2 Sheets--Sheet 1.

F. I. PALMER.

Lubricators.

No. 157,025. Patented Nov. 17, 1874.

FIG 1

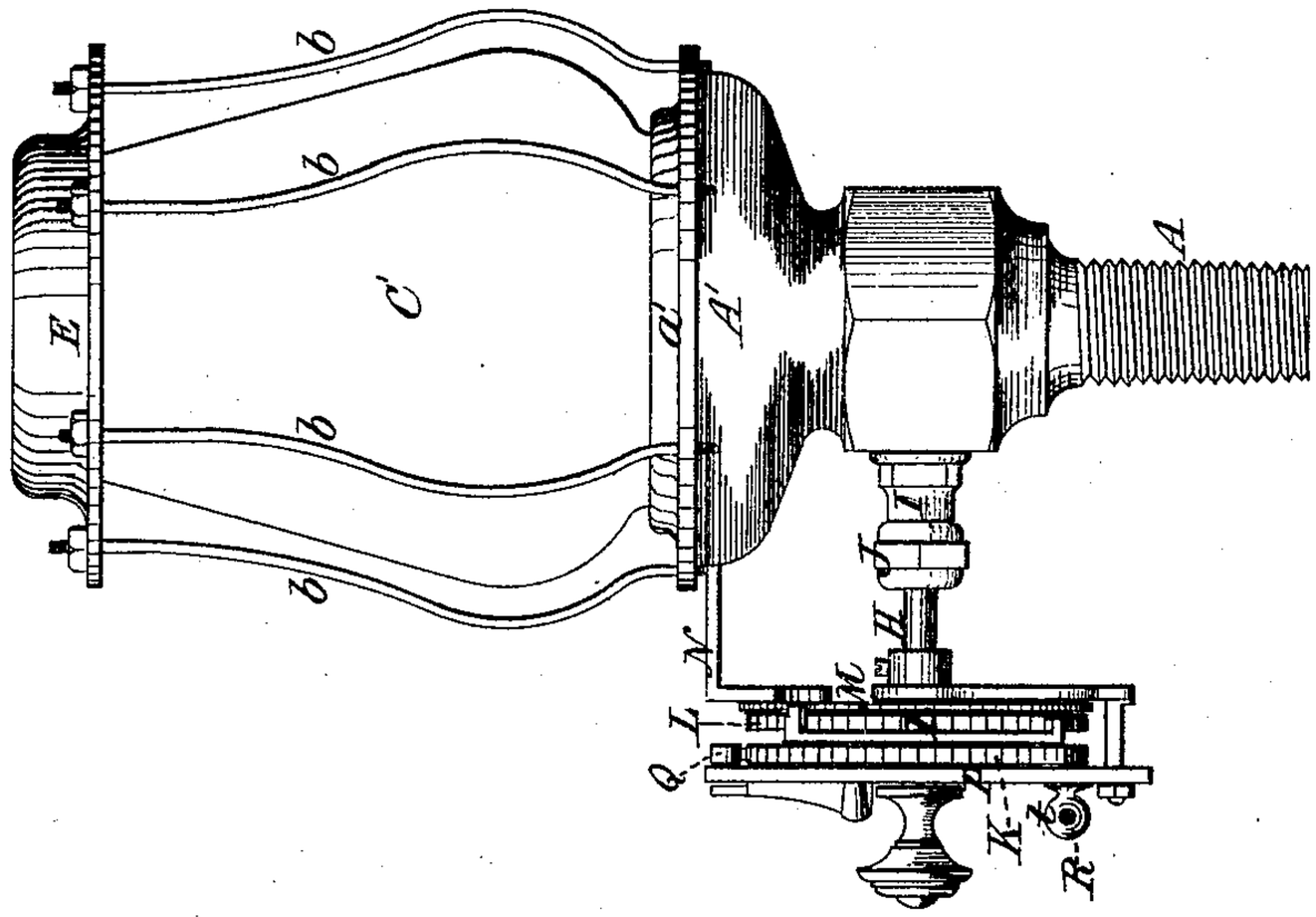
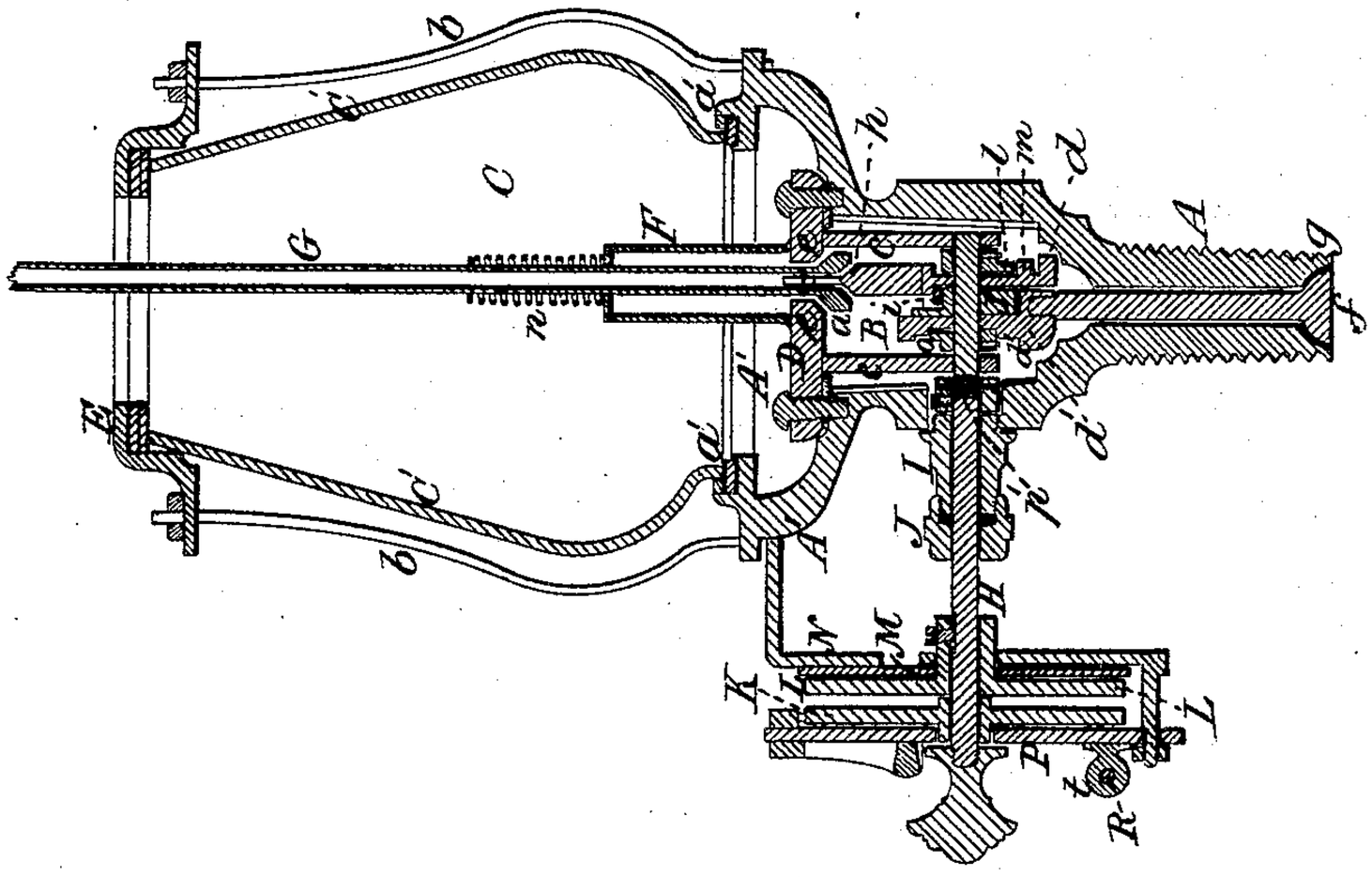


