No. 820,821. PATENTED MAY 15, 1906.

J. T. PEDERSEN.

LUBRICATOR.

APPLICATION FILED MAY 26, 1905.

4 SHEETS—SHEET 1.

Fig. 4.

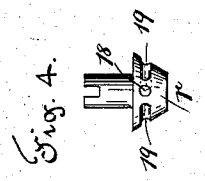

Fig. 1.

Witnesses
Charles Kanimann
Chas. A. Smith

Inventor
Johannes Fr. Pedersen
By his Attorney Harold Terrell

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4 SHEETS—SHEET 2.

Fig. 2.

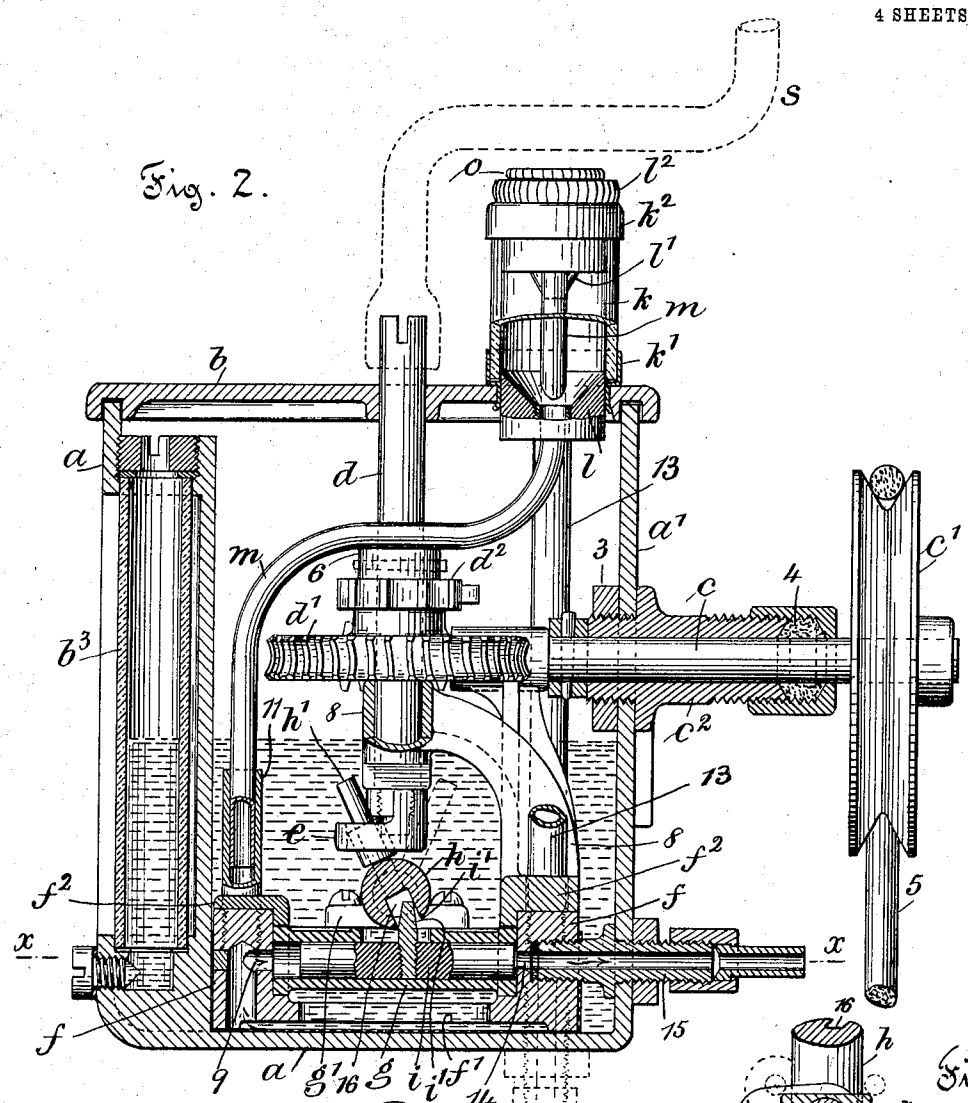


Fig. 7.

