

1,016,569.

Fig. 1 is a detailed cross-sectional view of a mechanical device, likely a pump or engine, showing internal components and their assembly within a housing. The device features a central vertical shaft (10) with a crank (11) at the top. This shaft is connected to a series of levers or arms (2, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39) that are arranged in a row. These levers are connected to a common horizontal shaft (4) at the bottom. The entire assembly is housed within a rectangular frame (5) with a top cover (6) and a bottom cover (7). The device is shown in a cross-sectional view, revealing the internal components and their assembly. The drawing is labeled "Fig. 1" in the upper left corner.

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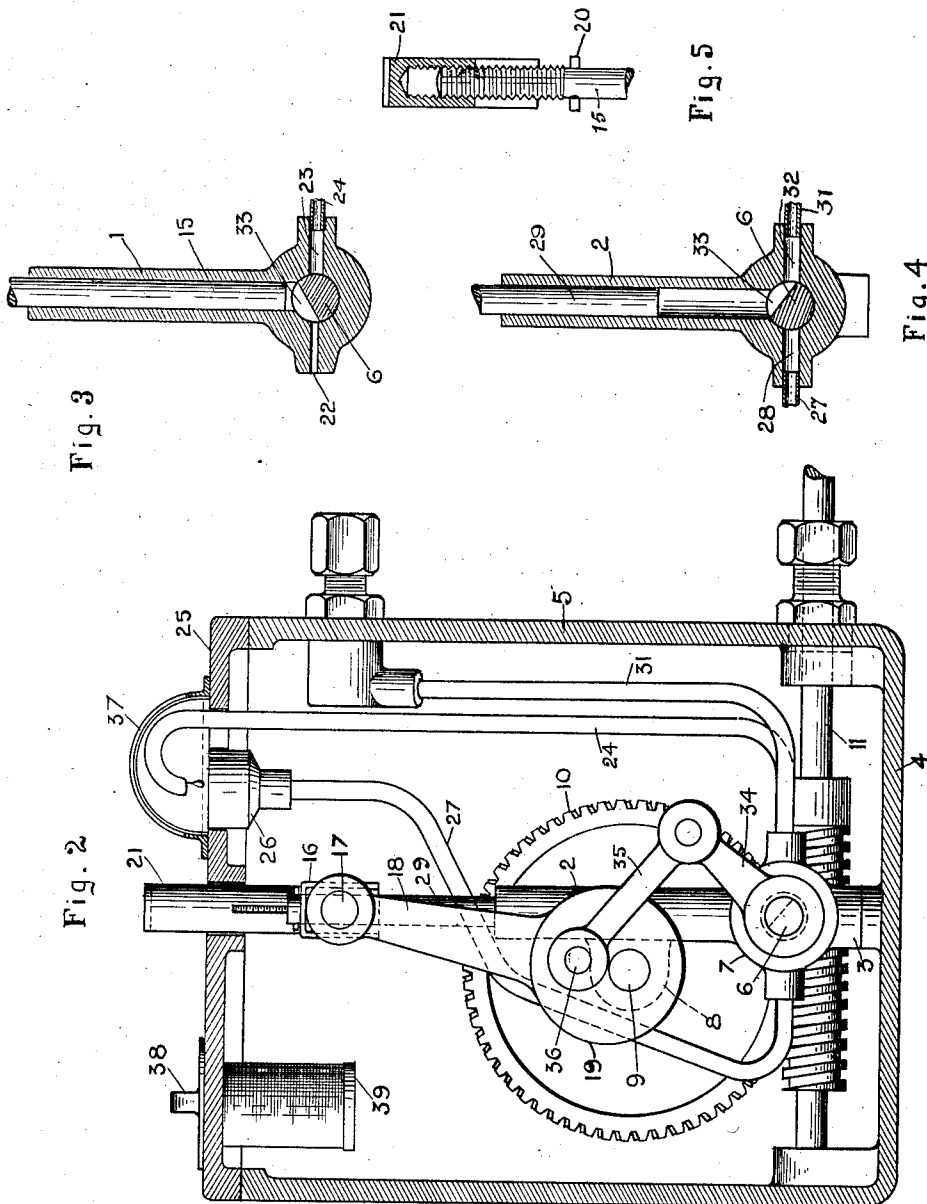
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LUBRICATOR.