FIG 11



WITNESSES

John E. Laing

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Frederick Ingersoll Palmer

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his Attys

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

2 Sheets--Sheet 2.

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FIG VI

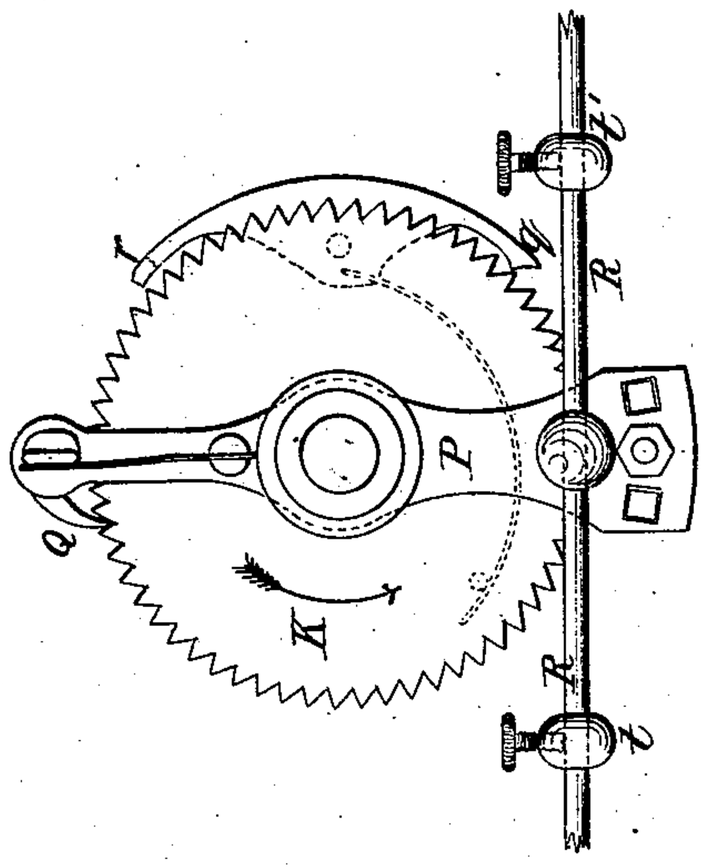


FIG VII

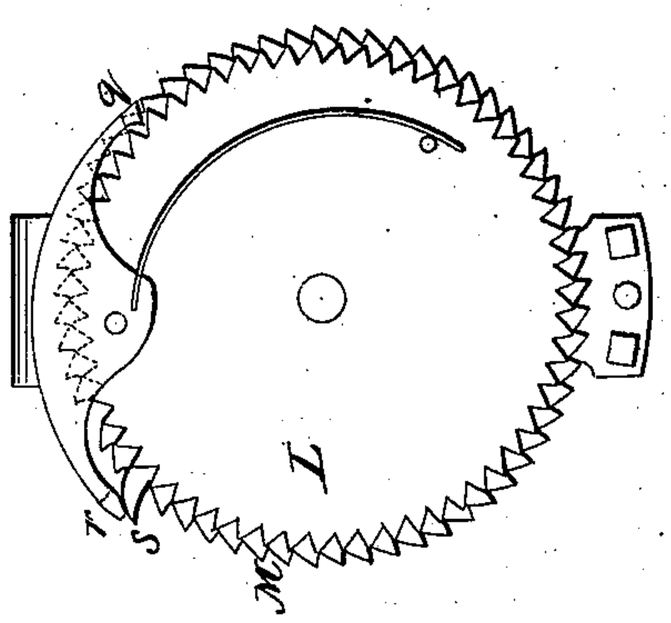


FIG IV

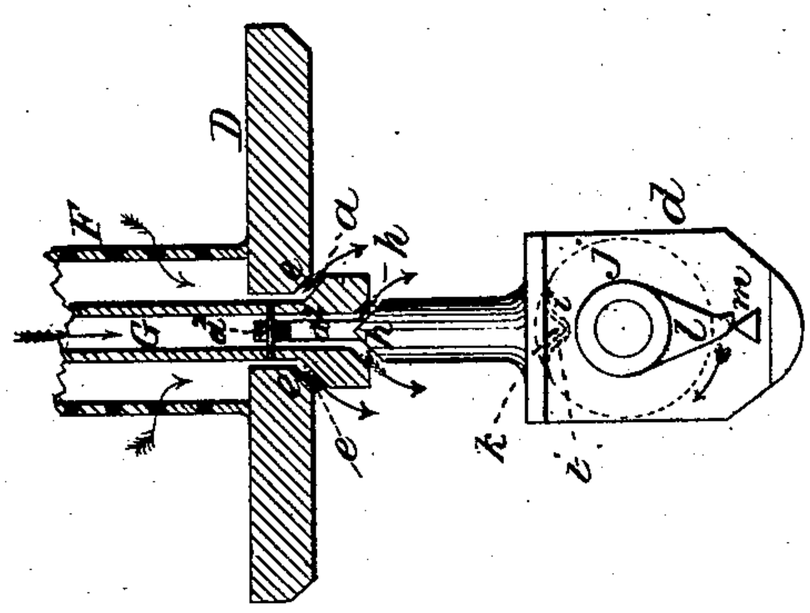


FIG V

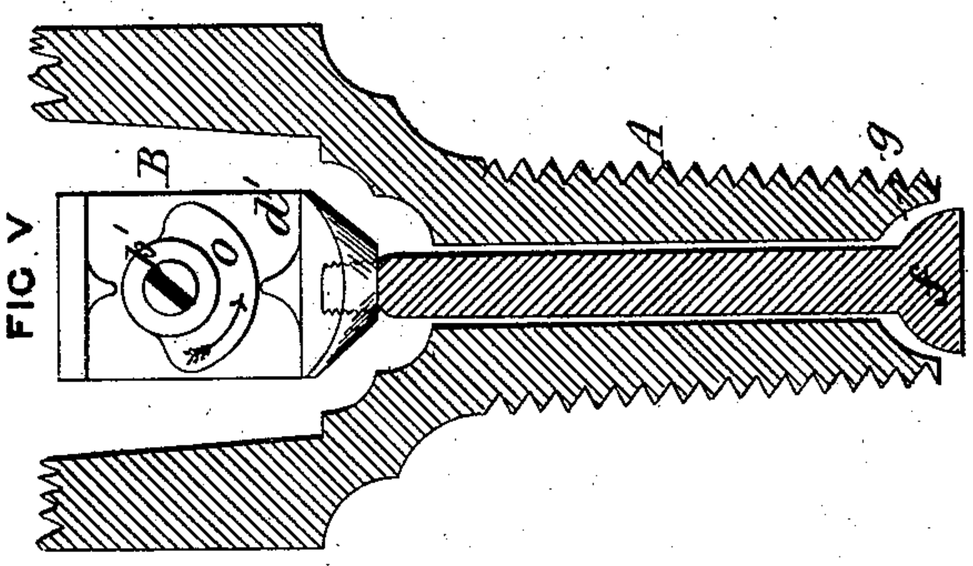
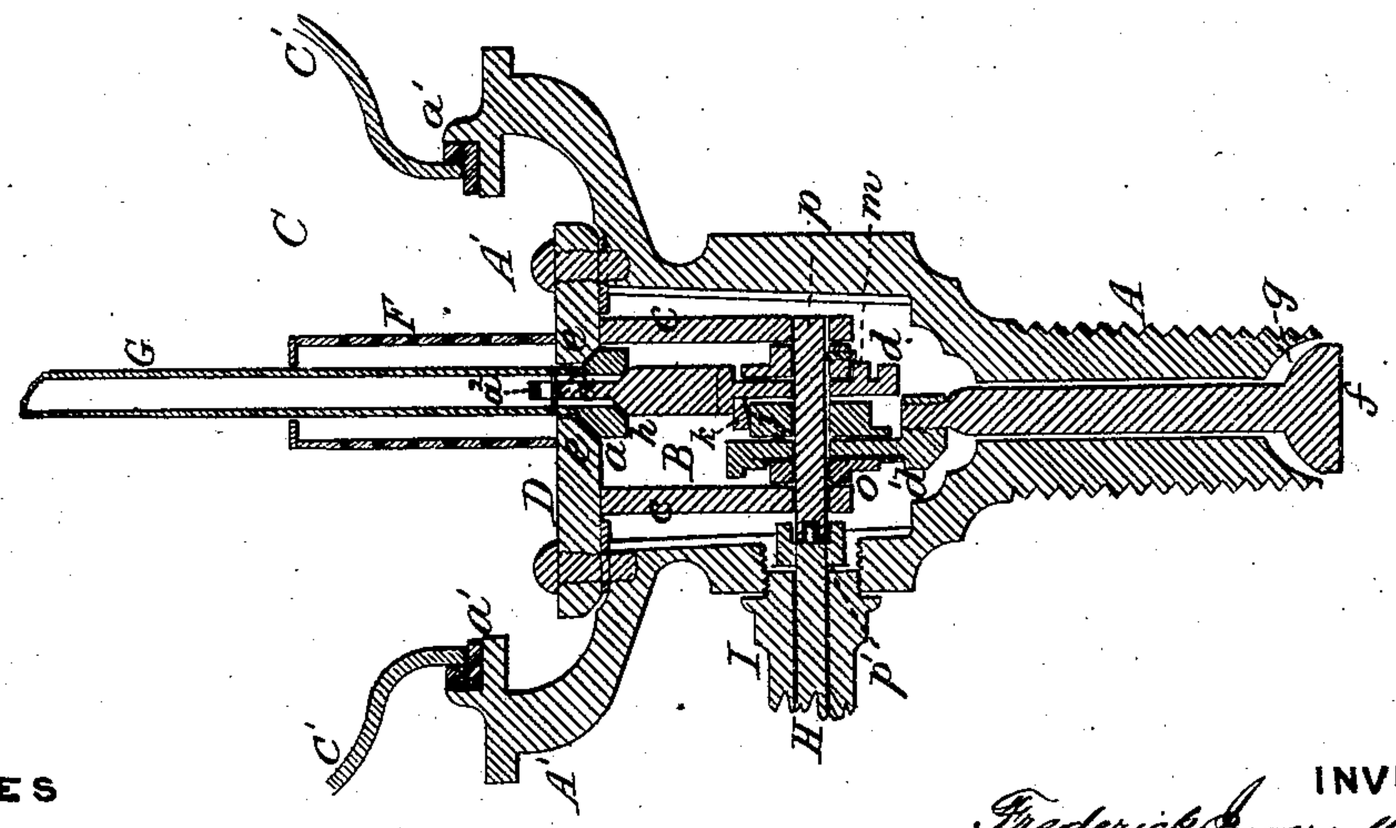


