(No Model.) 2 Sheets—Sheet 1.

J. POWELL.

LUBRICATOR.

No. 348,170. Patented Aug. 24, 1886.

Fig. 1.

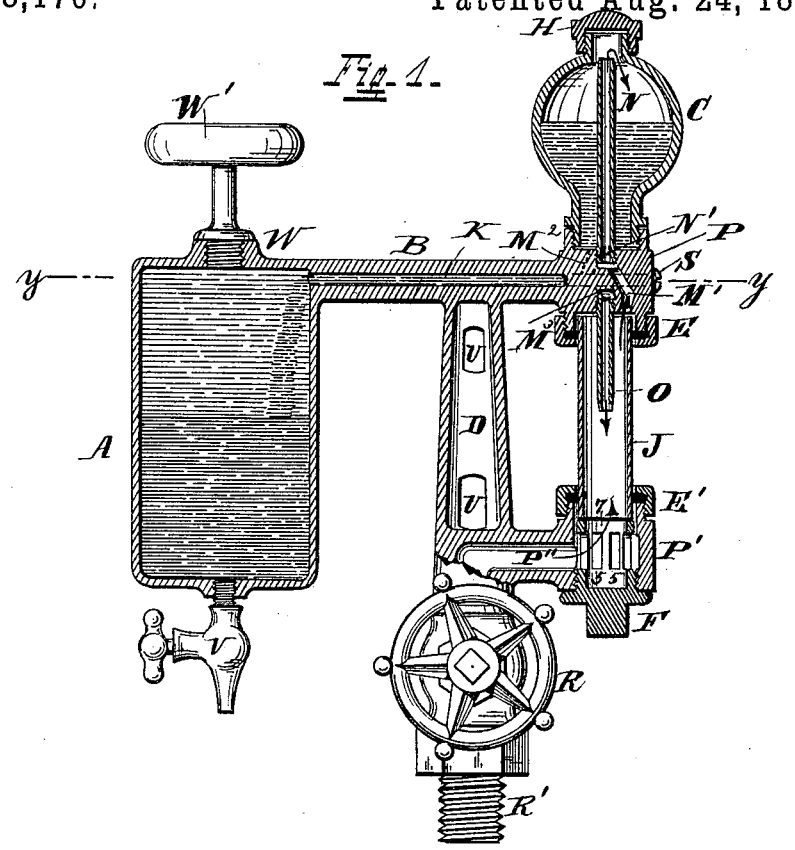
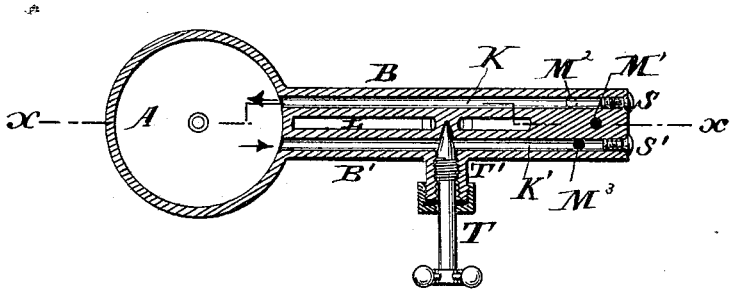


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

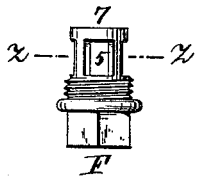
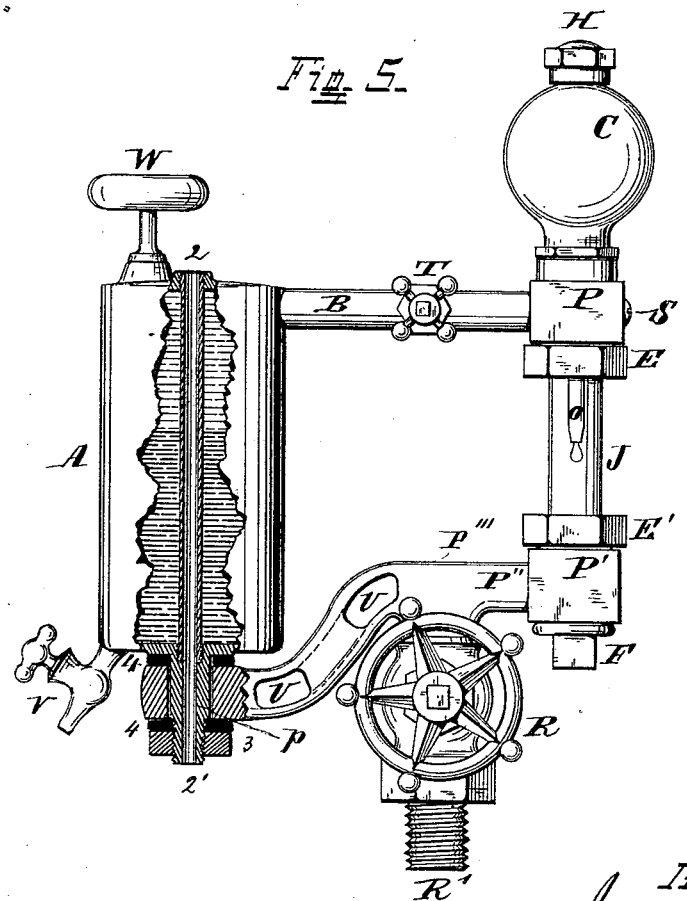


