

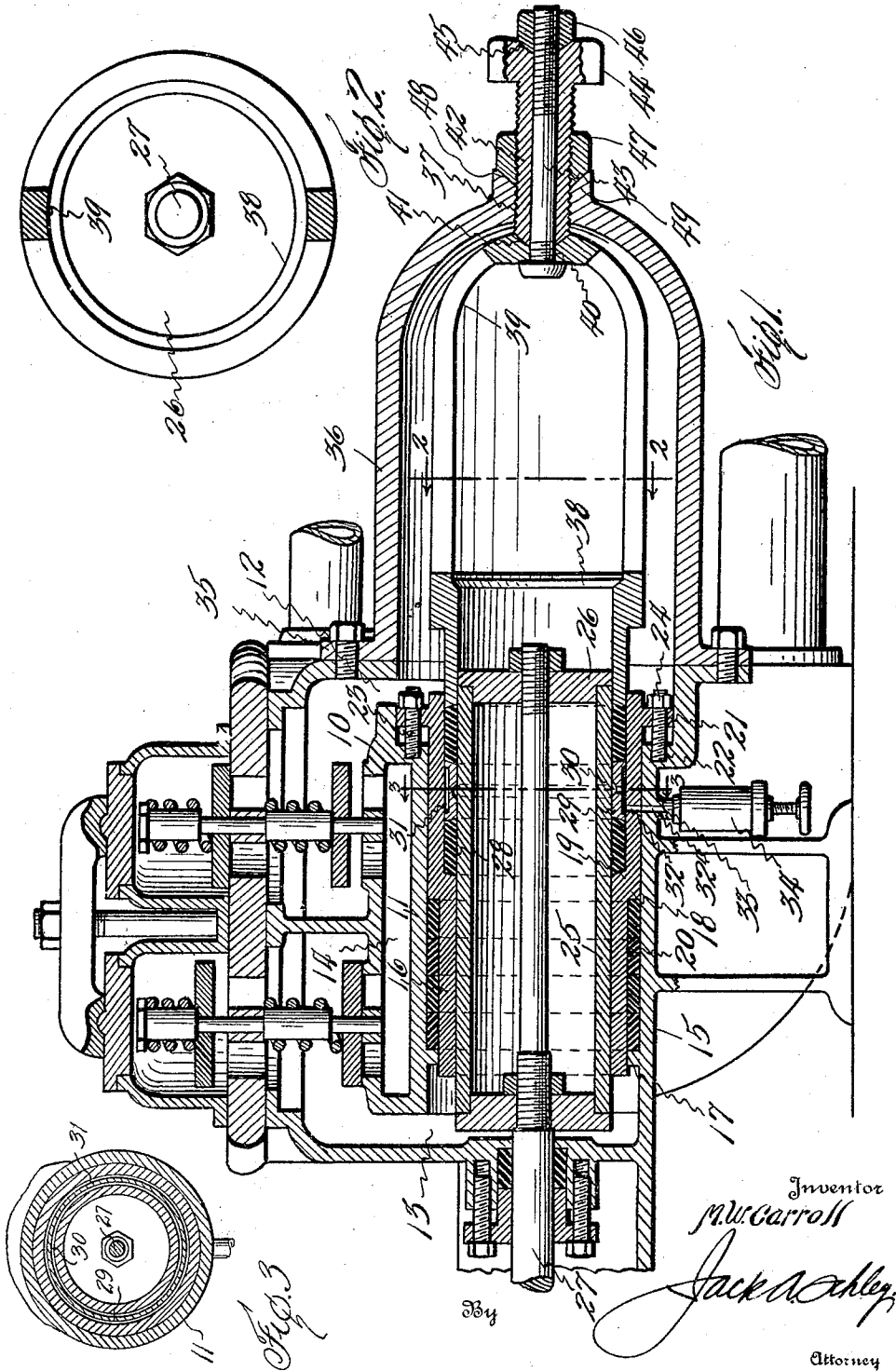
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SLUSH PUMP STRUCTURE

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SLUSH-PUMP STRUCTURE.

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This invention relates to new and useful improvements in slush pump structures.

In drilling deep wells with rotary rigs, it is necessary to employ a pump to wash out the mud, sand etc., and such pumps are known as slush pumps.

The parts of these pumps are subject to excessive wear and considerable experimenting has been done with the internal parts. It has been found necessary to provide a removable liner and stuffing boxes, which may be replaced when worn. Protracted tests have shown that soft rubber is the best material for packing the box.

