W. L. KENFIELD.

LUBRICATOR PUMP.

APPLICATION FILED JUNE 18, 1909.

1,069,145.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

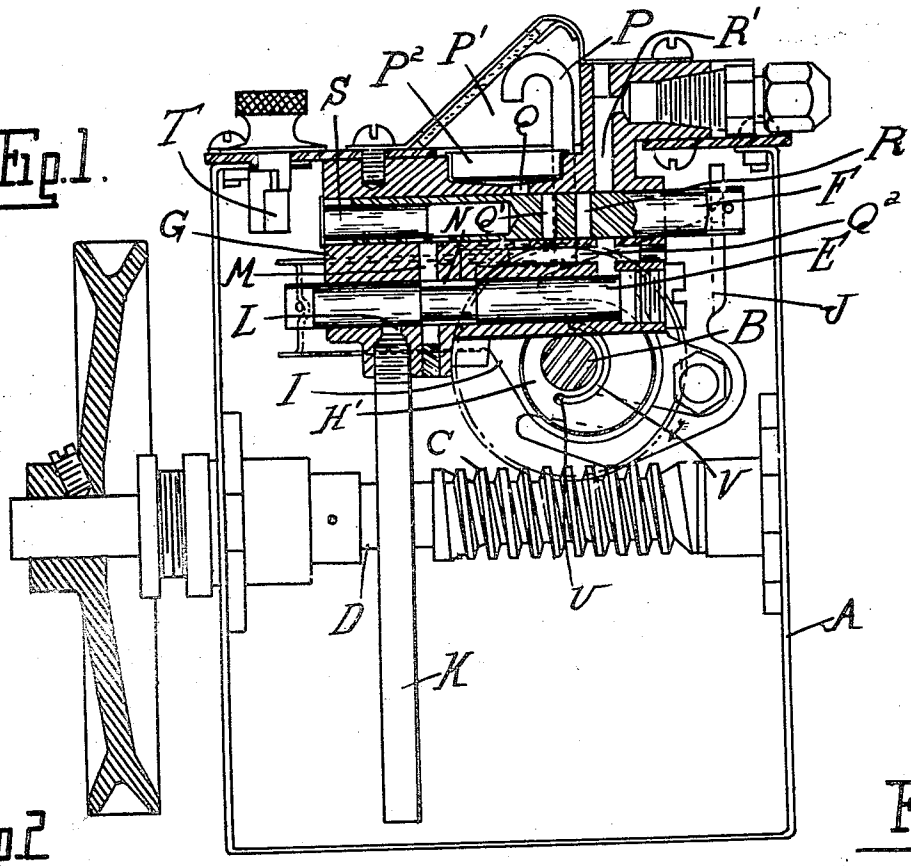


Fig. 2

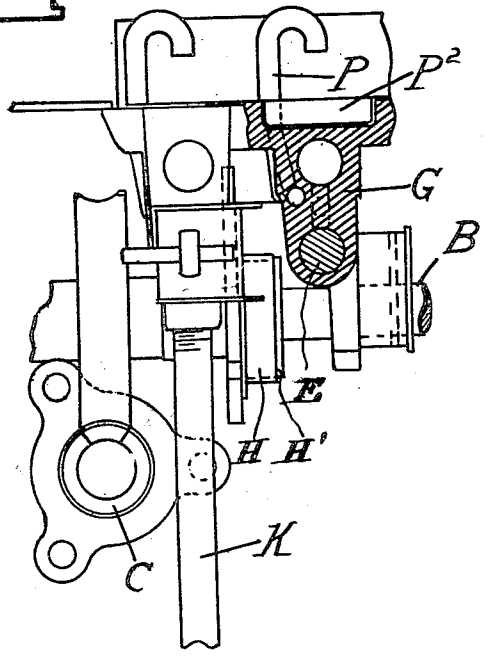
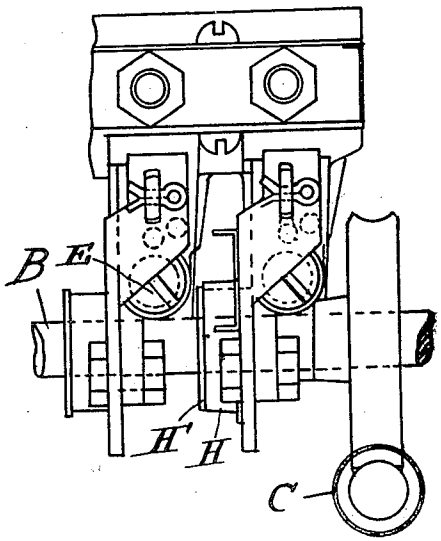


Fig. 3.



