March 20, 1945. F. A. NICHOLS 2,371,704

DOUBLE ACTION PUMP

Filed Sept. 8, 1943 3 Sheets-Sheet 1

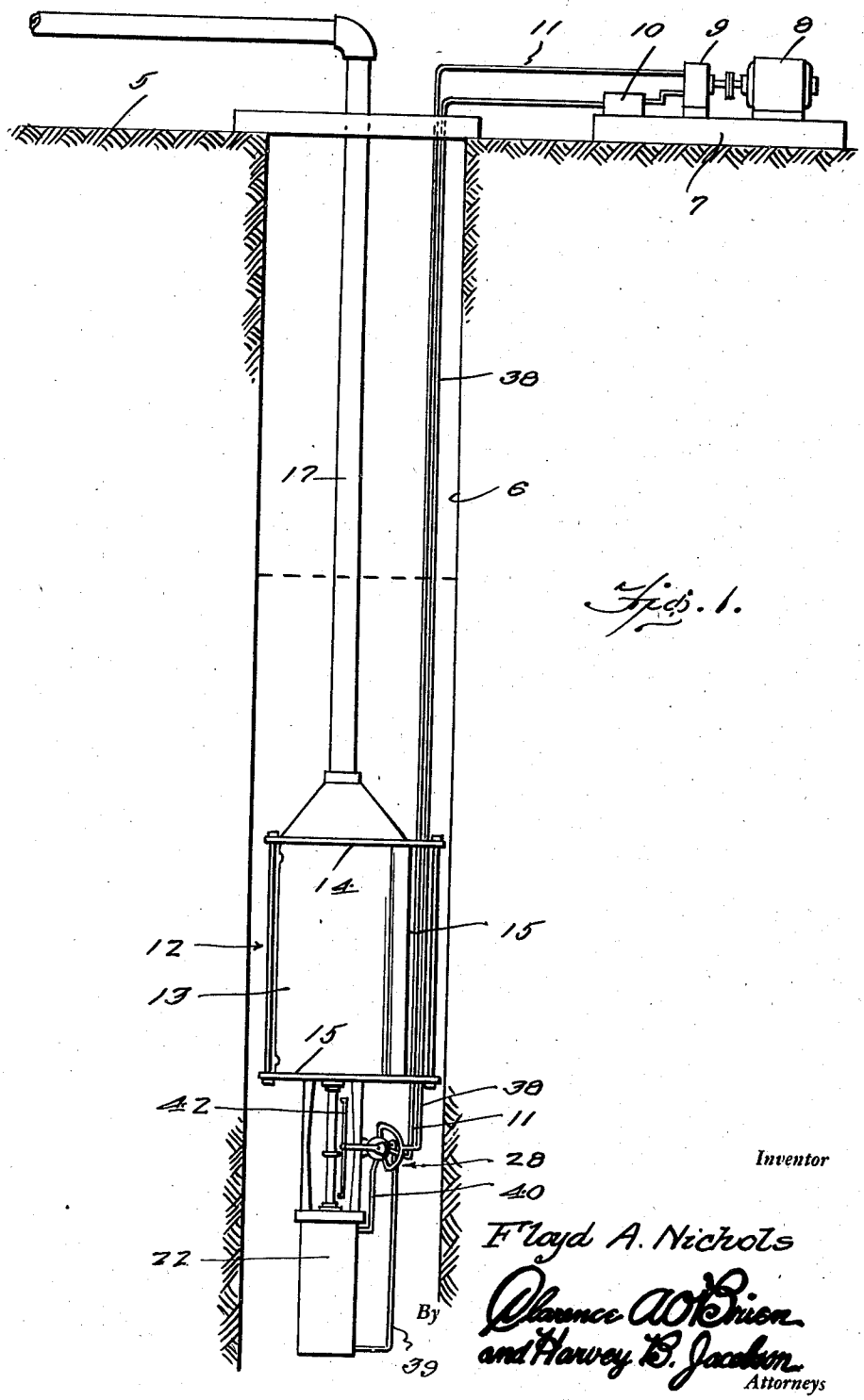


Fig. 1.

