

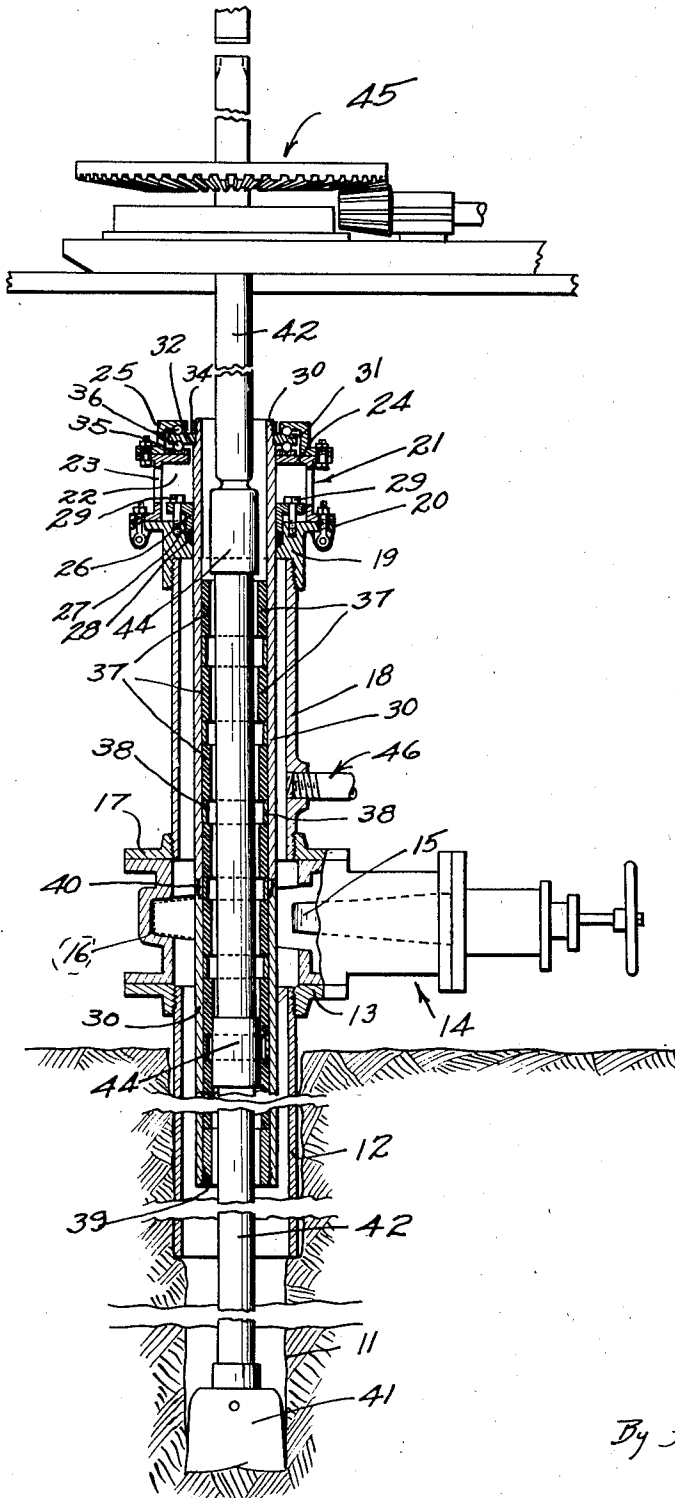
July 7, 1931.

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1,813,402

PRESSURE DRILLING HEAD

Filed June 1, 1927



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UNITED STATES PATENT OFFICE

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PRESSURE DRILLING HEAD

Application filed June 1, 1927. Serial No. 195,696.

My invention is a pressure drilling head for drilling wells, such as oil wells, by rotary drilling.

An object of my invention is the construction of a drilling head which will allow a drill pipe to rotate and to pass downwardly therethrough, whereby a drill bit at the lower end may be rotated and a circulation fluid may be forced downwardly through the drill pipe.

An object of my invention is the construction of a pressure head which has an inner part or sleeve rotating with the drill pipe, and with packing rings therein to form a tight seal with the drill pipe or with the couplings of such pipe.

In constructing my invention I mount a valve on the top of a well casing, this valve preferably being of the gate type, and above this valve there is a false or upper casing which extends to a sufficient height to form a support for the inner rotary sleeve of the drilling head. This sleeve is mounted on a cap with, preferably, antifricition bearings and is suspended inside of the upper or false casing, passes downwardly through the valve and extends into the upper part of the casing. This sleeve is provided with packing rings secured thereto, these rings being of such character as to form a fluid tight and gas tight seal with the couplings of the stands of drill pipe. The sleeve with the packing rings is of such length that in the downward or upward movement of the drill pipe one or more of the couplings engages the packing rings.