Witnesses

W. D. Ford

B. B. Belknap

Inventor

William L. Kenfield

By Whittemore, Hulbert & Whittemore

Attys

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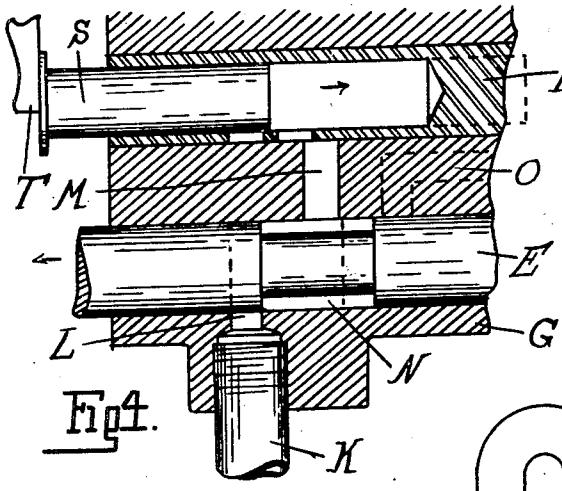

Fig. 4.

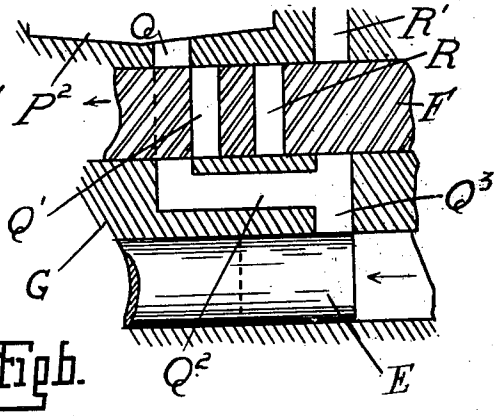

Fig. 6.

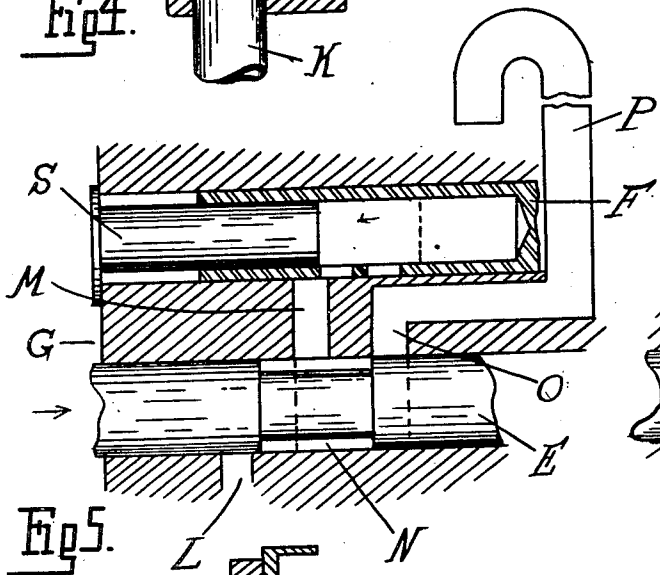

Fig. 5.

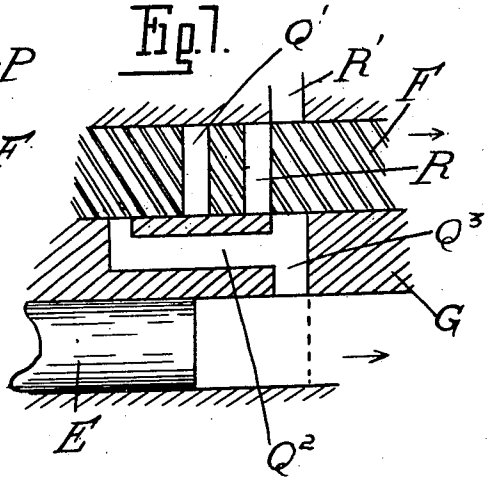

Fig. 7.

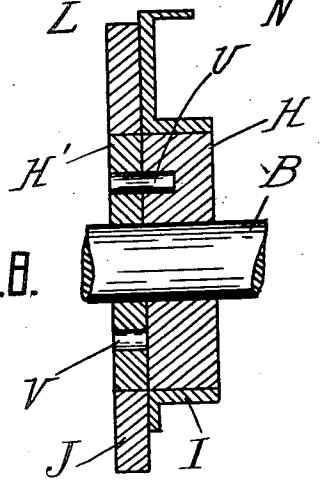

Fig. 8.