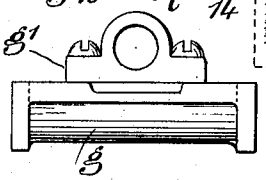


Fig. 9.

Fig. 10.

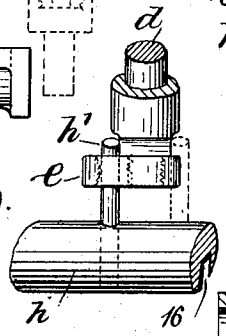
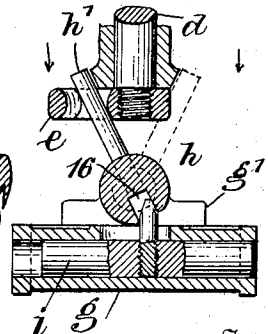


Fig. 8.



Witnesses
Charles Hanjmann
Chas. A. Smith

Inventor
Johannes Th. Pedersen
By his Attorney Harold Serrell

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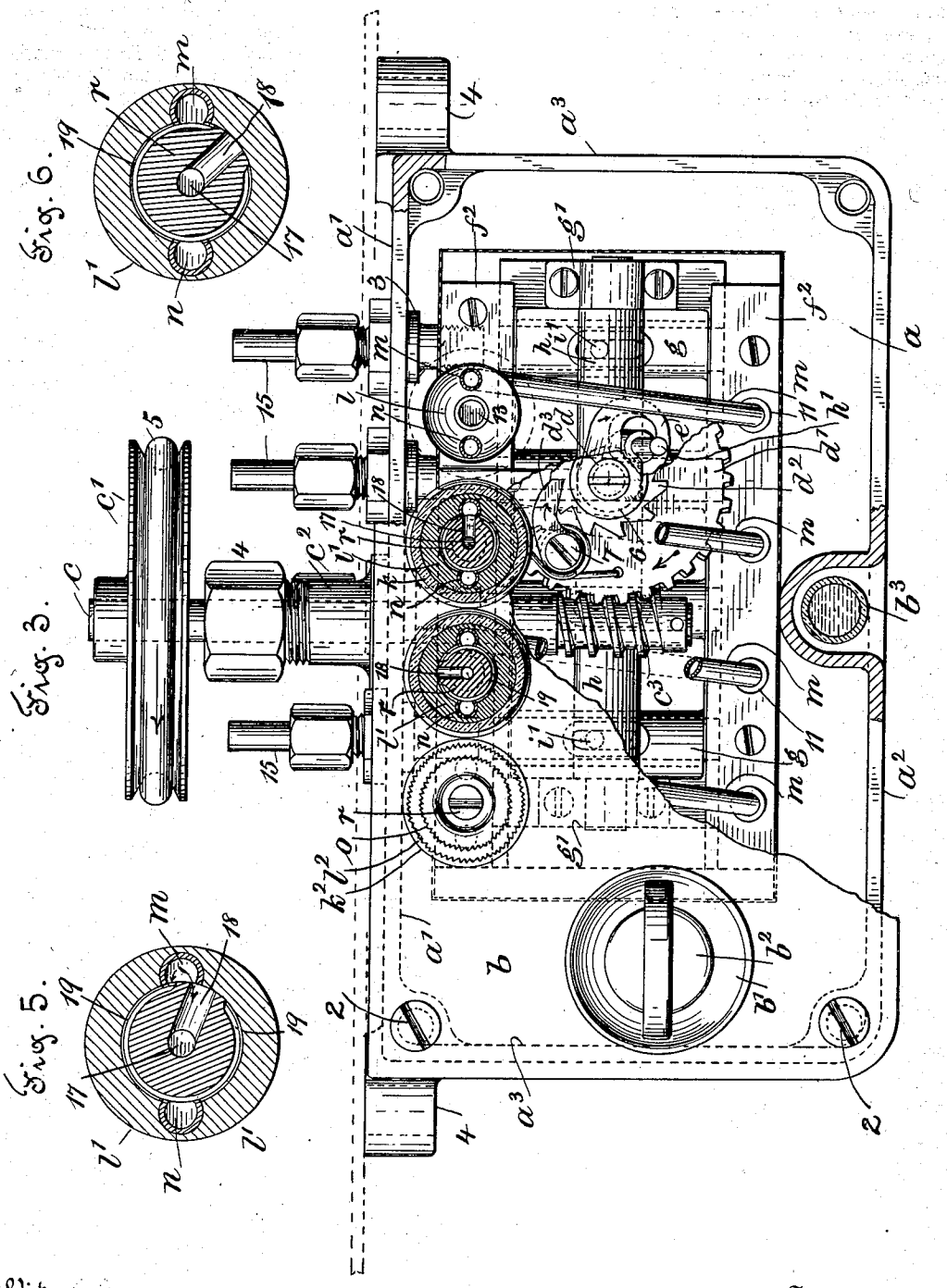
4 SHEETS—SHEET 3.



