Sept. 2, 1924. 1,507,442

J. A. SPEARS

PUMP MOTOR

Filed Sept. 10, 1921

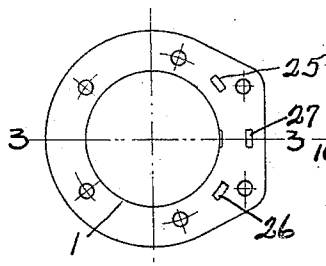


Fig. 2.

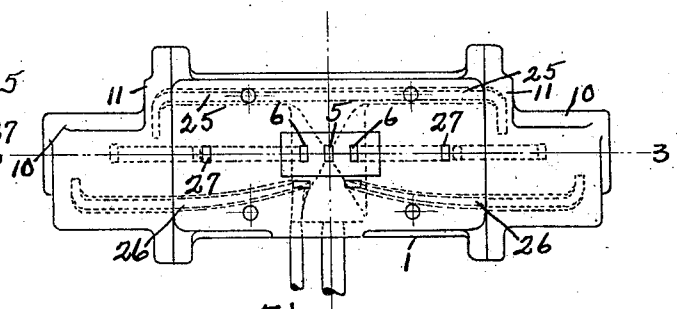


Fig. 1.

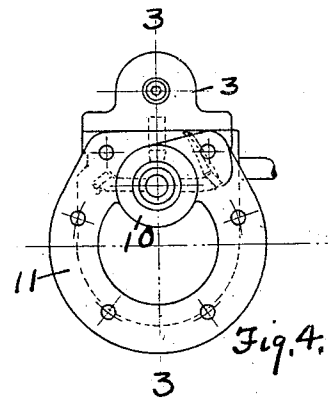


Fig. 4.

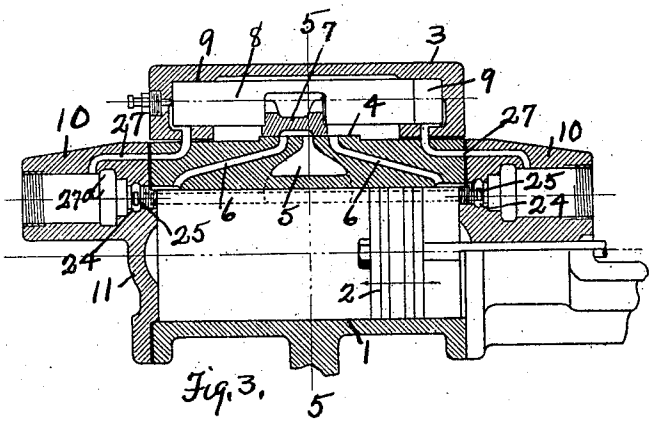


Fig. 3.

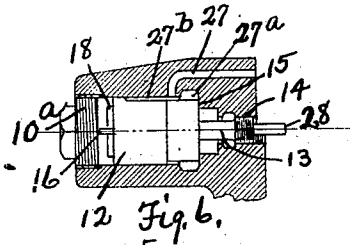


Fig. 6.

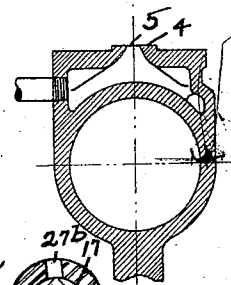


Fig. 5.

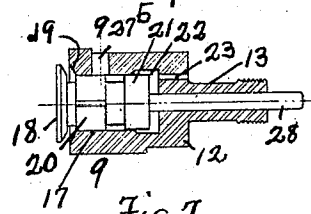


Fig. 7.

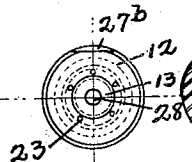


Fig. 8.

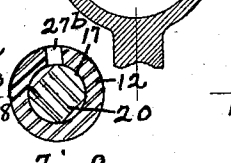


Fig. 9.

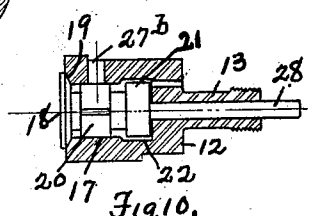


Fig. 10.

