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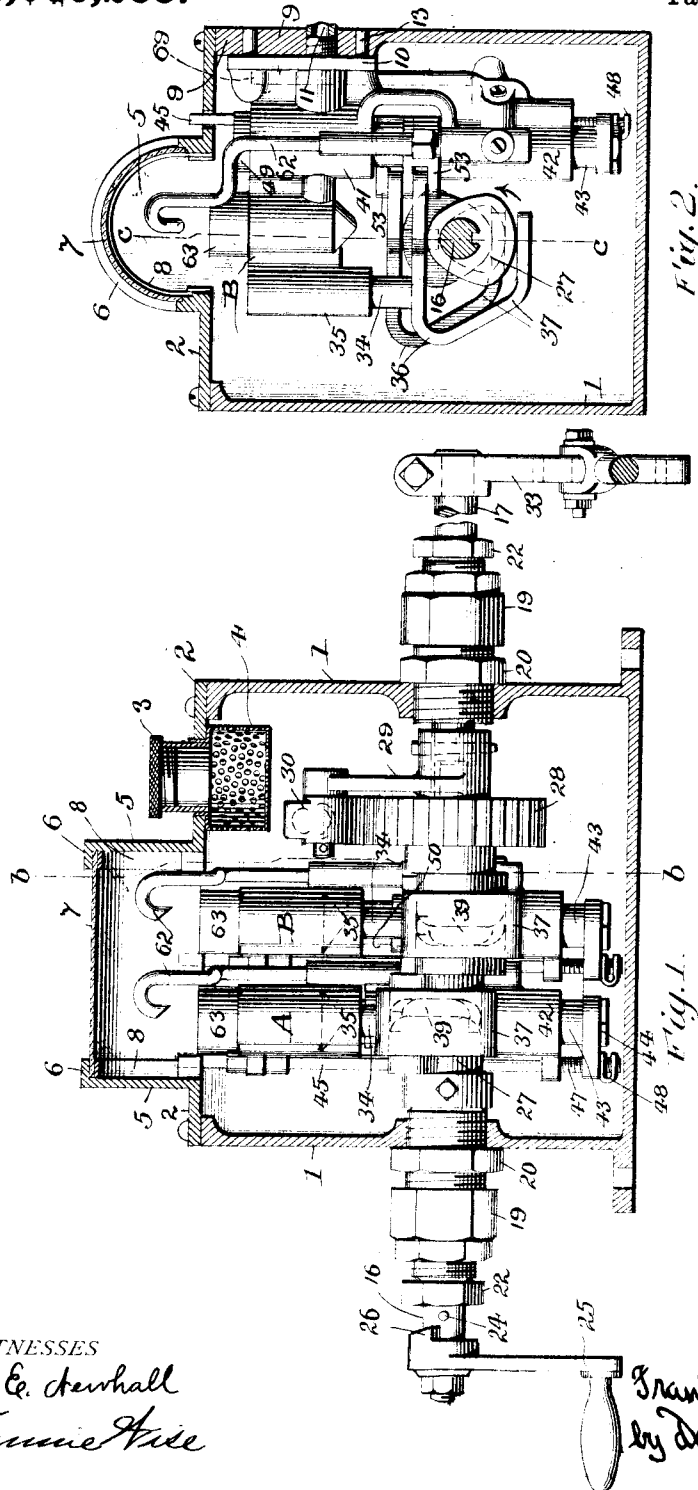
LUBRICATOR.

APPLICATION FILED JAN. 29, 1912.

1,066,238.

Patented July 1, 1913.

