoulder, a packer carried by said flow line and of a size and so positioned that when the flow line is lowered relatively to the shell, the packer will be projected into said shell until the lower end of the packer contacts said shoulder and a further lowering of said flow line will cause the packer to expand into engagement with the cylindrical wall of the flow line and close said passageway.

ALBERT PRANGER.