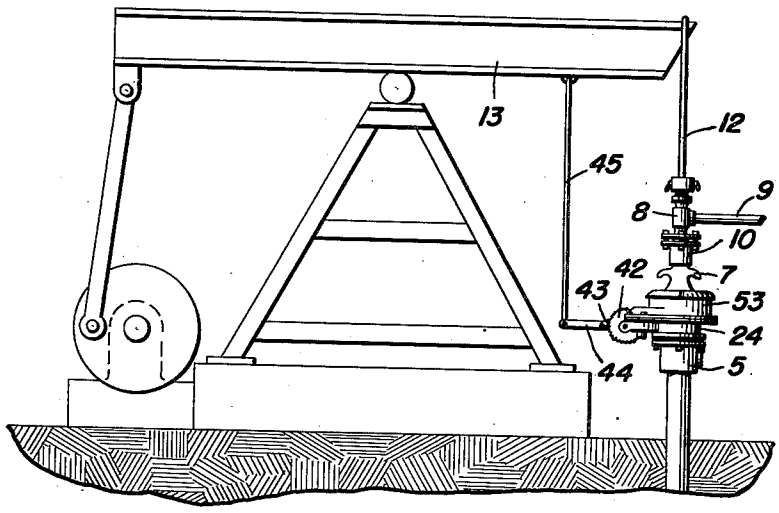
May 6, 1952 W. W. WILLIAMS 2,595,434

TUBING ROTATOR

Filed June 27, 1949

2 SHEETS—SHEET 1

Fig. 1.



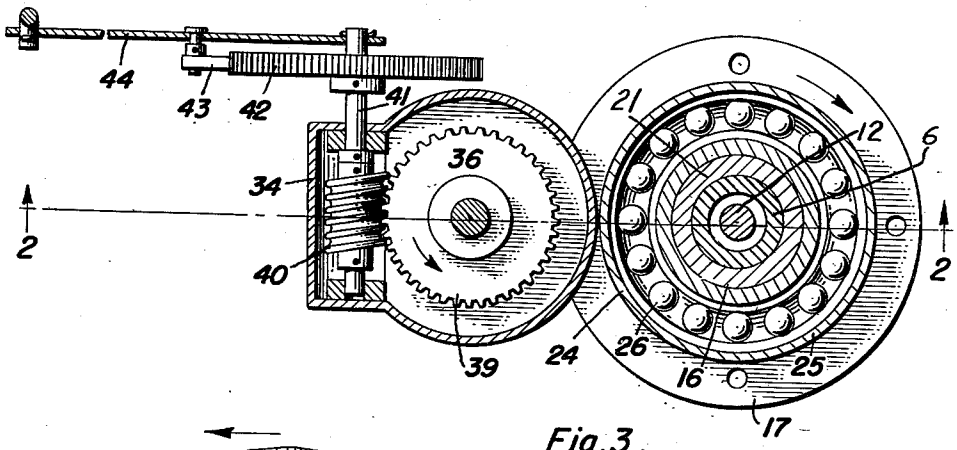


Fig. 3.

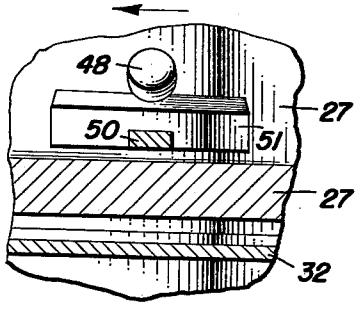


Fig. 5.

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2 SHEETS—SHEET 2

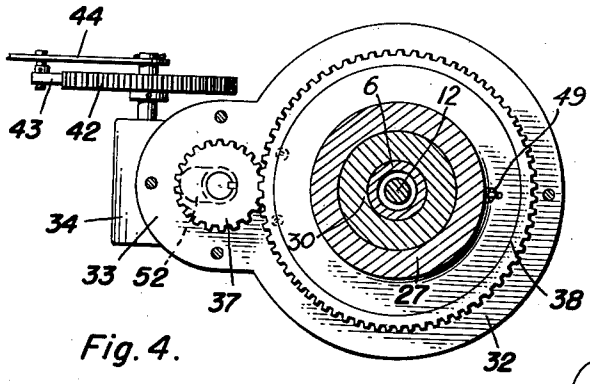


Fig. 4.

Fig. 2.

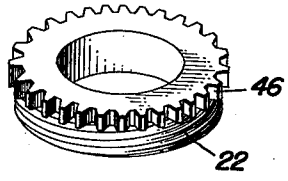


Fig. 6.

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UNITED STATES PATENT OFFICE

2,595,434

TUBING ROTATOR

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Application June 27, 1949, Serial No. 101,550

7 Claims. (Cl. 166—14)

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The present invention relates to new and useful improvements in oil wells and more particularly to means for rotating the tubing of a well to prevent excessive wear therein at the point of contact by the sucker rod working in the tubing.

