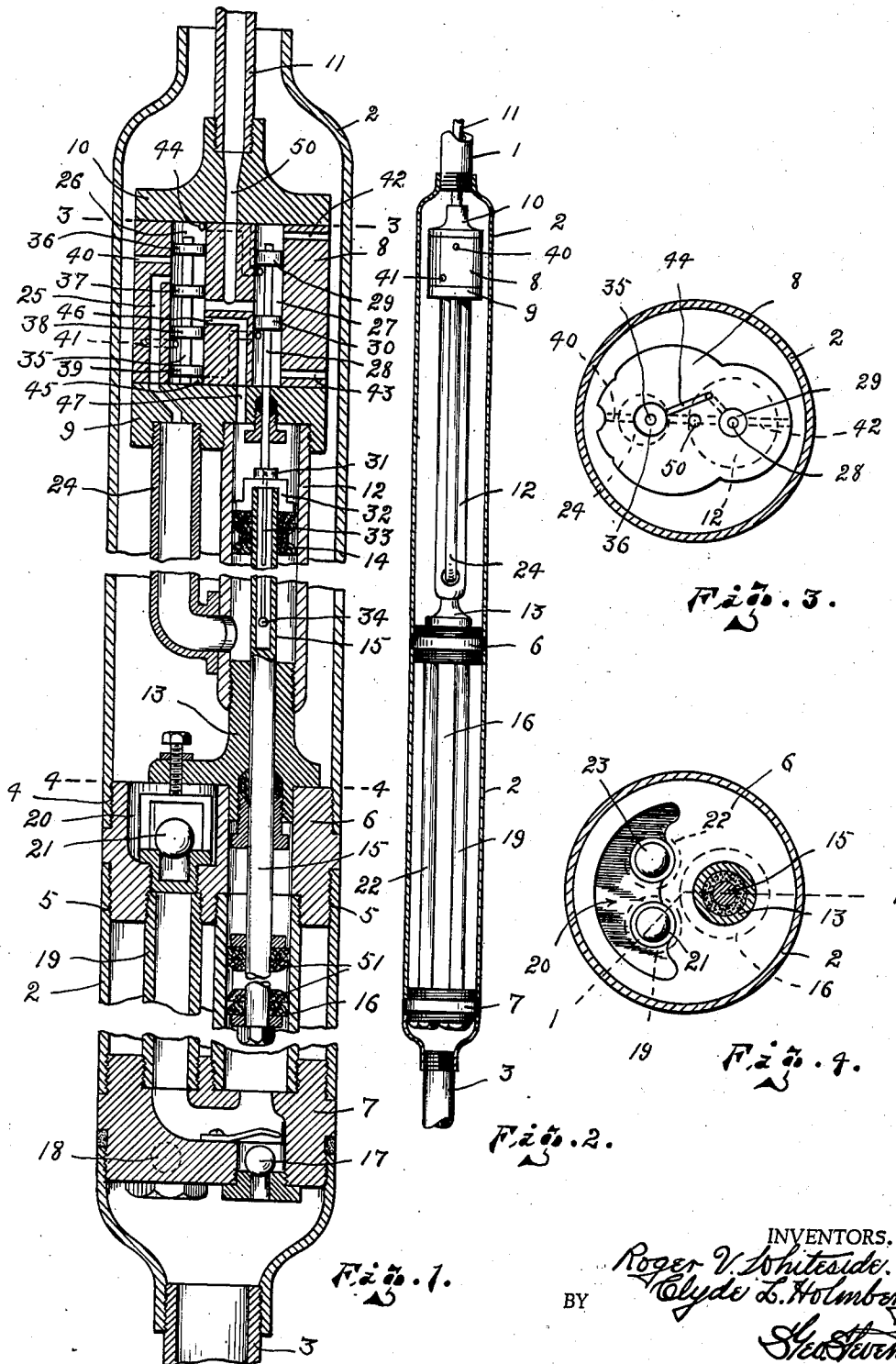


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DOUBLE ACTING DEEP WELL PUMP

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DOUBLE ACTING DEEP WELL PUMP

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1 Claim. (Cl. 103—46)

This invention relates to pumps and has special reference to those known in the art as deep well double acting pumps.

