Oct. 31, 1950 A. R. MAIER ET AL 2,527,949

SLUSH PUMP VALVE COVER

Filed April 23, 1946 2 Sheets-Sheet 1

FIG. 1.

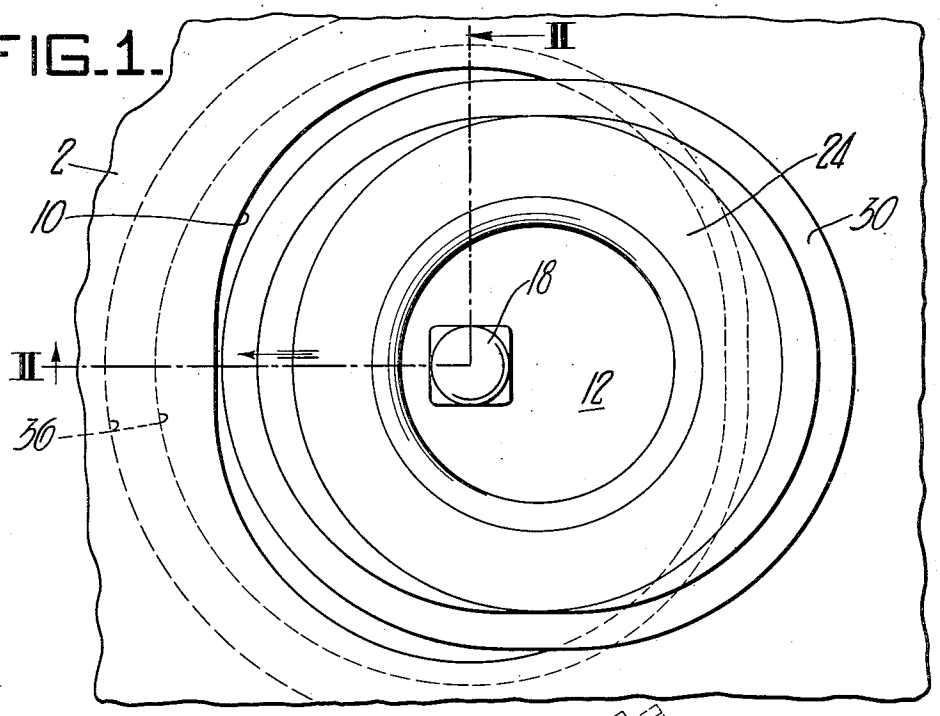

FIG. 3.