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Patented Feb. 6, 1912.

3 SHEETS—SHEET 2.



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Fig. 7

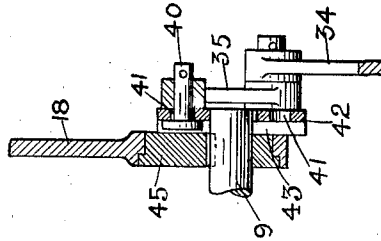
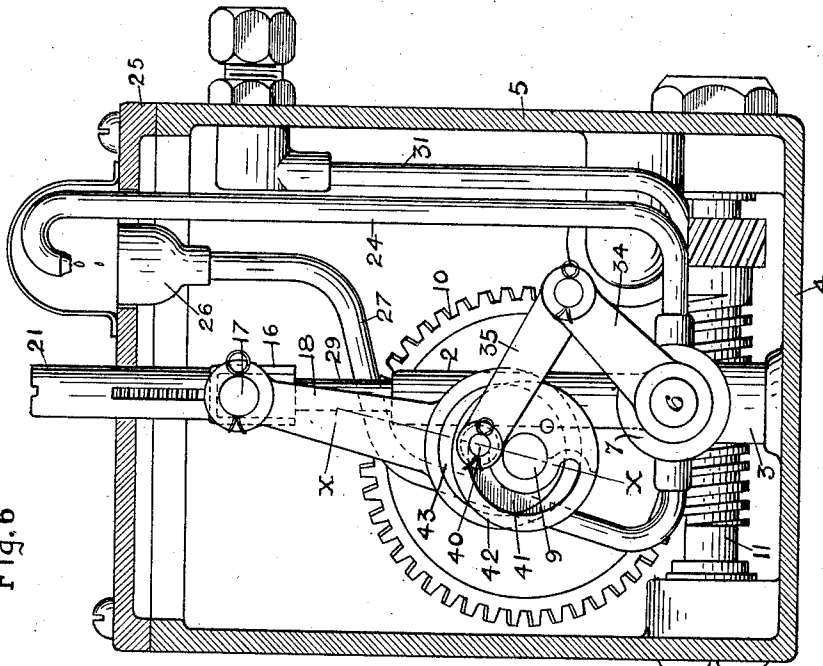


Fig. 6



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LUBRICATOR.

1,016,569.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH P. LAVIGNE, 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 Lubricators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to lubricators and more particularly to those of the multiple force feed type.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view in side elevation, with outer casing in section, of a lubricator embodying features of the invention; Fig. 2 is a view in end elevation, with outer casing in section, of the lubricator; Fig. 3 is a view in detail, in section of a pump cylinder with plunger at bottom of the stroke and valve connecting an inlet port and cylinder interior; Fig. 4 is a view in section, in detail, of a feed cylinder with plunger at upper end of its throw, and valve connecting the cylinder with an outlet port; Fig. 5 is a view in detail of an adjustable plunger sleeve; Fig. 6 is a view of a lubricator provided with reversing means; and Fig. 7 is a view in detail in section on line $x-x$ of Fig. 6.

Referring to the drawings, a pump cylinder 1 with companion feed cylinder 2 preferably formed integral therewith, stands in an upright position on a foot 3 that is secured as by a screw or other like means to the base 4 of a reservoir casing 5 of suitable design. A corresponding pair of cylinders 40 1 and 2 are likewise secured on a foot 3 near the opposite end of the reservoir and a cylindrical valve 6 is journaled at its ends in bearings 7 formed in the lower end of each cylinder. Bearing lugs 8 on the cylinders 45 afford support for a drive shaft 9 which may be rotated in any suitable manner, as, for example, by a worm gear 10 and worm shaft 11 journaled transversely in the casing and driven from any suitable source of 50 power. Intermediate pump cylinders 12 each with a companion feed cylinder 13 have bearings 14 at their lower ends by which they are journaled and supported on the cylindrical valve 6. A plunger 15 in each 55 pump cylinder has its upper end or stem extending through a guide aperture in a yoke