My invention is illustrated in the accompanying drawing, this being a vertical sectional view partly in elevation.

The well is indicated by the numeral 11, having a well casing 12 extending downwardly from the surface of the ground. At the top of the casing a collar 13 is attached thereto and above the collar is secured a valve, designated generally by the numeral

14. This valve is indicated as being of the gate type and has a slidable valve gate 15 which may be moved from open position, in which it is shown in full lines to closed position, as shown in dotted lines and indicated by the numeral 16, thereby forming a closure for the well when the remaining parts hereunder set forth are removed or before their attachment.

An upper collar 17 is secured to the upper face of the valve 14 and to this collar there is attached and upper or false casing 18. This casing has a closure head 19, screw threaded thereon or otherwise attached, such head having a flange 20. A cap 21 is secured to the flange 20 of the head 19, this cap having a cylindrical wall 22 with openings 23 therein for a purpose hereunder set forth. A shoulder 24 forms part of the cap, with a clamping ring 25 secured to the cap. A packing gland 26 fits in the upper portion of the head 19, which head has a cylindrical opening 27, and such gland compresses the packing 28, there being bolts 29 which may be reached through the openings 23 in the wall 22.

A cylindrical sleeve 30 extends downwardly from the cap through the false casing 18 through the main part of the valve 14 and into the upper part of the casing 12. This tube has a bearing ring 31 on the upper end fitting against a shoulder 32 and retained in place by a lock nut 34. On the shoulder 24 there is a lower ring raceway 35 of the antifricition bearing, and the balls 36 of such bearing engage between this lower ring raceway 35 and the bearing ring 31 and the clamping ring 25. The gland 26 with the packing 28 forms a liquid and gas tight seal on the outside of the sleeve 30 but allows rotation of such sleeve.

Internally of the sleeve there are a series of packing rings 37 formed of rubber or the like which are spaced apart by spacing rings 38, the bottom ring being held by an internal

nut 39 at the lower end of the sleeve 30. This sleeve may have a joint such as 40 if desired, this being illustrated as a screw threaded joint.

The drill bit 41 is illustrated as being connected to a drill tube 42 which has the different stands joined together by couplings 44. These couplings are of such diameter that they form a tight seal with the resilient packing rings 37 on the sleeve and when such rings are formed of rubber the rubber is tightly compressed during the downward and upward movement of the couplings through the sleeve 30. The drill pipe is rotated by a rotary rig designated generally by the numeral 45, this rig being illustrated as being supported in any suitable manner above the top of the false casing 18 and above the cap 31 thereon. This rotary rig is of standard construction and does not form an immediate part of my invention.

I do not show the mechanism for feeding a circulation fluid to the top drill pipe as this does not form an immediate part of my invention, but the circulation outlet is indicated by the numeral 46, this being connected, preferably, to the false casing above the valve 14.

The manner of functioning and operation of my pressure drilling head is substantially as follows:

As it is desired to maintain a pressure on the well, therefore, before the false casing is connected in place, the valve 14, which is on the top of the casing 12, will be closed. The false casing, its head 19, and the cap 21 are then assembled above the valve 14. The rotary sleeve 30 is then fitted in the assembly, the antifriction bearing being assembled in the procedure, and the packing in the head 19 being clamped to a sufficient extent to prevent escape of gas but to allow rotation of the sleeve 30.

When the drill pipe is being lowered into the well, as each coupling 44 passes downwardly through the sleeve 30, it engages the resilient packing rings 37, thereby forming a tight seal, and, as above mentioned, this sleeve is of sufficient length so that there will always be at least one coupling engaging the packing rings; hence as an upper coupling is entering the top of the packing rings, the lower coupling will be passing below the bottom of the sleeve 30.

When the drill is rotated, the frictional resistance of the collar on the packing rings rotates the sleeve 30, the weight of this sleeve being carried by the antifriction bearings at the top, and thus allowing free rotation. As the drilling proceeds there is a more or less continuous downward movement of the bit and hence the drill pipe with the collars engage the packing rings 37, thereby maintaining the continuous tight seal. When it is desired to raise the drill bit, the assembly of

the antifriction bearings on the cap may be disassembled, the rotary sleeve may then be withdrawn and such sleeve raised above the valve 14 and the bit drawn above such valve. The valve may then be closed and after this assembly, including the false casing 18, removed.