FIG III



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UNITED STATES PATENT OFFICE.

FREDERICK I. PALMER, OF YOUNGSTOWN, OHIO, ASSIGNOR OF ONE-THIRD HIS RIGHT TO THOMAS PEAT AND SAMUEL FRY, OF SAME PLACE.

IMPROVEMENT IN LUBRICATORS.

Specification forming part of Letters Patent No. **157,025**, dated November 17, 1874; application filed September 24, 1874.

To all whom it may concern:

Be it known that I, FREDERICK I. PALMER, of Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Lubricators; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification:

This invention relates to automatic lubricators for supplying regulated quantities of oil or grease to the steam chests and cylinders of steam-engines for lubricating the valve-seats, cylinders, and piston-packing.

The features of the invention which form the subject-matter of this patent consist, first, in the combination, in a steam-lubricator, of a lower chamber with top basin or supply-reservoir, and inlet and outlet valves, connected with and operated by a cam-shaft arranged within the lower chamber, wherein the exhaust-steam valve is located upon the inlet-valve and connected thereto, so that one opens the other, and both are opened and closed before the opening of the outlet-valve, whereby the exhaust steam and the oil are received within and discharged from the lower chamber by the joint action of the cam-shaft and the valves; second, in the combination of the supply-reservoir with the strainer, into and through which the exhaust-steam pipe passes to give out its heat to the tallow and keep the strainer from clogging by the heat of the steam imparted to the exhaust pipe; third, a holding-plate for the valve-operating devices and the supply-reservoir, seated and secured upon the basin of the lower chamber, whereby they may be removed and replaced with the valve-operating cam-shaft; fourth, in the employment of a sectional operating-shaft for the cam and ratchet-wheel devices, with the junction of the inner and outer sections of said shaft within the lower chamber, whereby the cam-shaft is separately united with the ratchet-wheel shaft, and made removable, and in the combination of ratchet-wheels with pawls, a fixed disk, and a projection thereon for operating the cam-shaft, in conjunction with means for connecting said ratchet devices with the valve-rod of the steam-chest, and adjusting such connection to regulate thereby the supply of the oil to the engine as often as may be desired.

In the accompanying drawings, Figure 1 represents a side elevation of a steam-lubricator embracing my invention; Fig. 2, a vertical section, showing the valves of the exhaust-steam pipe and of the supply-pipe, open to admit both steam and oil into the lower chamber; Fig. 3, a similar section, showing the lower valve open to allow the oil to pass into the steam-chest; Fig. 4, a view of the cams which operate the valves of the exhaust-steam pipe, and the valve of the latter which lets the oil into the lower chamber; Fig. 5, a view of the cam which operates the valve to discharge the oil from the lower chamber; Fig. 6, a view showing the devices for connecting the operating-valves of the lubricator with the valve-rod of the steam-chest, if attached to it; and Fig. 7, a view of the ratchet-wheel, in connection with the double spring-pawl for turning the valve-shaft.