Inventor

Floyd A. Nichols

Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

March 20, 1945. F. A. NICHOLS 2,371,704

DOUBLE ACTION PUMP

Filed Sept. 8, 1943 3 Sheets-Sheet 2

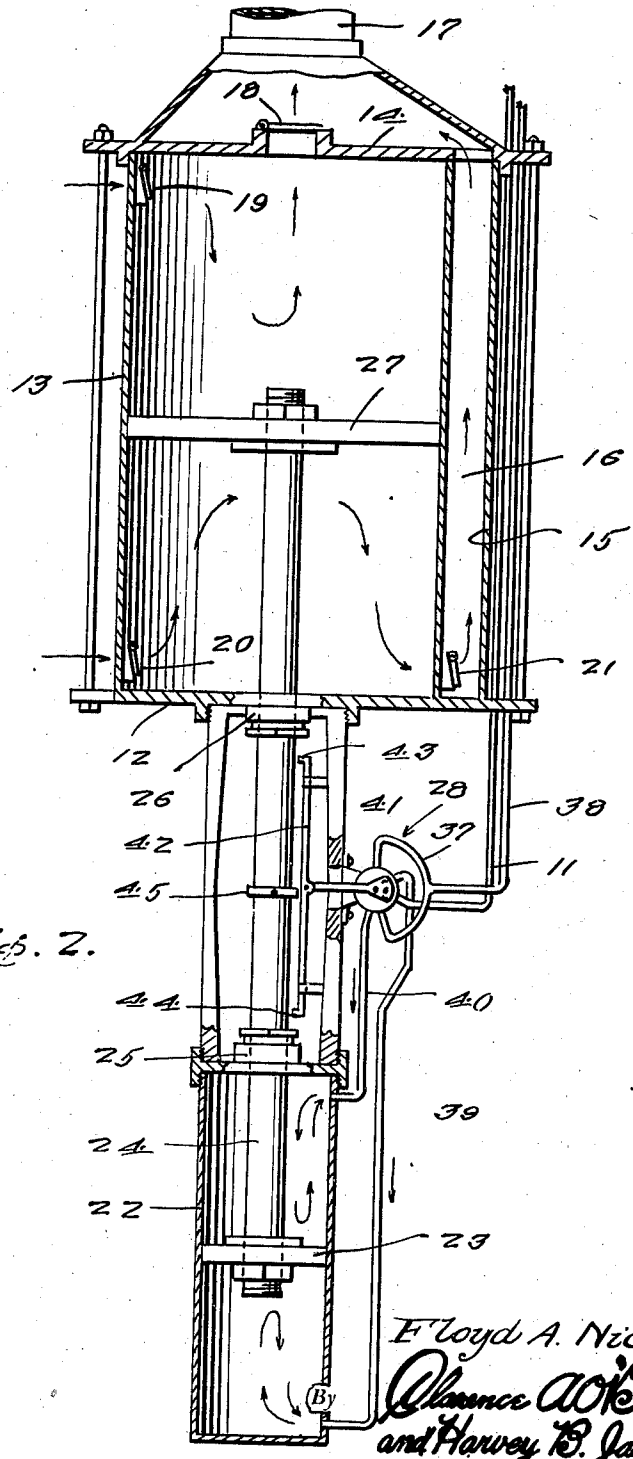


Fig. 2.

Inventor

Floyd A. Nichols

Clarence O'Brien

and Harvey B. Jacobson

Attorneys

March 20, 1945. F. A. NICHOLS 2,371,704

DOUBLE ACTION PUMP

Filed Sept. 8, 1943 3 Sheets-Sheet 3

Fig. 3.