16 that is pivotally supported by studs 17 at its ends journaled in the outer portions of eccentric rods 18. Preferably the yoke is U-shaped or channeled in cross-section. 60 The eccentric rods are each mounted on an eccentric 19 secured on the drive shaft 9. A pin 20 or like suitable stop on each plunger below the yoke is engaged by the latter to force the plunger into the cylinder 65 while its withdrawal is effected by the contact of the yoke with a sleeve 21 screw-threaded on to the upper end of the plunger stem, the lower portion of the sleeve being longitudinally slotted to have a spring- 70 pressed frictional engagement with the plunger thread. An intake port 22 opens into the lower end of each pump cylinder, and an outlet port 23 therefrom is connected with a sight tube 24 whose upper end extends through an aperture in the cover 25 75 in the casing and discharges into a suitable cup 26 at an interval below it. A drain tube 27 that supports the cup is secured at its lower end in an inlet 28 of the companion 80 feed cylinder. A plunger 29 in each feed cylinder extends through a guide aperture in the web of the pump yoke, suitable stops 30 on either side of the yoke web at an interval therefrom cooperating with the yoke 85 to reciprocate the piston. A supply pipe 31 leads from an outlet port 32 in each feed cylinder through an aperture in the side wall of the casing, from whence it may be connected to any bearing that it is desired 90 to lubricate.

Transverse slots 33 are formed in the cylindrical valve 6 so as to alternately connect the bore of each cylinder with the corresponding cylinder inlet and outlet ports 95 when properly oscillated. A rock arm 34 is secured to one end of the valve 6 and is connected at its outer end to a link 35 whose other extremity is pivoted on a crank pin or stud 36 on the adjacent drive shaft eccentric. 100 A shield 37 covers the sight tubes and a filling plug 38 with strainer 39 complete the machine.

In operation the driving mechanism is timed so that during one portion of a revolution 105 of the drive shaft each pump cylinder plunger, whose length of stroke may be varied by adjustment of the sleeve on the stem, is drawn to the full limit of its outward stroke at a time when the inlets of 110 the pump cylinders are connected through the transverse slots of the valve with the

cylinder bores. At the same time the feed cylinder plungers are being lifted so as to draw the contents of the drain tubes 27 into the feed cylinders. As the drive shaft continues its rotation, the valve is turned to connect the cylinder bores with their respective outlets while there is such play for the yoke between the stops on the plungers that the latter remain stationary until this valve movement is effected. At this point the link and rock arm connections have nearly reached the limit of their throw and as a consequence the angular movement of the rock arm for a short period is so slight that the valve is practically stationary during the time when the descending yoke forces the plungers into their respective cylinders and ejects the contents. As the rotation of the drive shaft continues the link and rock arm connection rocks the valve back while the eccentric rods of the yoke are practically vertically stationary as the eccentrics are passing the lower end of their throws. This brings the valve into position which connects the inlet port of each cylinder with the bore thereof ready for the drawing out of the pistons and plungers which follows during the second temporary arrest of the valve oscillation. The break in connection between the sight tube and drain pipe vents the latter so that the oil therein is readily drawn into the feed cylinder. By this arrangement any amount of lubricant up to the full capacity of each pump cylinder is supplied through the sight tube to the feed cylinder from which it is positively discharged to the bearing connected therewith.

In order that the lubricator may be driven in either direction as when used with a reversible engine or the like, the modified form of operating mechanism shown in Figs. 6 and 7, or equivalent construction is used. In such arrangement the rock arm 34 is coupled by the link 35 pivoted at one end to a crank pin or stud 40 that extends and slides through a segmental slot 41 in a disk 42 non-rotatably secured to the shaft 9, a crescent shaped filler 43 or spacer giving clearance for the stud between the disk and a drive-shaft-eccentric 45 that is similar in operation to the eccentric 19. Thus at each reversal, the crank 34 is retarded half a revolution, and then drives the connected parts in proper timed relation.

Obviously, changes in details of construction may be made without departing from the spirit of the invention, and I do not care to limit myself to any particular form or arrangement of parts so long as it comes within the scope of the appended claims.

What I claim as my invention is:—

1. In a force feed lubricator, a pump cylinder and feed cylinder in parallel relation, a sight feed connection between the outlet

port of the pump cylinder and the inlet port of the feed cylinder, plungers for the cylinders, a yoke coupling the plungers to reciprocate together, an oscillatory valve journaled transversely in the cylinders and adapted to alternately connect the inlet and outlet ports of the cylinders with the cylinder interiors, a shaft, eccentrics on the shaft, eccentric rods thereon whose outer ends support and reciprocate the yoke, studs on the eccentrics, rock arms on the valve and links connecting the studs and arms, the operating members being so arranged that the plungers are substantially in mid-stroke when the valve is nearing the limit of its throw.

