Sept. 15, 1936. D. W. HOFERER 2,054,322

PUMP ANCHOR

Filed April 26, 1935

Fig. 1.

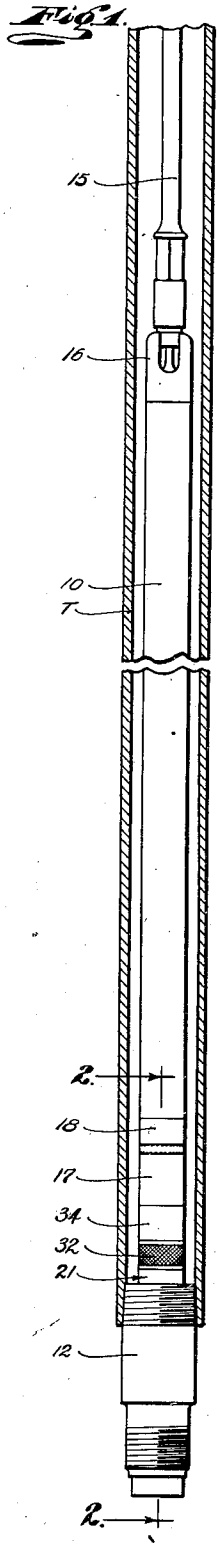


Fig. 2.

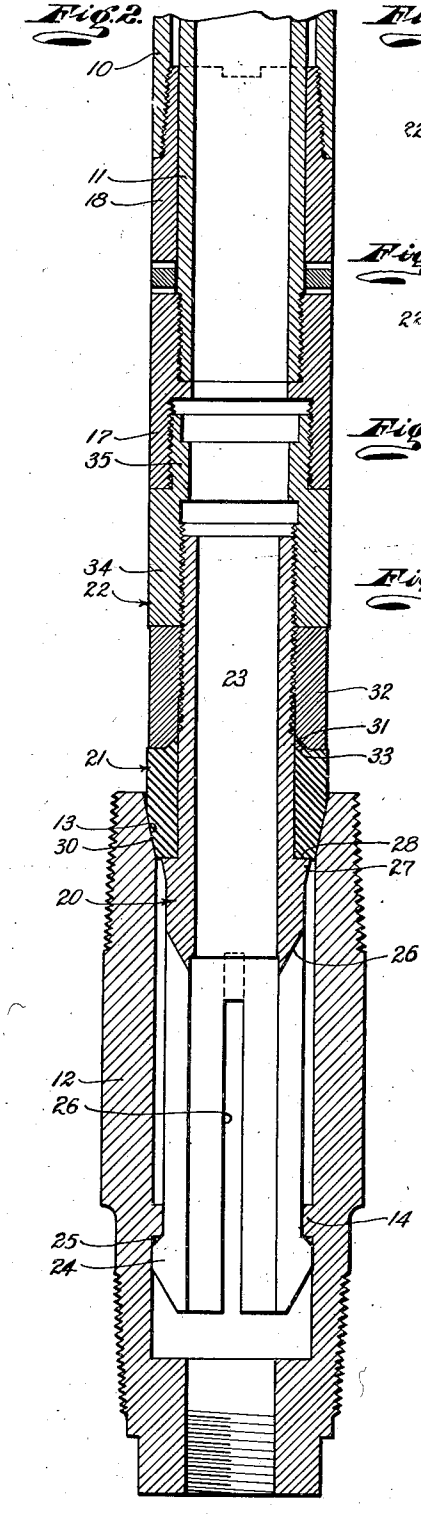


Fig. 3.

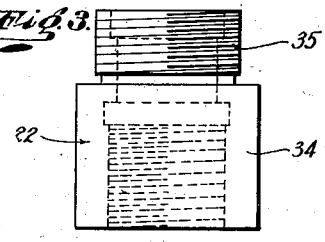


Fig. 4.

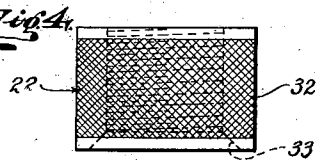


Fig. 5.

