E. H. McCLELLAND.

COMPOUND HIGH PRESSURE LUBRICATING PUMP.

APPLICATION FILED JUNE 12, 1916.

1,228,335. Patented May 29, 1917.

Fig. 1.

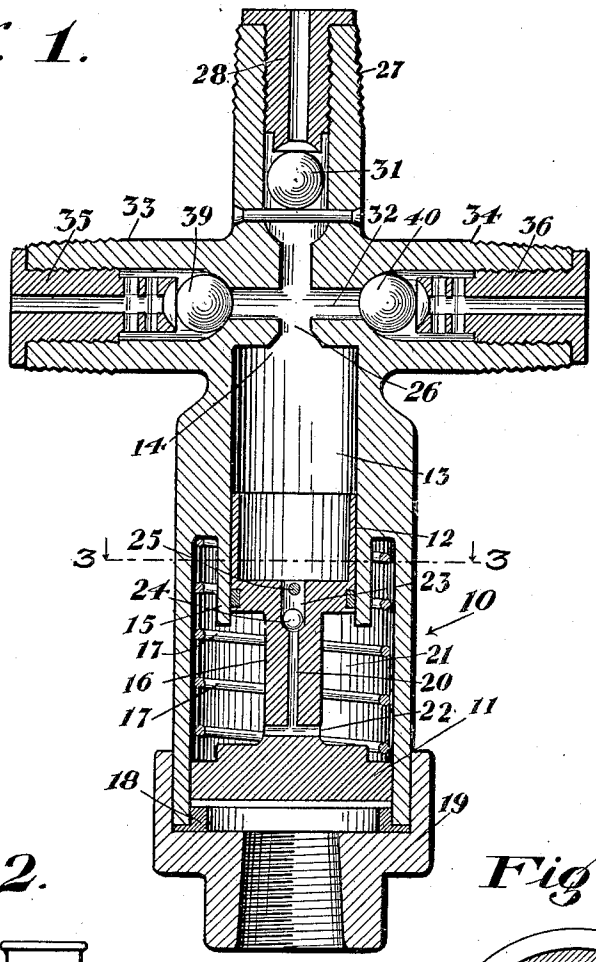


Fig. 2.

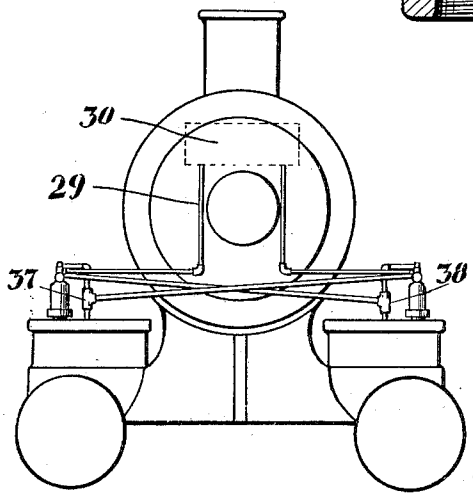
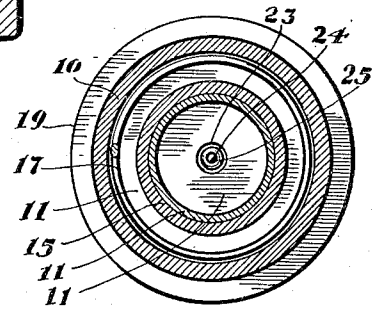


Fig. 3.



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UNITED STATES PATENT OFFICE.

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COMPOUND HIGH-PRESSURE LUBRICATING-PUMP.

1,228,335. Specification of Letters Patent. Patented May 29, 1917.

Application filed June 12, 1916. Serial No. 103,257.

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 and State of Arizona, have invented new and useful Improvements in Compound High-Pressure Lubricating-Pumps, of which the following is a specification.

My invention relates to a compound high pressure lubricating pump especially adapted for use with locomotives and in particular with locomotives of the superheated steam type.

It is an object of this invention to construct a high pressure lubricating pump which is superior to the lubricator pumps hitherto in use and which will positively deliver a charge of lubricating oil to the engine of the locomotive, both when the same is working or drifting. The lubricator pump is attached to the steam chest of the engine and comprises a motor cylinder in which a motor piston is reciprocably mounted. Operatively connected with said piston is a pump plunger reciprocating in a pump cylinder. A valve controlled oil inlet port connected with the lubricator in the engineer's cab supplies oil to the pump cylinder and a valve controlled outlet port connected with the pump cylinder delivers the oil to the engine. The oil is fed to the pump cylinder under boiler pressure, the motor piston being of a size proportioned to the size of the pump plunger in such a manner that the latter is able to force the oil against the boiler pressure into the steam chest of the engine.

It is another object of this invention to construct a high pressure lubricator pump in which the pump plunger is of relatively large area as compared to the oil inlet and discharge ports so that the force with which the oil is injected to the engine is multiplied or compounded.

It is another object of this invention to provide a check valve controlled passageway leading from the pump cylinder to the annular chamber surrounding the pump plunger, whereby a free passage is afforded to the oil from said annular chamber to the pump cylinder on the upward stroke of the motor piston. On the downward stroke of the motor piston the valve controlling said passage is closed, whereby a partial vacuum is created in said annular chamber which acts as a cushion for said motor piston.

With the above and other objects in view which will appear as the description proceeds, my invention consists in the novel features of construction, arrangement and combination of parts hereinafter described and claimed.

In the accompanying drawings I have shown a preferred embodiment of my invention in which:

Figure 1 is a vertical cross section of my lubricator pump.

Fig. 2 is a front elevation of a locomotive showing a pair of lubricator pumps mounted on the steam chests of the engines on opposite sides of the boiler.

Fig. 3 is a horizontal section taken on line 3—3, Fig. 1.