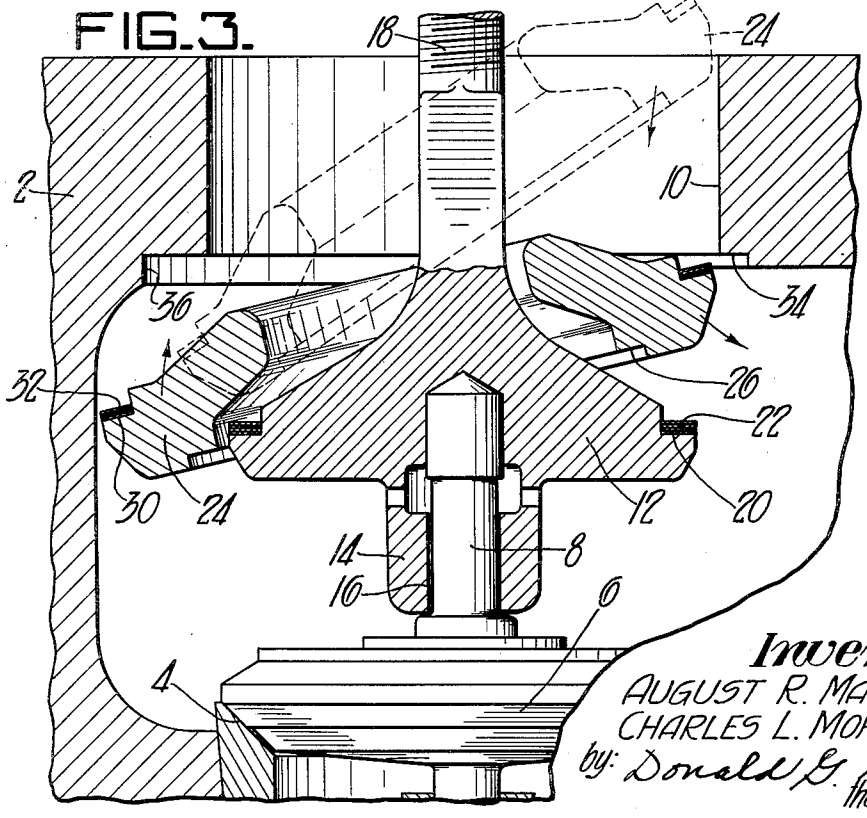

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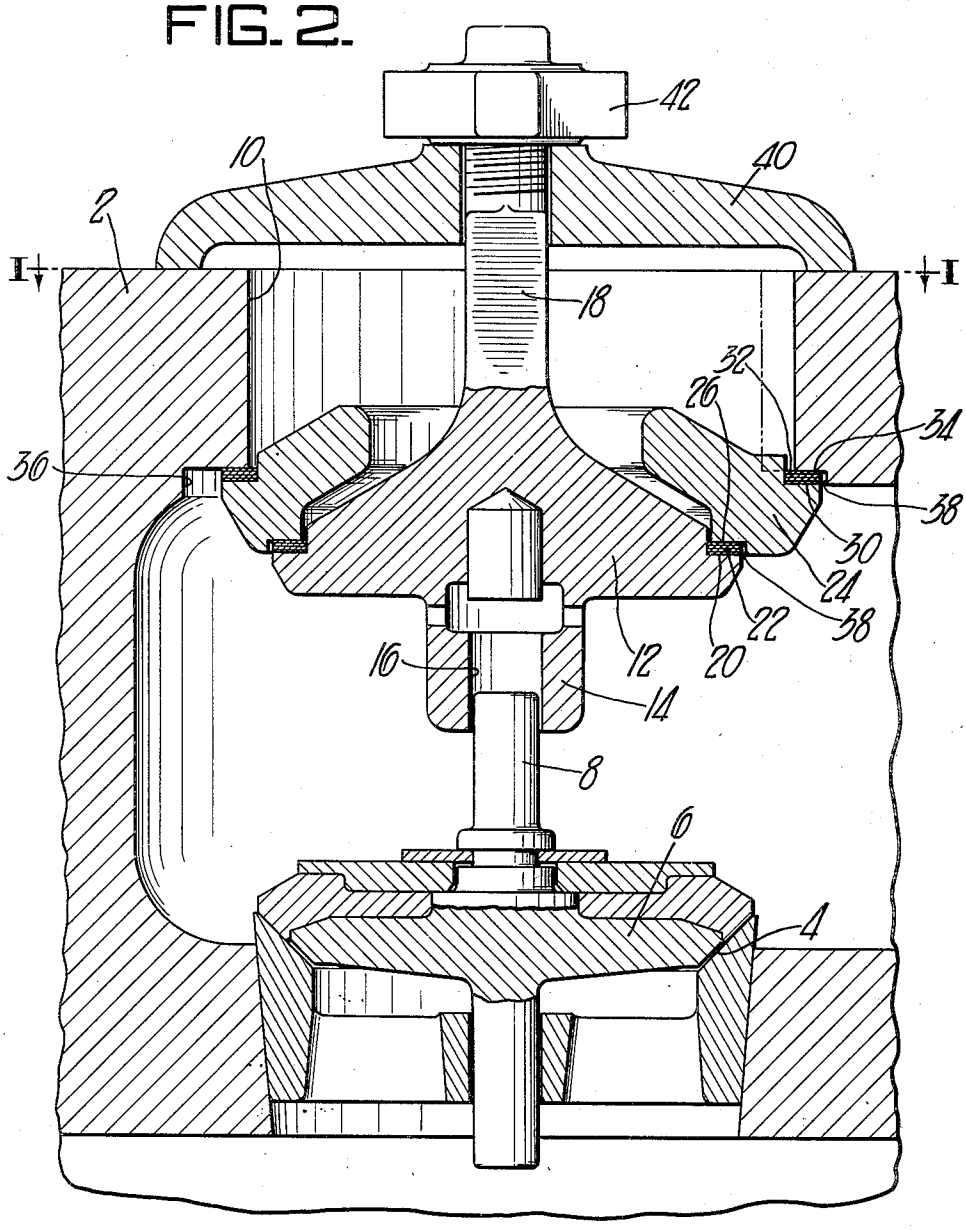
FIG. 2.



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Patented Oct. 31, 1950 2,527,949

UNITED STATES PATENT OFFICE

2,527,949

SLUSH PUMP VALVE COVER

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Application April 23, 1946, Serial No. 664,249

1 Claim. (Cl. 251—127)

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This invention relates to readily removable oil well slush pump valve covers.

In present day slush pump operations where drilling depths occasionally exceed 15,000 ft., pumps suitable for working pressures of 3000 lb./sq. in. are required. These pumps have to deliver fluid at the rate of about 600 to 800 G. P. M., requiring large diameter fluid valves with an outside diameter in the neighborhood of 8".

It is the usual custom to locate these valves and their seats in separate valve chambers so that they are readily accessible due to the necessity of replacing both valves and seats frequently. The valves and seats are inserted into the pump chamber in each case through an opening which is closed by a valve cover held in place by a large number of heat treated studs. These studs must carry the full pump pressure exerted against the valve cover over the entire area enclosed by the valve cap gasket. This means, for example, that with an 8" diameter opening and gasket, the valve cap and studs must carry a total load of approximately 150,000 lbs. when the pump is operating against 3000 lbs./sq. in. pressure.

