

Nov. 13, 1923.

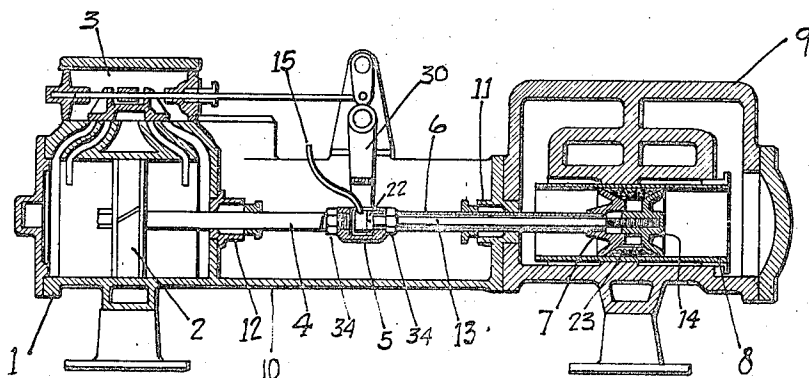
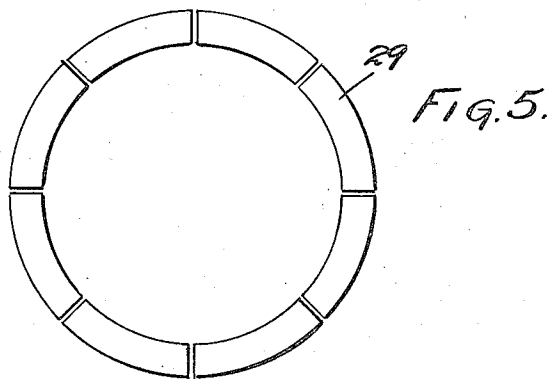
1,474,201

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OIL WELL SLUSH PUMP PISTON AND PUMP PISTON PACKING ADJUSTING MECHANISM

Filed Aug. 8, 1921

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

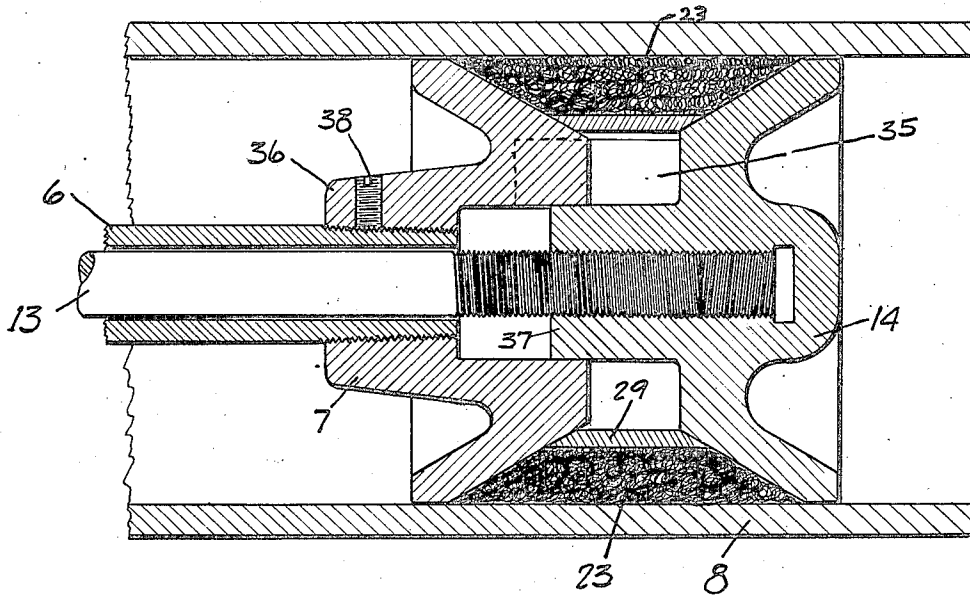


Fig. 2.

