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PUMP PISTON

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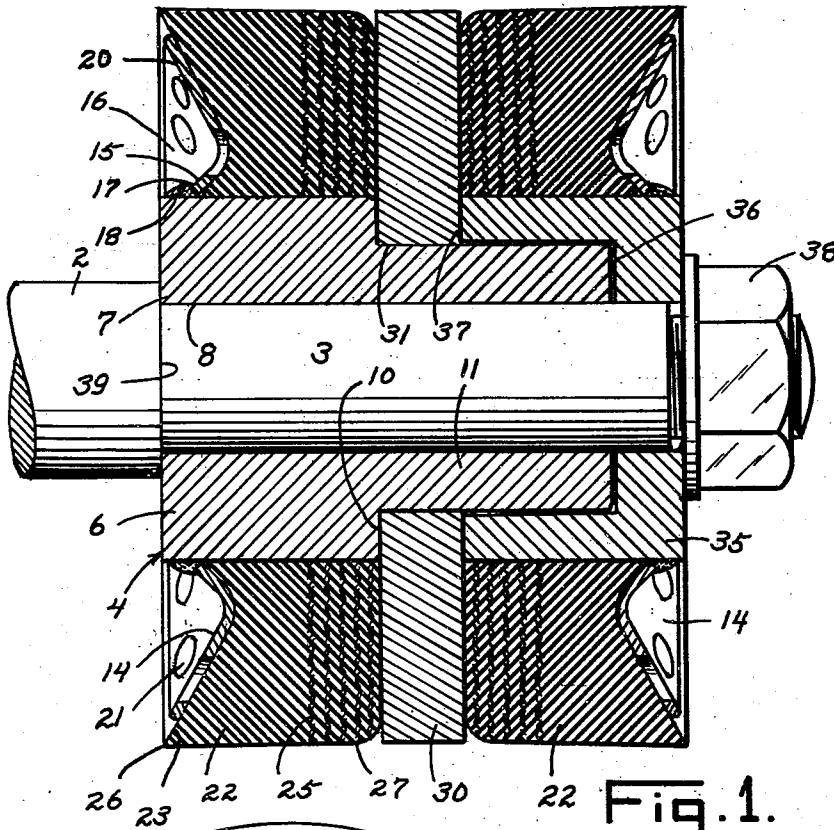


Fig. 1.

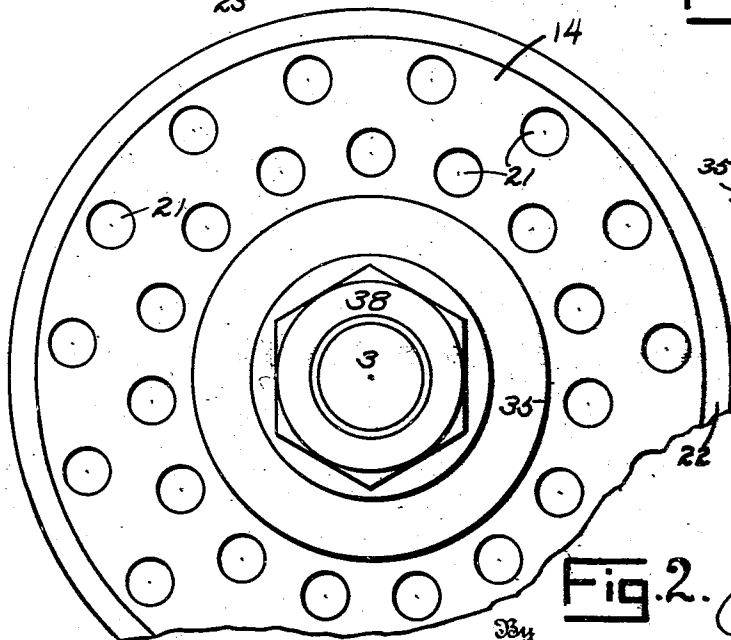


Fig. 2.

