April 9, 1929. R. C. MASON 1,708,584

PUMPING RIG

Filed April 27, 1925

Fig. 1.

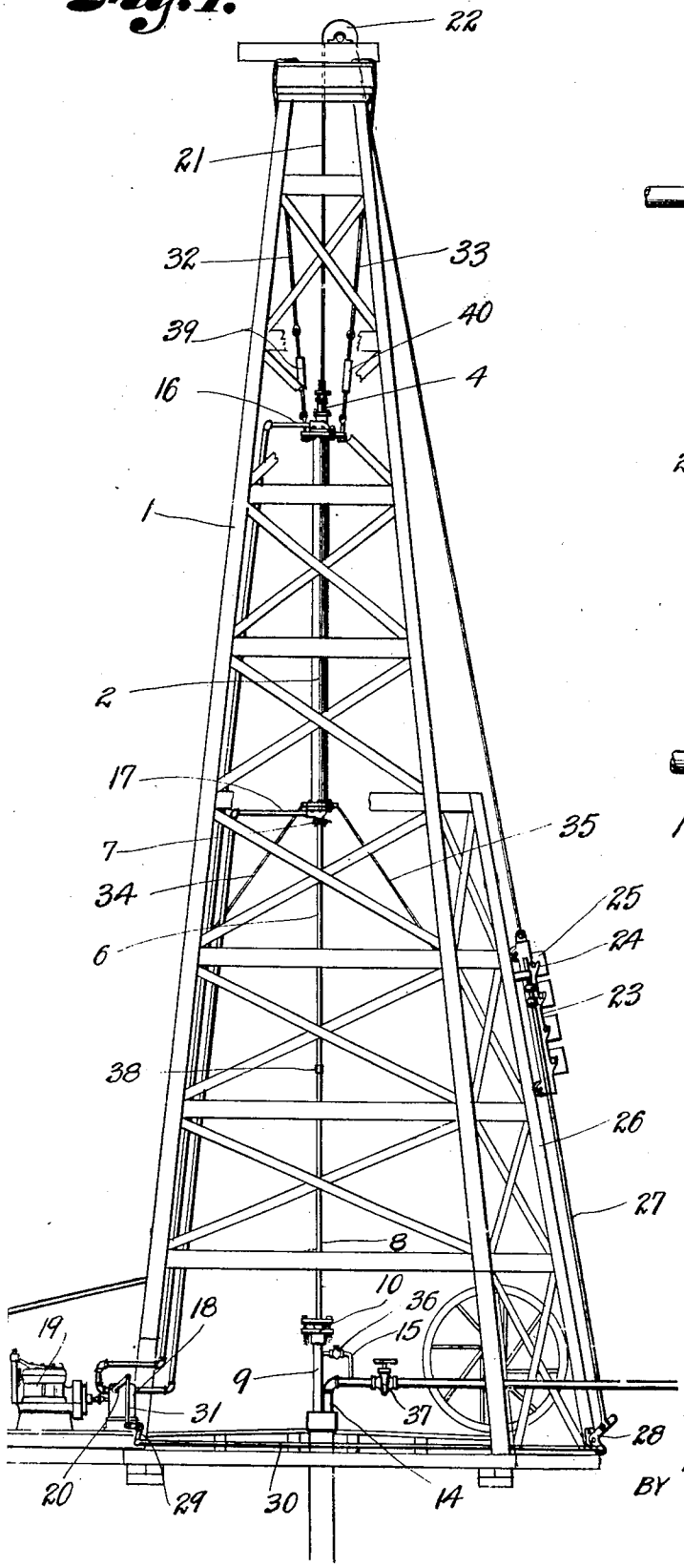
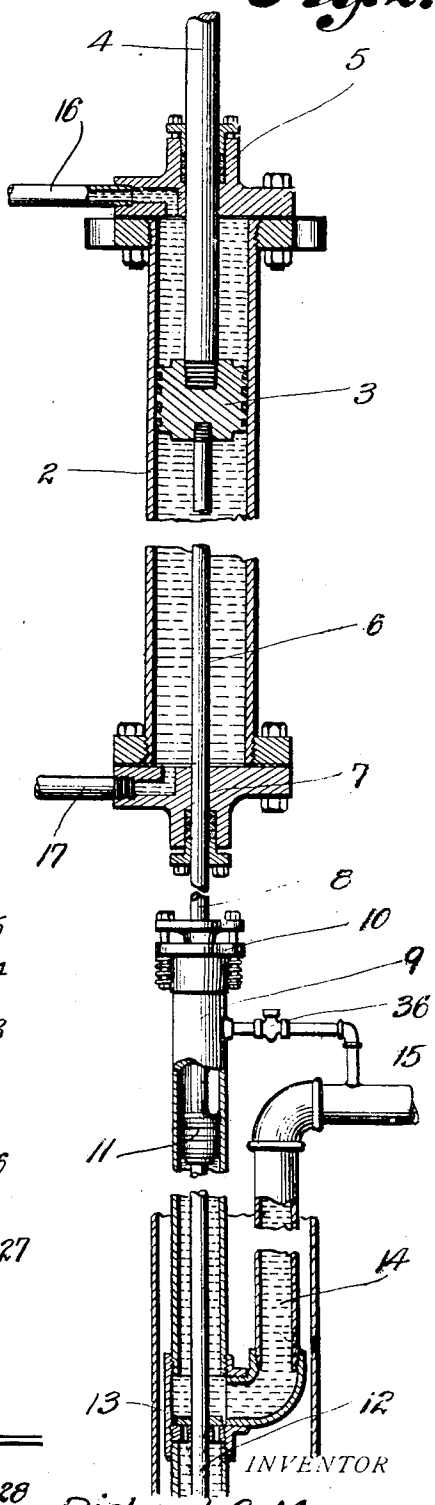


