July 10, 1934. W. S. PIERCE 1,965,907

GAS AND OIL WELL EQUIPMENT

Filed Dec. 13, 1932

Fig. 1.

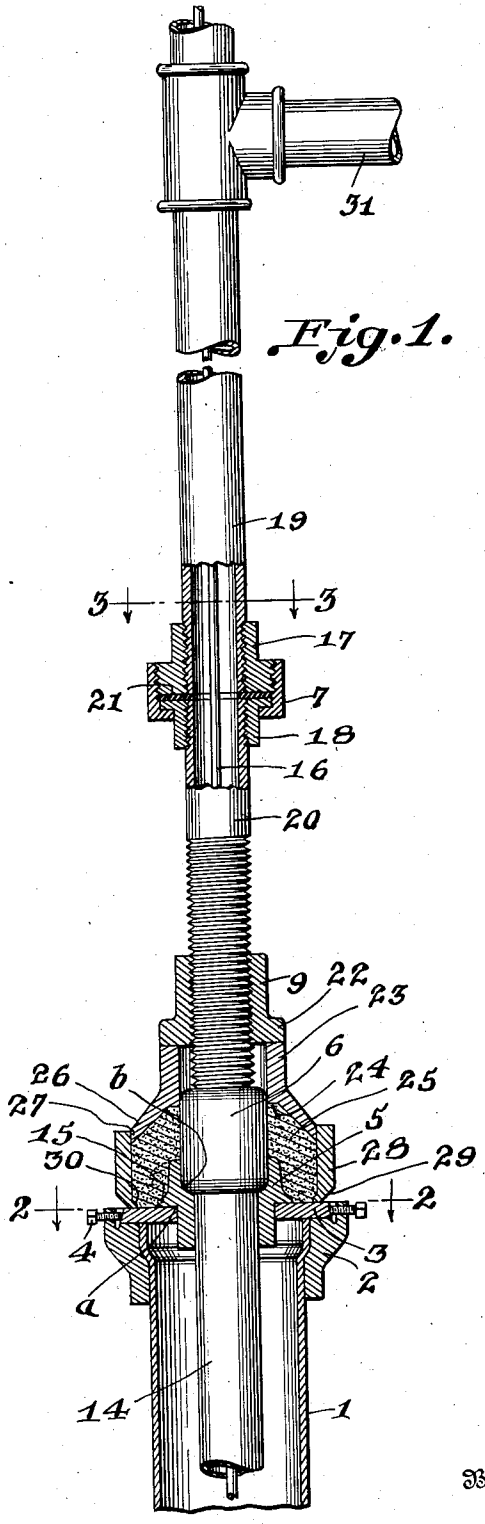


Fig. 2.

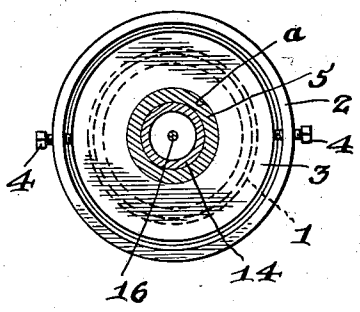
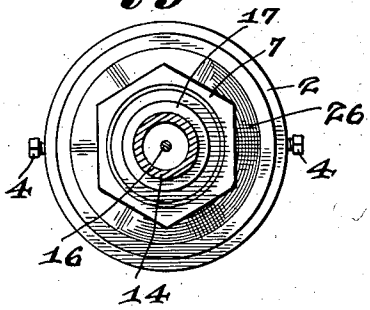


Fig. 3.



Inventor

W. S. Pierce

By Wilkinson & Mawhinney

Attorneys

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GAS AND OIL WELL EQUIPMENT

William S. Pierce, Keystone Heights, Fla., assignor of one-half to James A. Rupert, Keystone Heights, Fla.

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8 Claims. (Cl. 166—14)

The present invention relates to improvements in gas and oil well equipment and has for an object an improved construction of oil well casing, tubing and associated parts whereby to increase the life of the tubing, distribute sucker rod wear of the tubing and avoid shut downs and suspension of production.

It is found that in drilling wells it is impossible to drill a perfectly straight hole, especially where the wells are very deep, and more especially where the rotary drill is used. The tubing must follow this crooked hole and is correspondingly crooked.

