

July 11, 1939.

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2,165,410

BLOW-OUT PREVENTER

Filed May 24, 1937

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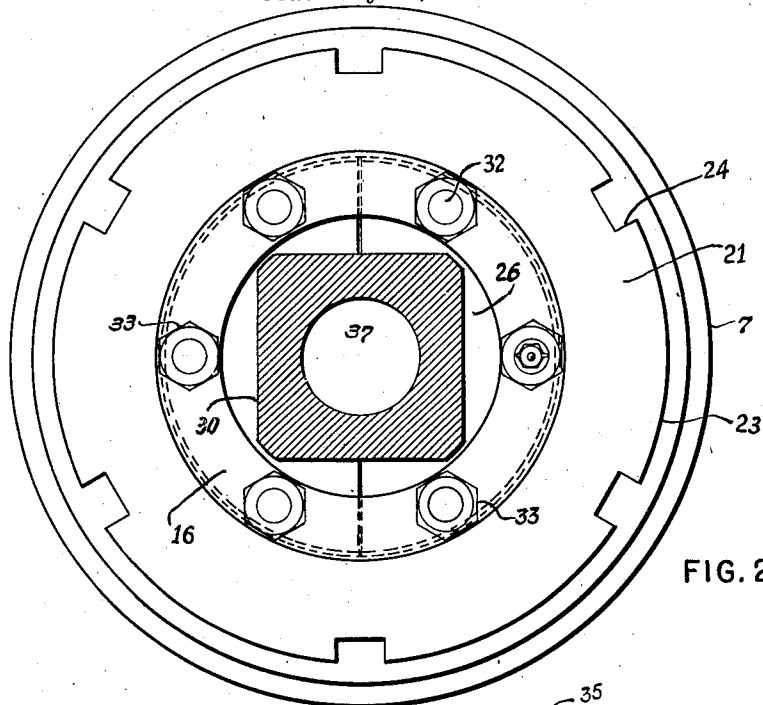


FIG. 2.

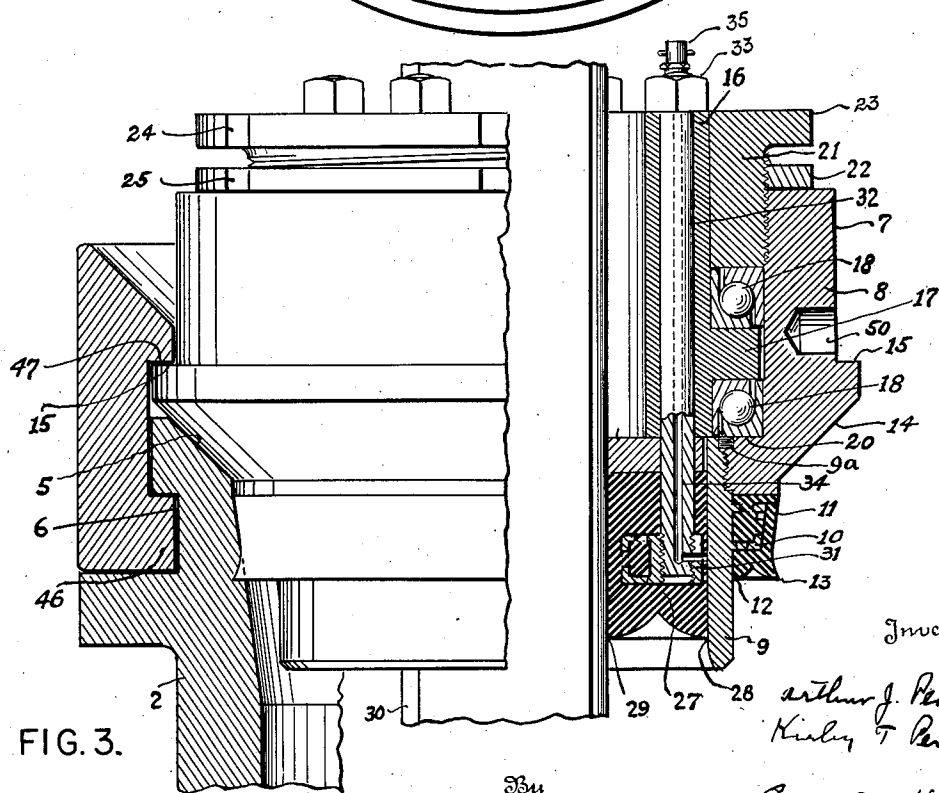


FIG. 3.

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2,165,410

BLOWOUT PREVENTER

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Application May 24, 1937, Serial No. 144,451

4 Claims. (Cl. 255—1)

This invention relates to a blowout preventer.

