

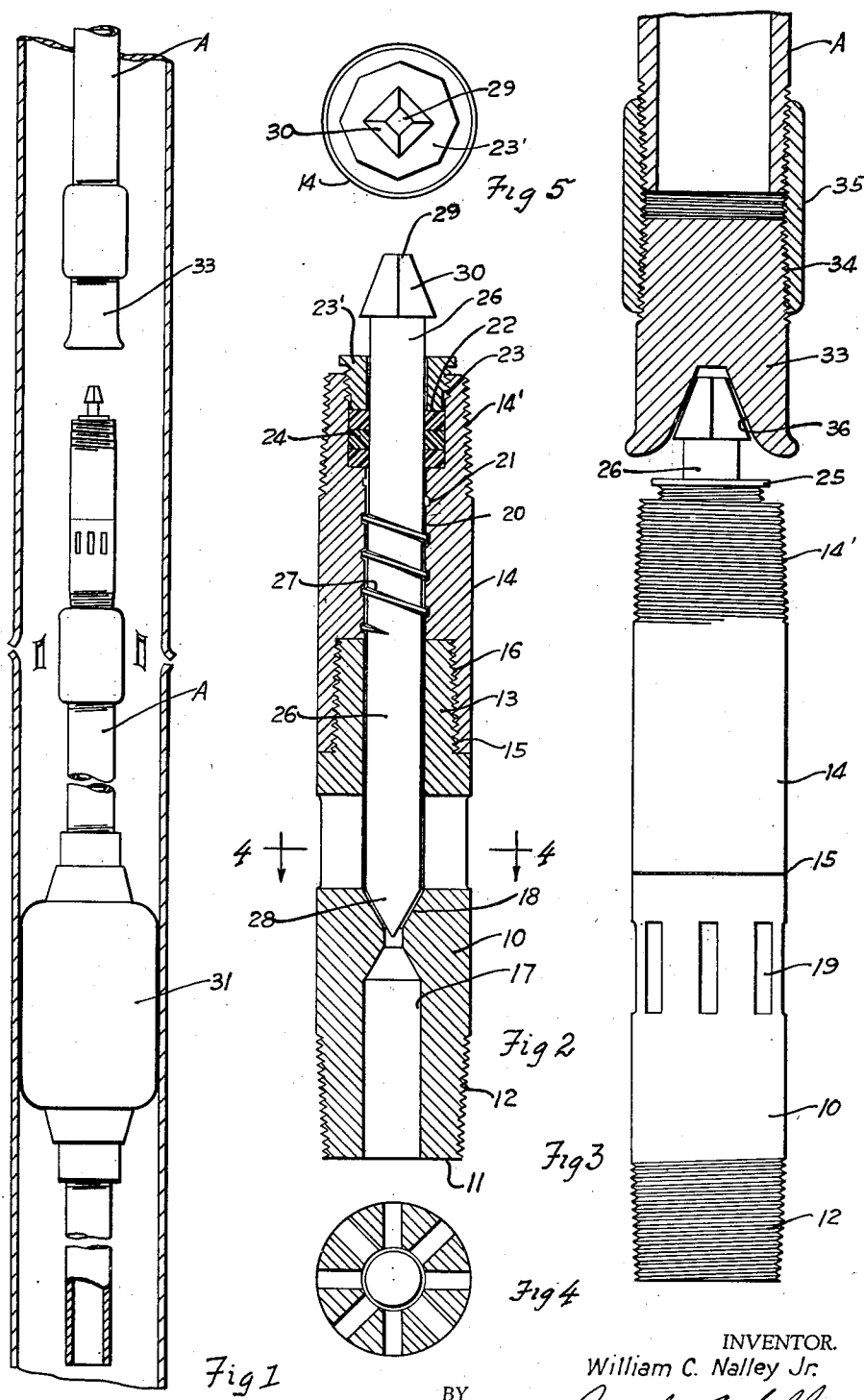
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WELL FLOWING DEVICE

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WELL FLOWING DEVICE

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This invention relates to new and useful improvements in well flowing devices.