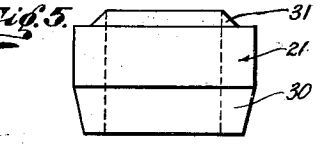
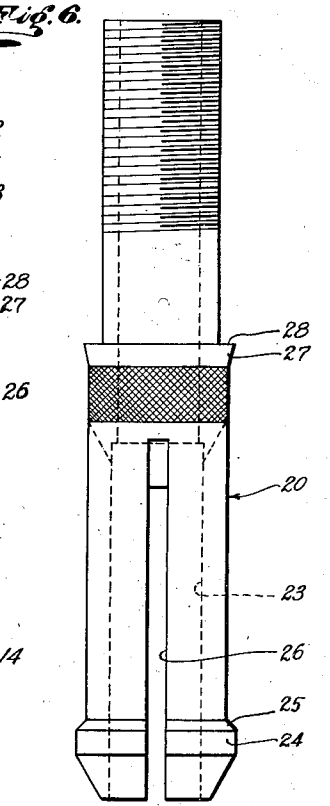


Fig. 6.



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UNITED STATES PATENT OFFICE

2,054,322

PUMP ANCHOR

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Application April 26, 1935, Serial No. 18,455

3 Claims. (Cl. 103—219)

This invention relates to well pumps and relates more particularly to anchors for connecting the stationary elements of the reciprocating type of well pumps with the pump tubing. A general object of the present invention is to provide a simple, practical dependable pump anchor.

The stationary elements of the reciprocating type of oil well pumps are releasably or removably connected with the tubing by devices known as anchors. Pump anchors are usually provided with packing rings of lead, babbitt or the like for sealing with the tapered seats in the shoes on the lower ends of the tubing. The soft metal packing rings soon become worn and damaged to the extent that they must be replaced or repaired. In the usual types of anchors special tools and equipment are required to replace the packing parts and it is usually necessary to take the anchors to shops to repair and recondition them. Further, the soft metal packing rings of anchors sometimes become displaced and lost in the wells when the pumps are removed.

Another object of this invention is to provide a pump anchor embodying an effective packing part that may be easily replaced at the well derrick or pump house without special tools or equipment.

Another object of the invention is to provide a pump anchor embodying a simple inexpensive packing part that forms a perfect seal with the shoe.

Another object of the invention is to provide an anchor having a sealing part that can be refaced from time to time as conditions may require to accurately and properly seal with the shoe.

Another object of the invention is to provide a pump anchor embodying a replaceable packing ring that is dependably held on the anchor body so that it cannot become displaced and cannot remain in the shoe when the pump and anchor are removed from the well.

A further object of the invention is to provide a pump anchor of the character mentioned that is dependable and long wearing and that is inexpensive of manufacture.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawing, in which:

Fig. 1 is a side elevation of a typical pump in position in a tubing illustrating the anchor provided by this invention connecting the stationary pump part with the tubing and shoe. Fig. 2 is an enlarged vertical detailed sectional view taken substantially as indicated by line 2—2 on Fig. 1. Fig. 3 is a side elevation of the member for coupling the anchor body with the pump part. Fig. 4 is a side elevation of the nut for retaining the sealing ring in place. Fig. 5 is a side elevation of the sealing ring and Fig. 6 is a side elevation of the anchor body with the other parts removed.

The pump anchor provided by the present invention may be applied to or used in connection with well pumps of various types. In the drawing I have illustrated my improved anchor employed in connection with a more or less typical oil well pump having a relatively stationary plunger and a reciprocating barrel. It is to be understood that the invention is not to be construed as limited to the particular use or application illustrated in the drawing and about to be described.

The typical pump structure illustrated in the drawing include a reciprocable barrel 10 and a stationary plunger 11 entering the lower end of the barrel 10. The pump is arranged longitudinally in a pump tubing or oil tubing T. A typical seat member or shoe 12 is provided on the lower end of the tubing T to carry the stationary plunger 11. The shoe 12 is a tubular member threadedly connected with the lower end of the tubing T to project downwardly therefrom. A downwardly and inwardly tapered seat 13 is formed in the upper end portion of the shoe 12. An annular internal flange 14 is provided in the lower end portion of the shoe 12. An operating rod or sucker rod 15 is connected with the upper end of the barrel 10 by the cage 16 of a working valve. A nut or coupling 17 is threaded on the lower end of the plunger 11 below the lower end of the barrel 10 and a guide 18 is provided on the lower end of the barrel to slidably engage the plunger. The anchor of the present invention releasably or detachably connects the lower end of the plunger 11 with the shoe 12.