An object of the invention is to provide a blowout preventer for forming a seal between the grief pipe or kelly and the casing head, to prevent a blowout of gas under pressure in the well when such pressure is encountered during the drilling operations.

It is another object of the invention to provide a novel type of pressure head, or packing unit, adapted to fit within the casing head to completely close the space between the grief joint, or kelly, of the drill stem and the casing head to prevent the escape of fluid from the well, said pressure head including a packing which is rotatable with the kelly but which forms an effective seal while rotating.

The invention also embodies novel means for supplying a lubricant to the rotatable packing to minimize its friction with the adjacent part of the pressure head while rotating.

The invention is also useful when it is desired to maintain the drilling fluid, or other fluid, in the well under pressure.

It is another object of the invention to provide a pressure head including a stationary part, and a rotatable part and which is adapted to be mounted, and maintained, on the kelly in readiness for use during the various operations incident to well drilling.

With the above and other objects in view the 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 drawings, wherein:

Figure 1 shows a side view, partly in section, of the blowout preventer as in use.

Figure 2 shows a plan view of the pressure head showing the drill stem kelly in cross-sectional view.

Figure 3 shows a side view of the pressure head, partly in section, shown mounted on the kelly, and showing one of the clamps in section, and

Figure 4 shows a fragmentary plan view.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates the well casing having the casing head 2 secured to the upper end thereof and provided with an inside, downwardly tapering seat 3. The casing head has a lateral, tapped hole 4 beneath said seat for the connection of a pipe thereto through which the fluid in the well may be lead off or through which

fluid under pressure may be forced into the well as desired.

At its upper end the seat 3 is outwardly flared as at 5 beneath said flared portion the head has an external, annular groove 6.

There is a packing unit or pressure head assembly designated generally by the numeral 7 and which will now be more specifically described:

This packing unit comprises an outer shell, 10 or jacket, 8 threaded into the lower end of which is a depending friction sleeve 9 and on said sleeve adjacent the lower end of the jacket 8 there is formed an external, open-work cage 10 which surrounds the sleeve and into which 15 is molded the annular, external packing sleeve 11 whose lower end is annularly grooved to form the inner and outer lips 12, 13 as shown in Figure 3, the former of which fits closely around said sleeve and the latter of which is outwardly flared 20 and presses closely against the seat 3 when the pressure head is in place. The jacket has a downwardly tapering face 14 shaped to fit closely on the seat 5 and above said tapering portion has an external, annular, upwardly facing shoulder 15. The pressure head also includes an inner sleeve 16 which has the external, annular flange 17 therearound. Above and beneath the flange 17 are the anti-friction bearing assemblies 18, 19 which are located between the inner 30 sleeve 16 and the outer jacket 8 and the latter of which is supported on an inside, annular shoulder 20 of the jacket. A gland 21 is fitted closely around the inner sleeve 16 and screwed into the upper end of the jacket in abutting 35 relation with the assembly 18 and may be locked in place by a suitable lock nut 22. The gland has the outwardly extended flange 23 at its upper end provided with notches 24 to receive a wrench whereby it may be screwed home and the 40 lock nut 22 is also provided with marginal notches 25 for a similar purpose.

Within the upper end of the sleeve 9, and abutting the lower end of the sleeve 16 there is a plate 26 which is split in two similar sections as shown in Figure 2. Abutting the lower side of the plate 26 there is the inner sleeve-like packing 27 which is also split and thus preferably formed in two sections as also indicated in Figure 2. The lower end of the packing 27 50 is annularly grooved to form outer and inner lips 28, 29, the former of which fits closely within the sleeve 9 and the latter of which fits closely around the grief pipe or kelly 30 when the pressure head is seated in the casing head.

Within each section of the packing 27 there is molded a cage 31. Clamp rods 32 have their lower ends screwed into, or otherwise attached to, these cages and they extend up through the plate 26 and the sleeve 16 and their upper ends receive the clamp nuts 33 for securing the assembly together. In case of wear and leakage, on the part of the packing 27, the nuts 33 may be tightened up to draw the inner packing more closely against the lower side of the plate 26 thereby causing an expansion of the packing as is required to form the necessary close fit.

One of the rods 32 has a duct 34 leading downwardly from the upper end thereof and being outwardly turned through the cage 31 and through the packing 27. The upper end of this rod has a conventional connection 35 for a grease gun or other appliance whereby a lubricant may be forced down through the duct 34 to lubricate the inner wall of the sleeve 9.

As is well known to those familiar with the art of well drilling the kelly 30 is attached to the upper end of the drill stem 36 and is usually formed polygonal being preferably square in cross-section for engagement with the driving bushing of the table of the rotary drilling machine. This kelly is also tubular having the passageway 37 therethrough for the passage of drilling fluid downwardly through the drill stem. The plate 26 and inner packing 27 are shaped internally, to fit closely about the kelly and to rotate therewith during drilling operations. While carrying on drilling operations the inner packing will close the space between the kelly and the friction sleeve 9 and the outer packing 11 will close the space between the said friction sleeve and the casing head thus making a blow-out impossible while drilling.

