

Aug. 27, 1935.

J. W. TURNER

2,012,839

MOTOR

Filed April 19, 1932

2 Sheets-Sheet 1

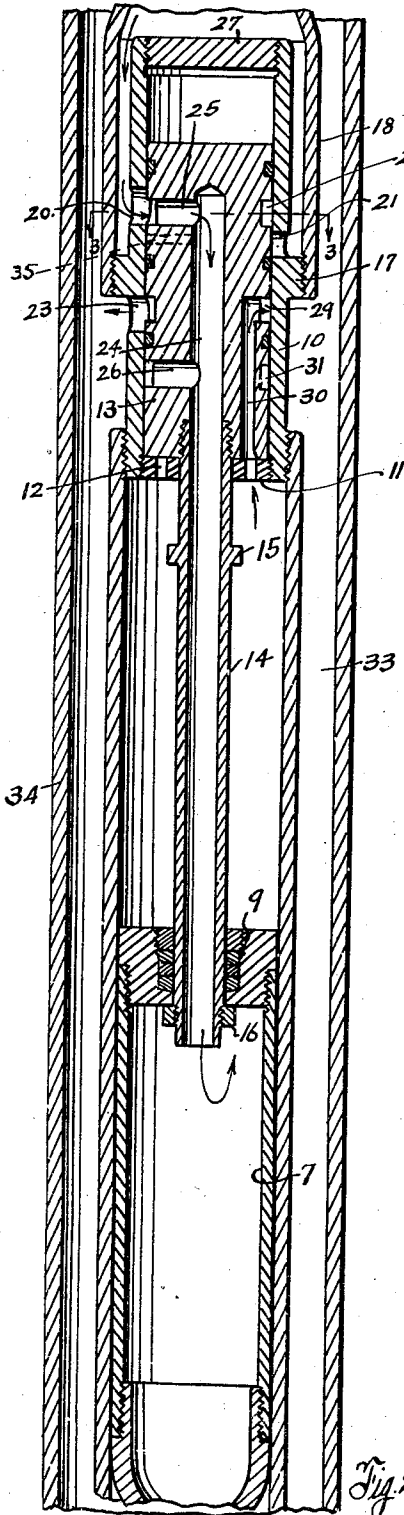


Fig. 2.

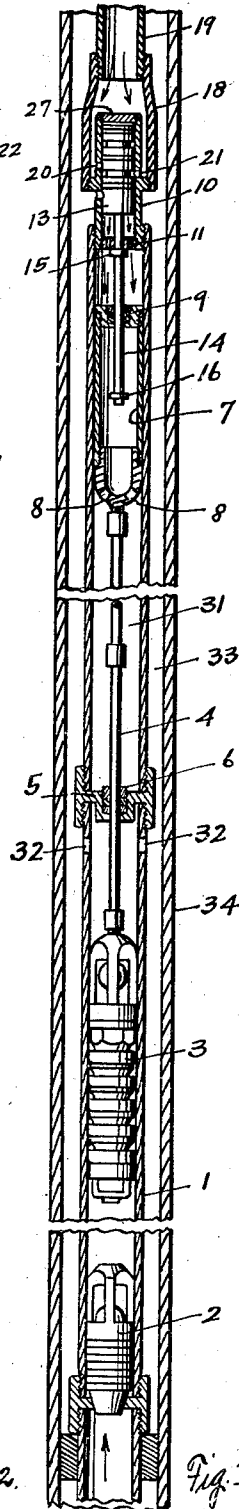


Fig. 1.

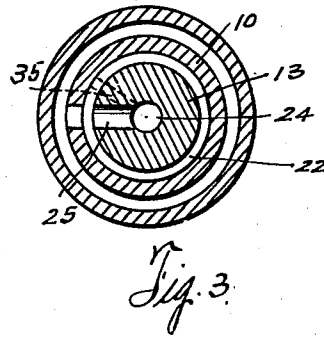


Fig. 3.