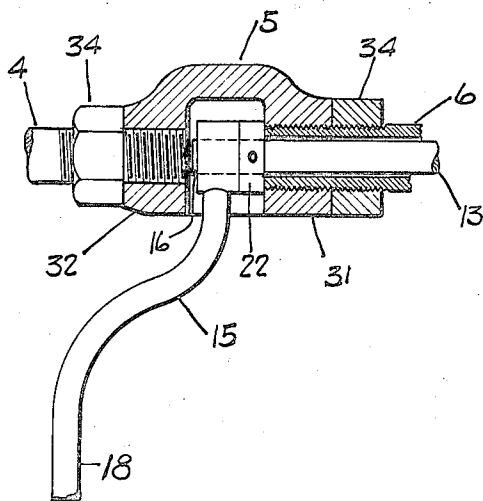


Fig. 3

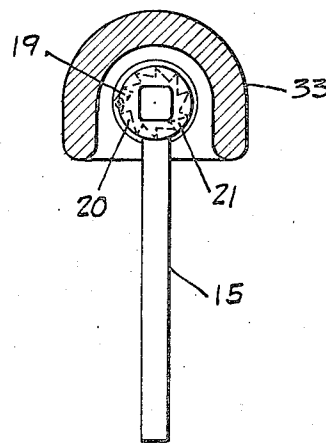


Fig. 4.

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OIL-WELL SLUSH-PUMP PISTON AND PUMP-PISTON PACKING-ADJUSTING MECHANISM.

Application filed August 8, 1921. Serial No. 490,783.

To all whom it may concern:

Be it known that I, WILLIAM FREDERICK McMAHON, a citizen of the United States, and resident of Long Beach, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Oil-Well Slush-Pump Pistons and Pump-Piston Packing-Adjusting Mechanism, of which the following is a specification.

This invention relates to new and useful improvements in pump pistons as applied to oil well slush pumps. While the invention is shown applied to oil well slush pumps it may obviously be manufactured for any kind of a pump having a piston, and used to equally good advantage.

This invention includes several important objects among which may be noted first: that of mechanism to adjust or take up the wear in the pump piston packing of the pump piston when the pump is in operation. Second: to adjust the pump piston packing without dismantling any part of the pump. Third: to increase the volumetric efficiency of the pump.

As before stated, this pump piston packing adjustment mechanism is shown applied to oil well slush pumps. This so-called slush, which has a direct connection with the pump piston, is a heavy fluid composed mostly of water, sand and clay, etc. Forcing this fluid out of the pump causes a maximum wear on the pump piston packing or liner, this wear creates a space between the piston and the wall of the tubular cylinder, of the pumps, in which the piston moves, allowing a leakage of fluid past the piston, thereby decreasing the delivery or discharge of the pump. To prevent this action taking place I adjust or take up the wear of the piston packing or liner by wedging the packing or liner outward to bear sufficiently against the wall of the tubular cylinder, preventing thereby the leakage of fluid past the piston.

With these and other objects in view the invention resides and consists in the construction and novel combination and arrangement of parts hereinafter more fully described and illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to with-

out departure from the spirit or sacrificing any of the advantages of the invention.

Similar characters of reference denote like or corresponding parts throughout the several figures of the accompanying drawings forming a part of this specification and upon which—

Fig. 1. is a longitudinal sectional view through a steam oil well slush pump showing the water pump piston and the mechanism for adjusting the water pump piston packing or liner.

Fig. 2. is a longitudinal sectional view of the water pump piston on larger scale, showing the construction of same.

Fig. 3. is a longitudinal sectional view of the piston rod coupling showing the ratchet wrench on the adjusting spindle.

Fig. 4. is a cross sectional view through the center of the piston rod coupling showing the ratchet wrench in position.

Fig. 5. is an end view of the traveling ring, showing the construction of same.

Referring in detail to the characters of reference marked upon the drawings, 1 represents the steam cylinder in which the steam piston 2 is forced backward and forward by the pressure of the steam admitted to the steam chest 3 this action of the steam piston moves the steam piston rod 4 which transmits the force through the piston rod coupling 5 and the pump piston rod 6 to the water pump piston 7. The water pump piston 7 moves backward and forward in a pump liner 8 which is held stationary in the pump body 9. This motion of the water pump piston 7 draws fluid in the pump body 9 in one movement and discharges the fluid from the pump 9 in another movement. The principle of which is well known.

