E. H. McCLELLAND.

HIGH PRESSURE LUBRICATING PUMP.

APPLICATION FILED JULY 3, 1915.

1,186,485.

Patented June 6, 1916.

Fig. 1.

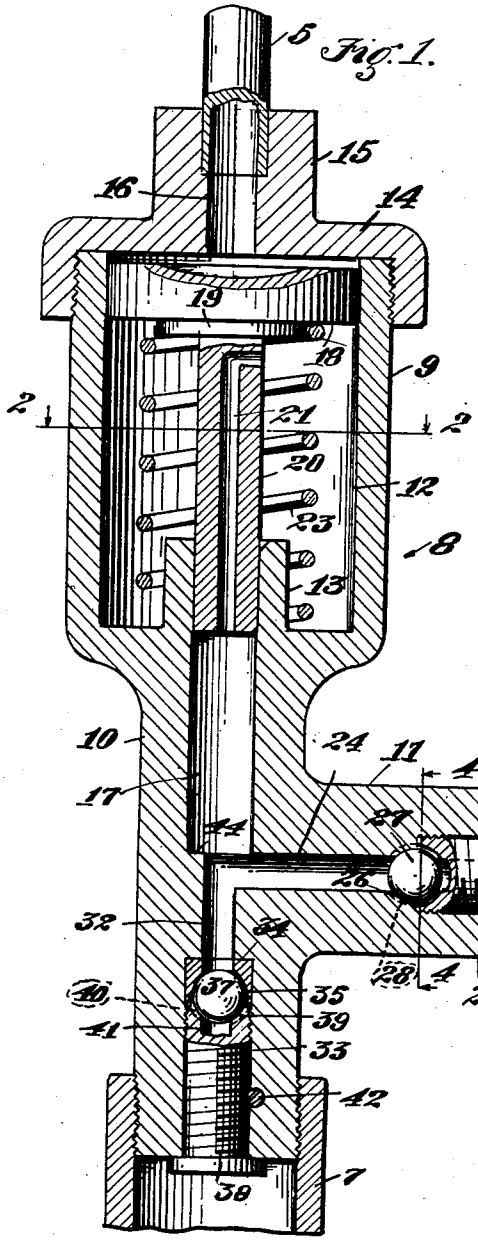


Fig. 2.

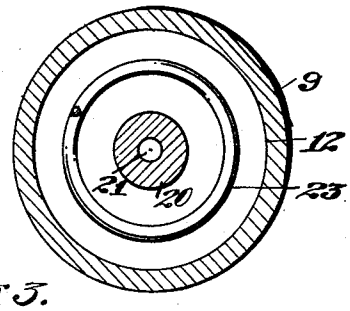


Fig. 3.

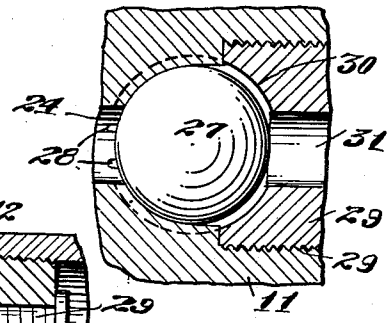
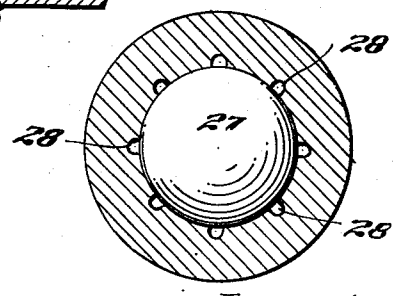


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HIGH-PRESSURE LUBRICATING-PUMP.

1,186,485. Specification of Letters Patent. Patented June 6, 1916.

Application filed July 3, 1915. Serial No. 37,997.

To all whom it may concern:

Be it known that I, EARBY H. McCLELLAND, a citizen of the United States, residing at Tucson, in the county of Pima, State of Arizona, have invented new and useful Improvements in High-Pressure Lubricating-Pumps, of which the following is a specification.

This invention relates to high pressure lubricating pumps and pertains especially to pumps adapted to feed lubricant to the cylinders of a locomotive engine.

It is the primary object of this invention to provide a pump which will feed fluid to a chamber which is under high pressure and under a high temperature.

It has been found that locomotive cylinders, especially those using superheated steam are difficult to lubricate when the locomotive is handling a heavy load such as drawing a train up an incline, a case which is common in hilly or mountainous country.

It has been the practice to place the lubricant under boiler pressure and feed it downward from a point within the cab of the locomotive or adjacent thereto to the cylinders, the pipe carrying the lubricant being placed underneath the boiler jacket. Under heavy loads and high superheat the cylinders become excessively hot and the lubricant carbonizes in the cylinders unless fed freely; further, the pipes leading from the lubricator clog up with carbonized lubricant since the lubricant does not flow but remains stationary in the pipe and is subject to the great heat of the boiler.