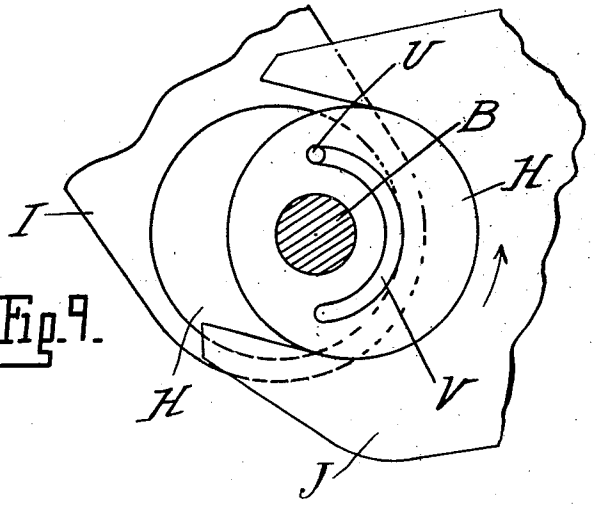

Fig. 9.

Witnesses

W. E. Ford

H. J. Belknap

Inventor

William L. Kenfield.

By Whittemore, Hulbert & Whittemore

Attys

UNITED STATES PATENT OFFICE.

WILLIAM L. KENFIELD, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT LUBRICATOR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

LUBRICATOR-PUMP.

1,069,145. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed June 18, 1909. Serial No. 502,912.

To all whom it may concern:

Be it known that I, WILLIAM L. KENFIELD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Lubricator-Pumps, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in a construction embodying two pumps, each having a cylinder and piston, the piston of one pump acting as the valve for controlling the other pump, whereby the necessity for any check-valves or other parts than the two pistons themselves to control the flow of the oil is obviated; in the construction of the actuating devices for the pistons whereby they may be properly timed to perform this double function; in the construction of this actuating device whereby the timing of the valves may be automatically adjusted regardless of the direction in which the drive-shaft for the pistons is turned; and further in the construction and arrangement in combination of the various parts, all as more fully hereinafter described and particularly pointed out in the claims.

In the drawings, Figure 1 is a vertical cross-section through the lubricator in the plane of one of the pumps; Fig. 2 is a sectional elevation view at right angles to Fig. 1; Fig. 3 is an elevation of the opposite end of Fig. 2; Figs. 4, 5, 6, and 7 are diagrams illustrating the operation of the pump; and Figs. 8 and 9 are respectively a section and elevation of the reversing mechanism.

A is the tank or casing for the lubricant, in which is arranged a series of mechanical pumps all operated from a common shaft B, which in turn is driven through the medium of a worm gearing C from a drive shaft D extending out from the casing. All of the pumps of the series are of the same construction, and are arranged side by side along the shaft B, from which they are driven. Each comprises a pair of pistons E and F operating in ported cylinders preferably formed in an integral casting G. The construction is such that each piston performs the double function of a plunger for propelling the oil and a valve for controlling the ports of the cylinder for the other piston. Thus, the piston F operates to raise the oil from the tank and propel it to the sight feed, the piston E coöperating in the control of the ports, while the latter pumps the oil from the sight feed and propels it to the part to be lubricated through the cooperation of the piston F controlling its ports. In order that these pistons may each properly perform this double function, it is desirable that the movement should be retarded during a portion of the stroke and that the time of greatest retardation of one piston would correspond with the time of the greatest acceleration of the other piston. This I have accomplished by driving each piston from an eccentric on the shaft B, which imparts a simple harmonic movement, and through intermediate connections the movements of the pistons are thrown out of phase. Specifically, the piston E is driven from an eccentric H through the medium of a connecting rod I, and the piston F is driven from the same or adjacent eccentric through the medium of a bell crank lever J, one arm of which is bifurcated to embrace the eccentric, while the other arm engages the end of the piston. As the pistons are arranged in parallel relation, it is obvious that the point of reversal of one will be substantially at mid-stroke of the other, by reason of the change in direction of the movement effected by the bell crank.

The lubricant is conducted from the bottom of the tank to the piston F through the riser tube K, which communicates with a port L controlled by the piston E. This port is placed in communication with a port M leading to the cylinder of the piston F by an annular groove N in the piston E, which registers with said ports as said piston E approaches one end of its stroke, while at the opposite end of its stroke the same groove N establishes communication between the port M and a port O, which latter connects with the conduit P, leading to the sight feed. The conduit P discharges lubricant through the sight feed chamber P′ into a well P^2, which connects with a port Q in the cylinder of the piston F. This port is connected with a port Q′ in the piston F as the latter approaches one end of its stroke, and through which the lubricant is conveyed to a passage Q^2 leading to a port Q^3 in the cylinder of the piston E, and as the piston F approaches the opposite end of its stroke

a port R therein establishes communication between the port Q^3 and a passage R′ leading to the discharge conduit.