Witnesses
Charles Kanzmann
Chas. A. Smith

Inventor
Johannes Th. Pedersen
By his Attorney Harold Serrell

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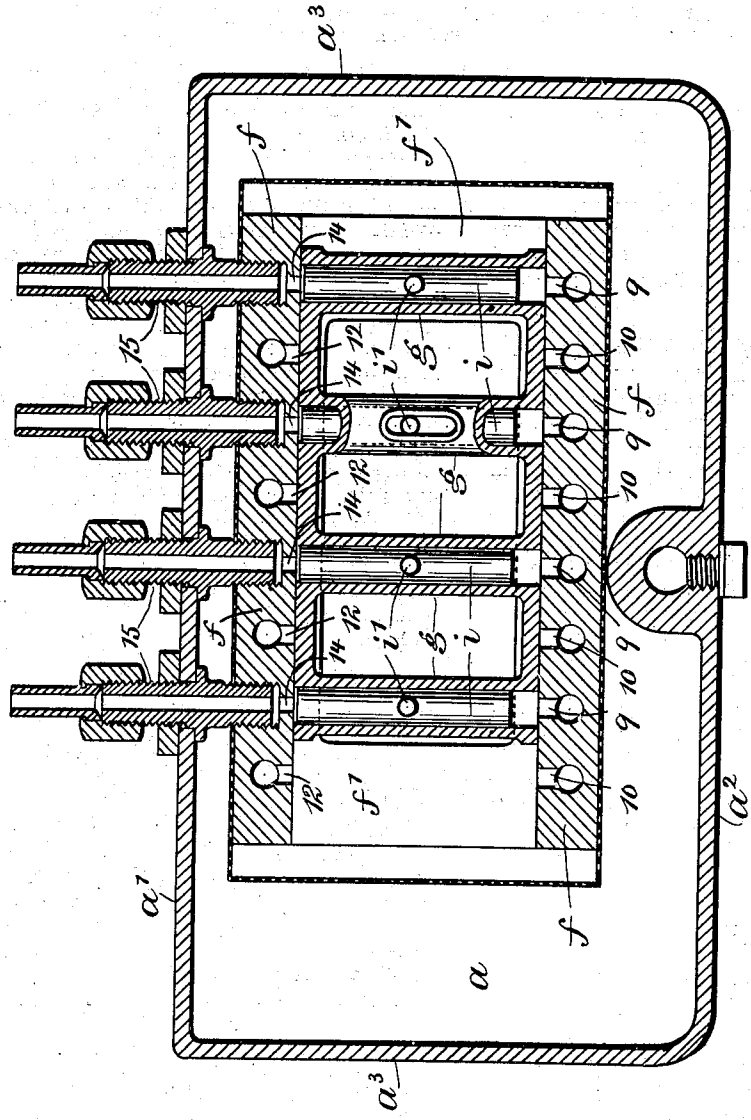
4 SHEETS—SHEET 4.

Fig. 11.



Witnesses
Chas. H. Smith
A. Berrell

Inventor
Johannes Th. Pedersen
per Harold Serrell

Atty

UNITED STATES PATENT OFFICE.

JOHANNES TH. PEDERSEN, OF NEW YORK, N. Y., ASSIGNOR TO PEDERSEN MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

LUBRICATOR.

No. 820,821. Specification of Letters Patent. Patented May 15, 1906.

Application filed May 26, 1905. Serial No. 262,350.