When the well is pumping, the sucker rods inside the tubing lift a great weight when on the up stroke. This weight tends to straighten out the rods, causing them to rub and wear the tubing excessively, sometimes wearing holes in the tubing, causing it to leak. This leakage entails great trouble and expense as the rods and tubing must be removed from the well and new tubing supplied. Of course production must be suspended and lost while this work is being done.

It is an object of the present invention to supply a means whereby the tubing can be quickly and easily rotated by one man without loss of gas and without shutting down the well.

It will be understood that, if the tubing is rotated the fraction of a turn, it will cause the tubing to wear in a new place, and as a consequence tubing can be made to last many times as long as at present, and with correspondingly less expense and loss of production.

Another object of the invention is to provide a new and improved form of packing at the casing head to resist wear involved in the rotation of the tubing as above explained and to present egress of gas or ingress of air around the tubing.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation, with parts broken away and parts shown in section, of an improved oil well constructed in accordance with the present invention.

Figure 2 is a horizontal section taken on the line 2—2 in Figure 1, and

Figure 3 is a similar view taken on the line 3—3 also in Figure 1.

Referring more particularly to the drawing, 1 designates the casing and 2 represents the casing head upon which is seated the casing head plate 3, being held in place by the set screws 4. A sleeve 5 is shown as placed on the last joint of the tubing 14. This sleeve extends through the plate 3 and has a shoulder 15 for resting on such plate 3. The coupling 6 of the tubing rests in or on the sleeve 5.

Heretofore, before lowering the coupling 6 onto the plate 3, a fibrous packing, usually hemp, was wound around the sleeve at the point marked *a*. Also similar packing was wound around the tubing at the point marked *b*. Such packing at *a* and *b* is to prevent the gas escaping, and will hold indefinitely if the tubing is not disturbed. However, if the tubing is rotated the merest degreee, it will grind out this packing, causing the gas to leak.

In accordance with my invention I am enabled to do away with this fibrous packing at the points *a* and *b*. This enables me to rotate the tubing 14 so as to present new surfaces to the sucker rod 16. I therefore provide a novel form of packing in connection with the casing head which will not be affected by the rotation of the tubing 14, and above such casing head I provide means to enable the rotation of the tubing.

At 7 is shown the external flanged nut of a lip union composed of the internally threaded members 17 and 18. The member 17 is screwed onto a section 19 of the tubing. In a similar manner the member 18 is screwed onto a section or nipple 20 of the tubing. This section 20 is externally threaded throughout a great portion thereof extending down to its lower part and into the coupling 6. The section 20 is also screw threaded at its upper end in order to take the union member 18. A gasket 21 is placed between the two members 17 and 18 and the nut 7 is employed to bind the two members 17 and 18 upon such washer or gasket 21 in order to provide a tight joint and to hold the sections of the tubing against movement. On the lower portion of the tubing section 20 is threaded a sleeve 9 which may be screwed or rotated up and down upon the section 20. This sleeve 9 has a flange 22 at its lower portion resting upon the cylindrical portion 23 of a rubber or other packing gland. This cylindrical portion 23 fits over the upper portion of the coupling 6 and provides a shouldered or right angular lower edge portion 24 presented to the rubber or other packing 25 which is placed about this coupling 6. The gland also comprises a lower skirt portion 26 extending downwardly and flaring outwardly from the shoulder 24 in order to encompass the upper portion of the loose packing 25.

The skirt has a flat vertical edge 27 fitting snugly within a sleeve 28 which surrounds the lower portion of the packing and rests upon the plate 3. The pressure on the gland may be changed by screwing the sleeve 9 up or down on the tubing section 20.

The sleeve 28 is of much smaller outer diameter at the point where it rests on 3 than it is above such point. It is made in this way so that

nothing but atmospheric pressure can be on the under side of the sleeve 28. If there should be any leak of gas inside the sleeve 28, such gas could not get under the sleeve to force the sleeve upward. This involves a lower cut away portion 29 of the sleeve. Opposite this cut away portion and upon the interior of the sleeve is an inner ring or projection 30 of smaller inside diameter than the inside diameter of the remaining portion of the sleeve 28. This ring 30 is only for a short distance or in other words for a small vertical height. When pressure is applied to the packing 25, as by the action of the nut 9, the packing will be squeezed down upon the inner sloping wall of this ring 30, tending to hold the sleeve 28 down.