In the oil well practice it has been the custom, when the well is finished, to allow the gas pressure in the well to raise the oil to the ground surface or top of the well. Nearly all oil sands have sufficient gas pressure to raise the oil to the surface. However, after this practice has been followed for a length of time the gas pressure in the well bore drops off to such a point as to be too low to raise said oil to the surface and other means must be employed to obtain the oil or "flow the well."

One method of flowing the well is to introduce gas under pressure to the oil bearing sands and allow said gas to force the oil through the sands and out through the adjacent wells. Frequently, in the process of drilling a well a gas bearing sand or strata is passed through by the well bore before oil bearing sands are reached. This gas bearing sand is sealed off from the well bore by the casing and by cementing the well at the bottom.

One object of this invention is to provide an improved well flowing device which introduces gas under pressure from these gas bearing strata into the oil bearing sands and thereby forces the oil out through adjacent wells.

Another object of this invention is to provide an improved well flowing device wherein the admission of gas under pressure into an oil bearing sand having a lower gas pressure, may be positively and quickly controlled.

A still further object of this invention is to provide an improved well flowing device which may be used as a bottom hole choke for use on wells that flow of their own accord making it possible to choke down the flow of the well so as to prevent gas separation and emulsifying at the choke.

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 drawing, in which an example of the invention is shown, and wherein:

Figure 1 is a view, partly in elevation and partly in section, of the well flowing device mounted in a well casing or bore,

Figure 2 is an enlarged longitudinal, sectional view of the valve body used in the well flowing device,

Figure 3 is an enlarged side elevation of the

valve body showing the pipe fitting or wrench used to operate the valve, the wrench being shown in engagement with the valve body,

Figure 4 is a transverse, sectional view taken on the line 4—4 of Figure 2, and

Figure 5 is a plan view of the valve body.

In the drawing, the numeral 10 designates a cylindrical valve body having its lower end formed with a pin 11 which carries external screw threads 12. The screw threads 12 are right hand threads. The upper portion of the body 10 is shouldered and carries an externally screw-threaded pin 13 so as to engage in a guide sleeve 14. The guide sleeve 14 is formed with a depending peripheral flange 15 which is internally screw-threaded at 16 so as to engage with the threads 13. The threads 13 and 16 are right hand threads, the utility of which will be explained later in the operation. The guide sleeve 14 and valve body 10 fit closely together and form a substantially continuous exterior surface.

The valve body has an internal axial bore 17 which has a reduced portion or constriction 18 spaced from its lower end. This constriction 18 serves as a valve seat and will be referred to as such hereinafter. The bore 17 continues above the valve seat 18 with substantially the same diameter as below the valve seat, and terminates as the upper end of the pin 13. Radial slots or posts 19 communicate with the outside of the valve body 10 and the portion of bore 17 above the valve seat 18, as is clearly shown in Figure 2. The guide sleeve 14 has an internal axial bore 20 substantially the same diameter as and in alinement with the bore 17. The bore 20 is provided with left hand, square, internal screw-threads 21 and is enlarged at its upper end to form a packing gland 22. The enlarged portion of the bore has internal screw threads 23 and receives suitable packing 24 and a packing gland nut 25. The guide sleeve has external left hand screw threads 14' formed on its upper end and adapted to engage a tubing coupling.

An elongate cylindrical valve 26 is formed with left hand square, screw-threads 27 in its mid-portion, which engage the screw-threads 21. The valve 26 has its lower end 28 tapered so as to engage the valve seat 18 and has a tapered wrench head 29 with angular sides 30, formed on its upper end. The valve 26 is of such length as to engage the valve seat 18 with its lower end and have its upper end projecting above the packing gland nut 25. The packing gland 22 effectively seals off the upper portion of the valve

26. It will readily be seen that by rotating the valve 26 in a left hand direction the tapered portion 28 is forced into engagement with the valve seat 18 thus closing the valve.