To all whom it may concern:

Be it known that I, JOHANNES TH. PEDERSEN, a citizen of the United States of America, residing at Woodside, in the county of Queens, city and State of New York, have invented an Improvement in Lubricators, of which the following is a specification.

My invention relates particularly to the class of force-feed or power-actuated oil-feeding devices or lubricators especially adapted to supplying lubricating-oil to the machinery of motor-vehicles, motor-boats, &c.; and the object of my invention is to provide a lubricator of simple construction and in which springs, check-valves, and other small and uncertain parts that are liable to get out of order are dispensed with, and also to provide in the one structure a device which while normally actuated by the power of the machinery being lubricated may also be manually operated, if desired, to supply oil previous to starting up the machinery and without disturbing the connections or devices for mechanically operating the lubricator.

My improved lubricating device comprises, essentially, a revoluble shaft, a reciprocating series of pistons or plungers, devices intermediate of said parts, whereby the movement of the former is communicated to the latter to both reciprocate the series of pistons and actuate the same, so that on one side and in one position of their movement they draw in oil from a receptacle and in their other position force the same quantities of oil into and through an adjustable sight-feed, while on the other side of the series of pistons in one position they draw the oil from the said sight-feed and in the other position force the said quantities of oil to the parts of the machinery to be lubricated. The pistons of the series are moved longitudinally by a rocker, which at the same time is actuated by an engaging revoluble member to reciprocate the series of pistons in ways provided therefor. These parts are contained in a receptacle holding the lubricating-oil and from which the oil is drawn and forced to the sight-feed and from which the oil received is forced to the machinery and parts being lubricated.

The guides of the reciprocating series of pistons are provided with ports at each side and the difference in length between the pistons and their cylinders and the diameter of the parts regulate the quantity of oil moved by each piston at each stroke. The sight-feed structure is provided with a regulatable oil-feed controlling the quantity of oil delivered to be forced to the machinery and with means for returning the surplus thereof to the oil-receptacle. The number of feed devices and discharge-pipes agree with the number of places to be lubricated.

In the drawings, Figure 1 is a vertical longitudinal section and partial elevation of the devices of my improvement. Fig. 2 is a vertical cross-section at right angles to Fig. 1. Fig. 3 is a plan of the parts within the oil-receptacle with the cover broken open and a horizontal section through the regulatable oil-feed devices, an end view of the slide, the slotted rocker-shaft, and an elevation and partial section of the piston, together with a section of the slotted rocker-arm. Fig. 4 is an elevation of the regulatable sight-feed device. Figs. 5 and 6 are sectional plans through the upper portion of the sight-feed and through the regulating devices and in opposite positions, the same being of exaggerated size for clearness. Fig. 7 is an end elevation of the slide, showing the bearings for the slotted rocker-shaft. Fig. 8 is a sectional end view of the slide, the slotted rocker-shaft, and an elevation and partial section of the piston, together with a section of the slotted rocker-arm. Fig. 9 is a plan of the slotted rocker-arm. Fig. 10 is an elevation of the same; and Fig. 11 is a sectional plan at the dotted line $x\,x$ shown in Figs. 1 and 2.

The receptacle for lubricating material is usually composed of the bottom a, back a', front a^2, and ends a^3, and formed therewith are lugs 4 for attaching the same to a suitable support.

b represents the cover, preferably with a groove in the under surface, whereby the cover fits down over the upper edge of the body, the cover being held to the body by the screws 2 at the corners. The cover at one end is provided with an aperture interiorly threaded to receive the filling-nozzle b', which is screwed thereto, and the aperture of the nozzle is interiorly threaded to receive the threaded plug or stopper b^2, and I provide a sight-tube b^3 at the front of the oil-receptacle to indicate the level of the oil therein.

c represents a shaft, and c' a wheel or sprocket on the outer end of the same, said shaft passing through a suitable bearing-

sleeve c^2, secured, preferably, to the back a' of the oil-receptacle and held in position by a nut 3 and provided with a packing 4. A belt or chain 5 passes around the wheel or sprocket c' for rotating the shaft, power and movement being communicated by the mechanism that the device of my improvement is employed to lubricate, and while I have shown in the drawings a wheel and belt it is obvious that a sprocket and chain may be employed in their place.

