

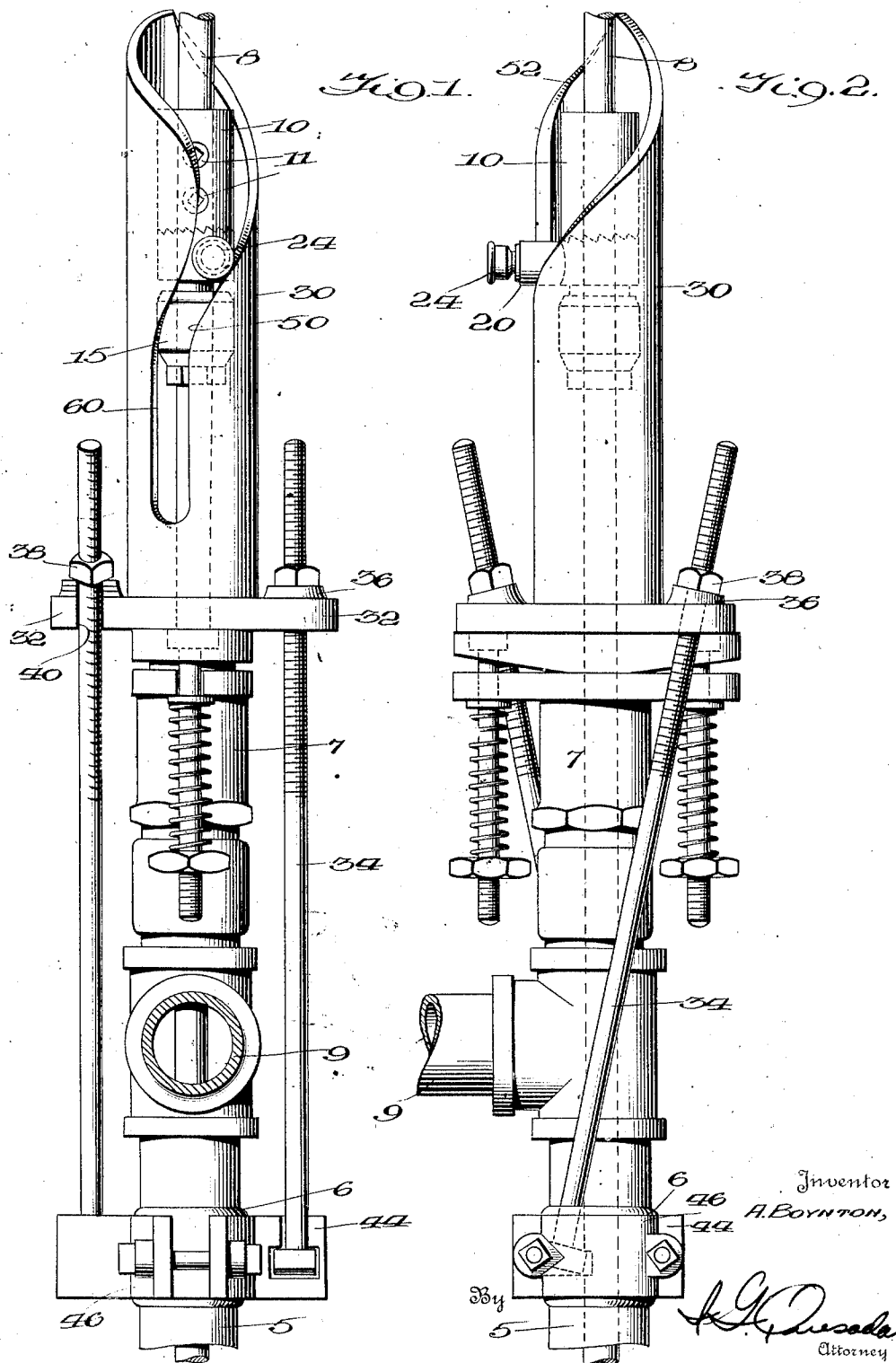
May 14, 1929.