My pump is designed to overcome these difficulties and also to come within the standards required by the Interstate Commerce Commission. It comprises a motor cylinder within which is disposed a piston of relatively large diameter. The cylinder has a port adapted for piping which is designed to be connected to the exhaust of the motor end of the air compressor which is ordinarily installed upon locomotives. Secured to the motor piston is a pump piston of relatively small diameter and which reciprocates within a pump cylinder. An inlet valve and a discharge valve are provided for the pump cylinder. The inlet and discharge ports on the pump are connected into the line of piping from the lubricator to a locomotive cylinder, and the valves are so constructed that normally they are open so lubricant will flow due to gravity or pressure at the lubricator, even though the pump may not be in operation, the conditions being practically the same as they are in lubricator systems now in use.

I accomplish the above objects by means of the embodiment of my invention illustrated in the accompanying drawing in which:

Figure 1 is a vertical section through a pump. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1. Fig. 3 is an enlarged vertical section of the inlet valve detail. Fig. 4 is a section taken on the line 4—4 of Fig. 1.

More specifically 5 is a pipe which is adapted to be connected to the exhaust of the motor end of an air compressor, 6 is a pipe which connects to the lubricator, and 7 is the portion of the cylinder or valve in which a tallow plug is ordinarily inserted and connects the discharge of the pump with the parts to be lubricated. The pump is indicated generally by 8.

Referring particularly to the pump 8 it is comprised of a casting 9 reduced in diameter at one end 10 and having a laterally extending arm 11. A bore 12 is provided at the upper end of the casting and forms the cylinder for a motor.

A boss 13 is provided at the lower end of the bore, and the upper end is closed by a head 14 provided with a boss 15 having a port 16 to which the pipe 5 is connected. The portion 10 of the casting has a bore 17 of small diameter as compared with the bore 12. Bore 17 forms the pump cylinder.

A motor piston 18 is disposed within the cylinder 12 and is provided with a boss 19 and a pump plunger 20 which is disposed for reciprocation within the pump cylinder 17. Pump cylinder 20 has a longitudinally extending duct 21 which opens at its upper end below the piston 18 and at its lower end to the cylinder 17. Abutting the lower end of the cylinder 12 and surrounding the boss 13 and abutting the piston 18 surrounding the boss 19 is a helical spring 23 which tends to hold the piston 18 at its upper position, the bosses 13 and 19 retaining the spring from lateral movement. It will be noted that there are no openings or ports to the atmosphere at the lower end of the cylinder

bore 12. This feature of construction leaves no opening through which steam could escape from the motor end of the pump.

An inlet port 24 connects at right angles to the pump cylinder port 17, is counter-bored at one end as indicated by 25 and is provided with a seat 26 for a ball valve 27. The seat 26 is provided with grooves 28 so that when the ball 27 is seated upon seat 26 the fluid may flow around the ball through the grooves 28. A bushing 29 is secured in the counter-bored portion 25 by screw threads or any other suitable means. A pin 42 is passed through the arm 11 and the bushing 29 to one side of the port 31 so as not to obstruct it and prevents the bushing from working loose. The end adjacent to the ball 27 is constructed with a seat 30 so that when the ball rests against the seat 30 a tight fit will be formed preventing the passage of fluid from port 24 outward through port 31 in the sleeve 29.

A discharge port 32 is provided and opens into pump cylinder 17. The outer end of port 32 is counter-bored as indicated at 33. A bushing 34 having a seat 35 for a ball valve 37 is disposed in the counter-bored portion 33 of the port. A second bushing 38 is disposed within the counter-bored portion 33 of the discharge port and has at its upper end a seat 39 shaped to receive the ball valve 37. Bushing 38 is secured in position preferably by screw threads and a pin 43 is passed through it and the body portion 10 to hold the bushing from working loose. Seat 39 is provided with grooves 40 similar to grooves 28 in seat 26 so that when the ball valve 37 rests upon seat 39 the fluid may flow from port 32 about the valve 37 through the ports 40 into the bore 41 of the sleeve 38.

It will be noted that valves 27 and 37 and the seats therefor are so constructed that lubricant may flow under pressure around the valves when the pump is not in operation. It will therefore be seen that when the pump is thrown out of service the lubrication of the cylinders is not interfered with so far as it can be performed under the conditions which now attend forced lubrication. At the bottom of bore 17 and above port 24 a shoulder 44 is formed, which prevents plunger 20, in case it breaks off from piston 18, from dropping and obstructing ports 24 and 32.