On the inner end of the shaft c—that is, within the oil vessel or receptacle—there is a worm c^3, and passing through the oil-receptacle vertically there is a shaft d. This shaft passes through the cover in an opening provided therein for the shaft, the bearing at the lower end being a bracket 8, secured as hereinafter described. Upon this vertical shaft d is a loose worm-wheel d', with which the worm c^3 is in mesh. Around the vertical shaft d and secured thereto is a ratchet d^2, by its hub 6 above the ratchet, pinned to the shaft d, and the bearing-bracket 8, coming below the loose worm-wheel d'. These parts are held in position on the shaft. Upon this loose worm-wheel d' there is a spring-held pawl d^3, mounted upon a stud 7, secured to the loose worm-wheel, the said pawl bearing and meshing with the teeth of the ratchet d^2. At the lower end of the shaft d and secured thereto in any desired manner below the bracket-bearing 8 is a slotted crank-arm e.

I employ a frame secured within the oil receptacle or vessel and to the bottom thereof, which frame comprises the parallel side members $f\,f$ and cross-connecting members f' near the bottom of the vessel and cover-plates f^2 upon the upper edges of the side members $f\,f$ and between which cover-plates and the side members are formed slideways for a reciprocating frame of cylinders, hereinafter described. In these side members $f\,f$ are series of ports at predetermined places. (See especially Figs. 2 and 11.) In the left-hand side member f, Fig. 2, there are a series of inlet-ports 9, four in number, agreeing with the initial position of pistons hereinafter described, and shown in Figs. 1, 2, and 11, and through which ports 9 the oil from the reservoir enters. In this same side there are a series of intermediate ports 10, which rise and communicate with the pipes 11. These ports 10 are also four in number. In the opposite or right-hand side member f, Fig. 2, there are series of intake-ports 12 directly opposite the ports 9 and which communicate with pipes 13, rising from the right-hand side member f, and there are other ports, four in number, opposite to the ports 9 and which may be designated as "discharge-ports" 14, which are in line with pipes 15, that extend to the parts to be lubricated, and it is to be remarked that while I have shown four series of ports in each of the side members there may be any number of ports in the series, as the ports of the series must in all cases agree in the lubricating device of my improvement with the number of places to which the oil is forced for lubricating the machinery. The bracket 8, hereinbefore described, is to be secured to or formed in one with the cover-plate f^2 at the right-hand side for support.

g represents a reciprocating frame of cylinders, each of which cylinders is centrally and longitudinally slotted in the upper surface g', being end bearings on the frame g. This frame of cylinders is received between the right and left hand side members $f\,f$ and between surfaces prepared thereon and the under surfaces of the cover-plates f^2. I provide a rock-shaft h with trunnion ends in the bearings g', which rock-shaft is longitudinally slotted in the under surface, as appears from Figs. 1 and 2. This rock-shaft has a pin h' secured thereto and projecting from the upper surface. This pin passes through the slot of the crank-arm e and is advantageously provided with a roller (shown in Figs. 1 and 2) contacting with the inner surface of the slot of said crank-arm. The slot in the said rock-shaft is indicated at 16. In the cylinders of the reciprocating frame g I place pistons i, which are shown as plain cylinders of metal each provided with a pin i', extending up through the slot of its cylinder and entering the slot 16 of the rock-shaft h.

The sight-feed devices for the oil and in which the movement thereof is visually indicated are shown as extending above and attached to the cover b. This is for convenience and compactness; but it is obvious that these sight-feed devices may be located anywhere in the line of pipes conveying the oil. These sight-feed devices are alike, and similar parts therein carry the same letter of reference, and the description of one will suffice for all. In each of these, k represents the cylindrical glass section of the sight-feeding device, at the lower end of which is a metal annulus k', secured in an aperture of the cover preferably by overturning the lower edge and by the shoulder above the cover, while at the upper end there is an annulus k^2.