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UNIVERSAL POLISHED ROD ROTOR

Original Filed Oct. 8, 1926 2 Sheets-Sheet 1



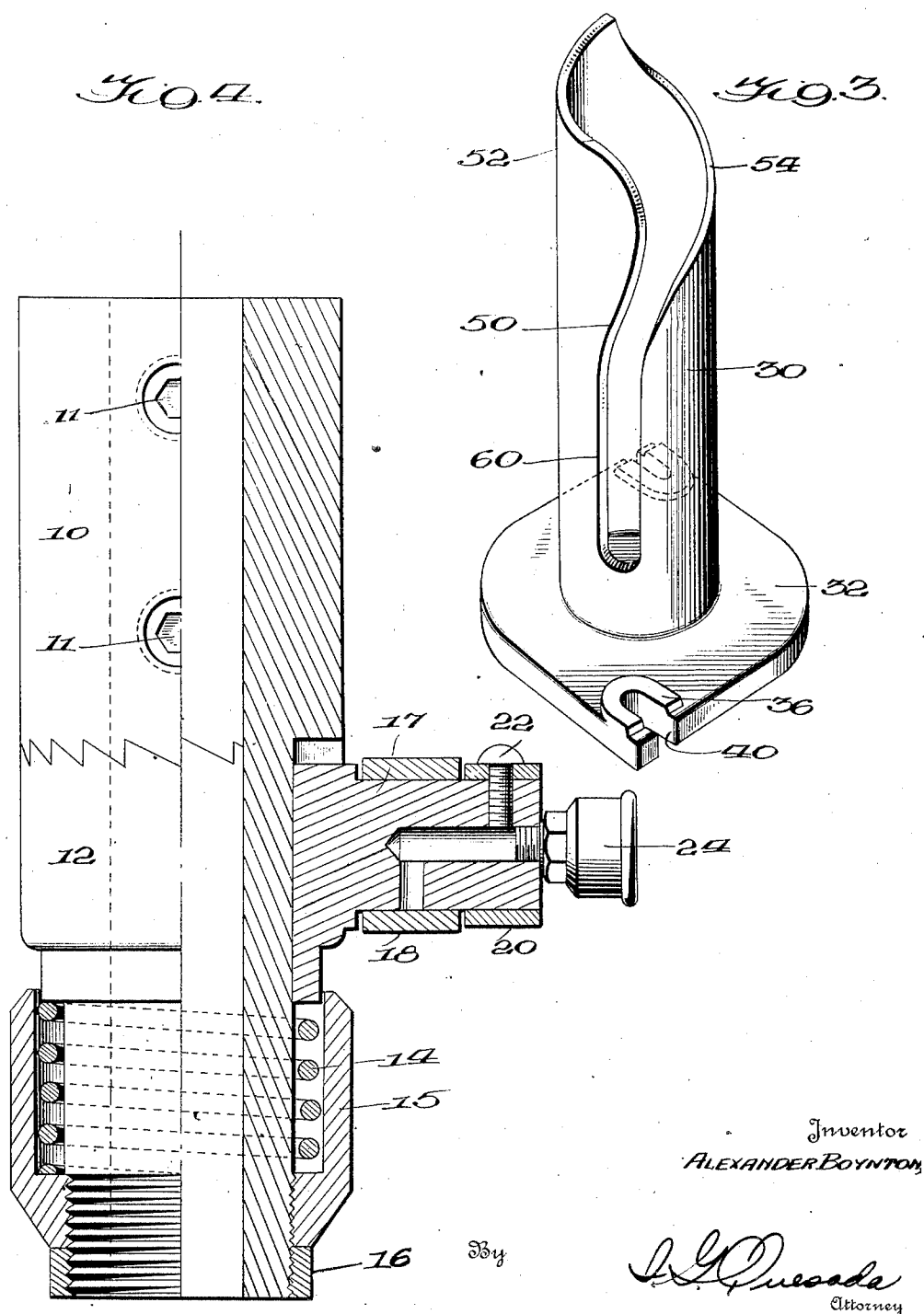
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UNITED STATES PATENT OFFICE.

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UNIVERSAL POLISHED-ROD ROTOR.