2. In a force feed lubricator, a pump cylinder and feed cylinder in parallel relation, a sight feed connection between the outlet port of the pump cylinder and the inlet port of the feed cylinder, plungers for the cylinders, a yoke coupling the plungers to reciprocate together, an oscillatory valve journaled transversely in the cylinders and adapted to alternately connect the inlet and outlet ports of the cylinders with the cylinder interiors, eccentrics on the shaft, eccentric rods thereon whose outer ends support and reciprocate the yoke, studs on the eccentrics, rock arms on the valve, and links connecting the studs and arms, the operating members being so arranged that the plungers are substantially in mid-stroke when the valve is nearing the limit of its throw, and are temporarily at rest at each end of their stroke.

3. In a force feed lubricator, a reservoir casing, a series of pump cylinders and feed cylinders disposed in pairs across the casing base, the end pairs being secured on the base and the intermediate pairs being supported by an oscillatory valve journaled transversely in all the cylinders and adapted to connect either the inlet or the outlet port of each cylinder with the cylinder interior, a shaft journaled on the end pairs of cylinders parallel to the valve, eccentrics on the shaft, eccentric rods thereon, a yoke supported and reciprocated by the eccentric rods and adapted to simultaneously move the plungers, rock arms on the valve and links pivoted at one end to the arms and at the other to studs on the eccentrics, the parts being so arranged that the plungers are at substantially mid-stroke when the valve is approaching the limit of its throw.

4. In a force feed lubricator, a reservoir casing, a series of pump cylinders and feed cylinders disposed in pairs across the casing base, the end pairs being secured on the base and the intermediate pairs being supported by an oscillatory valve journaled transversely in all the cylinders and adapted to connect either the inlet or the outlet port of each cylinder with the cylinder interior, a shaft journaled on the end pairs of cylin-

ders parallel to the valve, eccentrics on the shaft, eccentric rods thereon, an apertured yoke supported and reciprocated by the eccentric rods through which the plungers extend, stops on the plungers below the yoke, stops on the plungers above the yoke, those on the pump cylinders being adjustable to vary the plunger stroke, rock arms on the valve, disks secured on the shaft, studs engaging the disks, and links pivoted at one end to the arms and at the other to the studs, the parts being so arranged that the plungers are at substantially mid-stroke when the valve is approaching the limit of its throw, and the stops being so disposed that the plungers are temporarily at rest at the ends of their strokes.

5. In a force feed lubricator, a pump cylinder and feed cylinder in parallel relation, a vented sight feed connection between the outlet port of the pump cylinder and the inlet port of the feed cylinder, plungers for the cylinders, a yoke coupling the plungers to reciprocate together, an oscillatory valve journaled transversely in the cylinders and adapted to alternately connect the inlet and outlet ports of the cylinders with the cylinder interiors, eccentrics secured on the shaft, eccentric rods thereon whose outer ends support and reciprocate the yoke, disks secured on the shaft, studs movably secured on the disks and adapted to shift through an arc of 180 degrees on reversal of the

shaft, rock arms on the valve and links connecting the studs and arms, the operating members being so arranged that the plungers are substantially in mid-stroke when the valve is nearing the limit of its throw.

6. In a force feed lubricator, a pump, cylinder and feed cylinder in parallel relation, a vented sight feed connection between the outlet port of the pump cylinder and the inlet port of the feed cylinder, plungers for the cylinders, a yoke coupling the plungers to reciprocate together, an oscillatory valve journaled transversely in the cylinders and adapted to alternately connect the inlet and outlet ports of the cylinders with the cylinder interiors, eccentrics secured on the shaft, eccentric rods thereon whose outer ends support and reciprocate the yoke, disks secured on the shaft each adjacent an eccentric, studs sliding in semi-circular slots in the disks concentric with the shaft, rock arms on the valve and links connecting the studs and arms, the operating members being so arranged that the plungers are substantially in mid-stroke when the valve is nearing the limit of its throw.

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

JOSEPH P. LAVIGNE.

Witnesses:

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