Sept. 16, 1930 R. U. GRANT 1,775,759

PUMP

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Fig. 4.

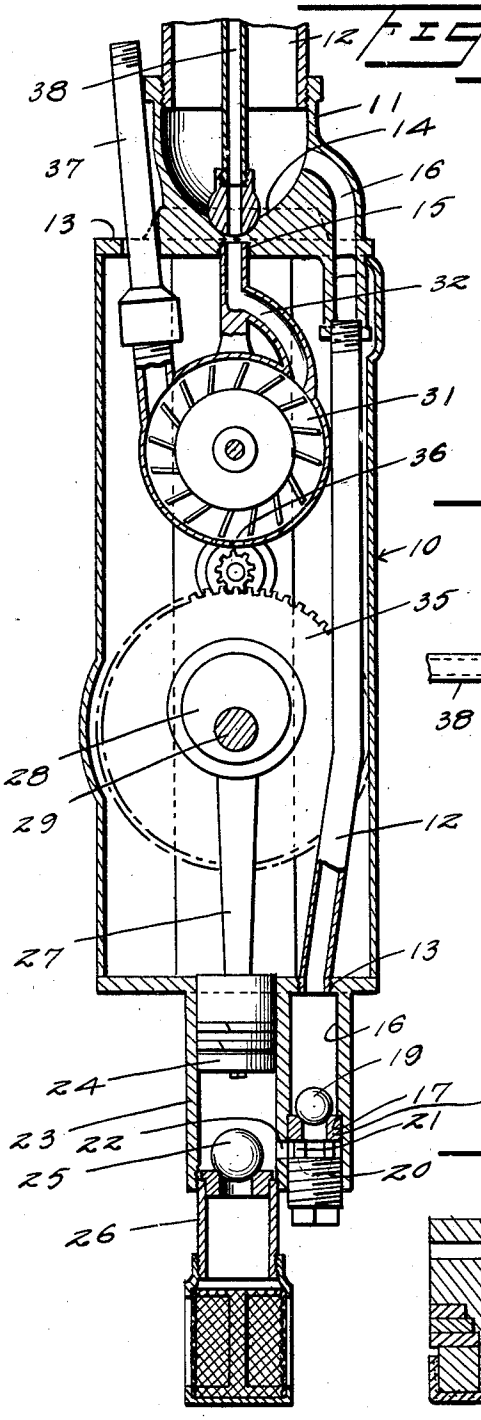


Fig. 1.

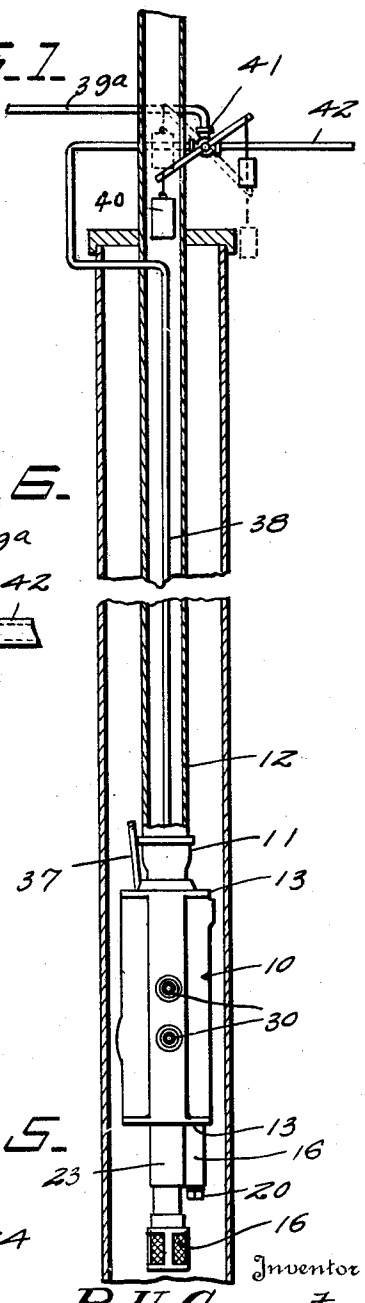


Fig. 6.