Application filed October 8, 1926, Serial No. 140,263. Renewed April 8, 1929.

This invention relates to polished rod rotors especially adapted for use in connection with pumping wells.

Briefly stated, an important object of this invention is to provide a polished rod rotor which is entirely independent of a pumping jack or other operating means for the reciprocating mechanism of the well and which is attached to those parts common to all pumping wells of which I know whereby a single rotor constructed in accordance with this invention is capable of universal application and use without any modification whatever.

A further and equally important object of the invention is to provide a rotor by means of which a polished rod, the sucker rods, and the fluid lifting unit connected thereto may be turned in a clockwise direction to distribute wear, to avoid the formation of squirt grooves or jets in the working barrel and the fluid lifting unit and at the same time to exert an intermittent tightening effect on the rods at all the joints thereof, the accomplishment of these aims being intended to avoid frequent interruption of the pumping operation.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a front view of the improved rotor in use;

Figure 2 is a side elevation of the same;

Figure 3 is a perspective of an actuating shell embodied in the invention;

Figure 4 is a side elevation of a rotor unit embodied in the invention, parts being shown in section.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 5 designates a tubing having a coupling 6 which normally rests on the casing head of a well. A stuffing box 7 of conventional or other design is attached to the upper portion of the tubing and provides a substantially liquid tight seal between the tubing and the polished rod 8, it being well known that the fluid is elevated by a fluid lifting unit such as a series of cups or a plunger at the lower portion of the sucker rods connected to the polished rod and that the fluid thus elevated is carried off from the well through a pipe 9.

At this point it is noted there are many different types of actuating means by which the polished rod 8 is reciprocated, but, as suggested in the opening paragraphs of this specification, the rotor has connection with only those parts common to all pumping wells of which I know and in carrying out the invention, I mount a clutch unit or an actuating unit, clearly illustrated in Figure 4, on the polished rod at a point above the stuffing box. By reference to Figure 4 it will be seen that the rotor or clutch unit consists of a body 10 of more or less tubular formation and having set screws 11 by means of which the body may be locked to the polished rod for movement therewith. The outer portions of the set screws 11 are preferably flush with the periphery of the body 10 so they will not interfere with the operation of the rotor and the set screws may be provided with hexagonal sockets for the reception of an Allen wrench whereby the set screws may be easily tightened or loosened.

The body 10 constitutes one member of a clutch, while the other major member of the clutch is in the nature of a sleeve or band 12 mounted on the reduced lower portion of the body 10 for clockwise and anti-clockwise movement thereon. Figure 4 clearly illustrates that the clutch sections 10 and 12 have co-acting ratchet teeth by means of which the section 10 is turned in a clockwise direction when a similar movement is imparted to the section 12 and by means of which the section 12 may be moved in a counter-clockwise direction without imparting a similar movement to the section 10. In other words, the driving connection between the sections 10 and 12 is strictly one way.

The lower portion of the section 10 is extended beyond the section 12 and is encircled by a coil spring 14, the upper portion of which bears against the adjacent end of the section 12 while the lower portion of the spring abuts the internal shoulder of a hood 15. It will, therefore, be seen that the spring 14 urges the section 12 upwardly so that the teeth of the same are normally in engagement with the teeth of the section 10. However, counter-clockwise movement of the section 12 is provided for by the compression of the spring 14. The upper terminal of the hood 15 is beveled to shed rain, snow, and the like, and freely receives the reduced portion of the section 12. A lock nut 16 holds the hood in place.

The section 12 is provided with a radial arm 17 upon which a roller 18 preferably of case hardened metal is mounted. The inner portion of the arm may be annularly enlarged to define a shoulder which cooperates with a collar 20 in limiting endwise movement of the roller. However, there is sufficient play between the roller 18 and the enlarged inner portion of the arm and the collar 20 to permit the roller to be freely turned under the influence of an actuating mechanism to be described. Suitable fastening means such as a screw bolt 22 may be employed to hold the collar 20 in place. A grease cup or other lubricating means 24 is threaded into the outer terminal of the arm and supplies a lubricant to the roller 18 by way of an L-shaped passage in the arm.