Fig. 4.

Fig. 5.



Attest.
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E. Louis

Inventor:
James Powell
by Gifford & Howard, Attys.

UNITED STATES PATENT OFFICE.

JAMES POWELL, OF CINCINNATI, OHIO.

LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 348,170, dated August 24, 1886.

Application filed October 24, 1885. Serial No. 180,804. (No model.)

To all whom it may concern:

Be it known that I, JAMES POWELL, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Lubricators, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My improvements relate to that class of lubricators known as the "sight" or "visible" feed, in which the oil, being displaced by the superior gravity of the water of condensation, is caused to pass from the reservoir, drop by drop, down through a transparent glass chamber, charged with steam, to the part to be lubricated. In all lubricators heretofore constructed of this class it has been usual to so connect them to the steam pipe or engine as to have the oil-reservoir more or less directly under the influence of the heat of the steam, so that the oil or other lubricant contained within the reservoir becomes heated to a temperature much greater than that required to liquefy the same. This undue heat or temperature to which the oil is raised I have discovered has a very injurious and wasteful effect upon it, and is the cause of the inefficiency and irregular action of the lubricators as made and used before my discovery. This inefficiency is manifested in various ways. At first, when the reservoir is full of oil or tallow, the feeding through the drop-tube is fairly regular and tolerably constant for a short time. Then it becomes irregular and intermittent or ceases altogether. This will continue for a time, and then the lubricator will suddenly begin to operate again, to be soon followed by another interval of irregular working until the oil is all exhausted; or the oil will suddenly disappear, and upon examination of the oil-chamber it will be found to be more or less empty. I have discovered that the cause of this capricious action is as follows: As long as the temperature of the oil is comparatively low, the feed is regular and steady; but as soon as the temperature is raised to 175° or 200° Fahrenheit, or more, the oil is ready to part with its volatile portion as soon as the pressure is reduced. These volatile portions are known as the "light hydrocarbons," and are of various degrees of specific gravity, requiring a greater or less degree of heat to vaporize them. As long as the steam-pressure is constant, the action of the drop-feed is tolerably regular; but should the steam-pressure from any cause be reduced some of the light hydrocarbons are at once liberated, and the oil in the reservoir becomes violently agitated, foams up, and pours out of the drop-tube in a wasteful manner, and if the steam-pressure is still more reduced, or should the same be entirely cut off, as in case of stoppage of the engine, the oil is not only wasted at the drop-tube, but the ebullition of the oil in the reservoir is so violent as to cause it to overflow down the condensing-tube that supplies steam to the lubricator. This action when the steam is shut off is the more violent, because of the effect of a partial vacuum in the steam chest or pipe, which reduces the atmospheric pressure, and thus the oil is caused to boil more violently than it would do at the normal atmospheric pressure at the same temperature. Moreover, this evaporative influence is not confined to the oil, but the water of condensation, that is always present in the lower portion of the reservoir, being raised to a temperature much higher than that required to vaporize it at the atmospheric pressure is, when suddenly relieved of pressure, at once caused to vaporize with explosive violence, and thus aid in the disturbance of the oil and consequent waste of the latter through the various ducts of the lubricator. This action, though only momentary, is nevertheless quite sufficient to prevent the lubricator from acting again for some time, for the reservoir being more or less empty, the discharge of oil through the drip tube cannot again take place until water of condensation has accumulated in the reservoir sufficiently to raise the oil to the proper level. Furthermore, it is not necessary to entirely shut off the steam to cripple the action of the lubricator. The pulsation of the steam, caused by the action of the slide-valves of the engine, will alone cause the oil to "spurt" or "jerk" irregularly, sometimes supplying too much, at other times not enough, oil to the part to be lubricated.