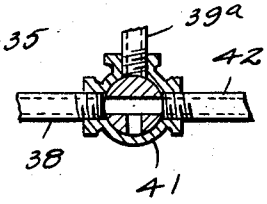
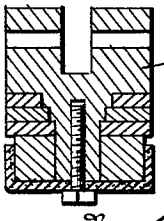


Fig. 5.



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Fig. 2.

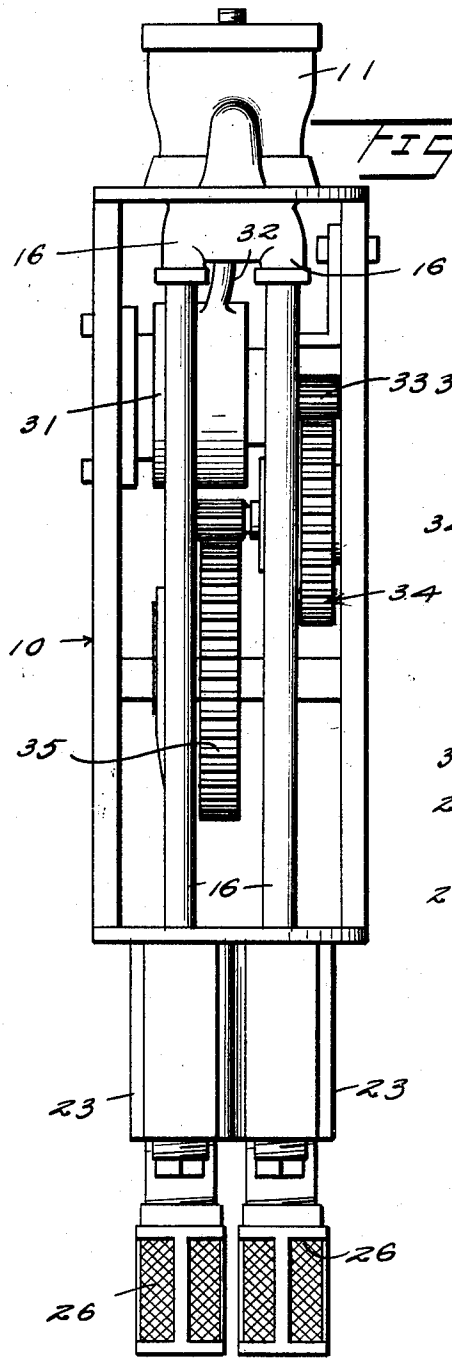
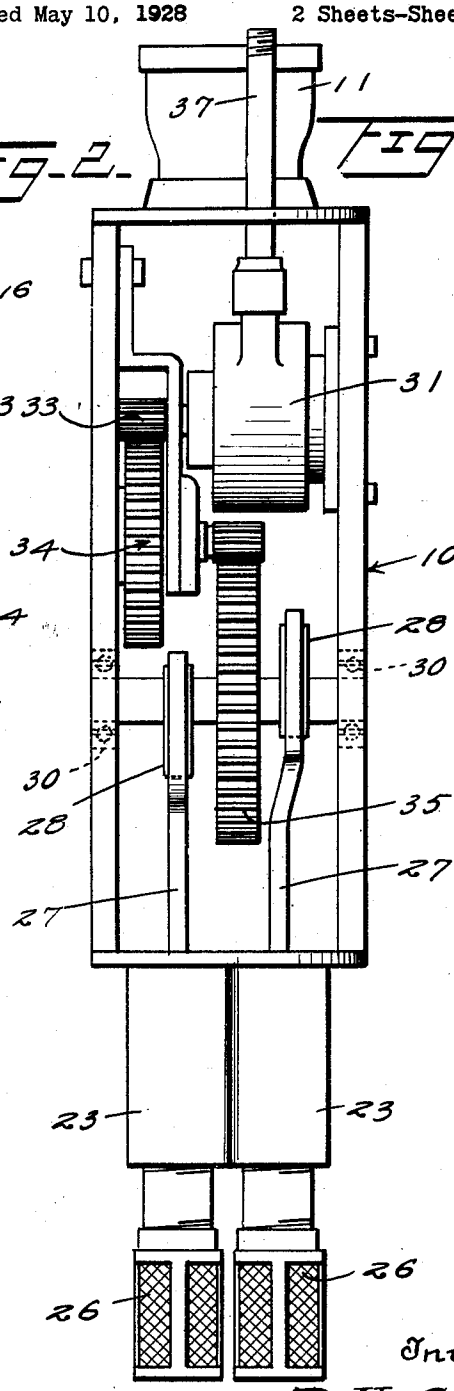