3 SHEETS—SHEET 1.



WITNESSES

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 Fannie A. Lee

INVENTOR:

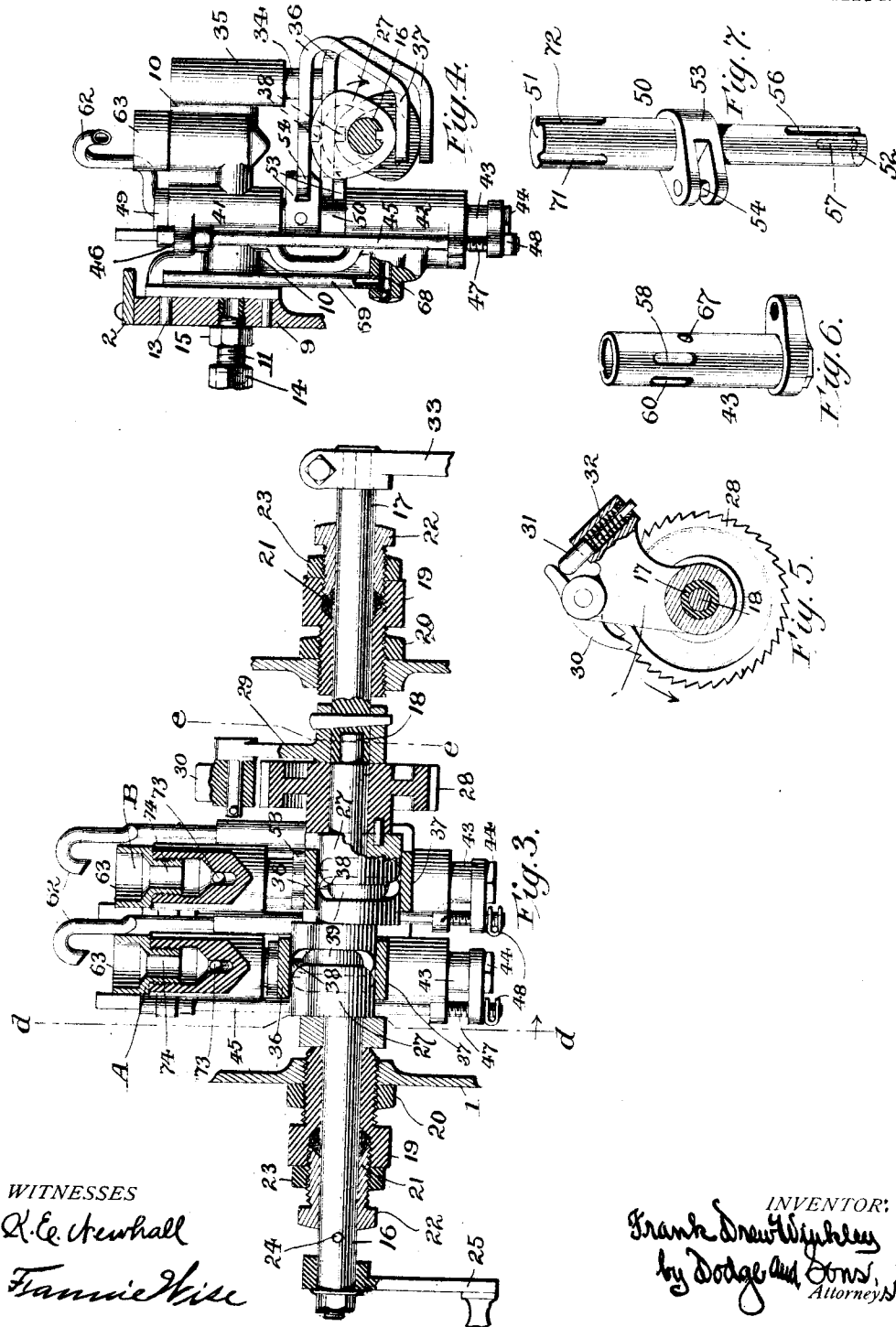
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