The sequence of operations is illustrated in the diagrams, Figs. 4 to 7, inclusive. In Fig. 4 the piston F is at the beginning of its suction stroke, and the piston E, which is at mid-stroke, is about to uncover the port L and place the same in communication with the port M, the direction of movement of each piston being indicated by the arrows. In Fig. 5 the piston F is at the beginning of its return stroke and the piston E is again at mid-stroke, having closed the port L and being about to open the port O. In Fig. 6 the piston E is at the beginning of its suction stroke and the piston F is at mid-stroke, being about to open the port Q and to connect the same with the passage Q^2, while in Fig. 7 the piston E is at the beginning of its propelling stroke and the piston F is again at mid-stroke and about to open the port Q^3 and place the same in communication with the discharge conduit R′. Thus in the complete operation the lubricant is first pumped to the sight feed and then propelled to the point to be lubricated through the operation of positive mechanism, and not dependent upon check valves.

To vary the amount of feed, I preferably provide means for altering the effective stroke of the piston F. This, as shown, is accomplished by forming the piston F hollow and inserting a plug or piston S in the end thereof so as to have a limited travel therewith. The amount of travel is determined by an adjustable stop T, preferably a rotatable cam, mounted upon the casing A. When this cam is adjusted in one position it will hold the plug S stationary and consequently the whole stroke of the piston F will be effective, but, by adjusting the stop away from the plug a limited lost motion will be provided and the effective stroke of the piston diminished a corresponding amount.

The mechanism is timed to operate the plungers E and F in proper sequence when the shaft B is rotated in one direction, but upon the reversal of this shaft the parts will be thrown out of time. This is for the reason that the pistons E and F are in effect 90° apart in their engagement with the eccentric when rotated in one direction and 270° apart in the rotation in the opposite direction. Thus to properly time the mechanism when reversely driven there must be a shifting of the eccentric which operates one of the plungers through an angle of 180°. I have accomplished this shifting automatically by forming the eccentric of two members H and H′, one of which is driven from the other through the medium of a lost motion connection, and this connection is such that upon reversal the driving eccentric can move 180° before it imparts motion to the other member. Thus, as shown, the eccentric H′, which actuates the piston E, is loose upon the shaft B and is coupled to the eccentric H by the pin U secured to the eccentric H, which engages a segmental slot V. When the parts are in the position shown in Fig. 1 the pin U is at the end of the segmental slot, which will drive both eccentrics in the direction of the arrow, said eccentrics being in registration with each other. On the other hand, when the direction of rotation is reversed the pin U will first travel to the opposite end of the segmental slot, and the two eccentrics will be spaced 180° apart, as illustrated in Fig. 9. When thus arranged the parts will again be in proper time and consequently the pump will be operative in whichever direction the drive mechanism may be rotated.

It is obvious that the conduit P may lead to a point to be lubricated, and the inlet passage Q connected to the liquid in the reservoir, where two discharges are desired for the two pumps without the sight feed, but in the construction shown it is desirable to inspect the feed, and one pump takes the oil discharged by the other.

What I claim as my invention is:

1. In a fluid feed device two cylinders and pistons therein, an actuating device therefor, ports and passages arranged so that the pistons act as valves for each other, and means for varying the amount of feed.

2. In a fluid feed device, a sight feed, reservoir, a pump which takes liquid from the reservoir and delivers it to the sight feed, a pump which takes the fluid from the sight-feed and delivers it to the discharge, the piston of each pump acting as the valve for the other.

3. The combination of a frame, and two cylinders and pistons therein, of an inlet and outlet port for each cylinder, such ports for each pump being controlled by the piston of the other, and a common actuating means for both pumps.

4. In a lubricator, the combination of a piston, a valve, a rotary member for actuating the same, and intermediate mechanism timed for operation by a rotation in one direction, and means automatically operating upon the reversal of the direction of rotation for re-adjusting said mechanism into correspondingly timed relation.

5. In a lubricator, the combination of a piston, a valve, a rotary member for actuating the same, and intermediate mechanism timed for operation by rotation in one direction, said mechanism including a lost motion connection whereby upon reversal of the direction of rotation it will automatically readjust itself into correspondingly timed relation.

6. In a lubricator, the combination of a piston, a valve, a rotary member for actuat-

ing the same, and intermediate connections for said piston and valve timed for operation in one direction, one of said connections having a lost motion whereby upon reversal of the direction of rotation it will remain inactive during a movement of 180°.

7. In a pump, two cylinders and the pistons therein, a drive shaft, an eccentric thereon in two parts for driving the pistons, one part loose on the shaft and the other fixed, a connection for causing the two eccentrics to move as one in the forward direction, and for permitting the eccentrics to change their relation and to cause them to continue to maintain that changed relation when the drive shaft is reversed in motion.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM L. KENFIELD.

Witnesses:
FREDERICK W. HODGES,
W. K. FORD.