Fig. 3.



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Patented Sept. 16, 1930 1,775,759

UNITED STATES PATENT OFFICE

ROBERT U. GRANT, OF BRECKENRIDGE, TEXAS

PUMP

Application filed May 10, 1928. Serial No. 276,780.

This invention relates to pumps and more particularly to a pump intended for use in deep wells.

An important object of the invention is to produce a device of this character which is so constructed that it may be placed within the bores of the relatively small pipes which are employed in deep wells.

A further object of the invention is to produce a device of this character which may be operated by air, gas or steam pressure from the top of the well and in which the construction is such that the necessary connections may be readily made thereto.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a vertical sectional view showing pumping apparatus constructed in accordance with my invention is position in the well;

Figure 2 is an elevation of the pumping apparatus with one of the side walls removed;

Figure 3 is a similar view with the other of the side walls removed;

Figure 4 is a vertical sectional view through the pumping apparatus;

Figure 5 is a detail view of the piston employed;

Figure 6 is a detail sectional view showing the type of valve employed with the float control.

Referring now more particularly to the drawings, the numeral 10 generally designates the housing of a pump having at its upper end a coupling 11 whereby it may be connected with a flow line 12. The upper wall 13 at the center of this coupling is formed as a concave socket 14 from the center of which a port 15 leads downwardly through the wall. A pair of ports 16 opens at their upper ends through the side wall of the coupling and extend downwardly through the housing of the pump to the lower end thereof. Immediately above the lower end of the pump housing, the ports are enlarged to provide downwardly facing shoulders 17 against which are disposed check valve seats 18, the valves 19 of which prevent downflow through the ports. These seats are held against the shoulders by plugs 20 threaded into the lower ends of the ports and having their upper ends castellated to provide escape slots 21 placing transverse ports 22 in communication with the under surface of the check valve seat 18.

The lower end of the pump housing is provided with two vertically extending cylinders 23 with which the opposite ends of the ports 22 communicate. Reciprocatable within each cylinder is a piston 24 and the lower ends of the cylinders are equipped with check valves 25 through which they are in communication with screened inlets 26 extending below the lower end of the pump housing. Pivoted to each piston is an eccentric strap 27, the upper ends of which are engaged with eccentrics 28 upon a shaft 29 which is mounted in ball bearings 30 in the walls of the pump housing.

In the upper end of the pump housing is a motor 31, the inlet 32 of which communicates with the port 15.

The shaft of the motor 31 is equipped with a gear 33 forming one element of a reducing gear train 34, the final element of which comprises a gear 35 mounted upon the shaft 29. The housing 10 is preferably fluid-tight to form a chamber for the reception of lubricant in which the gears of the train and the shafts thereof operate.

The main outlet port 37 of the motor opens through the upper wall 13 to discharge into the well bore.