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2 Sheets-Sheet 2

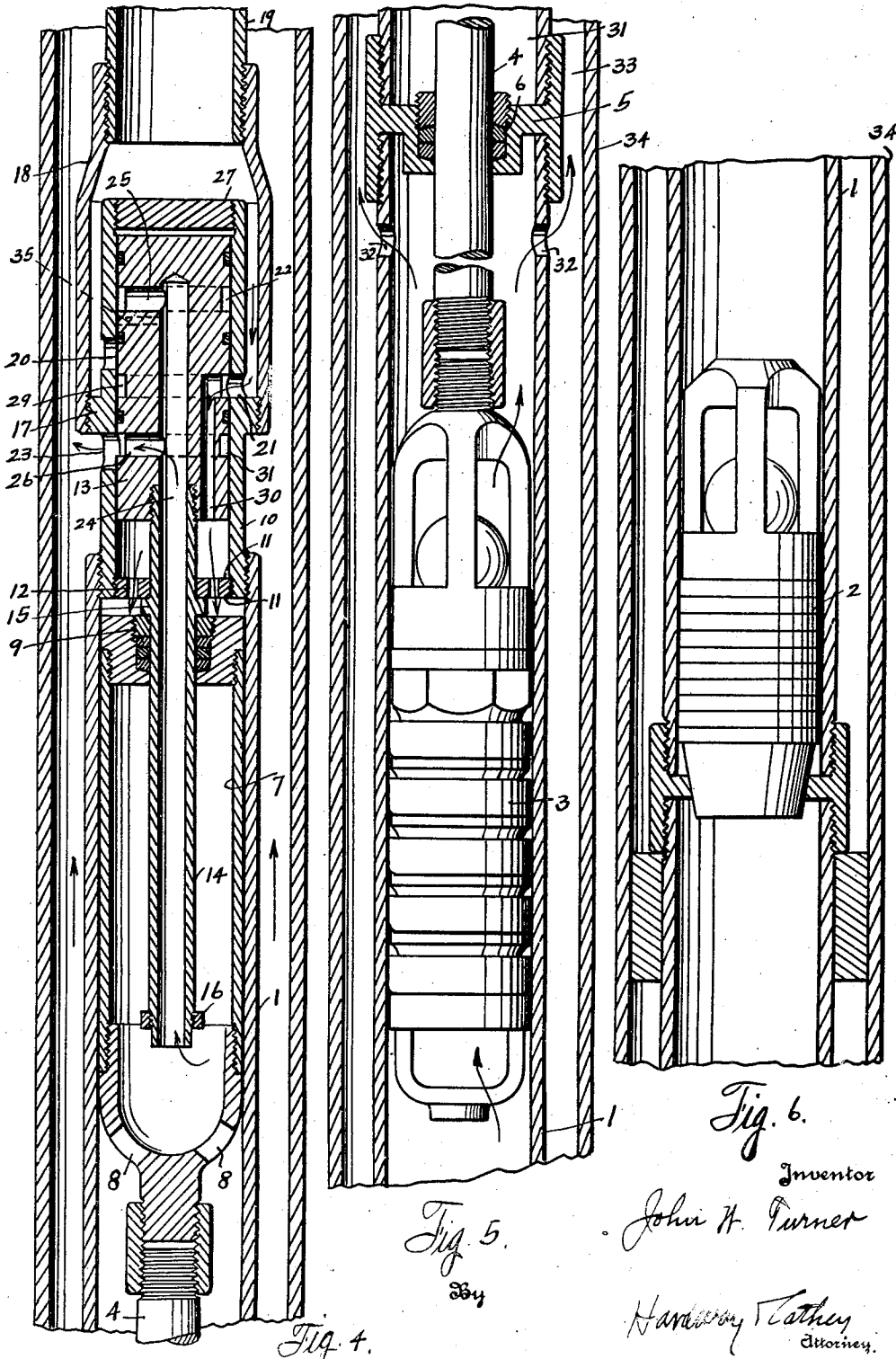


Fig. 6.

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UNITED STATES PATENT OFFICE

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MOTOR

John W. Turner, Houston, Tex.

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3 Claims. (Cl. 121—164)

This invention relates to a motor.

An object of the invention is to provide a motor to be used for operating a deep well pump and operable by pressure fluid.

Another object of the invention is to provide a motor of the character described specially designed for use in deep wells and adapted to be connected to the travelling valve of a pump and constructed to utilize an operating fluid under pressure to reciprocate said traveling valve whereby the well fluid may be pumped from the well.

A further object of the invention resides in the provision of pump operating mechanism connected to the traveling valve of the pump through which the operating fluid is utilized to reciprocate said valve and by means of which said operating fluid is discharged into the fluid being pumped and returned with said fluid to the ground surface.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a vertical sectional view of the motor as connected to a pump.

Figure 2 shows an enlarged vertical sectional view of the upper end thereof, with the parts in position for beginning the upstroke.