5 In using the valve to flow a well, it is mounted in a string of tubing A by means of the screw-threaded portions 12 and 14'. A special coupling (not shown) having left hand threads in its lower end must be mounted on the lower end of the tubing string so as to engage the left hand threads 14'. A packer 31, which may be of any desired construction, is mounted below the valve and spaced therefrom. A screen 32 may be mounted below the packer but this is not necessary and the invention is not limited thereto.

10 This well flowing device is simple and positive in its operation. The valve and packer are mounted in the tubing string A as explained hereinbefore, with the valve closed, and lowered into the well bore until the packer reaches the bottom of the casing. The packer is then set and the tubing rotated to the right. This causes the tubing to disconnect from the valve because of the left hand threads 14'. The screw-threads 12, 13 and 16, cannot disengage because they are right hand threads. After the tubing string has been disconnected from the valve it is removed from the well bore and a perforating device of any kind is placed on its lower end. The tubing is again lowered into the well until the perforating device is in horizontal alinement with a strata containing gas under high pressure. The casing is then perforated allowing the gas to flow into the well casing but not into the oil bearing sand because the valve is still closed. The tubing is removed from the well and a tool 33 mounted on its lower end. The tool 33 is formed with external screw-threads 34 on its upper end. These threads engage the tubing coupling 35 on the lower end of the tubing string A. A recessed wrench socket 36 is formed in the lower end of the tool 33 and is adapted to engage the angular sided wrench head 29 and rotate the same.

45 The tubing with the tool 33 mounted thereon is again lowered into the well bore until the socket 36 engages the head 29. Then the tubing is again rotated to the right thus opening the valve and allowing the high pressure gas to flow through the parts or slots 19 through the bore 17 to the oil bearing sand. The pitch of the threads 27 and the taper of the portion 28 may be calibrated so that a known amount of gas will be admitted to the oil sands when a prescribed number of turns are made on the valve. This prevents the operator from allowing too much

gas to enter the oil sands and possibly blow out a nearby well.

With the gas pressure raised in the oil sands the adjacent wells will commence to flow spontaneously. To remove the valve and packer from the well the tubing A and tool 33 are removed from the well and the special coupling (not shown) with left hand threads is replaced on the bottom of the tubing. By lowering the tubing into the well until the coupling engages the threads 14' and then rotating the tubing to the left, the operator may again connect to the valve and packer assembly. When this operation is completed the packer may be loosened by jerking the tubing. The whole assembly is then removed from the well.

The construction described herein may also be used as a bottom hole choke. With the device mounted in a well as set out hereinbefore, the valve may be used to control the flow of gas and oil from the bottom of the hole. By controlling the flow of the said gas and oil, emulsions of gas in oil and separation of the gas from the oil may be prevented. In this manner, it is possible to obtain less gas per barrel of oil flowed. When used as a bottom hole choke, the valve and packer are, of course, used in individual wells.

Thus, it will be seen that this well flowing device is positive and efficient in its operation, and at the same time is simple and rugged in construction.

Various changes, alterations and modifications may be made in the size, shape and arrangement of the herein described elements, within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. The method of flowing oil wells which consists in, shutting off communication with the oil bearing sands, perforating the casing above the point of shut-off to admit gas from an upper strata, and then establishing communication with the oil bearing sands at a lower level and directing the gas from said upper level to the lower oil bearing sands.

2. The method of flowing oil wells which consists in, shutting off communication with the oil bearing sands, perforating the casing above the point of shut-off to admit gas from an upper strata, then establishing communication with the oil bearing sands at a lower level and directing the gas from said upper level to the lower oil bearing sands, and forcing oil from the oil bearing sands to the ground surface through adjacent wells.

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