Referring to the drawings, 10 designates a motor cylinder of relatively large bore in which a motor piston 11 is reciprocably mounted. A pump plunger 12 integral with said piston extends vertically upward therefrom and is slidably mounted in a pump cylinder 13 formed in an extension 14 at the top of the cylinder 10. From the lower end of the extension 14, a circular neck 15 projects downwardly centrally into the cylinder 10, the interior of said neck 15 forming a continuation of the plunger cylinder 13. The cross sectional area of the plunger 12 is considerably smaller than the motor piston 11. An arm 16 connects the piston 11 to plunger 12. A helical spring 17 surrounding the extension 15 and the arm 16 is confined between the motor piston and the upper end of the motor cylinder 10 and tends to move said motor piston 11 against its seat. The seat consists of a ring 18 disposed at the lower end of the motor cylinder, and a tubular connection 19 adapted to be connected to the steam chest of the engine. A central passage 20 in the arm 16 connects the pump cylinder 13 with the annular chamber 21 formed between the walls of the motor cylinder 10 and the plunger 12 in which the spring 17 is disposed. The lower end of the passage 20 forms a pair of horizontal branch passages 22. The upper end of the passage 20 is counterbored providing a valve cage 23 having a valve seat at its lower end, in which a check valve 24 is positioned, adapted to close the passage 20. A horizontal pin 25 in said valve cage limits the upward movement of said check valve 24. A constricted passageway 26 co-axial with the pump cylinder 13 leads upwardly therefrom into a tubular arm 27 having a bushing 28 adapted to be

connected with an oil line 29 leading to the lubricator 30 in the engineer's cab. A check valve 31 is mounted in said tubular arm 27 and is adapted to close the passage leading from the oil line 29.

A passage 32 of the same cross sectional area as passage 26 intersects the latter at right angles and is connected at its extremities with a pair of tubular arms 33, 34 constituting discharge ports controlling the delivery of oil from the pump cylinder 13 to the steam chests of the engines. Tubular bushings 35, 36 are provided in said tubular arms which are adapted to be connected to the delivery pipes 37, 38. The inner ends of the tubular arms 33 and 34 provide valve seats for the reception of check valves 39 and 40, respectively, which serve to close the horizontal discharge passage 32.

In the operation of the lubricator pump, the oil will be fed under boiler pressure through the oil feed pipe to the oil inlet port in the tubular oil inlet arm 27. On the down stroke of the motor piston 11 which is assisted by the action of the helical spring 17, the check valves will be in the position indicated in Fig. 1 of the drawings. Check valves 39 and 40 will close the passage 32 leading to the discharge ports. Check valve 23 located in the plunger piston 12 will be closed, thus causing a partial vacuum to be formed in the annular chamber 21, which acts as a buffer for the motor piston 11.

As steam is admitted to the end of the steam chest on which the lubricator pump is mounted, the steam pressure will actuate the motor piston 11 moving the same upwardly against the tension of the helical spring, moving the plunger 12 upwardly, closing the oil inlet port and opening the check valves 39 and 40 leading to the discharge ports. Oil and water leaking from the pump cylinder 13 past the plunger 12 into said annular chamber 21, will be expelled on the upward stroke of the motor piston 11, through the branch passages 22 and main passage 20, the check valve 25 being moved from its seat. The operation of the pump is much smoother and pounding of the motor piston 11 against its seat is avoided by the provision of the check valve controlled passage 20, just described.

While I have shown two discharge ports supplying oil to both engines of a locomotive, as shown and described in my co-pending application, Serial Number 103,258, filed June 12, 1916, it will be understood that my lubricator pump is equally well adapted to operate with one discharge port. As the piston is moved upwardly, the oil in the annular chamber 21 will be forced therefrom through the passages 22 and 20 to the interior of the plunger cylinder 13. When the engine is drifting, the helical spring 17 in connection with partial vacuum in the annular chamber 21 described above and the compression in the steam chest will actuate the motor piston and supply the engine with oil. In making the cross sectional area of the plunger cylinder several times larger than the cross sectional area of the discharge ports and the discharge pipes leading to the engines, the force with which the oil is injected into said engines is multiplied or compounded, thereby effecting a positive feed of oil during the operation of the locomotive.

I claim:

1. In a high pressure pump, the combination of a motor cylinder of relatively large bore, said motor cylinder being adapted to be connected to the steam chest of an engine, a motor piston disposed in said motor cylinder, a pump cylinder of relatively small bore co-axial with said motor cylinder, a pump plunger integral with said motor piston disposed in said pump cylinder, a check valve controlled oil inlet port, a check valve controlled discharge port, both of said ports being in communication with said pump cylinder, and of considerably smaller cross sectional area than said pump cylinder, a passage leading from the pump cylinder to the motor cylinder and a check valve opening said passage on the upward stroke and closing the same on the downward stroke of said motor piston.

2. In a high pressure pump, the combination of a motor cylinder of relatively large bore, a motor piston disposed therein, a pump cylinder of relatively small bore co-axial with said motor cylinder, a pump plunger integral with said motor piston disposed in said pump cylinder, valve controlled inlet and outlet ports communicating with said pump cylinder, a passage leading from said pump cylinder to said motor cylinder, and a check valve opening said passage on the upward stroke and closing the same on the downward stroke of said motor piston.

3. In a high pressure pump, the combination of a motor cylinder of relatively large bore, a motor piston disposed therein, a pump cylinder of relatively small bore, a pump plunger actuated by said motor piston, an oil inlet port, a discharge port, a passage leading from said pump cylinder to said motor cylinder and a valve opening said passage on the upward stroke and closing the same on the downward stroke of said motor piston.

In testimony whereof I have signed my name to this specification.

EARBY H. McCLELLAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."