It has been the practice to use a gland which while adjustable to compress the rubber packing, is subject to the pressure of the fluid of the pump, and not being locked, is caused to unduly compress the packing which results in abnormal wear. It is also the practice to use plungers with comparatively soft surfaces and these soon wear out, due to the abrasion of the grit, sand and particles passing through the cylinder.

It is the object of my invention to provide a stuffing box for either a removable liner or a stationary plunger cylinder having provision not only for adjusting the gland so as to compress the soft rubber packing, but to positively lock the gland against longitudinally displacement, whereby compression by the pressure of the fluid in the cylinder is prevented and a fixed adjustment is assured.

A further object is to provide my improvement in the form of an attachment which may be readily secured to the end of a pump cylinder without altering or modifying the same.

Another object is to provide a tempered or case hardened steel plunger or a chilled cast plunger, which will withstand the abrasive action, and wear for a greater period than the plungers now in use.

An important object of the invention is to provide means for introducing a lubricant through the packing of the box, and under pressure if desired, which makes for more efficient lubrication of the plunger, due to the fact that the plunger rides on the packing instead of upon the surface of the plunger cylinder.

Advantageous results secured through my invention are, a greatly increased life, more efficiency, less loss of time due to replacing

parts, and a great reduction in wear, as well as a saving in the expense of operation and maintenance.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Fig. 1 is a longitudinal sectional view of one end of a slush pump having an attachment thereon in accordance with my invention.

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1.

In the drawings the numeral 10 designates a pump casing which has a cylindrical bore therein to form a cylinder 11. At the ends of the cylinder are the usual fluid passages 12 and 13, respectively. The casing has an inlet port 14. The pump body 15 is provided with the usual valves and other parts which do not enter into the invention.

A cylindrical liner 16 is fitted concentrically in the cylinder 11 and engages snug within an inwardly directed annular flange 17 in the inner end of the cylinder. The liner is offset outwardly, from about its center to its outer end so as to provide an outer annular shoulder 18 and an inner annular shoulder 19. In the space provided between the flange 17 and the shoulder 18, a plurality of suitable packing rings 20 are mounted. The liner has an outwardly directed annular flange 21 at its outer end engaging in a seat 22 on the outer end of the casing 10 and is adjustably fastened by stud bolts 23 and nuts 24. By this means the shoulder 18 may be set tight against the packing rings 20, and the latter compressed.

A tubular plunger 25 formed of a sleeve having heads 26 in which it is countersunk at each end, is mounted on the reduced end of a piston rod 27 and suitably fastened. This plunger sleeve has a sliding fit in the reduced portion of the liner and I propose to form it of tapered or case-hardened steel or to cast it and finish it with a chilled outer surface, which will reduce excessive wear and prolong the life of the plunger.

The shoulder 19 is beveled and forms the inner end or seat of a packing box. A pair of beveled-edge soft rubber or equivalent packing rings 28 are mounted in the outer end of the liner and spaced apart by a lubricating ring 29. The inner ring is seated against the shoulder 19, while the outer edge of the other ring 28 is inwardly of the outer edge of the liner. The inner surfaces of the rings 28 snugly embrace the plunger 25. The ring 29 has radial ports 30 extending inwardly from a circumferential peripheral duct 31. A port 32 in the liner communicates with the duct and registers with a port 32' in the pump body 15. A grease gun 34 is attached to a nipple 33 for supplying a lubricant under pressure to the ports 32 and 32'. This lubricant is conveyed to the duct 31 and supplied through the ports 30 to the plunger.

The plunger rides in the packing rings 28 and being properly lubricated will last much longer than otherwise. The life of the packing rings is frequently shortened because of excessive compression. I have designed my structure to obviate this and to compress the rings to the proper degree only.

To one end of the pump body 15, I fasten the flange 35 of an elongated dome shaped cap 36 having an axial screw threaded bore 37 at its outer end. An annular follower or gland ring 38 has its inner end beveled and engages the beveled edge of the outer ring 28. This follower is secured to the inner end of a yoke 39 which has a screw threaded central aperture 40. The outer end of the yoke is counter-bored around the aperture to form a beveled seat 41 in which the beveled end of a sleeve 42 is concentrically received. A heated stem 43 has screw-threaded engagement in the aperture 40 and extends through the sleeve.