The principal object of our present invention is to provide a more efficient, durable, and practical pump of this type, having special reference to simplicity of construction and a minimum number of parts.

Other objects and advantages of the invention will appear in the following description thereof.

Referring now to the accompanying drawing, forming part of this application, and wherein like reference characters indicate like parts:

Figure 1 is a broken vertical transverse sectional view of a pump and motor embodying the invention, the lower portion of same being on the line 1—1, Fig. 4.

Figure 2 is a reduced sectional view of the casing only of the pump, the other parts being shown in elevation.

Figure 3 is a transverse section on the line 3—3, Figure 1.

Figure 4 is a transverse section on the line 4—4, Figure 1.

1 represents one of the lowermost sections of a train of pipe for pumping purposes and which section is illustrated as having attached thereto an enlarged section of casing or pipe illustrated at 2, as the pumping mechanism would ordinarily require such enlarged space or chamber in which to operate successfully, though it is obvious that such enlargement may not be essential in all cases. In this instance I have shown at the lower end of the casing 2 a similar reduction end attachment of an extension 3 as intake for the pump and which may carry any desired form of screen or the like to prevent objectionable matter entering with the liquid being pumped.

The casing 2 is shown as consisting of two substantially equally sized portions screw-threadedly attached as at 4 and 5 to the central circular block or hub 6, which, together with the similarly shaped foot block 7, form the principal carrying members for support of the pumping mechanism, there, however, being a longer and smaller block 8 within the upper end of the casing to which the motor portion of the pumping mechanism is attached. This block will be referred to as the head block, it being comprised of removable end portions or caps 9 and 10 at either end thereof, they being connected together as by bolts in any convenient manner. The cap 10 has screw-threadedly attached thereto the power supply pipe 11 which is installed centrally of the line pipe 1 and furnishes from a supply not shown

the power liquid whatever it may be, oil, water, air, or the like, under pressure, for operation of the motor.

The motor cylinder is indicated at 12 and may be of any desired length or area, it being attached to the lower cap 9 of the valve head 8, and fixed to the cap 13 of the block 6 at its opposite end. Within this cylinder is mounted the reciprocable motor piston 14, the rod 15 of which is hollow at least in its uppermost portion and extends downwardly through the cap 13 and block 6 into the pump cylinder 16, the upper end of which latter is attached to the block 6 while the lower end is fixed to the foot block 7. This foot block 7 is provided with a pair of check valves, in this instance illustrated as being ball valves 17 and 18, both communicating with the pump cylinder 16, the valve 18 through the pipe 22 with the upper end of the cylinder 16 as at 22', and the one 17 being preferably directly beneath the pump cylinder 16 and communicating therewith as well as with the discharge pipe 19 which is disposed parallel with the pump cylinder 16, attached to the blocks 7 and 6 and in the chamber 20 of the latter provided with a check valve 21.

The check valve 18 is installed at the bottom of the pipe 22 which is in parallelism with the pipe 19 and the pump cylinder 16 and also provided with a check valve 23 at its upper end similar to the valve 21 within a like chamber to that illustrated at 20 within the block 6, so that both pipes 19 and 22 communicate with the pump cylinder as well as the discharge barrel above the head 6; the pump being of the double acting type.