Fig. 2.



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Patented Apr. 9, 1929. 1,708,584

UNITED STATES PATENT OFFICE.

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PUMPING RIG.

Application filed April 27, 1925. Serial No. 26,089.

This invention relates to hydraulic pump operating mechanism, the primary object being to provide a hydraulic motor in line with the pump, the motor having a reciprocatory motion to raise and lower the pump piston. The hydraulic motor is also adapted for use in pulling rods and the like. It is, therefore, preferably located at the upper portion of a tower or derrick and the reciprocatory motor piston is connected to a counter-balance weight adapted to counter-balance the weight of the pump rods so that comparatively little power will be required to operate the pump.

The specifically novel features of the invention will be apparent by reference to the following description in connection with the accompanying drawings, in which

Fig. 1 is a side elevational view of a derrick constructed in accordance with my invention, and

Fig. 2 is a sectional view through the motor and through the pump.

The derrick 1 may be of approved design and it supports a hydraulic motor consisting of the cylinder 2 having a piston 3 therein. The piston 3 is connected at its upper end to a piston rod or polish rod 4 passing through the stuffing box 5. A similar polish rod 6, although of less diameter, passes through the lower stuffing box 7. The polish rod 6 is connected to a sucker rod 8 which extends into the pump cylinder 9 through the usual stuffing box 10.

The sucker rod 8 carries a piston 11 and depending from the piston is a guide rod 12. The bottom of the cylinder 9 is provided with a lift valve 13 which, when the piston 11 moves upwardly, will unseat to bring oil into the cylinder 9 and when the piston moves downwardly, the valve 13 will seat, the oil being discharged through the pipe 14. In the event that oil passes the piston 11, it will flow into the pipe 14 through the drain pipe 15.

The hydraulic motor cylinder 2 is provided with end ports 16 and 17 which are connected to a hydraulic pump 18, driven by a suitable motor 19. The hydraulic pump 18 is provided with a reversing mechanism 20 so that liquid will be fed first to the port 16 and then to the port 17 in alternate relation. The operation of the reversing mechanism will depend, of course, upon the movement of the rod 4. The rod 4 is connected at its upper end to a cable 21, passing over a pulley 22 and connected at its lower end to a carriage 23 having brackets 24 to receive weights 25, the number of weights depending upon the weight of the polish rods and sucker rods and fluid.