In explaining the operation of the invention as thus far described it might be said that the clutch section 10 is rigidly connected to the polished rod approximately at the point indicated in Figures 1 and 2 and when the arm 17 is turned in a clockwise direction by a means to be described similar movement will be imparted to the polished rod and the fluid lifting mechanism connected thereto whereby wear on the fluid lifting unit, the stuffing box, and the like, is distributed and the possibility of the rods parting at the joints thereof overcome. When the arm 17 is moved back in a counter-clockwise direction to a new starting place the teeth on the sections 10 and 12 will again be brought into operative engagement by the spring 14 so that on the subsequent clockwise stroke of the section 12 the rotor section 10 and the polished rod will again be turned in a clockwise direction.

Coming now to the actuating means for the rotor unit illustrated in Figure 4 and just described, attention is directed to Figures 1 and 2 which show that an actuating shell 30 surrounds the polished rod and is provided with a base 32 which rests upon the stuffing box 7 and is held thereon by means of anchoring bolts 34.

The corners of the base 32 are more or less triangularly shaped and are provided with bearing portions or saddles 36 upon which the nuts 38 of the anchoring bolts 34 seat. Slots 40 in the base 32 allow of the expeditious application or removal of the bolts 34.

The squared heads at the lower portions of the bolts 34 are detachably secured within the laterally slotted ears 44 of a two-part clamp 46 secured to the coupling 6, as clearly illustrated in Figures 1 and 2. Thus when the nuts 38 are tightened the same draw the base 32 firmly down on the stuffing box whereby the shell is held rigidly in place.

If for any reason it is desired to temporarily disconnect the bolts 34 it is merely necessary to loosen the nuts 38 and then by a lateral movement of the bolts the same may be with-

drawn from the slots in the base 32. Attention is especially directed to the fact that the bolts 34 are tilted in the direction in which the actuating shell 30 may be prone to turn during the operation of the rotor.

Figures 1, 2 and 3 admirably illustrate that the shell or actuating member 30 is provided with a somewhat spiral cam slot 50 to receive the radial arm 17 and the roller 18 mounted thereon. It is clearly shown in Figure 3 that the upper portions of the walls of the cam slot 50 diverge to provide a gradually restricted entrance opening to the slot. Thus it is that as the radial arm 17 and the collar 18 approach the slot 50 on the down stroke of the pump the same are guided into the slot by the diverging walls of the slot.

The spiral formation of the walls of the slot is continued to the upper terminal shell 30 where the walls meet to define a rather sharp point against which the collar 18 may at times strike. Should the collar 18 strike the tip it will ride on either side of the same down into the more restricted portion of the cam slot. The curvature of the collar 18 and the formation of the tip avoids hanging of the collar on the tip on the down stroke of the well.

The engagement of the collar 18 with the wall 52 as the collar approaches the slot 50 will merely have the effect of turning the clutch section 12 in a counterclockwise position. No similar movement will be imparted to the section 10 or the polished rod. However when the collar 18 enters the slot 50 the rotor section 12 is positively turned in a clockwise position and a similar movement is imparted to the polished rod.

On the other hand if the collar 18 during the descent of the polished rod is engaged with the wall 54 at the upper portion of the slot 50 the clockwise turning of the rotor section and the polished rod will be immediately started and will continue during the descent of the collar through the slot 50.

Figure 3 clearly illustrates that the lower portion of the cam slot is provided with a vertical branch 60 constituting a safety zone by which bumping of the collar against the bottom of the slot is avoided. Also, sufficient space is provided between the bottom of the section 10 and the base of the shell and the adjacent portion of the stuffing box to prevent the possibility of the clutch bumping.

The branch 60 at the lower end of the cam slot and the complete opening of the slot at the upper end thereof provides a means whereby the actuation of the rotor is positively assured at all times, including those periods when the shackle lines stretch as a result of heat and contract due to cold weather. Should the shackle lines stretch as a result of heat, the arm 17 and the roller 18 may move down a considerable distance into the slot 50 and if the shackle lines contract as a result

of cold weather the polished rod will operate within higher limits and the actuating arm 17 and the roller 18 will, therefore, extend only into the upper portion of the vertical branch 60 if indeed it moves into the same at all.