John A. Spears INVENTOR.

BY

ATTORNEY.

Patented Sept. 2, 1924. 1,507,442

UNITED STATES PATENT OFFICE.

JOHN A. SPEARS, OF GROVE CITY, PENNSYLVANIA.

PUMP MOTOR.

Application filed September 10, 1921. Serial No. 499,758.

To all whom it may concern:

Be it known that I, JOHN A. SPEARS, a citizen of the United States, residing at Grove City, in the county of Mercer and State of Pennsylvania, have invented new and useful Improvements in Pump Motors, of which the following is a specification.

The invention is directed to the valve mechanism of the pump motor. Heretofore there has been a pump known as the Cameron pump of quite wide distribution. In it the valve is reversed by the action of the piston on a reversing valve. The valve motor is arranged in the steam chest and ordinarily has steam under pressure on the ends of the piston of the valve motor and the movement of the valve motor is accomplished by exhausting the steam from one end and the main valve moves in the opposite direction to that which is followed by the piston in response to a valve movement. This construction has certain disadvantages. With the present invention the reversing valves are tripped by the main piston but the heads of the valve piston are normally free from steam pressure, and steam is admitted alternately to actuate them as distinguished from relieving the steam from behind them. In consequence the main valve is moved in a direction which is followed by the piston in reponse to the valve movement. By this construction the mechanism as a whole is somewhat simplified and in addition the action of the valve is rendered more positive.

The invention is illustrated in the accompanying drawings as follows:—

Fig. 1 shows a plan view of the floor of the steam chest showing the ports and valve surface thereon.

Fig. 2 an end view of the cylinder with the valve cage and cylinder head removed.

Fig. 3 a section on the line 3—3 in Figs. 1 and 2.

Fig. 4 an end view of the cylinder.

Fig. 5 a section on the line 5—5 in Fig. 3.

Fig. 6 a section of the valve cage on the line 3—3 in Fig. 4, the valve case being in elevation.

Fig. 7 a section of the valve case.

Fig. 8 an end view of the valve case removed.

Fig. 9 a section on the line 9—9 in Fig. 7.

Fig. 10 a section similar to Fig. 7 with the controlling valve in reverse position from that of Fig. 7.

1 marks the cylinder, 2 the piston, 3 the steam chest, 4 the valve seat, 5 the exhaust port leading from the seat, 6 the inlet ports leading from the valve seat, 7 the main valve this being of the ordinary D-valve type, 8 a valve motor piston, and 9 cylinders arranged in the steam chest in which the valve motor piston operates.

A valve cage 10 is formed on a cylinder head 11. A valve case 12 is arranged in the valve cage, the end of the cage being closed by a plug 10^a. The valve case has an extension 13 terminating in a screw-threaded portion which is screwed into a screw-threaded opening 14 in the cage 10 by means of which the case may be forced up against a shoulder 15 at the inner end of the cage. Pins 16 are provided forming a wrench-hold by means of which the case may be readily turned. The valve case has a cylindrical opening 17. A poppet valve 18 operates on a seat 19 at the end of the case 12 the opening through the seat leading into the cylindrical opening 17. The valve 18 has a stem 20, this being rectangular so as to form passages between it and the cylindrical walls 17. A cylindrical valve 21 forms a closure fit with the cylinder wall 17, this valve being secured to the stem 20. The plunger valve 21 moves into a chamber 22 when the valve 18 is closed at the front end of the case 12. Openings 23 extend from the chamber 22 to a passage 24 in the front of the cage from which a port 25 leads to the exhaust port 5. A port 26 leads from the end of the cage 10 between the case 12 and the plug 10^a to the steam chest. A port 27 leads from the end of the cylinder 9 to a chamber 27^a formed in the cage around the case. The chamber 27 communicates through a port 27^b with the cylinder 17 at a point between the valve 18 and valve 21. A pin 28 extends from the valve 21 through the case and extension 13 into the cylinder 1 and into the path of the piston 2. These valve mechanisms and ports are duplicated at both ends of the pump motor.