Means have been provided for securing the pressure head in place and for releasing the same which will now be described:—

The securing means referred to comprises the arcuate clamps 38, 38 which are hinged together at one side by the hinge pin 39, said hinge pin passing also through the laterally extending arm 40, preferably formed integrally with the casing head, whereby the clamps 38, 38 are supported on and hingedly connected to the casing head. The pin 39 is secured in place by a suitable nut 41 screwed onto the lower end thereof. The other ends of the clamps 38 have outwardly turned grips, or handles, as 42. Between the grips, 42, the clamps have intermeshing lugs as 43 having pin bearings which register when the clamps are secured around the packing unit and through which a pin 44 may be inserted to hold the clamps in securing position. This pin 44 may be secured against loss by means of a chain or other flexible member as 45. As clearly shown in Figure 1 each clamp has an inwardly extended inside rib, or flange, 46 which seats in the groove 6 of the casing head, when the clamps are secured in position, whereby the clamps are securely held against detachment from the head and each clamp has an inside shoulder 47 which engages over the external shoulder 15 of the jacket 8 when the clamps are in securing position whereby the pressure head is securely locked in position. The grips, or handles, 42 are connected by a yieldable connection as 48, usually a coil spring. The construction of the clamps 38, the means for locking them in engagement with the casing head and with the pressure head, the means for yieldingly connecting the grips, or handles, and the means for securing the free

ends of the clamps together are substantially the same as that illustrated in Patent No. 1,997,152 issued to applicants on April 9, 1935, and a further and more detailed description and disclosure thereof is not believed to be necessary herein.

The clamps 38 are flared upwardly as at 49 for a purpose to be hereinafter stated.

In use the packing unit is assembled about the kelly 30 and is maintained thereon while carrying on drilling operations. When it becomes necessary to detach the kelly from the upper end of the drill stem for any reason, as when it is desired to add another section to the drill stem for drilling deeper, the pin 44 may be removed and the clamps 38 swung open to release the pressure head and the kelly may be detached and elevated together with the pressure head thereon. While being detached and elevated the drill stem will be suspended by the usual slips from the rotary table in the usual way. The additional section of drill stem may then be attached to the stem and the kelly connected to the upper end thereof and the drill stem as thus completed may be again lowered. As it is lowered the tapering face 14 of the jacket 8 will ride against the inside, upwardly flared portion 49 of the clamps and will spread the clamps apart to permit the downward passage of the pressure head and when the shoulder 15 clears the shoulders 47 of the clamps, said last mentioned shoulders will engage over the shoulder 15 under the influence of the pull spring 48 thus locking the pressure head in place.

The friction of the inner packing 27 against the sleeve 9 may have a tendency to cause the outer jacket 8 also to turn. In order to prevent this said jacket is provided with a socket 50 to receive an outwardly extended pin 51 which projects outwardly through the opening 52 of the clamp 38 whereby to lock said jacket against turning.

The drawings and description disclose what is now considered to be a preferred form of the invention by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What we claim is:

1. In a blowout preventer a pressure head comprising an outer jacket shaped to fit a casing head seat and having a depending sleeve, packing around the sleeve to form a seal with the sleeve and with the casing head in which the pressure head is seated, packing within said sleeve adapted to form a seal with the sleeve and with a pipe through the pressure head, packing supporting means rotatably mounted within the jacket and supporting the last mentioned packing.

2. In a blowout preventer an outer tubular part shaped to fit an inside casing head seat and having a depending tubular extension, sealing means around said extension shaped to close the space between said extension and the casing head, an inner rotatable part mounted in the jacket, annular sealing means carried by the rotatable part and shaped to close the space between said extension and an inner pipe through the pressure head.

3. In a blowout preventer an outer tubular part shaped to fit an inside casing head seat and having a depending tubular extension, sealing means around said extension shaped to close the space between said extension and the casing head, an inner rotatable part mounted in the outer part,

annular sealing means carried by the rotatable part and shaped to close the space between said extension and an inner pipe through the pressure head, said pressure head having means for supplying a lubricant to the inner wall of said extension.

5 4. In a blowout preventer a pressure head shaped to receive an inner pipe and comprising an outer tubular part shaped to fit a casing head
10 seat and having a depending tubular extension,

sealing means between the outer tubular part and adapted to form a seal with the casing head seat, an inner rotatable part mounted in the tubular part, annular sealing means carried by the rotatable part and shaped to close the space between said extension and an inner pipe through the pressure head. 5

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