In all lubricators of the class known as "sight-feed" the steam is admitted either directly through the oil-chamber from bottom to top by what is known and designated as

the "condensing-tube," or else, the condensing-chamber being on the top of the oil-reservoir or in close proximity thereto, the steam is admitted in the side of the same. In either case the steam, being in more or less close and direct contact with the mass of metal composing the lubricator, heats up the same, with its contents, to such a degree as to cause the unequal action before alluded to, this being in a great measure due to the shortness of the arms, brackets, or supports that contain the supply and discharge ducts, which connect the lubricators to the steam-pipe.

My improved lubricator is constructed with a view to entirely remedy the defects just mentioned. To do this I keep down the temperature of the reservoir or oil-chamber to the lowest degree necessary to maintain the fluidity of the oil or tallow contained therein—say 150°. I accomplish this in two ways. One is to completely exclude the live steam from the inside of the said reservoir, and the other is to interpose a sufficient distance between the reservoir and the extreme end of its supporting arm or connections with their operating ducts or parts, so that the resident heat due to the presence and passage of steam in said ducts or parts shall be largely dissipated or radiated before it reaches the said reservoir or its contents. I also, if necessary, interpose a washer or packing of low conductivity between the connections and the reservoir. Furthermore, to still more insure this moderate temperature I employ a system of ventilation, as will be more fully hereinafter described. By these means I maintain the temperature of the reservoir and its contents to a degree below that required to volatilize the light hydrocarbons of the oil or to vaporize the condensed water contained in the reservoir.

In the drawings annexed and forming a part of this specification the same letters and numbers refer to like parts in all the figures.

Figure 1 is a vertical section of my improved lubricator on the line *x x* of Fig. 2. Fig. 2 is a horizontal section taken on the line *y y* of Fig. 1. Fig. 3 is a front elevation of the supporting-stud F, showing the openings or ports for the passage of oil and steam. Fig. 4 is a horizontal section of the stud on the line *z z*. Fig. 5 shows a modification hereinafter described.

Referring more particularly to Figs. 1 and 2, A is the oil-reservoir, attached to a compound arm consisting of two branches, B B′, which arm constitutes not only the support of the reservoir A, but contains the duct for conveying the water of condensation from the condensing-chamber C to the reservoir, and also the duct which conveys the oil from said reservoir to the drip-tube O. The condensing-chamber C is screwed to the upper face of the head P, which head is at one end of the two branches B B′ and joins them together in one piece. The condensing-chamber is thus brought directly over the drip-tube O and glass sight-tube J with its connections. The oil-reservoir A is at the other end of the branches B B′, it, the branches and the head P being preferably cast in one piece.

The glass tube J not only acts as a sight-chamber whereby the drip of oil may be viewed, but is also the steam-duct from the steam-pipe to the condensing-chamber C, the latter with its charge of live steam being thus separated from the oil-reservoir a distance equal to the length of the compound arm, whereby the oil is effectually prevented from getting too hot. It will be seen that in the glass tube J and its connections are concentrated all the ducts and openings for the passage of steam, water, and oil, a variety of functions being thus performed by one simple construction, and that the parts being thus reduced to the fewest possible number the cost of manufacture is consequently greatly lessened.

N is the steam-pipe, connected at N′ with the steam-duct M′, bored through the head P. The duct M′ communicates with the interior of the sight-tube J and with the live steam.

H is a blow-off cap placed at the top of the condensing-chamber C.

M^2 is a duct for the water of condensation which accumulates in the chamber C and which passes through said duct to the horizontal duct K in the branch B (see Fig. 2) on its way to the bottom of the reservoir A. If preferred, a regulating-valve may be interposed between the condensing-chamber C and the discharge end of the duct K.

M^3 is the vertical duct, extending from the horizontal duct K′ in the branch B′ to the top of the drip-tube O, and which conveys the oil from the reservoir to the said drip-tube.

E E′ are packing-nuts that confine the glass tube in place.

F is a supporting-stud screwed in at the bottom of the lower arm, P′, to keep the sight-glass from slipping down and to admit of the removal of the same in case of breakage.