The steam cylinder body 1 and the water pump body 9 are held together by a longitudinal connecting base 10, which is open at the top, and is cast on the steam cylinder body 1 and bolted to the pump body 9. Where the piston rods enter the steam cylinder body 1 and water pump body 9 stuffing boxes 11 and 12 are provided in their respective places to prevent the leakage of steam and water there past. As this steam pump is of standard construction and is well known, I shall therefore describe only the parts pertaining to my improvement, as all other descriptions would be superfluous.

The adjusting spindle 13 which is located within the tubular piston rod 6, of the water

pump piston 7 is threaded at one end portion to engage a threaded hole in the piston follower 14. On the other end portion there is cut a square lug 16 onto which a ratchet wrench 15 is fitted. In general the ratchet mechanism of this wrench 15, which is a commercial article, is used to permit of motion in one direction and prevent it in the opposite direction. In this case when the handle 18 of the wrench 15 is moved in a non-clock-wise direction the pawl 19 in the wrench engages with the tooth 20 on the wheel 21 in the wrench, and the wheel 21 and the tooth 20 move as one piece. When the motion of the wrench 15 is reversed, the pawl 19 rides over the teeth of the wheel and the wheel remains at rest. Hence when the ratchet wrench is moved in a non-clock-wise direction this motion rotates the adjusting spindle 13, the threaded end portion of the latter engages the threaded hole of the piston follower 14, this screw action moves the piston 7 and piston follower 14 together. The reaction or thrust due to this screwing action is taken care of by a collar 22 which bears on the pump piston rod 6 and coupling 5, and is pinned onto the adjusting spindle 13. To prevent the turning of the piston follower 14 when the said screw action is in motion I have provided rectangular guides 35, which are a part of the piston follower, to move in longitudinal slots provided for same in the piston. To prevent the piston 7 from turning, due to this screw action, I have provided left hand tapered pipe threads on the tubular piston rod 6 that screws into the hub 36 of the piston 7. It can readily be seen that any turning action of the piston follower 14 will tend only to tighten the piston rod 6 in pump piston 7, and as the pump piston rod 6 is firmly screwed in place in the hub 36 of the piston at assembly, there can be practically no turning of the piston, due to any turning of the piston follower 14, caused by the screwing action of the adjusting spindle 13.

The piston follower 14 is a solid cylindrical disc having a conical surface the shape of a frustum of a cone. It has a central inwardly disposed round hub 37 that has a threaded hole in its center to take the threads on the adjusting spindle 13. This hub acts as a guide when the piston follower is moving, and bears in a bored hole in the piston 7. This arrangement ensures perfect alignment of the piston and the piston follower.

The piston is a cylindrical disc having a conical surface the shape of the frustum of a cone, identically the same as the opposite face of the piston follower 14. I have provided a central outwardly disposed hub on the piston to take the threaded end of the pump piston rod 6. A set screw 38 on the

hub of the piston 7 serves to keep the piston from turning. The piston 7 and the piston follower 14 are slightly smaller in diameter than the cylinder in which they move, in order that only the piston packing 23 will bear on the inside diameter of the cylinder 8.

The pump piston packing 23 is a flexible composition, preferably para rubber and bears directly on the conical surfaces of the piston 7 and the piston follower 14. The inner diameter surface of this packing 23 is supported by a traveling ring 29. The traveling ring 29 is a hollow cylinder having two conical edges; one edge bearing on the adjacent conical surface of the piston, and the other edge bearing on the conical surface of the piston follower. I have split this ring into several segments to allow for the increasing diameter when the traveling ring is being wedged outward by the action of the piston 7 and the piston follower 14 moving together.