In wells which have to be pumped, and particularly where the tubing is not straight, the sucker rod rubs against one side of the tubing causing the wearing of a groove therein and which finally causes a break in the tubing and necessitating pulling and replacing thereof. This excessive wear in the tubing frequently occurs after only a few months operation and results in considerable loss of pumping hours and expense in replacing the tubing.

Accordingly it is an object of the present invention to provide means for rotating the tubing to prevent wear thereof at any one point in the tubing and to thus distribute the wear over its entire internal surface so as to prolong the lift thereof.

A further object is to provide mechanism causing rotation of the tubing at a very slow speed to reduce wear of the packing for the tubing to a minimum.

Another object is to provide novel means for taking up wear in the packing.

Another object is to provide a tubing rotator whereby the tubing will be kept free of excessive accumulation of scale and paraffin by the constant changing position of the tubing relative to the sucker rod.

A still further object is to provide a tubing rotator which may be installed in position between the usual casing head and tubing holder without necessitating any changes or alterations in the construction thereof.

Another object is to provide a device of this character of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of a well showing the tubing rotator in position;

Figure 2 is an enlarged vertical sectional view of the rotator;

Figure 3 is a transverse sectional view taken on a line 3—3 of Figure 2;

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Figure 4 is a transverse sectional view taken on a line 4—4 of Figure 2;

Figure 5 is an enlarged fragmentary sectional view taken on a line 5—5 of Figure 2 and,

Figure 6 is an enlarged perspective view of the packing unit.

Referring now to the drawings in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of my invention, the numeral 5 designates a conventional type of casing head, 6 is the tubing threaded in the lower end of a conventional type of tubing holder 7 and to which is attached a fitting 8 for the discharge pipe 9 by means of a swivel 10 provided with a packing gland 11 for the rotation of the tubing and tubing holder, while the casing head 5 and fitting 8 remain stationary. The sucker rod 12, which works in the tubing, extends upwardly through the fitting 8 and is operated by the walking beam 13 of the well.

The upper end of casing head 5 is flared as shown at 14 to receive the tapered lower end 15 of an annular gland bearing member 16 having a flange 17 for attaching on top of casing head 5 by studs 18. Sealing rings 19 are positioned between casing head 5 and tapered portion 15 of gland member 16. The lower end of tapered lower portion 15 of gland member 16 is formed with an internal flange 20 to space the gland member centrally from the tubing 6 and on which packing 21 is supported and compressed by a nut 22 threaded in the upper end of gland member 16 with a coil spring 23 positioned between the nut and the packing.

A sleeve 24 is welded at its lower end to flange 17 outwardly of gland member 16 to provide an annular channel 25 in which a bearing assembly 26 is positioned and on which is supported an annular casting 27 having its lower end rotatable in channel 25 and also provided with a sealing ring 28. The tubing holder 7 rests on the upper end of casting 27 and provides a friction drive therewith and the upper end of the casting is shaped to receive the lower end 30 of the usual tubing holder.

Sleeve 24 is formed with a flange 32 forming a shelf 33 at one side and to the underside of which a gear housing 34 is secured by bolts or the like 35. A vertical shaft 36 is journalled in the top of housing 34 with a pinion 37 secured to the upper end of the shaft engaging a ring gear 38 suitably secured to casting 27.

A worm gear 39 is secured to shaft 36 in housing 34 driven by a worm 40 on a shaft 41 also journalled in the housing and having one end

projecting outwardly thereof and to which a ratchet 42 is secured. The ratchet is driven by a pawl 43 secured to one side of an arm or lever 44 which is pivoted at one end on the outer end of shaft 41 and a rod or link 45 connects the outer end of arm 44 to walking beam 13.

Packing nut 22 is toothed as shown as 46 and engaged by the inner end of a pin 47 slidably in an upwardly inclined position in one side of casting 27. A head 48 is provided at the outer end of pin 47 behind which is placed a coil spring 49 to hold the pin outwardly out of engagement with nut 22. A bracket 50 rises from flange 32 and curves inwardly over ring gear 38 with an arcuate cam 51 at the inner end of the bracket for engagement behind head 48 of pin 47 with each revolution of casting 27.

Bearing assembly 26 runs in a bath of oil contained in channel 25 and gears 39 and 40 are likewise immersed in oil in housing 34. Suitable filler plugs (not shown) are provided for oil channel 25 and gear housing 34.

A slot 52 is provided in plate 33 in which shaft 36 slides to enable removal of gear housing 34 by sliding the housing outwardly sufficiently to clear flange 17 after removal of studs 35 and disengaging pinion 37 from shaft 36.

The casting 27, pinion 37 and ring gear 38 are enclosed by a cover 53 suitably secured to flange 32 and plate 33 and a sectional dust and weather protective ring 54 rests on the lowered edge of tubing holder 7 and overlies the inner edge of the cover.