In the lower part l represents a thimble centrally receiving the pipe 13, the center of the thimble being made funnel shape for the discharge of the oil into the pipe 13. At the upper end there is also a thimble l', which is of conical configuration centrally perforated. This thimble l' comes within the annulus k^2 and extends above the same and is securely held in position by the nut l^2, which screws upon the outer surface of the same down to the upper end of the annulus k^2.

m represents a curved pipe the lower end of which passes into the pipe 11, secured to the left hand of the side members f, Fig. 2, and the upper end of this curved pipe m passes up within the sight-feed, through the

thimble *l*, and into the thimble *l'*. A pipe *n* (shown diametrically across from the axial center of the sight-feed to the pipe *n*) passes through both thimbles *l'* and *l* and terminates below the thimble *l*, and in the thimble *l'* there is a valve *r*, the stem of which passes up through a cap *o*, the cap being exteriorly threaded and screwing into the interiorly-threaded upper part of the thimble *l'*, so as to close the same. This valve *r* is conical exteriorly and agrees in its taper with the conical interior of the thimble *l'*, and said valve *r* is provided with a central perforation 17 and a lateral perforation 18 and with a circumferential by-pass 19, the center of which is in the same horizontal plane with the center of the lateral opening 18. This particular construction is amply illustrated in Figs. 1, 5, and 6, and the horizontal plan through the by-pass 19 and lateral opening 18 agrees with the upper ends of the pipes *m* and *n*, which are made inclined, the upper end of the valve *r* being provided with a kerf for a screw-driver, by which the same may be turned, or any other suitable mechanical contrivance may be employed for turning the said valve and indicating its position.

In the operation of my improved lubricating device and after oil has been filled into the vessel or receptacle the rotation of the shaft *c* and its worm c^3 rotates the worm-wheel *d'* and by its pawl d^3 the ratchet d^2 and shaft *d*. The slotted crank-arm *e* turns with the shaft *d* and by its rotary movement actuates the pin *h'* and slotted rock-shaft *h* to impart reciprocating movement to the pistons *i* of the series, all of the pistons moving simultaneously in the same direction. From the peculiar construction of this slotted crank-arm *e* and its relation to the slotted rock-shaft *h* and with special reference to Figs. 2 and 3 it will be noticed that following the direction of rotation indicated by the arrow the further movement of said crank-arm *e* cannot further swing the shaft *h*, because the same has reached its extreme movement with the pistons. Consequently the next operation will be to move the reciprocating frame of cylinders *g* along in the slideway provided therefor in the side members *f f*. In this movement the piston-cylinders will go from the series of ports 9 on one side to the series of ports 10 on the same side and on the other side from the series of ports 14 to the series of ports 12, (see Fig. 11,) and after reaching this position the further movement of the said crank-arm *e* will be above and over the rock-shaft *h*, swinging the same from the position shown in Fig. 2 to its opposite position and in so doing move the pistons *i* from the position shown in Fig. 2 to their opposite position. In the movement of the reciprocating frame of cylinders and pistons from the positions shown at the ports 9 to the position at the ports 10 the oil drawn in at the ports 9 will be moved to the ports 10, and with the swinging of the rock-shaft *h* and the moving of the pistons to the opposite position (shown in Fig. 2) the oil will be forced into the ports 10 and pipes 11, and so into the pipes *m* and up into the sight-feeds, passing either partly through the lateral opening 18 and by-pass 19, as in Fig. 5, or entirely by the by-pass 19, as in Fig. 6, or, if the valve *r* is so set, the entire amount of oil will pass by the openings 18 and 17 in the sight-feed, and so by the pipe 13 to the ports 12 to be drawn into the opposite end of the pistons and be retained there with the return movement of the reciprocating frame of cylinders and pistons which will take place with the further movement of the slotted crank-shaft *e* on the opposite side of the position shown in Fig. 3, returning said parts to the position shown in full lines, Fig. 3, after which the further movement of said slotted crank-shaft to its position shown in Fig. 3 will swing the rock-shaft *h* and move the pistons into the position shown in full lines, Fig. 2, in which the oil drawn from the sight-feed devices will be forced through the pipes 15 to the parts of the machinery to be lubricated. It is apparent that in this operation if the valve *r* is in the position Fig. 6 all of the oil raised through the pipe *m* will go by the by-pass and the pipe *n* and be returned to the receptacle, and it is also obvious, referring to Fig. 5, that a part of the oil will go by the by-pass 18 and pipe *n* and return to the receptacle, while the other part will go by the openings 18 17 through the sight-feed into the pipe 13 to be forced for lubricating the machinery, and it will be also apparent that if the lateral opening 18 is in line with the pipe *n* the entire quantity of oil raised will pass by the openings 18 and 17 through the sight-feed and into the pipe 13 to be forced to the machinery for lubricating.