This traveling ring 29 serves to support the packing and move the same outward when the piston and the piston follower are being forced together. The result of this action, on the pump packing and the traveling ring is theoretically speaking, that of a double wedge, the traveling ring being forced outward together with the piston packing. The resultant pressure on the packing and walls of the cylinder 8, due to this double wedge action will be such, that this piston can be adapted for pumps, subjected to high hydrostatic pressures.

The pump piston rod 6 is a hollow pipe threaded at both ends. On the pump piston end I have provided a tapered pipe thread to insure tightness in the piston. On the other end portion there is a straight thread that is screwed into the piston rod coupling 5.

The piston rod coupling 5 is provided for connecting the steam and pump piston rods. The rocker arm 30 of the steam pump is also connected to the coupling by means of shoulder studs that are tapped into the piston rod coupling 5. The piston rod coupling 5 consists of two cylindrical bosses 31 and 32 spaced apart and in alignment with each other. Each boss contains a threaded hole to take the threaded end portions of the steam and water pump piston rods 4 and 7. The bosses are connected by a circular ring sector rib 33 which is of a diameter in size to give rigidity to the piston rod coupling 5 and to provide space for the fitting of a collar 22 and the ratchet wrench 15 on the adjusting rod spindle 13 that projects through the boss of the piston rod coupling 5 on the pump piston side. I have also provided ample space in the said circular ring sector rib 33 to permit of the

necessary movement of the ratchet wrench handle 18. Locknuts 34 serve to prevent the piston rods from turning.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim and desire to secure by Letters Patent is:

1. In a pump, a tubular pump piston rod, a pliable hollow cylindrical piston packing, a piston formed of two cylindrical discs, each said cylindrical disc having a conical surface forming a conical frustum, means for adjusting the said piston packing, located within the said hollow tubular pump piston rod, and a ratchet mechanism adapted to operate said last named means.

2. In a pump, a pump piston, a pliable piston packing, and means for adjusting the said pliable piston packing, a tubular piston rod, a rod fixed against longitudinal movement and constructed to be rotated by a ratchet mechanism substantially as described by operating the said means.

3. In a pump piston, a piston member and a piston follower adapted to be moved toward said member, said member and follower having opposed conical surfaces, a packing between said conical surfaces, a rod fixed against longitudinal movement having threaded engagement with said piston follower, and adapted to be rotated to impart longitudinal movement to said follower relatively to said member.

4. In a pump piston, a piston member and a piston follower adapted to be moved toward said member, said member and follower having opposed conical surfaces, a packing between said conical surfaces, a tubular piston rod connected to said member and a rod extending through said tubular rod, being fixed against longitudinal movement and having threaded engagement with said piston follower and adapted to be rotated to impart longitudinal movement to said follower relatively to said member.

5. In a pump, a driving piston, a pump

piston comprising two members, one being longitudinally adjustable relatively to the other, packing between said members adapted to be expanded upon contracting the relation of said members, a piston rod connecting said driving piston to said pump piston and comprising a tubular rod portion connected to said pump piston, a rod portion connected to said driving piston and a coupling member therebetween, and means for effecting the longitudinal adjustment of said pump piston member extending through said tubular rod portion and accessible for manipulation at the coupling end thereof.

6. In a pump piston, a piston member and a piston follower adapted to be moved toward said member, said member and follower having opposed conical surfaces, a packing between said conical surfaces, means for imparting longitudinal movement to said follower relatively to said member, and a ratchet for operating said last named means.

7. In a pump, a pump piston formed of two cylindrical discs, a flexible tubular piston packing, a tubular pump piston rod, means located within the said tubular pump piston rod for adjusting the said piston packing, and a ratchet mechanism substantially as described.

8. In a pump, a pump piston, a pliable piston packing, means for adjusting the said pliable piston packing, a tubular piston rod, a rod fixed against longitudinal movement and constructed to be rotated by a ratchet mechanism substantially as described.

9. In a pump, a pump piston, a pliable piston packing, means for adjusting the said pliable piston packing, a tubular piston rod, a rod located within said tubular piston rod and fixed against longitudinal movement and constructed to be rotated by a ratchet mechanism substantially as described, for operating the said means.

WILLIAM FREDERICK McMAHON.