D is a vertical column or post, preferably cast hollow, which constitutes a general support to the whole lubricator, and is united at its upper end to the compound arm, while its lower end contains the port through which the steam passes on its way to the condenser, which port is also that through which the oil passes from the lubricator to the engine. The said port is partitioned off from the rest of the column or post on a line with the upper side of said port.

It will be seen that by the use of the vertical column or post D the lubricator can, if preferred, be attached, by means of the screw-neck R′, directly to the steam-chest of an engine, while at the same time the oil-reservoir A is isolated from the injurious effects of heat.

The vertical column D is preferably cast with openings U U, to insure a free circulation of air through it to keep down the temperature; but I do not limit myself strictly to this mode of construction, for it is obvious that the said column, even if cast solid, when inter-

posed between the live-steam passage P″, or the upper steam-passage, M′, and the oil-reservoir A, performs not only the function of a general support to the whole lubricator, but also that of a disperser, by radiation, of a large portion of the resident heat due to the presence of live steam in the operating parts of lubricators.

5 5 5 are ports connecting with the central opening, 7, Fig. 3, to allow of a free passage of steam from the steam-pipe or engine to the lubricator. Said ports also act as ducts to carry the oil to the engine.

P″ is the combined steam and oil channel, leading from and to the steam engine or pipe.

R is the stop-valve, terminating in the screw-neck R′, which latter connects the lubricator to the engine or steam-pipe.

T is a valve on the branch B′, its purpose being to regulate the flow of oil from the chamber A to the sight-chamber J.

S S′ are screws closing the end openings of the ducts K K′, the screws being removable to allow the said ducts to be cleaned.

L is a ventilating-slot separating the two branches of the compound arm B B′, and which may communicate with the interior of the hollow post D.

W′ is a filling-plug screwed at the top of the reservoir A.

V is a vent-cock at the bottom of the reservoir A, to permit the removal of condense-water preparatory to re-filling the reservoir with oil.

It will be seen that the reservoir A, compound arm B B′, upper head, P, lower branch and head, P′, supporting-post D, and valve-socket T′, are all combined in one casting, thus producing a strong and compact structure, greatly reducing the cost of manufacture, and obviating all danger of leaky joints common to all lubricators made in the usual way.

Fig. 5 is a modification of my invention, in which, instead of the vertical central post, D, a horizontal extension or arm, P‴, is used, which is made to bend down under and support the reservoir A, the said arm P‴ being pierced with an opening which receives a shank or stud, *p*, on the bottom of the reservoir, the arm being secured in place (between vulcanite fiber 4 or other material of low conductivity) by the nut 3. 2 2′ represent a hollow tube secured at each end of and passing entirely through the reservoir A, and which, by affording ventilation, keeps down the temperature of the oil. The extension or arm P‴ is cored out in the same manner as the vertical post D, and also has side openings, U, to insure a free circulation of air.

In operation, the valves R and T being closed and the cap W′ removed, the reservoir A is filled with oil or other lubricant at the filling-hole W. The cap W′ is then screwed down tight. The lower valve, R, being then opened, the steam passes up through the channel P″ and ports 5 5 5 7, up the glass sight-tube J to the duct M′, thence up said duct to the small steam-pipe N, and through the latter to the chamber C, where it condenses, the accumulated resulting water descending the vertical duct M² to the horizontal duct K, and passing through the latter, discharges into the reservoir A, and, the water being heavier than the oil, sinks to the bottom. If, now, the regulating-valve T be opened, the oil will fall in drops from the nozzle O to the bottom of the stud F, whence it flows out through the channel P″, down the same on its way to the engine or steam-pipe. Thus it will be seen that the functions of my improved lubricator are carried on through the agency of one single passage—namely, the sight-tube J—and that the hot steam being removed from the oil-reservoir A a distance equal to the length of the compound arm, the deleterious effects of heat upon the oil are prevented. It is evident that no live steam can find its way to the reservoir A, for as soon as the steam reaches the chamber C it condenses and the resulting water fills up the ducts M² and K.

In lubricators employing a sight or index tube of glass it is usual to rely on the packing to keep the tube in place; but in practice the glass is liable to settle down and break loose from one of its sockets. In my improved lubricator I overcome this defect by extending the stud F into the head P′, so as to loosely support the glass, only sufficient space being allowed between the stud and head for expansion. The stud being provided with ports 5 5 and 7 free way is provided for the flow of oil and steam.

It will be seen that I dispense with all internal tubes in the reservoir A, as the ducts for water and oil open directly into its interior.