The anchor provided by this invention includes, generally, a mandrel or body 20 adapted to be inserted in the shoe 12 to connect therewith, a packing or sealing ring 21 on the body 20 for sealing with the seat 13, and means 22 for removably retaining the ring 21 in place and for attaching the body 20 to the plunger 11.

The anchor body 20 is an elongated tubular member having a central longitudinal opening 23 extending through it from one end to the other. The body 20 is in the nature of a pin or

mandrel to be inserted in the shoe 12. An enlargement or head 24 is provided on the lower end of the body 20. The lower end or side of the head 24 has a rather gradually tapered surface while the upper end 25 of the enlargement 24 is more abrupt. The lower end portion of the body 20 is longitudinally slit being provided with spaced longitudinal slots or cuts 26. The cuts 26 make the lower portion of the body 20 flexible so that it may contract when the head 24 is forced or passed through the flange 14 and the resiliency of the body tends to return it to its original size and configuration so that the upper end 25 of the head cooperates with the flange 14 to releasably lock the body 20 to the shoe 12. The periphery or outer surface of the head 24 engages the interior of the shoe 12 to center the body 20. An annular enlargement or flange 27 is provided on the body 20 above the upper ends of the cuts 26. The flange 27 is positioned at or immediately below the lower end of the seat 13 and its upper side forms an upwardly facing annular shoulder 28. The upper end portion of the body 20 projecting above the shoe 12 is externally screw threaded and the portion of the body immediately below the flange 27 is knurled to indicate that it is adapted to receive a wrench. The body 20 is preferably formed of a non-corrosive alloy steel and heat treated.

The packing or sealing ring 21 is carried by the body 20 to seal with the seat 13 of the shoe 12. It is a feature of the invention that the sealing ring 21 is arranged on the body 20 so that it cannot become displaced in the well and so that it may be easily and quickly removed for replacement or repair at the well derrick or pump house. The ring 21 may be formed of copper, brass, lead, babbitt or other relatively soft metal or may be formed of any other suitable sealing material. It is preferred to form the ring 21 of copper or brass having a greater strength than the lead and babbitt that has been in use heretofore. In accordance with the invention the ring 21 is adapted to be arranged or passed over the upper end of the body 20 and brought to a position against the body shoulder 28. The lower end of the ring 21 is preferably flat and normal to evenly seat on the shoulder 28. A downwardly and inwardly inclined peripheral surface 30 is provided on the ring 21 to cooperate with the seat 13. The surface 30 is tapered and finished to effectively seal with the seat 13. The surface 30 seals with the major portion of the seat 13 and the sealing ring 21 is proportioned to project upwardly from the seat 13 beyond the upper end of the shoe 12. In accordance with the invention the sealing ring 21 has a flat normal upper end provided with an annular lip 31 having an upwardly and inwardly inclined outer surface.

The means 22 for retaining the sealing ring 21 in position and for connecting the body 20 with the pump part or plunger 11 includes a sleeve or nut 32 threaded on the body 20 to bear against the upper end of the sealing ring 21. The nut 32 has a flat normal lower end provided with an annular groove 33 to receive the lip 31. The wall of the groove 33 is inclined to effectively cooperate with the lip 31 to retain the ring close around the body and provide a tight seal between the ring 21 and the nut 32 and to insure a tight seal between the anchor body 20 and the interior of the upper portion of the ring 21. The combined weight of the sucker rod 15, the pump and the oil in tubing T is imposed on the ring 21 and the cooperation of the surface 30 with the seat 13 forces the interior of the lower portion of the ring 21 into tight sealing engagement with the body while the cooperation of the inclined wall of the groove 33 with the lip 31 forces the interior of the upper portion of the ring tightly inwardly against the body 20 and retains it in that position. The nut 32 is operable to hold the sealing ring 21 clamped tightly against the body shoulder 28. The nut 32 may be knurled to indicate that it is to be engaged by a wrench when assembling and disconnecting the anchor parts. The means 22 includes an extension or connecting member 34 threaded on the upper end portion of the body 20. The member 34 bears against the upper end of the nut 32 to dependably lock the nut in place. The member 34 projects upwardly beyond the upper end of the body 20 to connect with the pump. In the particular application of the invention illustrated in the drawing the member 34 has a reduced upper end portion 35 threaded into the lower end of the nut or coupling 17 on the lower end of the plunger 11.