From the above description, together with the drawings, it will be seen that I have developed a simple type of pressure drilling head suitable for rotary drilling or other operations, and maintaining a tight seal on the well whereby the well may be maintained under pressure. It is manifest that the same type of head may be utilized for lowering well casings or the like of a smaller diameter than the main casing, and for other operations in which it is desired to maintain a pressure in the well.

It is to be understood that instead of having separate resilient packing rings 37 in the cylindrical sleeve 30, I may have a continuous ring fitting inside this sleeve so that the collars 44 on the drill pipe or other assembly passing therethrough will form a tight seal.

Various changes may be made in the principles of my invention without departing from the spirit thereof, as set forth in the description, drawing and claims.

I claim:

1. In the art described the combination of a well casing, a valve mounted thereon, a false casing mounted on the valve, said casing having a head with a packing, a cap mounted on the head, having antifriction bearings, a rotatable sleeve mounted on said bearings and passing through the packing into the false casing and through the valve into the casing, resilient packing rings in the sleeve, and a drill pipe passing through the sleeve and forming a seal with the resilient packing rings.

2. In the art described the combination of a well casing, a valve mounted thereon to form a closure for said casing, a false casing on the valve, a head on said false casing having a packing, a cap on the said head having antifriction bearings, a rotatable sleeve suspended from said bearings extending through the packing and the false casing, a plurality of resilient packing rings in the sleeve spaced apart, a drill pipe having a plurality of couplings, said couplings forming a seal with the resilient packing rings.

3. A pressure drilling head comprising a false casing adapted for attachment to a valve, a head on said casing having a packing, a rotatable sleeve journaled above said head and passing through said packing and the casing, and resilient packing rings in the said sleeve adapted to form a tight seal with the couplings of a drill pipe.

4. In a pressure drilling head a casing, a sleeve longer than a length of drill pipe and supported upon said casing and extending

internally of said casing, means for holding said sleeve against longitudinal displacement, and packing rings in each end of said sleeve, said rings being adapted to provide a seal with the couplings of a drill pipe.

5 5. In a pressure drilling head a casing, a sleeve longer than a length of drill pipe and supported upon said casing and extending internally of said casing, means for holding
10 said sleeve against longitudinal displacement, and a plurality of packing rings distributed throughout the length of said sleeve, said rings being adapted to provide a seal with the couplings of a drill pipe.

15 6. In a device as described, the combination of a well casing, a head having a packing with means to support said head on the casing, a cap mounted on the head, a bearing in said cap, a rotatable sleeve having its upper
20 end mounted on said bearing, the sleeve extending downwardly and being longer than a length of drill pipe, a plurality of resilient packing rings in the sleeve adapted to engage a coupling on a string of drill pipe, and
25 forming a seal therewith, said packing rings being positioned whereby a coupling is always engaged by one or more of the said packing rings.

30 7. In a device as described, a cap, means to attach said cap to a well casing, a sleeve rotatably mounted in said cap, a packing on the outside of the sleeve, said sleeve being longer than a length of drill pipe, a plurality of
35 packing rings in the sleeve, said rings being adapted to engage couplings on drill pipe, there being always one coupling engaged by the said packing.

40 8. In a device as described, a cap, means to attach said cap to a well casing, a sleeve rotatably mounted in the cap, a packing on the outside of the sleeve, packing rings in the sleeve, said packing rings being adapted to
45 engage a coupling on drill pipe, the coupling being of larger diameter than the pipe and the packing being of sufficient length so that one coupling is always engaged by the said packing rings.

50 9. In a device as described, a closure head having means to secure same to a well casing, a cap mounted on the said head and having a bearing therein, a sleeve rotatably mounted on the bearing of the cap, the bearing preventing longitudinal movement of the sleeve, a packing between the closure head and the sleeve,
55 the said sleeve being longer than the length of drill pipe and having a packing therein, the packing in the sleeve being adapted to engage the couplings on the drill pipe and the said latter packing being of such length as to engage at least one coupling.

60 10. A pressure drilling head comprising in combination a false casing, a valve supporting said casing, said valve being mounted on a well casing, a head on the top of the false
65 casing, a packing in the head, a cap mounted

above the head and connected thereto, an anti-friction bearing, a rotatable sleeve suspended from the bearing and passing through said packing into the false casing and through the valve into the upper part of the well casing, said sleeve having cylindrical, resilient, packing rings spaced apart, said rings being adapted to engage couplings on the drill pipe and to form a seal, the said rings contacting only with the couplings of the drill pipe.

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

E. N. HEWITT.

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