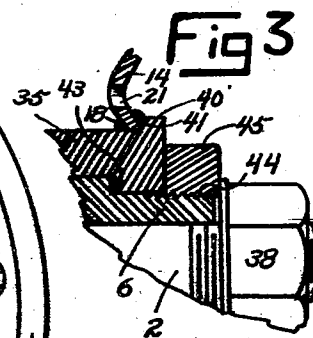


Fig. 3.

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PUMP PISTON

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7 Claims. (Cl. 309—4)

The invention relates to an improvement in pump pistons and particularly that type of piston which is used in a slush pump to maintain the circulation of mud in the rotary method of drilling wells.

It is one of the objects of the invention to provide a composite piston wherein the resilient packing portions thereof are retained in a position by means of a thin metal flange which is affixed to the piston body.

Another object of the invention is to provide a composite piston which can be disassembled in order to renew the resilient packing portions thereof.

Another object of the invention is to provide a telescoping body for a slush pump piston so that the reinforcing flange is firmly clamped by the telescoping parts of the body.

Another object of the invention is to provide a curved plate portion to support the ends of the resilient packing and wherein such plates are firmly anchored to the piston body.

Still another object of the invention is to provide in combination with a resilient sealing portion for a pump piston a supporting end plate.

Still another object of the invention is to provide a piston wherein the packing portions are slipped over the hub portions and then the hub portions clamped together.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawing, wherein:

Fig. 1 is a transverse sectional view taken through an assembled piston and illustrating the parts in section.

Fig. 2 is an end elevation with certain parts broken away.

Fig. 3 is a broken detailed view of a modified form of the body and plate.

It is well understood that pistons of the type herein described are employed in slush pumps and are disposed in a cylinder for reciprocation, the valves of the pump being such that the piston is double acting.

The piston is caused to reciprocate by means of a piston rod 2 which usually has a reduced area 3 thereon in order to receive the piston which is indicated generally at 4.

In view of the fact that pistons of this type must resist enormous pressure and are caused to come into contact with abrasive fluids it is necessary that the piston be securely mounted and strongly reinforced. To accomplish this the piston body of metal is indicated generally at 5 and

comprises the body portion 7 which is cylindrical and provided with an opening 8 so that it may be slipped over the reduced portion 3 of the piston rod. The body 7 is provided with a shoulder 10 which carries a hub portion 11 which is rugged in size as regards the body portion 7. The hub and body combined are of slightly less length than the entire piston. Fixed to the periphery of the end of the body portion 7 is an annular end plate 14 which is of a suitable sheet metal so that it will resist considerable stress. This plate is of peculiar construction in that it is dished at 15 so as to form a concavity or recess at 16. The inner edge 17 of this plate is affixed to the outer surface of the body 7 by means of a ring of welding material 18. From the inner edge 17 the plate extends inwardly for a short distance and then flares outwardly to provide the supporting portion 20 thereof. Any desired number of openings or recesses 21 may be provided in the plate if desired. These openings serve a dual function in that they minimize weight and permit application of fluid pressure directly against the sealing material 22. The foregoing construction facilitates desired clamping of the sealing material on the piston and provides a piston that is both light and strong.

In assembling the piston the packing ring 22 may be slipped over the body 7 so that its edge will abut against the plate 14. The contour of the end face 23 of the packing ring 22 is the same as the inside contour of the plate 14 so that the resilient ring will fit snugly against the plate. Fluid pressure acting upon the end plates also acts directly upon the end face 23 of the packing ring 22 through the openings 21.

The ring 22 may be made up of any suitable material, but rubber, which is reinforced with the fabric portions 25 adjacent its inner end, has been found to be satisfactory. The reinforcing is desired because expansion of the resilient member should occur adjacent the corner or lip portion 26 rather than at the heel 27 thereof.

In order to properly support the sealing ring 22 a rigid flange 30 is next provided in the piston assembly. The flange is in the form of an annular plate having a recess 31 therein which fits snugly over the hub 11. The diameter of the flange 30 is slightly less than the diameter of the cylinder in which the piston is to reciprocate so as to allow a slight clearance but still serve as a support for the sealing ring 22.