If preferred, the compound arm B B′ may be attached to the reservoir A by means of screws or bolts, with or without insulating washers; or the ducts K K′ may be placed one above the other in a vertical plane, in which case the ventilating-slot may be situated horizontally between them.

If desired, the reservoir A may be pierced horizontally, instead of vertically, by the ventilating or hollow tube 2 2′.

Having described my invention, I claim—

1. In a steam-engine lubricator, an oil-reservoir having inlet and outlet ducts located within and near the top thereof, combined with a condensing-chamber so placed as to discharge its water of condensation to the inlet-duct of the reservoir, the outlet-duct of said reservoir being adapted to discharge oil through a drip-tube attached to and placed under the same head that supports the said condensing-chamber, combined with an arm connecting the oil-reservoir and condensing-chamber, and a general support located between the said reservoir and condensing-chamber, substantially as set forth.

2. In a steam-engine lubricator, an oil-reservoir held in position by an arm remote from all the operating parts composing the lubri-

cator, combined with a standard or general support placed between said oil-reservoir and the other operating parts of the lubricator, substantially as set forth.

3. In a steam-engine lubricator, an oil-reservoir situated at one end of an arm, and a condensing-chamber placed at the opposite end of said arm, combined with a standard or general support formed with or attached to said arm, between the oil-reservoir and condensing-chamber, substantially as and for the purpose set forth.

4. In a steam-engine lubricator, an oil reservoir having inlet and outlet ducts located within and near the top thereof, a condensing-chamber so placed as to discharge its water of condensation to the inlet-duct of said reservoir, and an arm having formed within it ducts, and sustaining said oil-reservoir and condensing-chamber at opposite ends thereof, combined with a standard or general support formed with or attached to the arm, and located intermediately of the oil-reservoir and condensing chamber, substantially as set forth.

5. In a steam-engine lubricator, an oil-reservoir held in position by and combined with ventilated supporting devices, substantially as and for the purpose described.

6. In a steam-engine lubricator, an oil-reservoir, A, and condenser C, connected by an arm, said arm being supported by a standard having formed within its base the steam and oil channel P″, combined with the sight-glass J and its supports, and the upper head, P, having formed within it the duct M′, and supporting the pipe N, the sight-glass receiving steam at its lower end and delivering it through said duct M′ and pipe N to the condensing-chamber, substantially as and for the purpose set forth.

7. In a steam-engine lubricator, the oil-reservoir A and condenser C, connected by an arm having formed within it the ducts K K′, combined with a general support having within it the steam and oil channel P″, and also with the upper head, P, having the duct M′, pipe N, and drip-tube O, the sight-glass receiving steam at its lower end, and delivering it through said duct and pipe to the condensing-chamber, substantially as and for the purpose set forth.

8. In a steam-engine lubricator, the reservoir A, compound arm B B′, having the ducts K K′, said ducts terminating at one end near and within the top of said reservoir, and at the other end in the head P, combined with the condensing-chamber C, sight-glass J, drip-tube O, and lower branch or head, P′, and its support, having the channel P″ and valve R, substantially as described.

9. In a steam-engine lubricator, the reservoir A, placed at one end of an arm away from the influence of steam heat, and the compound arm B B′, having ducts for water and oil, and a ventilating-slot, L, between the members of said arms, combined with the head P, having steam, oil, and water ducts, the condensing-chamber C, sight-glass J, drip-tube O, lower head, P′, having the channel P″, the ventilating shaft or post D, and the valve R, substantially as described.

10. In a steam-engine lubricator, an oil-reservoir pierced as described, and combined with a ventilating-tube through which a free circulation of air may be maintained, substantially as and for the purpose described.

11. In a steam-engine lubricator, the described stud F, combined with the glass J and supporting it loosely, the said stud being pierced with ports 5 5 5 5 7 for the passage of steam and oil, and constituting a screw-cap, substantially as and for the purpose set forth.

12. As a new article of manufacture in a steam-engine lubricator, the reservoir A, compound arm B B′, upper head, P, lower head, P′, and support D, all cast in one piece, substantially as described.

13. In a steam-engine lubricator, the removable screws S S′, placed at the outer end of the oil and water ducts K K′, for the purpose of enabling the latter to be cleaned, substantially as described.

In testimony whereof I hereunto set my hand and seal.

JAMES POWELL. [L. S.]

Witnesses:

SAML. S. CARPENTER,

PAUL CARPENTER.