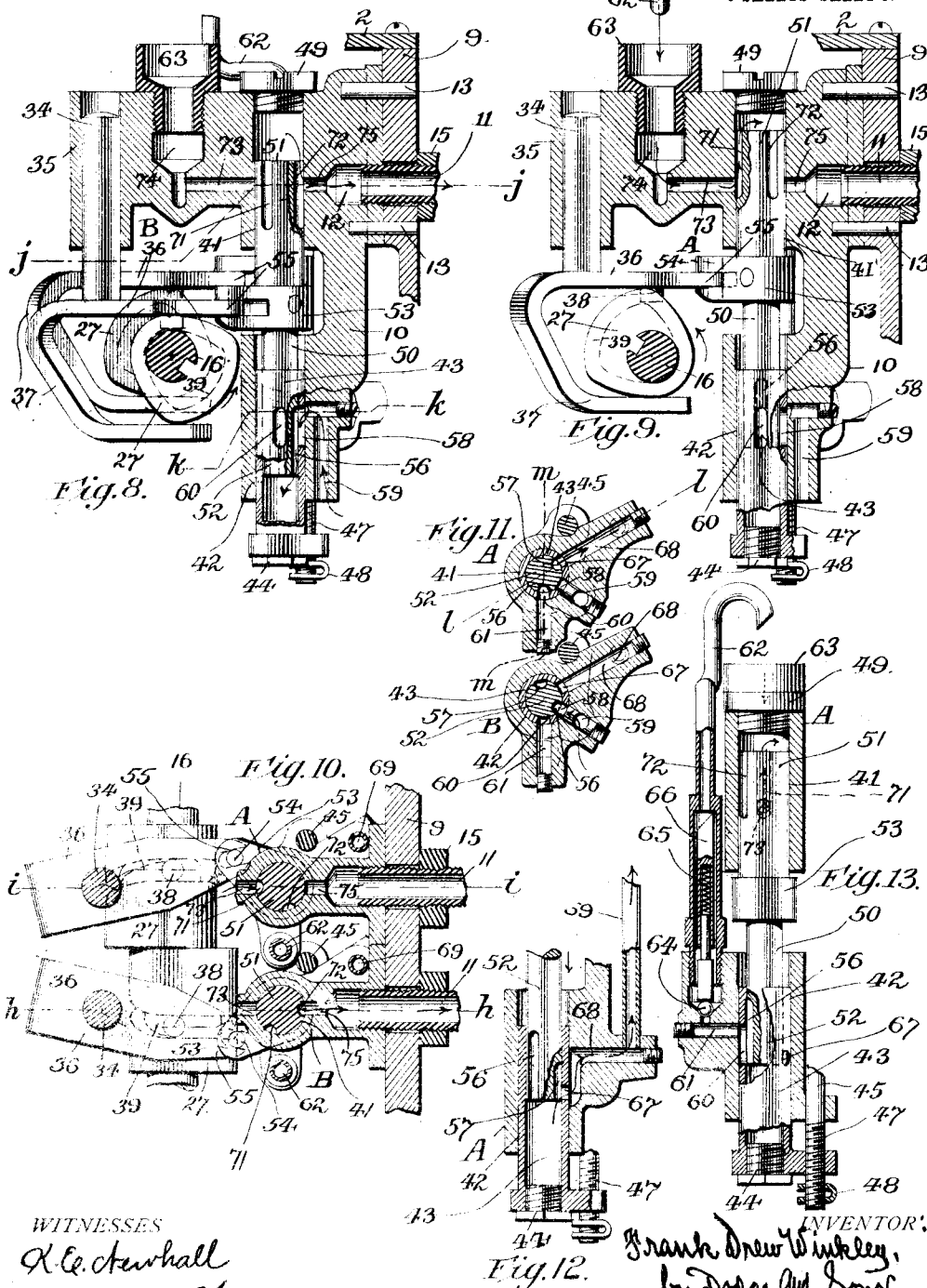
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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LUBRICATOR.