The lubricator is designed for application to either stationary or locomotive engines, and is provided with a screw-stem, A, which is screwed into a hole tapped in the cover of the steam-chest. A small chamber, B, and a basin, A′, surmounts the screw-stem, and a reservoir, C, is directly above and within the basin A′, and communicates with the chamber B below by a valve, *a*, located within the latter. The reservoir C is to hold a supply of oil or tallow sufficient for several days, and the lower chamber B is to receive it in charges with the exhaust steam, and discharge it therefrom. In the example shown the lower chamber B is formed within a casting whose upper portion is considerably enlarged to form the basin A′ and seat for the supply-reservoir C, and a seat for a plate, D, bolted to the basin, and from which the valve-yokes and their cams are suspended within the lower chamber B, which thereby not only forms a receptacle for the oil or tallow in charges, but an inclosed receptacle for the devices which operate the inlet and outlet valves thereof. This form of construction, moreover, is convenient and de-

sirable for the use of a separate and removable supply-reservoir to afford means for cleaning it out by removing it from an elevated flange-seat, a', on the enlarged basin A′, upon which it is held and clamped when in place by wire guards b, similar to a lantern, and a cap-plate, E, through which the guards pass and are secured by screw-nuts.

For the convenience in observing when the supply is low, I make this supply-reservoir of a glass case, C′, like a lantern-globe, and seat and clamp it between rubber packing. It is of great advantage in showing, at all times, the quantity of the oil or tallow in the reservoir, and exposing the sediment in the basin and round a strainer, F, to show when it should be cleaned. These advantages could not be obtained by a metal casing. The strainer-tube F rises from the valve-plate D, and while affording communication for the oil into the lower chamber B, is also the means for sustaining the inlet-valve and the pipe G, through which the exhaust steam enters the lower chamber, and by this means obtain the full benefit from the heat of the exhaust steam to melt tallow in the supply-reservoir. The latter, therefore, is made the medium of conducting the exhaust steam through a pipe located within the body of the oil or tallow and the strainer, so as to give out its heat thereto and keep the strainer-perforations open.

The valve devices consist of a short cam-shaft carried by two arms, c c, depending from the plate D, within the lower chamber, and yokes d d', arranged upon the cam-shaft, to receive the action of the cams, in a manner to be hereinafter described. The inlet-valve a, for the oil, is formed upon the lower end of the exhaust-steam pipe G, and its seat e is in the under side of the plate D, or top of the chamber B; while the outlet-valve, f, is carried by the yoke d', and has its seat g in the lower end of the screw-stem. The exhaust-steam pipe G, while serving as the valve a, to let the oil in the lower chamber B, serves, also, as a seat for a valve, h, operated by the yoke d, to cut off the inlet of the exhaust steam, so that these two valves are within each other and connected, so that one opens the other. These valves are opened in successive order as the cam-shaft is turned, the one, h, to admit the exhaust steam into the lower chamber by means of a depression, i, Fig. 4, in a cam, j, into which a projection, k, on the yoke d falls, and thus this exhaust-valve h opens by the pressure of the exhaust steam in the pipe G, and is held open until the cam l on the shaft p strikes a projection, m, Fig. 4, on the yoke d, and draws the latter down still farther, and as the exhaust-valve stem is connected by a stem, a^2, with the exhaust-steam pipe G, the latter is, therefore, also drawn down by this cam l, and thus opens the supply-valve a, to let into the lower chamber a charge of oil or grease. This opening of the supply-valve a is only for a moment, and it is closed by the force of a spiral spring, n, Fig. 2, which surrounds the pipe G, and, resting upon the top of the strainer F, is compressed by a pin, so as to constantly exert an upward force to keep the supply-valve a closed, except when opened by its cam. The closing of the supply-valve a is instantly followed by that of the exhaust-steam valve h, which is effected by the cam j, and it is held closed by the concentric portion thereof (shown by dotted lines in Fig. 4) upon which the yoke-projection k rests as the shaft turns. Thus these two valves a and h are opened and closed while the outlet-valve f remains closed; but at the moment of their closing the outlet-valve f opens, to let out the charge of oil into the steam-chest. The opening and closing of this valve is effected by a cam, o, upon the shaft, and the intervals of the movement of this valve are about equally divided.