Parallel with the motor cylinder 12 is an actuating fluid conductor pipe 24 connected at its lower end to the lower end of the cylinder and at its upper end to the cap 9 of the valve head and communicating as by the port 25 with the valve chamber 26. A passageway or port 30 is formed axially of the cap 10 and head 8 and extends downwardly to approximately centrally of the latter where it is of inverted T-shape and communicates with both the chamber 26 and a like but slightly smaller chamber 27 formed in the head axially of the motor cylinder 12. A reciprocable pitman 28 is mounted within this chamber 27 and which pitman carries two spaced heads or pistons 29 and 30, constituting the pilot valve. Upon that portion of the pitman 28 within the motor cylinder 12 is fixed a collar or stop 31 for impingement against the yoke 32 carried upon the upper end of the piston rod 15 and which pitman 28 is reduced in diameter as at 33 and extends downwardly within the piston

rod 15 the proper distance in relation to the length of the motor cylinder where it is provided with an enlargement or ball 34, which, when the piston 14 is about to approach its lowermost limit, the yoke 32 will engage, and draw downwardly the pitman 28 for proper function of the motor, which will be described later.

Within the chamber 26 is installed the main floating valve spool comprising the stem 35 carrying fixed thereto the four piston heads 36, 37, 38 and 39. It is to be noted that the stem 35 extends slightly beyond both terminal piston heads to admit of the actuating fluid entering the chamber when desired beyond said pistons. Now the exhaust ports within the head 8 are illustrated at 40, 41, 42 and 43, while two intermediate ports are shown at 44 and 45, there also being the transverse port 46 forming communication with the chamber 26 and the vertically disposed port 47 leading to the upper end of the pump cylinder 12.

The operation of the device is as follows:

Assuming that the combination motor and pump piston rod is in its uppermost position and having engaged the stop 31 and raised the pitman 28 to the position illustrated, and there being pressure of the actuating fluid through the pipe 11 and port 50, it is seen that such pressure will instantly be communicated through the cross terminal of the port 50 into the chambers 26 and 27 directly, and indirectly through the chamber 27 and port 44 to the upper end of the chamber 26 above the piston 36, tending to force the main valve spool in the chamber 26 to its lowermost position, simultaneously with opening of the port 45 through the chamber 27, below the piston 30 and to the exhaust port 43, permitting the valve spool to move to its lowermost position.

At this time the pipe 24 communicates through the port 25 and the chamber 26 to the exhaust port 40 into the pump flowage, relieving pressure from the lower end of the motor piston 14, at the same time establishing communication through the chamber 26, port 46, and port 47, to the upper end of the cylinder 12 above the piston 14 which will force the latter downwardly together, of course, with the pump piston 51.

Now when the piston 14 approaches its lowermost position the yoke 32 will engage the ball 34 on the extension 33 of the pitman 28 and carry

the latter downwardly until the pistons 29 and 30 pass the opening of the ports 44 and 45 respectively in the chamber 27, when instantly exhaust discharge is opened from the chamber 26 above the piston 36 through the port 44, chamber 27 and port 42, allowing the valve spool within the chamber 26 to be raised by the pressure of the power fluid passing through the cross terminal of the port 50 into the chamber 27 through the port 45 to beneath the piston 39 in chamber 26, forcing the valve spool upwardly and holding it there simultaneously with the passage of the power fluid through the chamber 26 and port 25 to the pipe 24 and beneath the piston 14 forcing it to its uppermost position, simultaneously with opening communication from the upper end of the motor cylinder above the piston 14 through the ports 47 and 46 and through the chamber 26 to the exhaust port 41, thus relieving pressure from the upper end of the motor piston.

In this manner it is obvious that reciprocal motion is automatically controlled simply by pressure being applied to the power fluid and the pump piston within the pump cylinder 16 correspondingly reciprocated.

The action of the pump piston is deemed sufficiently obvious without further explanation except that it is double acting as is common in such pumps, affording the greatest efficiency possible.

Having thus described our invention, what we claim and desire to secure by Letters Patent, is:

Control valves for a pump of the type described, comprising a motor and a pump, a piston rod common to both pump and motor, a valve head, connecting the motor to a source of liquid power supply, an axial passageway within said head, spaced valve cylinders upon opposite sides of said passageway and communicating therewith, a valve stem or rod in one of said cylinders carrying sliding valves thereupon and operable directly by said common piston rod, and a floating valve spool carrying sliding heads thereupon within the other of said cylinders for automatic reciprocation by the power fluid controlled by the changing position of the first mentioned sliding valves.

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