1,066,238.

Specification of Letters Patent.

Patented July 1, 1913.

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To all whom it may concern:

Be it known that I, FRANK D. WINKLEY, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Lubricators, of which the following is a specification.

This invention relates to force feed lubricators of the type in which a measuring piston or pump delivers a measured amount of oil through a sight feed device to a corresponding force pump, which then forces this oil to the bearing to be lubricated.

Important features of the invention are the use of a single plunger for the measuring and force pumps; the adaptation of the oscillating piston valve principle to a lubricator of this general type; the construction of a lubricator for feeding any desired number of bearings, by the mere duplication of standard units; and the individual progressive adjustment of the feed of each measuring pump, without changing the piston travel and without stopping the machine.

Broadly stated the lubricator may be said to consist of a combined case and reservoir in which is mounted a plurality of pump units corresponding to the number of bearings to be lubricated. Each pump unit consists of two single acting pumps axially aligned and having a common plunger, one being the measuring and the other the force pump. The plungers are ported and are actuated through combined disk and cylinder cams, one for each plunger, the cam actuating mechanism being so designed as first to move the plunger longitudinally without rotation with one set of ports in register, then at the end of the longitudinal movement to rotate the plunger slightly to bring a new set of ports into register; then to move the plunger longitudinally in the reverse direction and finally at the end of such reverse longitudinal movement to rotate it reversely to its original position. In this way a satisfactory valve action is had. The oil fed by the measuring pump runs from a spout under a sight glass into a cup from which the force pump draws its supply, and the quantity fed is determined by the longitudinal adjustment of a bushing within the measuring pump. This bushing is provided with a waste port through which oil is discharged back into the reservoir until

the plunger overtravels the port. The point of such overtravel is determined by the adjustment of the bushing.

With this general statement of the construction and operation of the preferred embodiment of my invention the details of the construction will now be set forth in connection with the accompanying drawings, in which:—

Figure 1 is a vertical longitudinal section through the case of the device showing the pump and pump actuating mechanism in elevation; the plungers having completed a longitudinal movement and being at the mid point of their partial rotary movement; Fig. 2 is a section on the line *b—b* of Fig. 1; Fig. 3 is a section on the line *c—c* of Fig. 2; Fig. 4 is a section on the line *d—d* of Fig. 3; Fig. 5 is a section on the line *e—e* of Fig. 3, showing the construction of the ratchet drive; Fig. 6 is a perspective view of the measuring pump, adjustable bushing; Fig. 7 is a perspective view of the measuring and force pistons together with their attached actuating lug; Fig. 8 is a section on the line *h—h* of Fig. 10, showing the plungers about to begin their longitudinal movement; Fig. 9 is a section on the line *i—i* of Fig. 10; Fig. 10 is a section on the line *j—j* of Fig. 8; Fig. 11 is a section on the line *k—k* of Fig. 8; Fig. 12 is a section on the line *l—l* of Fig. 11; and Fig. 13 is a section on the line *m—m* of Fig. 11.

Referring to the drawings 1 represents the combined oil reservoir and case, which may be of any suitable form. This is provided with a removable cover 2 having a filling opening 3 and strainer 4. On the cover 2 are also two upstanding portions 5, having semicircular flanges 6 against which a sight glass 7 is held by clamping rings 8. This sight glass permits a view of the feed of each measuring pump contained in the case. At the back of the case is a boss 9 to which are attached the castings 10 each containing the cylinders, guides, ports, &c., of a single pump unit as will later be described in detail. These castings are attached to the case 1 by screwing a nipple 11 into the discharge port 12 of the pump unit, and are held in alignment by pins 13 as shown in Fig. 8. The nipples 11 are provided with unions 14 (see Fig. 4) by which they may be connected to pipes running to the bearings to be lubricated, and are held in place by nuts 15.

In the drawings is illustrated a lubricator adapted to feed two bearings, but it is obvious that the structure may be adapted to feed any number of bearings by the mere duplication of the pump units and actuating cams. The pump units are absolutely identical and like parts in different units will be referred to by the same reference numerals. Where it is necessary to distinguish between the two units these will be referred to as A and B as marked on the drawings.