Figure 3 shows a cross sectional view taken on the line 3—3 of Figure 2.

Figure 4 shows a fragmentary vertical sectional view of the upper end of the motor showing the parts in position at the beginning of the down stroke.

Figure 5 shows an enlarged vertical sectional view of an intermediate section of the pump connected to the motor, and

Figure 6 shows an enlarged vertical sectional view of the lower end thereof.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the working barrel of a pump at the lower end of which there is the conventional upwardly opening standing valve 2. Within the working barrel there is the upwardly opening traveling valve 3 which is attached to the lower end of the pump rod 4. The working barrel has a transverse partition 5 above the traveling valve provided with a stuffing box 6 through which the rod 4 works. Within the working barrel 1 above the partition 5 there is a hollow plunger 7 to which the upper end of the

pump rod 4 is connected and which is provided with the lower end ports 8, 8. This plunger 7 fits closely within the working barrel 1 and its closed upper end carries a suitable stuffing box 9. Connected to the upper end of the working barrel 1 there is a cylinder 10 and anchored to the lower end of this cylinder there is an end plate 11 forming the upper end of the working barrel and provided with the ports 12. Within the cylinder 10 there is a piston valve 13 and a tubular piston rod 14 is attached to the lower end of the valve 13 and works through a central opening in the end plate 11 and is fitted also through stuffing box 9 and has its lower end open. The rod 14 has the external upper and lower abutments 15, 16, the former being located beneath the end plate 11 and spaced the required distance from the piston valve 13 and the other being located beneath the stuffing box 9.

The cylinder 10 has an external rib 17 thereon, arranged intermediate its ends, and a tubular nipple 18 is arranged over the upper end of the cylinder and is spaced therefrom and has its lower end attached to the rib 17. The upper end of the nipple 18 is reduced and the lower end of the string of pipe 19 is attached to said reduced upper end. This string extends to the ground surface, and is provided to conduct the operating fluid to the pump operating mechanism.

The cylinder 10 has the upper and lower inlet ports 20, 21 above the rib 17 and the piston valve 13 has the annular external channel 22 arranged to be brought into and out of registration with the port 20. The cylinder 10 has the discharge port 23 beneath the rib 17 and the piston valve 13 has the axial channel 24 which extends on down through the rod 14 and which has the upper and lower laterally turned branches 25, 26. The upper end of the cylinder 10 is closed in any suitable manner as by means of an end plate 27. Spaced beneath the channel 22 the valve 13 has another external annular channel 29 and leading downwardly from this channel through the valve 13 there is a duct 30. The piston valve 13 is also provided with an annular external channel 31 which is spaced beneath the channel 29.

The branches 25, 26 are connected into the respective channels 22, 31 and these channels are arranged to communicate alternately with the ports 20, 23.

The operation of the mechanism is as follows:— Assuming that the traveling valve 3 is in its lower position as indicated by Figure 2 with the valve 13 also in its lower position against the plate 11, in this position the inlet port 20 will register with

the channel 22 and the pressure fluid exerted downwardly through the string 19 will pass downwardly through the channel 24 and on down through the hollow plunger 7 and ports 8 into the pressure chamber 31 and the pressure will be built up in said chamber which will operate against the upper end of the plunger 7 and elevate said plunger as well as the traveling valve 3, and the fluid in the working barrel above the plunger 7 will be discharged out through a port 12 and through the duct 30 and channel 29 and out through the discharge port 23, and the fluid in the working barrel above the traveling valve will be discharged out through the ports 32 into the space 33 between the working barrel and the outer casing or pipe 34 and will pass on up during succeeding strokes of the pump and will be discharged at the ground surface. The plunger 7 will move on up under the influence of said pressure until it strikes the abutment 15 and the rod 14 and the piston valve 13 will be elevated until said abutment 15 strikes the plate 11 at the upper end of the working barrel. The inlet opening 20 has a greater diameter than that of the branch 25 to permit the pressure fluid to continue to enter through the branch 25 until the plunger 7 has moved to said extreme upper position. Thereupon the channel 31 will register with the discharge port 23 and the channel 29 will come into alignment with the lower inlet port 21 as shown in Figure 4 and the pressure fluid will pass inwardly through the inlet port 21 and will pass thence through the duct 30 and through the ports 12 and will operate against the upper end of the plunger 7 and will force the same downwardly, the fluid in the pressure chamber 31, escaping out through the port 23. Upon the corresponding downward movement of the traveling valve 3, the standing valve 2 will be closed and the fluid above it will pass on up above the traveling valve. Upon the downward movement of the plunger 7, its upper end will strike the lower stop 16 on the rod 14 and will force said rod downwardly moving the piston valve 13 downwardly with it to carry the channel 29 out of registration with the inlet port 21 and the momentum of the downwardly moving plunger 7 and traveling valve 3 carried thereby will be effective to cause the continued downward movement of the piston valve 13 until the channel 22 is brought again into alignment with the inlet port 20 and the channels 29 and 31 are carried out of registration with the inlet port 21 and the exhaust port 23, respectively as shown in Figure 2. The exhaust port 23 has a greater diameter than the branch 26 to permit the continued escape of pressure fluid from the pressure chamber 31 during the final downward movement of the plunger 7 and the traveling valve 3 carried thereby and thereupon pressure will begin to build up again in the pressure chamber 31 and the upstroke of the traveling valve 3 will again occur as before.