The carriage 23 slides on a guideway 26 and it, with its weights, counter-balances the polish rods, sucker rods and pump pistons.

Depending from the carriage 23 is a rod 27 connected to a bell crank lever 28, in turn connected to a bell crank lever 29 by a link 30, the bell crank lever 29 being connected to the reversing mechanism 20 by a link 31. Therefore, as the carriage raises, fluid will enter the ports 16 or 17, as the case may be, and as it lowers, fluid will enter the remaining inlet port 16 or 17. The cylinder 2 is connected to the tower at the top by braces 32 and 33 and at the lower end by braces or stays 34 and 35.

It will be observed that the rod or stem 4 has greater cross section than the stem 6; thereby reducing the capacity of the cylinder above the piston 3. It will not require as much power to force the rods down as it will to raise them. Another feature to be observed is that the check valve 36 in pipe 15 will permit oil to flow only toward the pipe 14. The valve 37 in pipe 14 can be controlled so as to regulate the amount of flow through the pipe 14; for example, when the valve is wide open, the piston 11 will be cushioned during its down stroke by the oil in the lower part of the cylinder 9, but not as much as when the valve is partially closed. Therefore, by regulating the valve 37, the amount of cushion for the piston 11 and consequently the resistance to the downward movement of the rod can be controlled.

From the foregoing it will be apparent that the motor can be made to exert a high degree of efficiency upon the pump, that the pull would be direct instead of through the usual walking beam, and that inasmuch as the motor will be a hydraulic motor, a uniform stroke may be insured at all times; it being further mentioned that in view of the fact that the sucker rods, pump pistons and the like will be counter-balanced by the weighted carriage 23, very little power will actually be required for the pumping and that when necessary, the motor will be employed for pulling rods and the like.

For the purpose of cleaning out the well or pulling rods or casing, the piston rod 8 is

disconnected from the polish rod 8 at the connection 38, then the turnbuckles 39 and 40 (there are four turnbuckles) are slacked off so that the cylinder 2 can swing out of line with the pump cylinder. A new line may now be run over the crown block or pulley 22 so the cleaning or other work may be accomplished.

The turnbuckles can be adjusted to center the cylinder 2 when it is to function.

The weight of the carriage 23 and the rods 6, as well as the fluid, etc., will tend to hold the derrick down during severe wind storms.

What I claim and desire to secure by Letters Patent is:

1. In a pumping rig, a derrick, a hydraulic cylinder having two port openings, one at each end, means for supporting the cylinder on the derrick, a piston in the cylinder, rods on opposite ends of the piston extending through opposite ends of the cylinder, a counter-balance weight connected to the upper rod, means for connecting the lower rod to a pump piston, and means controlled by the counter-balance weight for alternately admitting fluid to the respective ports of the cylinder.

2. In a pumping rig, a derrick, a hydraulic cylinder having two port openings, means connecting the cylinder to the derrick, a counter-balance weight connected to the piston, a rod projecting from the lower end of the piston, a pump operated by the lower rod, and means for admitting fluid first into one of the ports and then the other in alternating relation, said means being controlled by the counter-balance weight.

3. In combination with a derrick and pump, a pump actuating cylinder, a piston in the cylinder, cables supporting the cylinder at its opposite ends from the derrick, means connecting the piston and the pump, a counterbalance weight connected with the piston and adjustable means for centering the cylinder in the derrick.

4. In combination with a derrick and a pump, a pump actuating cylinder, a piston in the cylinder, means supporting the cylinder at its opposite ends from the derrick, means connecting the piston and the pump, a counterbalance weight connected with the piston and adjustable means for centering the cylinder in the derrick.

In testimony whereof I affix my signature.

RICHARD C. MASON.