The actuating shaft is formed in two sections 16 and 17, which are co-axial, the section 16 being journaled in the end of the section 17 at 18 (see Fig. 3). Each section turns in a bushing 19 screwed into the case 1 and locked by a check nut 20. To prevent leakage of oil along the shaft each bushing 19 has a packing gland 21 together with the usual gland nut 22 and a check nut 23. The portion 16 of the shaft carries a pin 24 and loosely mounted on this shaft is a hand crank 25 having a ratchet lug 26 adapted to engage pin 24 to permit turning shaft 16 by hand in one direction only. The portion 16 also carries the actuating cams 27, one for each unit and a ratchet wheel 28, the cams and ratchet wheel being fast to this portion of the shaft. The portion 17 of the shaft carries a radial arm 29 having a pawl 30 coacting with ratchet 28, the pawl being urged against the ratchet by a plunger 31 and spring 32. The portion 17 may have an arm 33 adapted to be connected to some reciprocating element of the machine to be lubricated or may itself be so connected to such machine as to receive a slow rotary movement. In either event the effect is to impart a rotary movement to portion 16 of the shaft in the direction indicated by arrows in various of the figures.

The cams 27 may be said to be compound in character; that is they combine a disk cam, adapted to impart reciprocating movement to the cam wiper and a cylinder cam adapted to impart an oscillating motion to the same wiper, the cam being so designed that the reciprocation and oscillation are successive and not simultaneous. The wiper is carried by a cylindrical guide pin 34 guided in a way 35 formed in the castings 10 parallel to the axis of the pump plunger. The wiper consists of a U-shaped member having arms 36 and 37 which straddle the corresponding cam 27 so as to be moved up and down by it. The arm 36 carries a pin 38 which is eccentric with respect to guide way 35 and runs in a groove 39 on the edge of cam 27. The groove 39 is of such form as to swing the arm 36 about the axis of way 35 at the proper time and to the proper extent.

Although the form of the cam is subject to considerable modification that shown in the drawing is laid out as follows: With re-

spect to the axis of the shaft the cam consists of four 90° portions. Two of these portions opposite to each other are of circular contour, and concentric with the axis of the shaft, but of different radius. The intervening portions are of progressively varying radius as shown. Consequently when the circular portions of the cam are in contact with the wiper the latter receives no longitudinal motion. On these circular portions of the cam alone, the groove 39 is of helical form the pitch of the helix being equal but opposite on the two opposite circular portions. On intervening portions of the cam the groove is straight or of zero pitch. Consequently during one quarter revolution the wiper while swinging to one extreme position moves longitudinally its full travel. During the next quarter revolution the wiper is swung by groove 39 to its opposite extreme position. In this position it is during the next quarter revolution moved back longitudinally its full travel. During the last quarter revolution it is swung back by groove 39 to initial position ready to begin its next longitudinal movement.

The pump proper consists of two alined cylinders 41 and 42, 42 being the measuring pump cylinder and having a ported bushing 43. This bushing is closed at its lower end by a screw plug 44 and is longitudinally adjustable in cylinder 42 by means of a rod 45 swiveled at 46 on ears on casting 10, and threaded at 47 into a lug on the bushing. A lock nut 48 limits the downward movement of the bushing. Cylinder 41 is closed at its upper end by a screw plug 49. The bushing 43 makes a close sliding fit in cylinder 42 and a plunger 50 works as a piston within the bushing and in cylinder 41. The upper end 51 serves as a force piston and the lower end 52 as the measuring piston. At mid length of plunger 50 is a collar 53 slotted at one side and there provided with a pin 54. The bifurcated end 55 of arm 36 lies in the slot of collar 53 and straddles pin 54 so that plunger 50 is reciprocated and oscillated by similar movements of the cam wiper. The lower end 52 of plunger 50 has two groove ports formed in its side, a long one 56 which is the suction and discharge port and a short port 57 which is the waste port through which the surplus oil is wasted back into the reservoir during the initial portion of the forcing stroke of the measuring pump.