I have shown in Fig. 3 the peripheries of the nut l^2 and cap *o* as knurled, so that the same may be grasped and turned by the fingers in case it is essential to separate the oil-feed devices and cover from the oil-receptacle and other parts, in which movement the thimbles *l'* and *l*, being firmly connected by the pipes *m* and *n*, come away with said pipes and the pipe 13, leaving the annulus *k* alone secured to the cover, and they may be replaced in the reverse manner. The movements herein described are continuously repeated so long as the machinery to be lubricated is running, driving the belt or chain 5, and it is also obvious that the speed at which these parts are operated will be controlled by the size of the wheel or sprocket *c'*.

I have shown in Fig. 2 part of a handle *s*, fitting on the upper end of the shaft *d* above the cover *b*, the object of this handle being to manually operate the shaft *d*, so as to manip-

ulate the working parts of the lubricator and cause a preliminary feed of the oil to the parts of the machinery to be lubricated before starting up the machinery, if desired. This is readily accomplished, because the worm d' is free on the shaft d, and when the shaft d is independently turned the ratchet d^2 runs free of its engaging pawl. This handle s is to be removed when not in use.

I claim as my invention—

1. In a lubricating device, the combination with a series of pistons, of a movable frame and cylinders holding the pistons, means for reciprocating the pistons, a common means for intermittently actuating the latter means and reciprocating the slidable frame, slideways for said frame having inlet and exit ports in series at each side, each series agreeing in number with the number of the pistons and communicating with the ends of the piston-cylinders.

2. In a lubricating device, the combination with a series of reciprocating devices for feeding oil, of a revoluble shaft, a shaft at right angles thereto, means connected with the latter shaft for actuating the reciprocating devices, devices extending between the shafts whereby the movement of the former is communicated to the latter, yet leaving the latter independent to be manually rotated to effect a preliminary feed.

3. In a lubricating device, the combination with a receptacle holding a supply of lubricating material, of single, double-acting pump devices located within the receptacle and immersed in the lubricating material, and means extending to the outside of the receptacle for connection with devices actuated by the machine to be lubricated and sight-feed devices through which the lubricating material is forced by the pump devices immersed within the receptacle, and pipes leading from the receptacle to the parts of the machinery to be lubricated.

4. In a lubricating device, the combination with a receptacle for holding lubricating material and a series of sight-feed devices, of a series of single, double-acting pump devices agreeing in number with the sight-feed devices located within the receptacle and immersed in the lubricating material, and a series of pipes from the receptacle also agreeing in number with the aforesaid parts for conveying away the lubricating material to the machinery to be lubricated, and means for actuating the series of pump devices within the receptacle whereby the lubricating material is forced through the sight-feed devices and then to the pipes for conveying the same away.

5. In a lubricating device, the combination with a receptacle for the lubricating material, of a slidable frame and cylinders and a series of pistons in the cylinders immersed in the lubricating material within the receptacle, means for imparting reciprocating movement to the said pistons and also reciprocating movement at right angles thereto to the said frame, cylinders and pistons, and devices coacting therewith for discharging lubricating material from the receptacle to the places to be lubricated.

6. In a lubricating device, the combination with a receptacle for lubricating material, and suitable sight-feed devices, of a revoluble shaft, a series of pistons, devices intermediate of said parts whereby the movement of the former is communicated to the latter to both reciprocate the series of pistons and move the same and their support, devices associated at opposite sides of the line of reciprocation having ports whereby on one side and in one position of their movement the pistons draw in the lubricating material from the receptacle, and in their other position force the same by suitable pipes through the oil-feed devices, and on their other side with the latter movement simultaneously draw oil from the sight-feed devices, and in their other and initial position force the oil to the parts of the machinery to be lubricated.