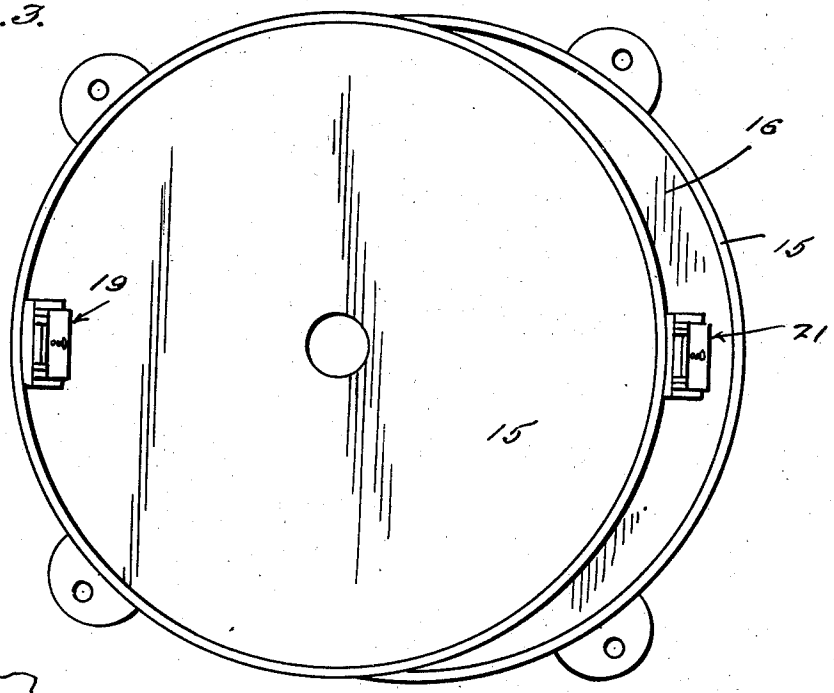


Fig. 5.

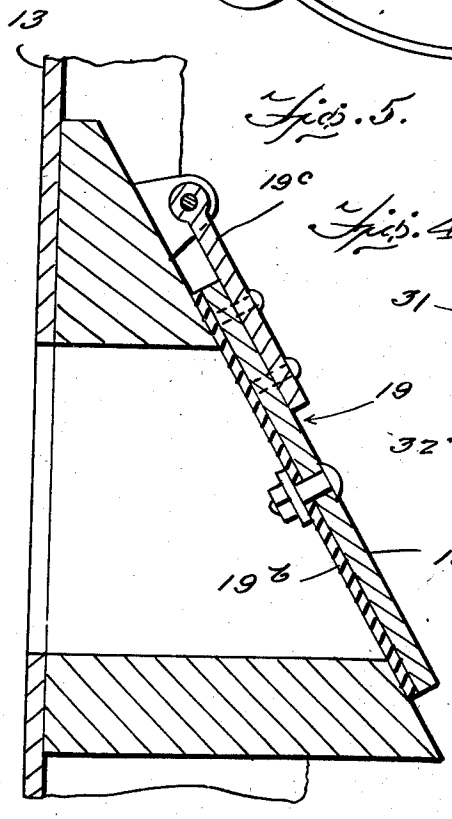
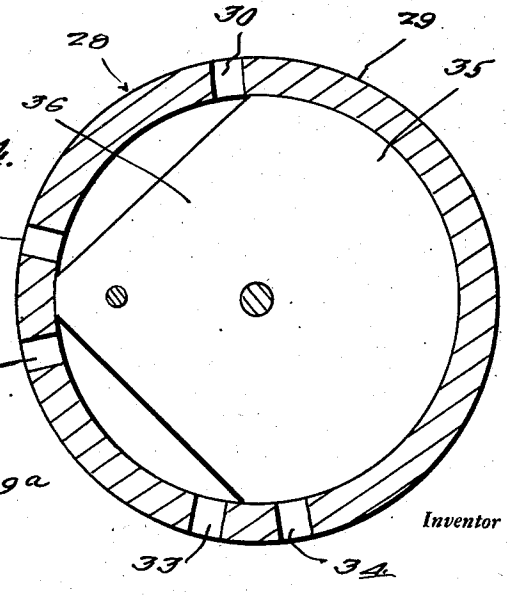


Fig. 4.



Inventor

Floyd A. Nichols

By Clarence A. O'Brien and Harvey B. Jackson

Attorneys

Patented Mar. 20, 1945 2,371,704

UNITED STATES PATENT OFFICE

2,371,704

DOUBLE-ACTION PUMP

Floyd A. Nichols, San Rafael, Calif., assignor of fifty per cent to Tyrrell A. S. Berger

Application September 8, 1943, Serial No. 501,568

1 Claim. (Cl. 121—164)

This invention relates to new and useful improvements in pumps of the deep well type.