58 is the suction port in bushing 43 and coacts with port 56 during the suction stroke of the measuring pump. Oil reaches it from the reservoir through a port 59 in casting 10. Port 60 in bushing 43 is the discharge port with which port 56 coacts during the discharge stroke. It leads to passage 61 (see Fig. 13) which is connected to sight feed drip pipe 62 and from this the oil measured

by the piston 52 runs into cup 63 from which the forcing piston draws its supply. In passage 61 is a ball valve 64 held down by a spring 65 and used for the purpose of preventing all flow through the discharge port until the waste port is closed. The spring is inclosed in a telescopic case 66 to prevent it from accumulating lint from the oil filter, and other foreign material likely to catch in the spring.

The waste port 57 coacts during the initial part of the forcing stroke with a small waste port 67 in bushing 43. This leads to a passage 68 and upstanding tube 69 through which oil overflows back into the reservoir. Ports 58 and 60 are relatively long, as shown in Fig. 6, but port 67 is short, so that while longitudinal adjustment of bushing 43 does not affect the coaction of ports 58 and 60 with port 56, it does vary the portion of the stroke through which oil may waste back to the reservoir through the registry of ports 57 and 67 with each other. As the oil, not so wasted back is fed to the force pump the adjustment of bushing 43 controls the feed of oil. It will be noted that the stroke of the pump is unchanged by such adjustment.

The end 51 of the plunger 50 has two groove ports 71 a suction port, and 72 a discharge port. The port 71 coacts with a port 73 which is the termination of a passage 74 leading from the sight cup 63. The port 72 coacts with a port 75 leading to discharge passage 12.

The operation of the device will now be traced. In Figs 8 to 12 the plunger of unit A is just ready to begin its descent and plunger of unit B just ready to begin its ascent. As shown in Fig. 8 plunger 50 of unit B has swung from the position in which it is shown in Fig. 1 to a position in which port 56 registers with port 58 and port 72 with 75. Consequently as the plunger moves up in this position oil from the reservoir is drawn into cylinder 42 and discharged from cylinder 41 to the bearing to be lubricated. At the end of this upward movement plunger 50 is rotated until it assumes the position in which unit A is shown in Fig. 9. The plunger then moves downwardly and as port 71 registers with port 73, port 56 with port 60 and port 57 with port 67 the following actions will take place. Oil from cup 63 will be drawn into cylinder 41. Oil in cylinder 42 will be wasted back into the reservoir until port 57 overtravels port 67, after which the oil will overcome the spring 65, lift ball valve 64 and flow by 56, 60, 61 and 62 to sight cup 63. At the end of its downward movement the plunger is rotated back to its initial position.

To produce an initial feed of oil before starting a machine the hand crank may be used. The feed of oil to any bearing may

be quickly adjusted by turning the rods 45 which project through the cover of the reservoir and are squared to receive a key.

Having thus described my invention, what I claim is:—

1. In a lubricator, the combination of a pair of pump cylinders provided with suitable admission and discharge ports, the first being a measuring cylinder and the second a forcing cylinder; a sight feed device adapted to receive lubricant pumped by the first cylinder and feed it to the second cylinder; a ported piston mounted in each cylinder; means for reciprocating and oscillating the pistons in unison and with a constant stroke, whereby the ports of the latter are brought into operative register alternately with the inlet and discharge ports of the respective cylinders; and means for varying the amount fed by the measuring cylinder.

2. In a lubricator, the combination of a pair of alined pump cylinders provided with suitable admission and discharge ports, the first being a measuring cylinder, and the second a forcing cylinder adapted to receive lubricant pumped by the measuring cylinder and to deliver it to the bearing to be lubricated; a ported plunger common to both cylinders; a mechanism adapted to reciprocate the plunger and to oscillate the same about its longitudinal axis to bring the ports therein into proper register alternately with the admission and discharge ports in the cylinders; and an adjustable member associated with the measuring cylinder and provided with a waste port whose position is adjusted by the adjustment of said member.

