April 12, 1932. W. S. GATTRELL 1,853,855

PACKING DEVICE

Filed Jan. 23, 1928

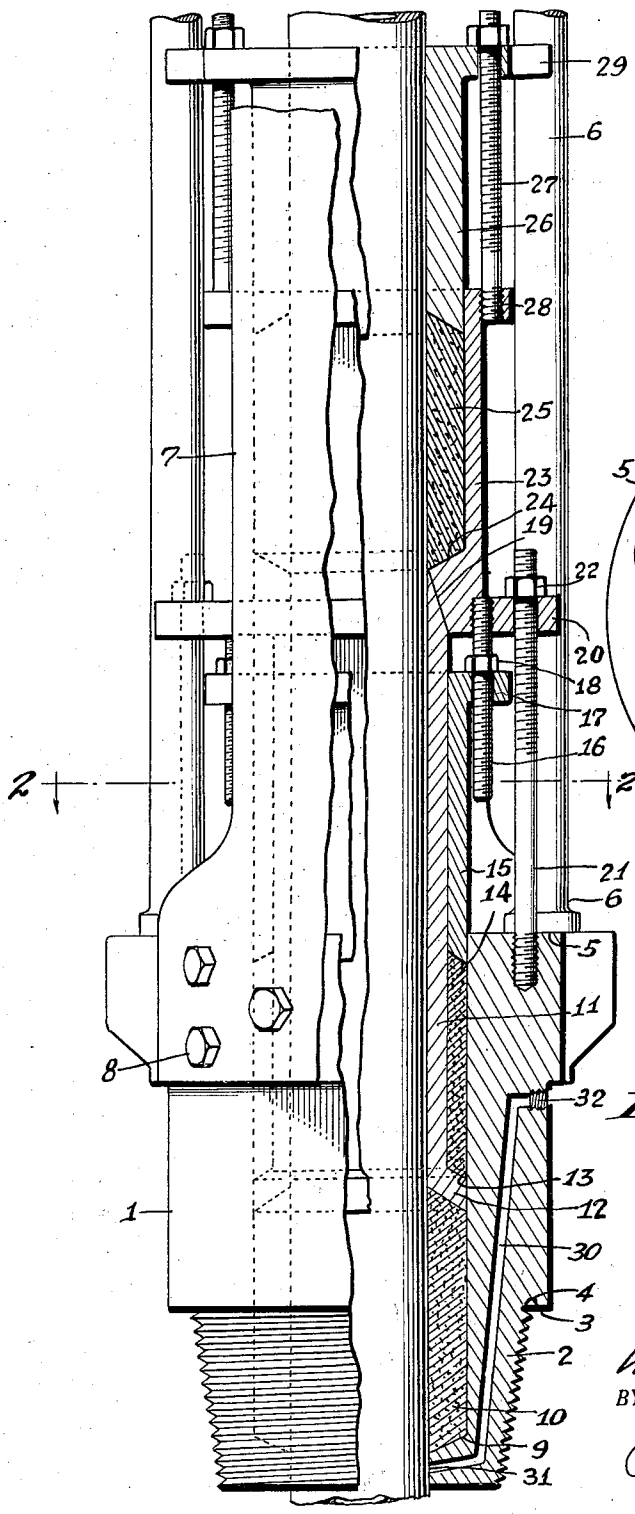

Fig. 1.

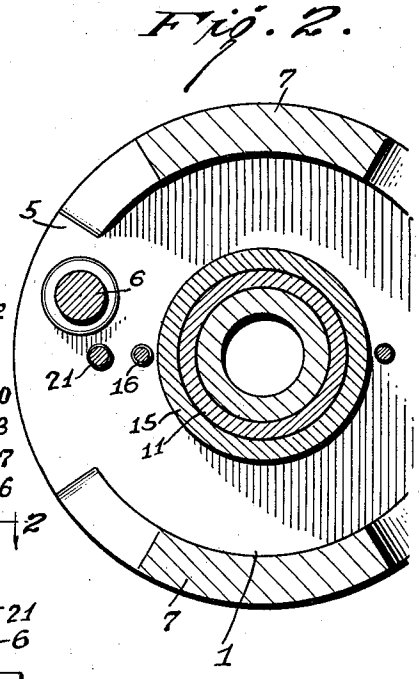

Fig. 2.

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UNITED STATES PATENT OFFICE

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PACKING DEVICE

Application filed January 23, 1928. Serial No. 248,735.

My invention relates to packing means to seal off the space within a casing head and about a flush joint drill stem in well drilling.

In many cases a well must be drilled into a producing formation which has a high gas pressure tending to blow the tools from the well. When such conditions are encountered, in rotary drilling, it becomes necessary to equip the drilling rig to take care of the gas pressures and prevent blowouts. The drill stem is sometimes coupled together with flush couplings so that a stuffing box may be formed in the casing head through which the drill stem may pass and still preserve a seal about the same to prevent escape of gas. The drill stem may thus be rotated and raised and lowered without danger.

There is some difficulty experienced with such an equipment in that the packing in the usual stuffing box will wear, so that a leak may develop in the seal thus provided, and this may happen at a critical moment when a blowout is imminent, and before the drill stem can be entirely withdrawn.

It is a further difficulty that the packing will freeze due to the expansion of the gas coming from the well under pressure. There is such a low temperature at the point of escape of the gas that the packing is frozen tight to the casing and to the gland.