In the operation of the device tubing holder 7 is attached to discharge fitting 8 by swivel 10 to permit rotation of the tubing holder while the discharge fitting remains stationary. Flange 17 of packing member 16 is attached to casing head 5, which also remains stationary, and casting 27 is rotatably supported in channel 25 of the packing member. Weight of the tubing holder provides a friction drive between casting 27 and tubing holder 7.

The oscillating movement of walking beam 13 in the usual manner during pumping operation reciprocates sucker rod 12 in the tubing and also reciprocates link or rod 45 to actuate pawl 43 and ratchet 42 and which turns casting 27 through worm and worm gear 40 and 39, pinion 37 and ring gear 38.

The diameter of ratchet 42 and reduced ratio of pinion 37 and ring gear 38 will result in an exceedingly slow turning movement of casting 27, tubing holder 7 and tubing 6 and in practice is timed to complete one revolution of the tubing approximately between 15 to 20 hours to thus avoid rubbing of the sucker rod at any one point of the tubing, but to allow the paraffin usually found in well tubing to continue to accumulate sufficiently to provide a lubricant for the sucker rod.

When it is desired to take up wear of packing 21, cover 53 is raised to expose pin 47 which is then pressed inwardly to engage the teeth 46 of packing nut 22, and as the casting rotates while the packing nut remains stationary, the pin will bind against the teeth to carry nut with the casting in a tightening movement for one complete revolution of the casting. As the head 48 of pin 47 approaches cam 51, the cam will ride under the head to retract the pin and release the pin from nut 22. Spring 49 holds the pin out of engagement until further tightening of the packing is desired.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the construction, operation and advantages of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting and extending downwardly therefrom, said tubing holder being adapted for attaching the upper end of a tubing thereto to extend downwardly through the casing head, a hollow casting surrounding the tubing and rotatably supported on top of the casing head, and in frictional driving relation with the tubing holder, and driving means for the casting.

2. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting and extending downwardly therefrom, said tubing holder being adapted for attaching the upper end of a tubing thereto to extend downwardly through the casing head, a hollow casting surrounding the tubing and rotatably supported on top of the casing head, and in frictional driving relation with the tubing holder, drive means for a reciprocating rod working in the tubing, and means connecting the casting to the drive means for converting the movement of the rod into rotary movement and transmitting the same to the casting.

3. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting and to which a tubing is attached, an annular gland member secured to the casing head and having an internal packing surrounding the tubing, said gland member also having an annular channel, a bearing assembly in the channel, an annular casting having its lower end positioned in the channel and rotatably supported on the bearing assembly, said tubing holder being positioned internally of the casting in frictional driving engagement therewith, and means rotating the casting.

4. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting and to which a tubing is attached, an annular gland member secured to the casing head and having an internal packing surrounding the tubing, said gland member also having an annular channel, a bearing assembly in the channel, an annular casting having its lower end positioned in the channel and rotatably supported on the bearing assembly, said tubing holder being positioned internally of the casting in frictional driving engagement therewith, and means rotating the casting and including a pawl and ratchet mechanism.

5. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably con-

nected to the discharge fitting and to which a tubing is attached, an annular gland member secured to the casing head and having an internal packing surrounding the tubing, said gland member also having an annular channel, a bearing assembly in the channel, an annular casting having its lower end positioned in the channel and rotatably supported on the bearing assembly, said tubing holder being positioned internally of the casing in frictional driving engagement therewith, drive means for a reciprocating rod working in the tubing supported by the tubing holder, and means operatively connecting the casting to the drive means and including a pawl and ratchet mechanism.

6. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting, an annular gland member secured to the casing head and having an annular channel, an annular casting having its lower end rotatably positioned in the channel, said tubing holder resting on the casting in frictional driving engagement therewith, means rotating the casting, packing between the gland member and tubing supported by the tubing holder and including a packing nut having circumferential teeth, and means for turning the packing nut to take up wear in the packing and including a pin slidably carried by the casting and movable into and out of engagement with the teeth of the nut to rotatably connect the pin to the casting.

7. In an oil well tubing rotator, the combination of a stationary casing head, a stationary discharge fitting, a tubing holder rotatably connected to the discharge fitting, an annular gland member secured to the casing head and having an annular channel, an annular casting having its lower end rotatably positioned in the channel, said tubing holder resting on the casting in frictional driving engagement therewith, means rotating the casting, packing between the gland member and tubing supported by the tubing holder and including a packing nut having circumferential teeth, and means for turning the packing nut to take up wear in the packing and including a pin slidably carried by the casting and movable into and out of engagement with the teeth of the nut to rotatably connect the pin to the casting, said pin having a head and a stationary cam in the path of rotary movement of the head with the casting to retract the pin to release the same from the nut.

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