The sleeve is externally screw threaded and engages in the bore 37. The outer end of the sleeve has a wrench head 44 and is provided with a beveled seat 45 receiving a beveled nut 46 engaged in the outer screw threaded end of the stem. By tightening the nut 46 the sleeve and yoke are fastened together and by rotating the sleeve it is moved axially whereby the yoke 39 is adjusted longitudinally and the follower is moved to compress or release the packing rings.

The sleeve and stem form a convenient means of communicating longitudinal movement to the yoke and are subject to variation. The important feature of the device is means for locking the gland follower so that when it is subjected to fluid pressure it will not move and unduly compress the packing rings 28. For this purpose I have shown a beveled nut 47 surrounding the sleeve and engaging in a beveled seat 48 in a concentric boss 49 on the end of the

cap 36. This nut locks the sleeve against rotation and axial movement and must be loosened before the gland can be adjusted.

By reason of the elongated cap I am enabled to use the elongated plunger 25 instead of the short piston head now in use. Such a structure permits of two broad face packing rings 28 and supporting the plunger in these rings, wear is taken off the liner 16. This structure makes advantageous the use of a plunger with a chilled or hardened surface. The packing rings 28, however must not be excessively compressed or they will unduly grip the plunger and cause unnecessary and wasteful wear.

As an attachment my device is applied by removing the head, liner, piston and piston rod (not shown) and substituting the rod 27, plunger 25, liner 18 and the cap 36 and component parts. The plunger gives a long stroke and passes through the follower 38 into the cap.

It is obvious that various means for compressing the packing might be used. Also many forms of locking devices for holding the gland after it is adjusted could be evolved and all those falling within the scope of the appended claims are contemplated.

What I claim, is:

1. In a slush pump, a pump cylinder, a pump casing having a bore forming a plunger working in the cylinder, compressible packing rings in the cylinder supporting the plunger, an elongated cap fastened on one end of the casing, an annular follower engaged in the cylinder for compressing the packing, a yoke rigid with the follower and extending outwardly in the cap, a sleeve screw threaded through the end of the cap and having rotatable engagement with the yoke for longitudinally adjusting the yoke, and a headed stem extending through the sleeve, the yoke being confined between the sleeve and the head of said stem to prevent axial movement of the yoke and follower in both directions.

2. The combination with a slush pump casing having a bore forming a cylinder open at one end, a plunger working in the cylinder, and compressible packing rings exposed at the open end of the cylinder and supporting the plunger in the cylinder, of an elongated dome-shaped cap secured to the open end of the casing and having an axial boss on the outside of its dome, an annular follower in the cap engaging the packing rings, a yoke rigidly attached to the follower and extending in the cap, an element for adjusting the yoke and extending through the boss of the cap and preventing forward movement of the yoke and its follower, a stem extending longitudinally through said element, a head on the stem engaging said yoke and preventing rear-

ward movement of the yoke and its follower, means for fastening said element against rotation with relation to the yoke and said stem against longitudinal movement with relation to said element, and means engaging the boss for locking said element in adjusted position.

3. The combination with a slush pump casing having a bore forming a cylinder, and a plunger and the compressible packing rings thereof, of an elongated cap secured to the pump casing, a concentric boss on the end of the cap axially screw threaded, a follower in the cap engaging the packing rings, a yoke in the cap attached to the follower, an externally screw-threaded sleeve engaged in the threaded bore of the boss, a headed stem extending through the sleeve, a head on the stem between which and the sleeve the yoke is confined, means to maintain the sleeve pressed against the yoke, and a jamb nut on the sleeve seated against the boss.

4. In a slush pump, the combination with a pump cylinder, of a plunger working in the cylinder, compressible packing rings in the cylinder supporting the plunger, a cap extending beyond the end of the cylinder, an annular follower engaged in the cylinder

for compressing the packing, a yoke rigid with the follower and extending outwardly in the cap, a member engaging the yoke and holding it from axial movement in one direction, another member engaging the yoke and holding it from axial movement in the other direction, and means to lock said members from movement relative to one another and to the cap.

5. In a slush pump, the combination with a pump cylinder, of a plunger working in the cylinder, compressible packing rings in the cylinder supporting the plunger, a cap extending beyond the end of the cylinder, an annular follower engaged in the cylinder for compressing the packing, a yoke rigid with the follower and extending outwardly in the cap, a sleeve extending through and in threaded engagement with the end of the cap and abutting against the yoke, a stem threaded in the end of the yoke and extending through the sleeve, a nut threaded on the outer end of the stem and engaging the outer end of the sleeve, and a nut threaded on the sleeve and engaging the outer end of the cap.

In testimony whereof I affix my signature.
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