Practically all conventional oil field slush pumps are double-acting pumps of the duplex or triplex type, requiring a total of eight or twelve valves and valve covers. Whenever valve leakage develops, it is frequently necessary to remove all of the valve caps in order to determine which valve is leaking and to make replacement of the faulty valve in order to maintain satisfactory pump performance.

A pump equipped with twelve valves, using eight studs for each valve cover, has a total of 96 studs and nuts. To remove all of the nuts and caps to examine the valves requires considerable time and is a very expensive procedure in view of the long shutdowns of the drilling rig.

In addition to the inconvenience and the expensive shutdown time incurred in removing valve caps of this type, the gaskets are subject to blowouts whenever sufficient stretch occurs in any of the stud retaining caps to allow the gasket to loosen. This also results in expensive shutdown time for gasket replacement.

Accordingly, it is an object of the present invention to provide a slush pump valve cover which is readily removable and replaceable.

It is a further object of the present invention to provide a slush pump valve cover which is efficient and durable in use.

The foregoing and further objects will be apparent from the following specification when read in conjunction with the attached drawings, wherein:

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Figure 1 is a top view of the valve cover along the line I—I of Figure 2 and showing in dotted lines the ring member turned 90° for removal;

Figure 2 is a cross section on line II—II of Figure 1 and showing in dotted lines the manner of positioning the ring member; and

Figure 3 is a partial section illustrating the insertion of the sealing ring.

Referring more particularly to the drawings, the numeral 2 designates a slush pump valve housing having a valve seat 4 and valve 6 with an upstanding stud 8 disposed thereon. The valve seat and valve are adapted to be placed in position through an aperture 10 in the housing 2.

In accordance with the teachings of our invention, the aperture 10 is slightly oval in shape for the insertion of a portion of the cover as is more fully described hereinafter.

Centrally disposed in the oval aperture 10 is an inner support member 12 having a sleeve 14 and bore 16 at the lower side thereof forming a guideway for the stud 8 of the valve 6 and an upstanding stud 18 which extends above the casing 2 and is screwthreaded at the outer end thereof. The outer periphery of the member 12 is machined to provide a seat 20 for a sealing ring 22.

Disposed around the member 12 is a dished ring member 24, which has its lower inner edge machined to provide a recess 26, which lies above the seat 20 so as to engage the upper side of the sealing ring 22. The upper outer edge of the ring 24 is also machined to provide an annular oval-shaped seat 30 for a sealing ring 32. The inside edge of the aperture is machined to provide an annular recess 34 so as to cooperate with, or receive in sealing engagement, the ring 32. As shown at 36, in Figure 2, the recess 34 is cut back somewhat farther at the edge portion of the long diameter of the oval to provide room to position the ring member, as shown by the dotted lines of Figure 3. In the case of both sealing rings 22 and 32, an annular space 38 is provided therearound to permit access of the interior pressure of the valve chamber to the edge of the rings.

Disposed over the aperture 10 and surrounding the stud is a yoke or cover member 40. The inner members are held in position by a nut 42 on stud 18 which engages the yoke 40.

With the yoke and cover members removed for the insertion of a new valve seat or valve,

the members are positioned in the following manner. The inner member 22 is entered through the aperture 10 and the sleeve 14 slid over the stud 8. The oval-dished ring member 24 is then disposed around the stud 18, turned so that the major axis thereof is at right angle to the major axis of the oval aperture and then by tilting the same is dropped through the aperture. It is then turned 90° so that its major axis and the major axis of the aperture are in coincidence. The yoke 40 is then placed over the aperture with the stud 18 extending therethrough. The nut 42 is then turned onto the stud to pull the inner member and sealing ring upwardly to bring the respective sealing surfaces into tight engagement with the sealing rings. When pressure is admitted to the valve chamber, it will be noted that such pressure is not transmitted to the stud holding the parts in position but instead acts to more tightly seal such members.

While we have shown and described one specific embodiment of our invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of our invention, as defined in the appended claim.

We claim:

In combination a valve chamber having an oval opening in the chamber housing, a valve in the chamber beneath said opening, an upstanding stud on said valve and a readily removable cover for said opening comprising a removable support member in said chamber, said member having a sealing member on its upper side adjacent its outer edge, a ring member having an annular surface on its underside adapted to engage said sealing member, a second sealing member on the upper side of said ring member adapted to engage the underside of the housing around said oval opening, guide means on the underside of said support member adapted to receive the stud on said valve member to hold said support member while said cover is being positioned and to guide said valve when it is operated and means for holding said support member to keep said sealing members tightly engaged.

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