It is an object of my invention to provide means for lubricating the packing in such manner as to avoid its freezing to the casing and the gland. It is also desired to provide a plurality of adjustable packing devices arranged between the casing head and the drill stem, so that if one packing fails, through mutilation or otherwise, there will be other devices which are securely packed to prevent accidental blowout of the well.

It is desired to provide a complete assembly for attachment to the casing head which will be capable of movement as a unit, but which will provide a plurality of means for preventing the escape of gas between the drill stem and the casing head. It is a further object to so construct the device that the packing elements will be prevented from rotation during the operation of the drill stem.

Referring to the drawings, Fig. 1 illustrates a side view partly in elevation and partly in vertical section, illustrating the application of my invention. Fig. 2 is a transverse section taken on the plane 2—2 of Fig. 1.

This device is shown as applied to a casing head of the same general structure as the one disclosed in my copending application No. 103,191, filed April 20, 1926, on a well drilling equipment.

The structure is adapted to be connected with the casing head employed in drilling. I have a lower tool joint member 1, which is threaded at 2 to engage with the casing head after the manner of an ordinary tool joint. At the upper end of the threaded shank there is a shoulder 3, which may have a lower groove 4 therein to receive packing, so as to assure a tight joint between the coupling and the casing head. The upper end of the tool joint member has a shoulder 5, upon which supporting posts 6 are mounted, these posts acting to connect with pipes supporting elements not shown and forming no part of this invention. As will be seen from Fig. 2, there are also plates 7 connected by bolts 8 to the outer surface of the tool joint and extending upwardly on each side of the drill stem and also serving as spacing elements.

The interior of the tool joint member is provided with a recess, the lower end 9 of which forms a seat for packing, and I contemplate employing a flexible packing indicated at 10, which may be compressed in said seat by a gland 11. This gland is of the full width of the recess at its lower end and has an annular outwardly flaring skirt 12, but is in turn recessed on its outer face to provide a seat 13 to receive further packing 14 between the gland and the inner wall of the recess within the joint. This packing 14 is adapted to be compressed within its seat by a gland 15, comprising a sleeve fitting slidably upon the outer surface of the gland 11, and adapted to be moved downwardly into said seat by means of threaded bolts or shafts 16, which are extended through a marginal flange 17 on the gland and which are secured

at their upper ends within the gland 11. A nut 18 upon each of the bolts 16 is adapted to screw downwardly on said bolts to adjust the gland 15.

The gland 11 is preferably made in two parts, joined together along a line 19, it being contemplated that these two parts shall be secured together by any desirable means so that the two parts will operate as one. The joint at 19 is necessary in order to allow the use of the sleeve 15 which must be inserted over the upper end of the lower section of the gland 11. Considering the gland 11 as an integral part, as it is when assembled, I have provided a radial flange 20 thereon somewhat about the central portion of the gland. This flange is formed with threaded openings to receive the bolts 21 secured at their lower ends within the joint member 1. Nuts 22 on said bolts serve to adjust the gland 11 in an obvious manner.

The upper portion 23 of the gland 11 is recessed to form an inner seat 24 to receive packing 25, which may be compressed by a gland 26 shaped to fit about the drill stem and within a recess 24. The gland 26 is adjusted through a bolt 27, supported at its lower end within a flange 28 on the gland 23 and extending through the flange 29 on the gland 26. The flanges upon the two glands 11 and 26 are formed with recesses or notches to receive the posts 6 previously referred to, so as to prevent the rotation of the packing elements during the rotation of the drill stem.

In the operation of my device, I find that it is desirable to lubricate the drill stem in such manner as to prevent its freezing to the packing 10. This can best be accomplished by a series of oil channels 30 formed in the coupling or joint 1 and extending into said joint so as to deliver lubricant at 31 below the packing 10, as will be obvious from Fig. 1. I may employ a threaded plug 32 at the upper end of this oil channel to close the same after said channel has been filled with lubricant.

When the drill stem is rotating under ordinary circumstances the packing will be adjusted loosely so as not to wear against the drill stem, but when any stratum has been encountered which gives indications of gas pressure or of oil, the two packing elements 25 and 14 will be adjusted first. This will be done by securing the glands 26 and 15 downwardly upon these packing elements. The upper packing 25 prevents the escape of gas between the drill stem and the gland. The lower packing 14 prevents the escape of gas on the outside of the gland and between the same and the tool joint. The driller will be able to rotate his drill stem and move the same downwardly into the well and be thus protected against the blowout of gas.

If it is found that oil has been reached, the drill stem will be withdrawn upwardly from the well and it is desired to make certain that no wearing or mutilation of the packing will take place during this operation. If it is noted that the interior packing 25 has been worn or broken, it will be possible to adjust the gland 11 upon the packing 10, and by compressing this gland upon the packing cut off the escape of gas entirely at that point. I am thus assured of safety in the operation of the drill stem during the usual operations and during the withdrawal of the drill stem from the well. The advantages of this construction will be obvious to those skilled in the art.

What I claim as new is:

A multiple stage stuffing box for use about a tube including a joint member, a packing seat therein, packing on said seat, a gland having a body portion in contact with said tube, an outwardly flaring skirt on the lower end adapted to contact said packing, a second packing in said first seat but overlying said skirt, a second gland for said second packing, and means to adjust said glands independently or together.

In testimony whereof I hereunto affix my signature this 4th day of December, A. D. 1931.

WILLIAM SLOVER GATTRELL.