The valves are arranged in a manner to cause the pressure of the steam to tend to close, and not to open them; and the cam-shaft by which they are operated is connected by an interlocking-joint, p', to an outside ratchet-shaft, H, which enters the side of the lower chamber through a screw-nut, I, and stuffing-box J. By means of this connecting-shaft H, the valves are operated by the motions of the engine by connections outside of the steam-chest and the valve-chamber, in such manner as to govern the number of charges of oil or tallow the engine may receive by any given number of revolutions of the engine, in a manner which I will now describe. The devices for effecting this consist of a ratchet-wheel, K, turning loosely upon the outer end of the ratchet connecting-shaft H, and a second ratchet-wheel, L, fixed upon and turning with said shaft against a disk, M, depending from an arm, N, from the basin A′ of the supply-reservoir. A pawl-frame, P, swings upon bearings on the ratchet-shaft, and carries a pawl, Q, at its upper end, while a wire rod, R, connects the lower end of the pawl-frame with the valve-rod of the engine. The loose ratchet-wheel K also carries a double-armed spring-pawl, one branch, q, of which is arranged to take into the ratchet L, fixed on the shaft, and the other branch, r, receives the action of a fixed projection, s, in the circumference of the disk M, so as to elevate it when passing thereover, and thereby correspondingly depress the other end, q, into the teeth of the ratchet L, as in Fig. 7, and thus turn the latter one tooth for each revolution of the loose ratchet-wheel; and when the latter has turned several hundred revolutions it turns the wheel L and cam-shaft one, and the engine receives oil or grease, and if it is desired to oil the engine every two thousand or two thousand five hundred vibrations it can be done by increasing or diminishing the stroke of the wire connecting-rod R, by means of two stops, t and t', placed on either side of the point which connects the rod to the pawl-frame, and making them adjustable to regulate the number of teeth the pawl Q shall pass over in its

teeth in the backward movement to turn the ratchet-wheel K, by the forward movement of said pawl. In this way the supply of the oil is regulated in accordance with any required number of revolutions of the engine.

The device is applied to each steam-chest, and the exhaust-steam pipe is connected with the latter in any suitable way. Instead of having the bottom plate D of the reservoir removable, the screw-stem A may be separate, and provided with a screw-thread at its upper end for screwing into the bottom of the valve-chamber B.

I do not wish to confine myself to the devices, as shown, of the pawls and ratchet-wheels, as I may use a worm-connection or other mechanical device for increasing or decreasing the opening and closing movements of the feed-valves.

I claim—

1. The combination, in a steam-lubricator, of the lower chamber B, the basin-supply reservoir C, and the inlet and outlet valve *a f*, connected with and operated by a cam-shaft located within the lower chamber, substantially as and for the purpose set forth.

2. The combination of the inlet and outlet valves *a f* for the oil, and the exhaust-steam valve *h*, with their respective cams, for operating them within the lower chamber, whereby the inlet and exhaust-steam valves are both opened and closed before the opening of the outlet-valve.

3. The inlet and exhaust-steam valves *a h*, seated one upon the other, and connected by a slotted stem, substantially as and for the purpose specified.

4. The combination of the supply-reservoir C, strainer F, and the exhaust-steam pipe G, arranged to pass into and through both the reservoir and the strainer, as and for the purpose described.

5. The supporting-plate D of the valve-operating devices, in combination with the supply-reservoir C, seated and secured upon the basin A′, as described, whereby they may be removed and replaced with the valve-operating cam-shaft, as described.

6. The sectional operating-shaft of the cam devices, interlocked within the lower chamber, whereby the cam-shaft is separately united with the ratchet-wheel shaft.

7. The combination of the fixed and loose ratchet wheels L K, with the pawls Q *q r*, fixed disk M, and its circumferential projection *s*, for operating the cam-shaft, as described.

8. The combination of the fixed and loose ratchet-wheels L K, their operating-pawls, and pawl-frame P, with the connecting-rod R, and its adjustable stops *t t′*, whereby the supply of the oil is regulated in accordance with any required number of revolutions of the engine.

In testimony that I claim the foregoing I have affixed my signature in presence of two witnesses.

FREDERICK I. PALMER.

Witnesses:

JAMES F. WILSON,
C. D. HINE.