In connecting the device, the tubing is attached to the pump housing and the pump lowered to the proper level in the well. After the pump has reached its proper position, the air, gas or steam pressure line 38, which is equipped at its lower end with a ball head for connection with the socket 14, is lowered until this head seats in the socket. The weight of the air line in the tubing will maintain a seal between the head and the socket without the provision of other means.

A device of this character will operate indefinitely and is preferably provided with an automatic cut-off means terminating operation when the discharge from the well discontinues. Such a means is illustrated in Figure

1, wherein a float 40 normally maintained in elevated position by the flow of fluid through the tubing controls a valve 41 which, in turn, controls supply to the motor. This valve is preferably so constructed that when in position to cut off a pump of the well with which it is associated, it places the supply line 42 in communication with the supply line 39ª of the pump of a second well which may be similarly equipped by placing a number of pumps in series.

In this manner, completion of the pumping operation of one well of the series starts operation of the next well of the series, thus rendering the device particularly adapted for use in pumping wells of low capacity without the constant attendance of a pumpman.

Since the construction hereinbefore set forth is capable of a certain range of change and modification without materially departing from the spirit of the invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. In pumping apparatus for deep wells and the like, a tubing, a pump housing having at its upper end a coupling for connecting the tubing thereto, the upper wall of the pump housing having a port formed therethrough at the center of the coupling, a fluid motor within the pump housing and communicating with said port, a conduit having means for sealing to the upper wall of the pump housing about the upper end of said port, pump cylinders at the lower end of the pump housing, pistons reciprocatable therein, driving connections between the pistons and said motor and discharge ports for the cylinders extending through said pump housing and communicating at their upper ends with the interior of said coupling.

2. In pumping apparatus for deep wells and the like, a tubing, a pump housing having at its upper end a coupling for connecting the tubing thereto, the upper wall of the pump housing having a port formed therethrough at the center of the coupling, a fluid motor within the pump housing and communicating with said port, the upper end of said port communicating with a concave depression in the upper wall of the pump housing, a conduit having a spherical head for engagement in the depression, pump cylinders at the lower end of the pump housing, pistons reciprocatable therein, driving connections between the pistons and said motor and discharge ports for the cylinders extending through said pump housing and communicating at their upper ends with the interior of said coupling.

3. In pumping apparatus for deep wells and the like, a tubing, a pump housing having at its upper end a coupling for connecting the tubing thereto, the upper wall of the pump having a port formed therethrough at the center of the coupling, a fluid motor within the pump housing and communicating with said port, a conduit having means for sealing to the upper wall of the pump housing about the upper end of said port, pump cylinders at the lower end of the pump, pistons reciprocatable therein, driving connections between the pistons and said motor and discharge ports for the cylinders extending through said pump housing and communicating at their upper ends with the interior of said coupling.

4. In pumping apparatus for deep wells and the like, a tubing, a pump housing having at its upper end a coupling for connecting the tubing thereto, the upper wall of the pump housing having a port formed therethrough at the center of the coupling, a fluid motor within the pump housing and communicating with said port, a conduit having means for sealing the upper wall of the pump housing about the upper end of said port, pump cylinders at the lower end of the pump housing, pistons reciprocatable therein, a shaft driven from the motor and having eccentrics, eccentric straps connecting the pistons with said eccentrics and discharge ports for the cylinders communicating with said coupling.

5. In pumping apparatus for deep wells and the like, a tubing, a pump housing having at its upper end a coupling for connecting the tubing thereto, the upper wall of the pump housing having a port formed therethrough at the center of the coupling, a fluid motor within the pump housing and communicating with said port, the upper end of said port communicating with a concave depression in the upper wall of the pump housing, a conduit having a spherical head for engagement in the depression, pump cylinders at the lower end of the pump housing, pistons reciprocatable therein, driving connections between the pistons and said motor including a shaft driven from the motor and having eccentrics, eccentric straps connecting the pistons with said eccentrics and discharge ports for the cylinders communicating with said coupling.

In testimony whereof I hereunto affix my signature.

ROBERT U. GRANT.