To operate the device, the man in charge slightly loosens the nut 7 of the lip union. He thereupon puts his pipe tongs on the tubing 20 and rotates the tubing a small fraction of a turn. Thereupon the nut 7 is tightened.

If any leakage should occur the nut 9 is run down to the necessary extent until the leakage is stopped. As to how often this operation must be performed, that will be determined by the condition of the well. In some wells it would probably have to be done every few weeks, while on others it would probably only have to be done at several month periods.

It will be apparent that this operation can be accomplished in a few minutes and during the time the well is pumping.

It will be noted that if the nut 9 is screwed down hard enough it will not only compress the packing but it will pick up the entire string of tubing thereby removing the weight of the tubing on the member 5 at the point *b* and placing the entire weight of the tubing on the threads of the nut 9. This construction has various advantages. For instance, a tubing can be rotated on the part 23. Also it is important that the weight of the tubing be not allowed to rest on the member 5 while the well is pumping, as the vibration of the pumping apparatus sometimes causes the threads of the tubing 14 to loosen in the coupling 6 if the coupling rests on the sleeve 5. This does not occur if the tubing is suspended in the well. The advantages of the present device is simplicity, the tubing can be easily rotated, but the most important advantage is this—if an accident should occur, such as a walking beam being thrown off, or a derrick blown down, nothing could be injured below the top of the nut 9. This broken nipple 20 could be easily screwed out of the coupling 6 and a new one supplied without disturbing the tubing 14 below the coupling.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In gas and oil well apparatus, a casing head, tubing including sections above the casing head, a support for the tubing on the casing head, a packing about the support and tubing, external means to adjust the packing, and a releasable coupling means between the sections to enable the lower section and tubing to be rotated within the packing with respect to the next upper section.

2. In gas and oil well apparatus, a casing head, tubing including sections above the casing head, a support for the tubing on the casing head permitting rotary movement of the tubing, a packing about the support and tubing, external means to adjust the packing, flexible coupling members on the said sections, and releasable means for normally holding the sections tight and against relative rotary movement but allowing same, when released, to rotate relatively to change the angular position of the tubing with reference to the sucker rods.

3. In gas and oil well apparatus, a casing head, tubing supported therethrough, a head plate, a sleeve on the head plate, a gland sliding in the sleeve, and adjusting means for the gland on the tubing.

4. In gas and oil well apparatus, a casing head, a head plate, tubing supported through the head plate, a sleeve supported on the head plate and having an outer cut-away lower edge and an inner flange with beveled upper face, packing engaging said flange, and a gland for tightening said packing.

5. In gas and oil well apparatus, a head plate, a string of tubing extending downwardly through said head plate and having a portion extending above the head plate, a nipple disposed above the head plate, a coupling removably connecting said nipple to the portion of said tubing above the head plate and adapted at times to be supported by said head plate, a nut threaded on said nipple above the coupling, and supporting means interposed between the nut and the head plate and cooperating with the nut to lift and support the coupling and tubing free of the head plate when the nut is screwed down.

6. In gas and oil well apparatus, tubing, a nipple, a coupling connecting the upper end portion of said tubing to said nipple, supporting means below said coupling for supporting the tubing, supporting means for supporting the weight of the tubing and nipple at a point above the coupling during operation of the apparatus and including a movable member for lifting the tubing and holding the tubing in an upraised position free of said first supporting means.

7. In gas and oil well apparatus, a casing head, tubing extending through said casing head, a nipple above said casing head, a coupling connecting said tubing and nipple, a sleeve seating upon said casing head and surrounding said coupling, packing surrounding said sleeve and coupling and resting upon said casing head, a gland engaging said packing and surrounding said nipple and the upper portion of said coupling, and a nut threaded upon said nipple above the coupling and engaging the upper edge of the gland and closing the space between the gland and nipple.

8. A means for supporting the tubing in a casing comprising a head plate engaging the top of the casing, said tubing projecting through said plate and having a coupling on the upper end thereof, a threaded member secured to and extending upwardly from the coupling, and means disposed about the coupling and engaging the head plate for lifting and supporting the coupling and tubing free of the head plate.

WILLIAM S. PIERCE.