3. In a lubricator, the combination of a casing; a pair of alined pump cylinders mounted in the casing and provided with suitable admission and discharge ports, the first being a measuring cylinder, and the second a forcing cylinder adapted to receive lubricant pumped by the measuring cylinder and to deliver it to the bearing to be lubricated; a ported plunger common to both cylinders; a mechanism adapted to reciprocate the plunger and to oscillate the same about its longitudinal axis to bring the ports therein into proper register alternately with the admission and discharge ports in the cylinders; an adjustable member associated with the measuring cylinder and provided with a waste port whose position is adjusted by the adjustment of said member; and means for adjusting said member from a point outside the casing.

4. In a lubricator, the combination of a measuring pump cylinder provided with admission and discharge ports; a sight feed device through which the measuring pump discharges; a forcing pump cylinder axially alined with the measuring pump cylinder

also provided with admission and discharge ports, and adapted to draw its supply from the sight feed device and discharge it to the bearing to be lubricated; a plunger common to both cylinders and provided with ports adapted to coact with the admission and discharge ports in the cylinders; means for actuating the plunger with a constant stroke; and means for varying the amount fed by the measuring cylinder.

5. In a lubricator, the combination of a measuring pump cylinder provided with admission and discharge ports; a sight feed device into which the measuring pump cylinder discharges; a forcing pump cylinder provided with admission and discharge ports, said cylinder being axially alined with the measuring pump cylinder and adapted to draw its supply from the sight feed device and discharge it to the bearing to be lubricated; a plunger common to both cylinders and provided with ports adapted to coact with the ports in the cylinders; means for reciprocating the plunger longitudinally with a constant stroke and for oscillating the same about its longitudinal axis to bring its ports alternately into register with the admission and discharge ports; and means for varying the amount fed by the measuring cylinder.

6. In a lubricator, the combination of a measuring pump cylinder provided with admission and discharge ports; a sight feed device into which the measuring pump cylinder discharges; a forcing pump cylinder axially alined with the measuring pump cylinder and adapted to draw its supply from the sight feed device and discharge it to the bearing to be lubricated and provided with admission and discharge ports; a plunger common to both cylinders and provided with ports adapted to coact with the admission and discharge ports in the cylinders; means for reciprocating the plunger longitudinally, and for oscillating the same about its longitudinal axis to bring the admission and discharge ports successively into register; a longitudinally adjustable bushing mounted in the measuring cylinder and provided with a waste port adapted to be overtraveled by the plunger; and means for adjusting the position of the bushing and consequently of its waste port.

7. In a lubricator, the combination of a pair of axially alined cylinders provided with admission and discharge ports, the first being a measuring cylinder and the second a forcing cylinder adapted to receive lubricant from the measuring cylinder and to discharge the same to the bearing to be lubricated; a plunger common to both cylinders and provided with ports adapted to register with the admission and discharge ports in the cylinders in different angular positions of the plunger; a cam

adapted to longitudinally reciprocate the plunger with a constant stroke and to oscillate the same about its longitudinal axis, to secure appropriate register of the ports; and means independent of the movement of the plunger adapted to vary the rate of feed of the measuring cylinder.

8. In a lubricator, the combination of a measuring pump cylinder; a ported bushing mounted in said cylinder, normally fixed therein but adapted to be adjusted to vary the amount fed therefrom; a plunger working within the bushing; suitable inlet and discharge mechanism for the cylinder; means for longitudinally reciprocating the plunger; and means for adjusting the position of the bushing.

9. In a lubricator, the combination of a measuring pump cylinder; suitable inlet and discharge mechanism therefor; an adjustable bushing mounted therein and provided with a waste port; a plunger working within the bushing and adapted to overtravel the waste port; means for reciprocating the plunger longitudinally; and means for adjusting the position of the bushing to vary the overtravel of the plunger past the waste port.

10. In a lubricator, the combination of a measuring pump cylinder; a ported bushing mounted in said cylinder and adapted to be adjusted to vary the amount fed therefrom; a ported plunger working within the bushing; means for imparting longitudinal reciprocation and rotary oscillation to the plunger; and means for adjusting the longitudinal position of the bushing.