7. In a lubricating device, the combination with a receptacle for lubricating material, of a vertical revoluble shaft in bearings therein, a slotted crank-arm at the lower end of said vertical shaft, a slidable frame and cylinders, a series of pistons in said cylinders, a rock-shaft mounted on said slidable frame and means connecting the same with the pistons, a pin on the said rock-shaft engaging the slot of the crank-arm a slideway for said slidable frame, means for imparting movement to the said vertical shaft and slotted crank-arm for actuating the pistons and reciprocating the same with the aforesaid frame and cylinders, and means for freeing said vertical shaft from the latter means so that it may be manually rotated.

8. In a lubricating device, the combination with a receptacle for holding lubricating material, of a frame secured within said receptacle adjacent to the bottom thereof so as to be immersed in the oil, and which frame comprises side members each having two series of ports, the ports of each series being alike and said frame forming a slideway, a frame of cylinders slidable in the aforesaid frame also immersed in the lubricating material, a series of pistons in said cylinders agreeing in number with the number of the ports of each series, means for actuating the pistons and for reciprocating the frame of cylinders and the pistons, whereby in one position of the parts oil is drawn into the piston-cylinders at one side and simultaneously forced from the other side to the parts of the machinery to be lubricated, and in the other position with the movement of the pistons the oil drawn in is forced out and oil is drawn in at the other side, and with the return movement the lat-

ter oil drawn in is forced to the parts of the machine to be lubricated.

9. In a lubricating device, the combination with a receptacle for holding lubricating material, of a frame secured within said receptacle and to the bottom thereof so as to be immersed in the oil, and which frame comprises side members each having two series of ports, the ports of each series being alike, and said frame forming a slideway, the frame of cylinders slidable in the aforesaid frame also immersed in the lubricating material, a series of pistons in said cylinders agreeing in number with the number of the ports of each series, a slotted rock-shaft, pins connected to the pistons and engaging the slot of the rock-shaft, a slotted crank-arm, a pin of the rock-shaft engaging the slot of the said crank-arm, and a shaft for revolving the crank-arm and actuating the pistons in opposite directions at parts of its movements, and reciprocating the frame and pistons at other parts of its movement.

10. In a lubricating device, a slidable frame comprising sides, ends and intermediate cylinders extending across between the sides, pistons in said cylinders, pins fast on said pistons and projecting through central longitudinal slots in said cylinders, a slideway for said frame, and means for actuating the pistons and reciprocating the frame and cylinders with the pistons.

11. In a lubricating device, the combination with a receptacle for lubricating-oil, of a frame secured within and to the bottom of said receptacle immersed in the oil and composed of the side members *f*, *f*, the one having a series of inlet-ports 9 and an intermediate series of discharge-ports 10, and the other side member having a series of intake-ports 12 and discharge-ports 14, a series of sight-feed devices, pipes from the intermediate ports 10 of one sight member to and into the sight-feed devices, pipes 13 from said sight-feed devices to the ports 12 of the other side member of the frame, pipes 15 from the discharge-ports of the latter side member for conveying the oil to the parts of the machinery to be lubricated and reciprocating devices for moving the oil in the directions indicated.

12. In a lubricating device, the combination with a receptacle holding a supply of lubricating material, of single, double-acting pump devices located within the receptacle and immersed in the lubricating material, and means extending to the outside of the receptacle for connection with devices actuated by the machine to be lubricated and adjustable sight-feed devices through which the lubricating material is forced by the pump devices immersed within the receptacle, and pipes leading from the receptacle to the parts of the machinery to be lubricated.

13. In a lubricating device, the combination with a receptacle for holding lubricating material and a series of adjustable sight-feed devices, of a series of single pistons forming double-acting pump devices agreeing in number with the sight-feed devices located within the receptacle and immersed in the lubricating material, and a series of pipes from the receptacle also agreeing in number with the aforesaid parts for conveying away the lubricating material to the machinery to be lubricated, and means for actuating the series of pump devices within the receptacle whereby the lubricating material is forced through the sight-feed devices and then to the pipes for conveying the same away.

14. In a liquid-forcing device, a movable frame, pistons carried thereby, means adapting the same to draw in the charge at one port and discharge at another port, devices associated with the pistons, and means engaging the same for reciprocating the pistons, and means engaging the latter means for moving said frame.

Signed by me this 22d day of May, 1905.

JOHANNES TH. PEDERSEN.

Witnesses:

GEO. T. PINCKNEY,

S. T. HAVILAND