Assume that the pump is connected to the exhaust of the motor end of an air compressor, pipe 6 to the lubricator and the discharge of the pump to steam chest of the engine cylinder. Upon the exhaust of the compressor, there will be a pressure exerted upon the piston 18 which comes with a quick sharp blow forcing the piston 18 downward and with it the plunger 20. Any air which has been entrapped within the cylinder 12 below piston 18 will be discharged through duct 21 into the cylinder bore 17. If there is oil in the cylinder 17, plunger 20 strikes it an impact blow thereby producing a relatively high pressure and forcing the lubricant around valve 37 and into the cylinder of the locomotive. Any excess air in the cylinder 17 will pass out with the oil under the influence of the piston 20 and into the locomotive cylinder. At this time the inlet valve 27 seats upon seat 30 closing the cylinder 17 from the pipe leading to the lubricator. After the exhaust of the air compressor has taken place the spring 23 returns the piston 18 to the position shown in Fig. 1. Valve 37 lifts and seats against seat 35 preventing any back pressure from the engine cylinder. Valve 27 will seat against seat 26 thereby opening the inlet port and allowing lubricant to flow into the pump cylinder 17, a partial vacuum will be formed in the motor cylinder. Due to the length and size of the duct 21 there is so much resistance to the flow of lubricant that it does not pass readily into the cylinder 12 below piston 18 and if it should do so the structure is such that it is self-cleaning.

It will be noted that the pump described depends upon impact rather than a static pressure, therefore a high pressure in the pump discharge is obtained. Attention is also called to the fact that the flow of lubricant is not obstructed when the piston is not in operation.

My pump may be used for various purposes with slight changes in design such as for illustration feeding compound to the boiler of a locomotive or any other engine boiler. It is adaptable for work where a small volume of fluid is to be pumped against high pressure.

What I claim is:

1. The combination, comprising a body provided with a relatively large bore at one end thereof forming a motor cylinder, and a relatively small bore at the other end thereof forming a pump cylinder, a solid piston disposed within said motor cylinder, a pump plunger secured to said motor piston and disposed in said pump cylinder, said pump plunger being provided with a port connecting said motor cylinder and said pump cylinder to permit air to escape from the motor cylinder to the pump cylinder, a spring member for moving the motor piston on one stroke, a normally open inlet valve and a normally open outlet valve for said pump.

2. The combination, comprising a body provided with a relatively large bore at one end thereof forming a motor cylinder, and a relatively small bore at the other end thereof forming a pump cylinder, a solid piston disposed within said motor cylinder, a pump plunger secured to said motor piston and

disposed in said pump cylinder, an axially extending discharge port for the pump cylinder, a normally open valve controlling said discharge port, a laterally extending inlet port for said pump cylinder connecting at a point at the end of said pump cylinder, and a normally open inlet valve for said pump cylinder, said pump cylinder being formed with a shoulder immediately above said inlet port.

3. The combination of a member provided at the upper end with a longitudinally extending bore of relatively large diameter forming a motor cylinder, a boss at the bottom of said bore, a relatively small bore extending through said boss and longitudinal of said member forming a pump cylinder, a downwardly extending port at the bottom of said cylinder, a counterbore at the outer end thereof, a bushing having a valve seat in said port, a valve for controlling said port, a second bushing in said bore forming a valve cage, a laterally extending inlet port, a counterbore at the outer end thereof having a valve seat, a valve controlling said port, a bushing forming a valve cage disposed in said port, a head for the motor cylinder provided with a port for motive fluid, a piston in the motor cylinder, a plunger secured to said piston and disposed in the pump cylinder, said plunger provided with a port connecting the pump cylinder and the motor cylinder, and a helical spring in said motor cylinder disposed about said plunger.

4. A device of the character disclosed comprising a motor cylinder and piston, a pump cylinder and piston, said pump piston being actuated by said motor piston, said pump cylinder being provided with an inlet and an outlet, a valve in said inlet, a double seat in said inlet for said valve, said valve being adapted to close said inlet when forced by the pump piston against one seat, the other seat being so constructed as to leave the inlet partly open when the valve is drawn there against by said piston, a valve in said outlet, a double seat in said outlet for said valve, said valve being adapted to close said outlet when drawn against said seat by said pump piston, the other seat being so constructed as to leave the outlet partly open, when the valve is forced there against by said piston.

5. A device of the character disclosed comprising a motor cylinder and piston, a pump cylinder and piston, said pump piston being actuated by said motor piston, said pump cylinder being provided with an inlet and an outlet, a valve in said inlet, a double seat in said inlet for said valve, said valve being adapted to close said inlet when forced by the pump piston against one seat, the other seat being so constructed as to leave the inlet partly open when the valve is drawn there against by said piston, a valve in said outlet, a double seat in said outlet for said valve, said valve being adapted to close said outlet when drawn against said seat by said pump piston, the other seat being so constructed as to leave the outlet partly open, when the valve is forced there against by said piston, said valves being adapted normally to rest against said seats which leave said inlet and outlet partly open.

In witness that I claim the foregoing I have hereunto subscribed my name this 13th day of May, 1915.

E. H. McCLELLAND.