11. In a lubricator, the combination of a measuring pump cylinder; an adjustable bushing mounted therein and provided with inlet and discharge ports and a waste port; a ported plunger working within the bushing and adapted to overtravel the waste port; means for reciprocating the plunger longitudinally; means for imparting rotary oscillation to the plunger to bring its ports into register alternately with the inlet and discharge ports; and means for adjusting the position of the bushing to vary the overtravel of the plunger past the waste port.

12. In a lubricator, the combination of a measuring pump cylinder having a discharge port leading to the point of use of the lubricant; a loaded valve in said discharge port opening in the direction of flow therethrough but tending to retard such flow; a plunger working in the cylinder; a movable member mounted in the cylinder and provided with a vent port adapted to be overtraveled by the plunger; and means for adjusting the longitudinal position of such member to vary the point of such overtravel.

13. In a lubricator, the combination of a measuring pump cylinder having a dis-

charge port leading to the point of use for the lubricant; a valve in the discharge port opening in the direction of flow there-through; a spring urging said valve in a closing direction; a telescopic case inclosing said spring; a plunger working in said cylinder; a movable member mounted in the cylinder and having a waste port adapted to be over traveled by said plunger; and means for adjusting the longitudinal position of said member to vary the point of such over travel.

14. In a lubricator, the combination of a measuring pump cylinder; an adjustable bushing mounted in said cylinder and having inlet and discharge and waste ports; a ported piston working within the bushing and adapted to overtravel the waste port; means for imparting longitudinal reciprocation to the piston; means for imparting rotary oscillation to the piston to cause its ports alternately to register with the inlet and discharge ports of the cylinder; means for adjusting the longitudinal position of the bushing; a sight feed device adapted to receive oil from the measuring cylinder; a ported forcing cylinder adapted to receive its supply from the sight feed device and deliver the same to the bearing to be lubricated; a ported piston adapted to work in the forcing cylinder; and operative connection between the piston in the measuring cylinder and that in the forcing cylinder whereby they are reciprocated and oscillated in unison.

15. In a lubricator the combination of a tank adapted to contain oil; an actuating mechanism mounted in said tank; and a plurality of lubricator units each adapted to feed oil from said tank to a corresponding point of use, each individually supported in said tank in operative relation with said actuating mechanism and each including the following instrumentalities, a fixed self-sustaining element provided with a measuring pump cylinder, a forcing pump cylinder, a sight feed cup and passages leading from the measuring pump cylinder to said cup, from said cup to the forcing pump cylinder, and from the forcing pump cylinder to a point outside said tank; a reciprocating piston mechanism for said pump cylinders mounted in said self-sustaining element and adapted to be driven by said cams; and means supported by said self-sustaining element, operable from a point outside the tank and adapted to vary the amount fed by the measuring cylinder.

ing pump cylinder, a forcing pump cylinder, a sight feed cup and passages leading from the measuring pump cylinder to said cup and from said cup to the forcing pump cylinder; a reciprocating piston mechanism for the pump cylinders supported by said self-sustaining element and adapted to be driven by said actuating mechanism; and means supported by said self-sustaining element and adapted to vary the amount fed by the measuring pump cylinder.

16. In a force feed lubricator, the combination of a tank adapted to contain oil; a cover therefor having a transparent window; a shaft passing through the tank and supported thereby; a plurality of actuating cams carried by said shaft; and a plurality of lubricator units each adapted to feed oil from said tank to a corresponding point of use, each individually supported in said tank beneath said transparent window in operative relation with said actuating cams and each including the following instrumentalities, a fixed self-sustaining element provided with a measuring pump cylinder, a forcing pump cylinder, a sight feed cup and passages leading from the measuring pump cylinder to said cup, from said cup to the forcing pump cylinder, and from the forcing pump cylinder to a point outside said tank; a reciprocating piston mechanism for said pump cylinders mounted in said self-sustaining element and adapted to be driven by said cams; and means supported by said self-sustaining element, operable from a point outside the tank and adapted to vary the amount fed by the measuring cylinder.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK DREW WINKLEY.

Witnesses:

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PAUL KNEY.