The operation of the device is as follows: The controlling valve is shown in its normal position in Fig. 10. Here it will be noted that the valve 18 is closed and is subjected to live steam pressure carried into the cage at the rear of the valve by way of the port 26. The cylinder 9 is in communication with the exhaust by way of the ports 27, 27^b, the cylinder 17, chamber 22, passage 23 and

port 25. When the piston strikes the stem 28 it forces the valve 21 into the cylinder 17, thus closing off the connection between the cylinder 9 and the exhaust and at the same time opens the valve 18 permitting steam to enter from the cage, the steam passing through the openings at the sides of the stem 20 and out through the port 27^b, chamber 27^a, and port 27 to the end of the cylinder 9. The opposite end of the piston 8 being subjected only to exhaust pressure immediately moves under the influence of this pressure reversing the D-valve 7 and admitting steam on the face of the piston engaging the stem 28. As the piston reverses its movement the stem 28 follows up, thus closing the valve 18 and opening the valve 21. Thus steam is cut off from the end of the cylinder 9 and the end of the cylinder in which there is steam under pressure is exhausted so that the two cylinders 9 are normally under exhaust pressure. Thus a positive action of the main valve is brought about and if there is any leakage of the valve motor pistons this leakage does not interfere with the correct operation of the valve.

What I claim as new is:

1. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the valve having its movable element normally connected to an exhaust; and means comprising a valve mechanism actuated by the piston for admitting fluid under pressure momentarily to one side of the movable element to actuate the valve motor.

2. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the valve having its movable element normally connected to an exhaust; and means comprising a valve mechanism actuated by the piston for admitting fluid under pressure momentarily to one side of the movable element to actuate the valve motor in a direction which is followed by the main piston in response to the movement of the main valve.

3. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the main valve; a valve mechanism controlling the valve motor comprising a valve case having exhaust and inlet valves working alternately; a pressure fluid connection to the inlet valve; an exhaust connection leading from the exhaust valve; and a connection leading from between the valves to the motor.

4. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the main valve; a valve mechanism controlling the valve motor comprising a valve case having a plunger exhaust valve and a poppet inlet valve, said valves working alternately; a pressure fluid connection to the inlet valve; an exhaust connection leading from the exhaust valve; and a connection leading from between the valves to the motor.

5. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the main valve; a valve mechanism controlling the valve motor comprising a valve case having exhaust and inlet valves working alternately; a pressure fluid connection to the inlet valve; an exhaust connection leading from the exhaust valve; a connection leading from between the valves to the motor; and a tappet in the path of the piston actuating said valves.

6. In a pump motor, the combination of a cylinder; a piston in the cylinder; a main valve controlling the flow of motive fluid to the cylinder; a valve motor actuating the main valve; a valve mechanism controlling the valve motor comprising a valve case having exhaust and inlet valves working alternately; a pressure fluid connection to the inlet valve; an exhaust connection leading from the exhaust valve; a connection leading from between the valves to the motor; and a tappet in the path of the piston actuating said valves, the fluid pressure closing the inlet valve and opening the exhaust valve when the tappets are released.

7. In a pump motor, the combination of a cylinder; a piston operating in the cylinder; a main valve controlling the pump motor; a valve motor controlling the main valve; a valve mechanism controlling the valve motor comprising a valve cage having a connection to the valve motor, a connection to the exhaust, and a connection to the motive fluid; a valve case in the valve cage seating in the cage and forming a passage leading to the exhaust connection; a chamber to which the connection from the valve motor leads; a chamber to which the connection for the motive fluid leads, said case having a seat at it send, a cylinder therein, and a chamber leading from the cylinder; a poppet valve operating on the seat; a plunger valve connected with the poppet valve operating in the cylinder, the plunger valve forming a closure with the opening of the poppet valve and passing into the chamber and connecting the exhaust and valve motor connections; and a tappet leading from the valve in the path of the piston.

In testimony whereof I have hereunto set my hand.

JOHN A. SPEARS.