The other half of the piston, insofar as the ring 22 and the end plate 14 are concerned, is identical with the ring 22, but the end plate on

the right-hand end of the piston is mounted upon a sleeve 35. This sleeve is in the form of a cap having a hollow inside area 36 so that it can be telescoped over the hub 11 as seen in Fig. 1. The outside diameter of this cap 35 is the same as the diameter of the hub 11. This cap 35 will be of sufficient length so that its inner end 37 will abut against the flange 30.

It seems obvious that the resilient rings can be slipped over the body 7 and the cap 35 and then the parts assembled as shown in Fig. 1. A nut 38 or other fastening means can be affixed to the end of the reduced portion 3 of the rod 2 and if it is tightened up it will clamp the parts securely into position against the body 39 on the piston rod 2. The clamping action is imperative because the enormous pressure to which the piston is subjected in some instances causes leakage along the piston rod and destroys the parts. With the present structure the flange 30 and the packing ring 22 are securely clamped into position between the end plates 14 and then against the flange 30, the flange 30 in turn being securely clamped between the body 7 and the cap 35.

Fig. 3 shows a slightly modified form of the end portion of the body or in fact of the cap wherein a shoulder 41 is formed by the edge 40 which is outstanding to form a stop for the plate and to insure its proper positioning. The plate will be held by the welding material 18 the same as previously described.

The cap 35 and body 6 are also slightly modified in that, the body extends entirely through the piston and is reduced at 43 to form a shoulder. A complementary shoulder on the inside of the cap 35 is in spaced relation with the shoulder 43 so as to give a positive clamping of flange 30. The end of the body extending through cap 35 is threaded at 44 to receive a lock nut 45 so that the piston may be assembled and locked together before being placed on the rod 2.

Broadly, the invention contemplates a slush pump piston in which the resilient packing portions can be readily removed and in which the number of parts which must be clamped together is maintained at a minimum and in which the reinforcing structure is rigid so as to support the packing element.

What is claimed is:

1. A slush pump piston comprising a supporting body, a reduced hub thereon, a sleeve fitted on said hub, a flange disposed about said hub and clamped between the ends of said sleeve and body, a sheet metal end plate fixed to each said body and said sleeve adjacent the outer ends thereof, said plates being recurved radially, and a resilient sealing member abutting said plates and said flange.

2. A pump piston comprising a body member having a flange portion and a reduced portion, a peripheral shoulder on said body member intermediate its ends, a flange on said reduced portion contacting said peripheral shoulder, a sleeve telescoped over said reduced portion said sleeve contacting said flange and having a flange portion, and a sealing member between the flange and each of said flange portions, said flange portions being radially recurved convexly in the direction of said flange.

3. In a pump piston, body members in telescoped relation, a radially extending flange clamped therebetween, sheet metal flanges secured to the opposite ends of said assembled body members, said flanges being annularly dished between their peripheries and the point of attachment to the body members and a resilient sealing member interposed between the radial flange and each of said sheet metal flanges and in abutment therewith.

4. In a pump piston, body members in telescoped relation, a radially extending flange clamped therebetween and foraminated sheet metal flanges secured to the opposite ends of said assembled body members, said flanges being annularly dished between their peripheries and the point of attachment to the body members.

5. A pump piston comprising a body, a reduced area thereon, a flange slipped onto said reduced area, a second reduced area, a cap slipped on said second area to abut said flange, a lock nut threaded to said body to clamp said flange and cap in position, an outwardly flaring end plate fixed to each said body and said cap, and resilient sealing members disposed between each plate and said flange.

6. A slush pump piston comprising a supporting body member having a radially extending flange intermediate its ends, a sheet metal end plate surrounding and attached to the body member adjacent each of the ends thereof, said plates being recurved radially inward toward said flange, and a resilient sealing member abutting said plates and flange.

7. In a pump piston a supporting body member having a radially extending flange intermediate its ends, and foraminated sheet metal flanges secured to the opposite ends of said body member, said flanges being annularly dished toward the radially extending flange between their inner and outer peripheries, and a resilient sealing member between each of said sheet metal flanges and the intermediate radially extending flange.

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