The principal object of the present invention is to provide a pump of the double acting type actuated by fluid under pressure and adapted to have a lifting power considerably greater than pumps of this general character in present-day use.

Other objects and advantages of the invention will become apparent to the reader of the following description.

In the drawings:

Figure 1 is a side elevational view of the pump located in a well.

Figure 2 is a fragmentary vertical sectional view through the cylinders.

Figure 3 is a top plan view of the pump cylinder with the connection removed.

Figure 4 is a sectional view through the automatic valve.

Figure 5 is a fragmentary vertical sectional view showing one of the flap valves.

Referring to the drawings wherein like numerals designate like parts, it can be seen in Figure 1, that numeral 5 denotes the ground level, while numeral 6 denotes a well. On the ground 5 is a suitable platform 7 upon which is a motor or other power plant 8 driving a pump 9 which is connected to a sump 10 and has a pressure line 11 extending therefrom.

Numeral 12 generally refers to the improved cylinder assembly, one form of which is employed in the well as shown in Figure 1.

The form of cylinder assembly shown in Figure 2, consists of a pump cylinder 13 having headers 14, 15 at the upper and lower ends thereof. The cylinder 13 has a supplemental wall 15a defining a passageway 16 through which the fluid being pumped can rise from the lower portion of the cylinder 13 to an eduction line 17.

The eduction line 17 is connected to the header 14 and the header 14 has an outlet valve 18 therein. The upper portion of the cylinder 13 has an inlet valve generally referred to by numeral 19, while the lower portion of the cylinder 13 has an inlet valve 20. The latter end of the cylinder 13 has an outlet valve 21. The valves 19, 20 and 21 are of the flap type, one of which is shown in detail in Figure 5.

Referring to Figure 2, it can be seen that numeral 22 denotes a pressure cylinder having a piston 23 therein. A rod 24 extends from the piston 23 through a packing gland 25 in the upper end of the cylinder 22 to pass through a packing gland 26 in the lower header 15 of the cylinder 13. The upper end of the piston rod 24 within the cylinder 13 has a piston 27.

Numeral 28 denotes an automatic valve for distributing fluid under pressure to the pressure cylinder 22 and this consists of a case (see Figure 4) denoted by numeral 29 and having ports 30, 31, 32, 33 and 34 and inside of the case 29 is an oscillatory element 35 having a tapered portion 36.

The exhaust or return ports 30, 34 are in communication with a connecting pipe 37 which, in turn, is connected by a pipe 38 to the sump 10. The port 31 is connected by a pipe 39 to the lower portion of the pressure cylinder 22, while the port 33 is connected by a pipe 40 to the upper portion of the cylinder 22. The pressure line 11 communicates with the valve 28 at the port 32.

The valve element 35 is controlled by an arm 41 which connects to a vertically disposed rod 42 having lugs 43, 44 at the upper and lower ends thereof. A collar or like actuating element 45 is provided on the piston rod 24 and obviously as the piston moves up and down, the collar 45 will act on the lugs of the rod 42 to alternately change the valve for delivering pressure to the upper and lower ends of the cylinder 22.

While the foregoing specification sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and materials may be resorted to without departing from the spirit and scope of the invention as claimed hereinafter.

Having described the invention, what is claimed as new is:

In a pumping apparatus for installation in a deep well, including a pressure cylinder, and a frame, a double acting piston in said cylinder, and a piston rod extending through the frame, the combination of an automatic valve carried by said frame, an operating arm for said valve extending into said frame, a vertically disposed member having protrusions at the upper and lower ends thereof connected to said arm, a fluid pressure line connected to said valve, conduits extending from the valve to opposite ends of said cylinder, and means on said piston rod engageable alternately with said protrusions to actuate said valve alternately to open one or the other of the ends of said cylinder to said fluid pressure line.

FLOYD A. NICHOLS.