The exhaust fluid will pass out through the exhaust port 23 and into the fluid being pumped out. The operating fluid will preferably be clean oil although any other suitable fluid may be used for the purpose.

A portion of the operating fluid may pass through the channel 35 which leads through the piston valve 13 from the channel 24 and this fluid passing through the channel 35 will be discharged against the wall of the cylinder 10 and will keep the same lubricated and washed free of grit and the like that might otherwise collect thereon.

The drawings and description disclose what is

now considered to be a preferred form of the invention by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A motor for operating a pump in a well bore and adapted to be actuated by an operating fluid, said motor comprising a cylinder and having an inlet for said fluid, a barrel attached to the lower end of the cylinder and having a pressure chamber therein, a piston valve in the cylinder, a hollow plunger in said chamber having an outlet port at its lower end leading into said chamber, a tubular valve rod connected to the piston valve and extending into said plunger, means closing the upper end of the plunger and including a stuffing box around said rod whereby the plunger is mounted to slide on said rod, said cylinder and piston valve having passageways for the operating fluid one of which leads from said inlet through said rod into said pressure chamber beneath the plunger and the other of which leads from said pressure chamber above the plunger through the piston valve to a point outside of the motor when the valve is in one position and one of which leads from the pressure chamber beneath the plunger through said rod to a point outside of the motor and another of which leads from said inlet into said pressure chamber above the plunger when the valve is in another position.

2. A motor for operating a pump in a well bore and adapted to be actuated by an operating fluid, said motor comprising a cylinder, a barrel attached to the lower end of the cylinder and having a pressure chamber therein, a piston valve in the cylinder, a hollow plunger in said chamber having an outlet port at its lower end leading into said chamber, a tubular valve rod connected to the piston valve and extending into said plunger, means closing the upper end of the plunger and including a stuffing box around said rod whereby the plunger is mounted to slide on said rod, said cylinder and piston valve having passageways for the operating fluid one of which leads from a source of fluid pressure through said rod into said pressure chamber beneath the plunger and the other of which leads from said pressure chamber above the plunger through the piston valve to a point outside of the motor when the valve is in one position and one of which leads from the pressure chamber beneath the plunger through said rod to a point outside of the motor and another of which leads from said source, through the piston valve, into said pressure chamber above the plunger when the valve is in another position, and operative connections between the plunger and rod through which said valve may be shifted from one to the other of said positions.

3. A motor for operating a pump in a well bore and adapted to be actuated by an operating fluid, said motor having an inlet for an operating fluid and comprising a cylinder, a barrel attached to the lower end of the cylinder and having a pressure chamber therein, a piston valve in the cylinder, a hollow plunger in said chamber having an outlet port at its lower end leading into said chamber, a tubular valve rod connected to the piston valve and extending into said plunger, means closing the upper end of the plunger and including a stuffing box around said rod whereby the plunger is mounted to slide on said rod, said cylinder and piston valve having passageways for the operating fluid one of which leads from said inlet through said rod and plunger into said pressure chamber beneath the plunger and the

other of which leads through the piston valve from said pressure chamber above the plunger to a point outside of the motor when the valve is in one position and one of which leads from
5 the pressure chamber beneath the plunger through said plunger, rod and valve to a point outside of the motor and another of which leads from said inlet into said pressure chamber above

the plunger when the valve is in another position, operative connections between said rod and plunger whereby the valve may be shifted from one to the other of said positions and means for connecting said plunger to the pump to be
5 operated.

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