In operation the parts of the anchor are assembled as illustrated in Fig. 2 of the drawing and the anchor is connected with the plunger 11 by the member 34 so that the projecting lower end of the body 20 is adapted to enter the shoe 12 when the pump is run to its position in the tubing T. The head 24 slips through the flange 14 to automatically connect the anchor with the shoe 12. When the anchor is in position in the shoe the surface 30 of the sealing ring 21 evenly cooperates with the seat 13 to effectively seal therewith. The ring 21 provides an effective seal between the body 20 and the shoe 12. The nut 32 tightly holds or retains the sealing ring 21 in its proper position on the body 20 where it tightly bears against the shoulder 28. The member 34 threaded to the upper end of the body dependably locks the nut 32 in its ring retaining position. The lip 31 in cooperation with the wall of the groove or recess 33 provides an effective seal between the ring 21 and the body 20 and between the ring 21 and the nut 32. When it is desired to remove the pump from the well the operating string 15 is given an upward pull which pulls the head 24 through the flange 14. The cuts 25 permit the body to contract as the head 24 is forced upwardly through the flange 14.

When the pump is in the derrick or pump house the member 34 may be easily disconnected from the nut or coupling 17 and may be unthreaded from the body 20. The nut 32 may then be unthreaded from the body to allow the sealing ring 21 to be removed. The sealing ring 21 may be replaced by a new sealing ring or may be refaced if necessary and then reassembled on the body 20. In the form of the invention illustrated the ring 21 is not adjustable and it is a feature of the invention that the shoulder 28 is a fixed shoulder so that it is impossible to incorrectly position the ring 21 when it is replaced or after it has been refaced. The nut 32 is, of course, threaded down on the body 20 to properly clamp the refaced ring or replacement ring against the shoulder 28. It is believed that it will be apparent how the sealing ring 21 may be re-assembled on the body 20 and then locked in place by the nut 32 and coupling member 34. It is to be noted that the sealing ring 21 may be easily and quickly replaced with

simple or common wrenches. The ring 21 is such that it may be refaced several times. The sealing ring 21 in being tightly clamped between the large body shoulder 28 and the nut 32 cannot possibly become displaced in the well. The shoulder 28 positively prevents the sealing ring 21 from remaining in the shoe 12 when the pump is removed from the well.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific form and application herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. An anchor for a well pump including, a body to be attached to a pump part and having a shoulder, a packing ring arranged on the body to engage the shoulder and operable to support the body in a shoe, a part threaded on the body to clamp the ring against the shoulder, and a separate threaded member locking said part on the body and connecting the body with the pump.

2. In combination, a shoe to be applied to a well tubing and having an internal seat, and an anchor for connecting a well pump part with the shoe including a body releasably locked in the shoe, a replaceable ring on the body bearing on the seat to seal therewith and support the anchor thereon, a nut retaining the ring on the body, and a separate threaded locking member locking the nut and means connecting the body with a part of the pump.

3. An anchor for a well pump including a body adapted to be attached to the pump or a threaded adapter thereon, the body having a fixed shoulder, a ring of sealing material arranged on the body to bear downwardly against the shoulder, a tapered lip on the upper end of the ring, a nut threaded on the body to hold the ring against the shoulder, the nut having a tapered groove receiving the lip and holding the lip inwardly against the body, and a separate member threaded on the body locking the nut and connecting the body with a part of the pump, the ring having an inclined surface on the ring for cooperating with a seat.

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