Having thus described the invention, what is claimed is:

1. In a rotor for the pumping rod of a well pump, a rotor unit having means whereby the same may be rigidly connected to a pumping rod to reciprocate therewith and being provided with an actuated element, and an actuating member having means whereby the same may be rigidly connected to a fixed portion of the equipment of a pumping well and having a cam disposed in the path of descent of and adapted to engage said actuated member to turn the pumping rod on each down stroke thereof.

2. In a rotor for the pumping rod of a well pump, a member having a cam edge and being provided with means whereby the same may be held in a relatively fixed position, and a rotor unit for rigid connection to the pumping rod and having means cooperating with said cam edge to turn the pumping rod when the same approaches the limit of descent.

3. In a rotor for well pumps, a shell having a cam slot open and widened at one end thereof to define an enlarged entrance, and a rotor unit having means whereby the same may be secured to the pumping rod of a well pump and having an arm adapted to be received in said slot by way of the enlarged entrance thereof.

4. In a rotor for a well pump, a shell having a cam slot open at one end thereof, and a rotor unit for connection with the pumping rod of a well pump and having an arm adapted to be detachably received in said cam slot, said slot being provided with a substantially vertical branch defining a safety zone.

5. In a rotor for a well pump, a shell having a cam slot, one wall of which is tilted and continued to one terminal of the shell to form a guide, and a rotor unit having an arm adapted to be engaged by said guide and directed thereby into said cam slot.

6. In a rotor for a well pump, an actuating member having a cam slot, the walls of which meet at one terminal of the actuating member to form a point, and a rotor unit having means detachably received in said cam slot and engaging a wall thereof.

7. In a rotor for a well pump, an actuating shell having a base provided with slots, anchoring bolts extended through said slots and being removable laterally from the same, and an anchoring clamp for said anchoring bolts and having means whereby the same may be connected to a relatively fixed part of a pumping well to hold the shell against movement.

8. In a rotor, an actuating shell having a base adapted to be mounted on the stuffing box of a well pump, bolts detachably connected to said base, and an anchoring clamp having ears engaged by said bolts, said bolts being tilted in the direction in which the actuating shell is prone to turn.

9. In a rotor for a pumping well, a member having a cam slot open at the upper portion thereof and provided with diverging walls defining a gradually restricted entrance and cam edges, and a second member adapted to be received in said slot.

10. In a rotor for a pumping well, a member having a cam provided with a continuation extended to one end portion of the member to form a guide, and a rotor unit adapted for intermittent engagement by said cam and the guide thereof, there being means whereby said member is held against movement.

11. In a rotor for a pumping well, a pair of cooperating members, one of which is adapted for rigid attachment to a pumping rod to move therewith and the other member being provided with means whereby the same may be secured in a relatively fixed position in the path of descent of the movable member and being provided with means to turn the same when approaching the limit of descent.

12. In a rotor for a well pump, an actuated member adapted for rigid attachment to a pumping rod to move therewith, and an actuating member having a cam for engagement with the actuated member to turn the same, and being provided at one end of the cam with a safety zone for the free reception of the actuated member.

13. In a rotor for a well pump, a shell having a spiral cam slot open at one end thereof and provided with walls diverging toward one end of the shell to define a gradually restricted entrance opening, the other end of the slot being provided with a safety branch, and a member adapted to be received in said slot and the safety branch thereof.

14. In a rod rotor for a well pump, a pair of cooperating members, one of which is adapted for attachment to the pumping rod of a well pump and the other being adapted for relatively fixed mounting, one of the cooperating members being provided with an arm and the other member being provided with a cam slot to detachably receive the arm and turn one of the members when the pumping rod approaches the limit of movement in one direction.

15. In a rotor for use on well pumps, a shell having a cam slot open at one end thereof, and a member having an arm adapted to be detachably received in said cam slot by way of the open end thereof.

In testimony whereof I affix my signature.

ALEXANDER BOYNTON.