(No Model.)

# R. MASON & J. M. SMITH.

## LUBRICATOR.

No. 384,051. Patented June 5, 1888.

FIG. 1.

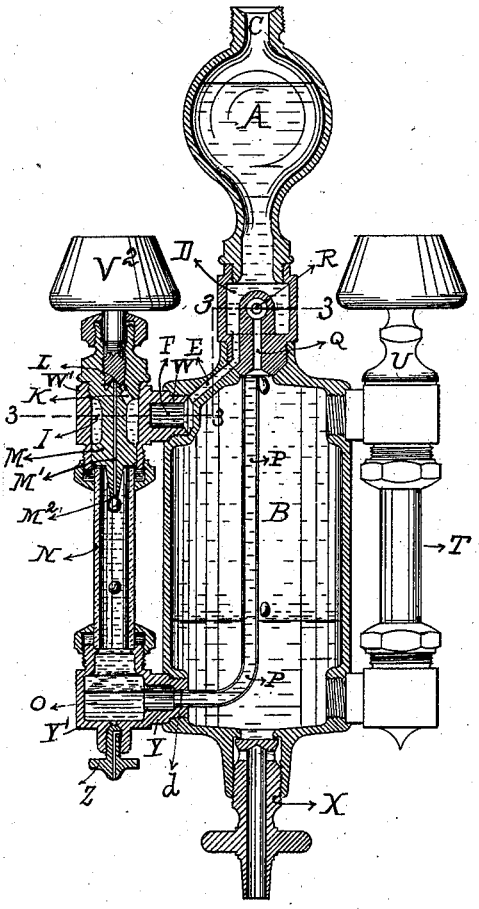



FIG 2.

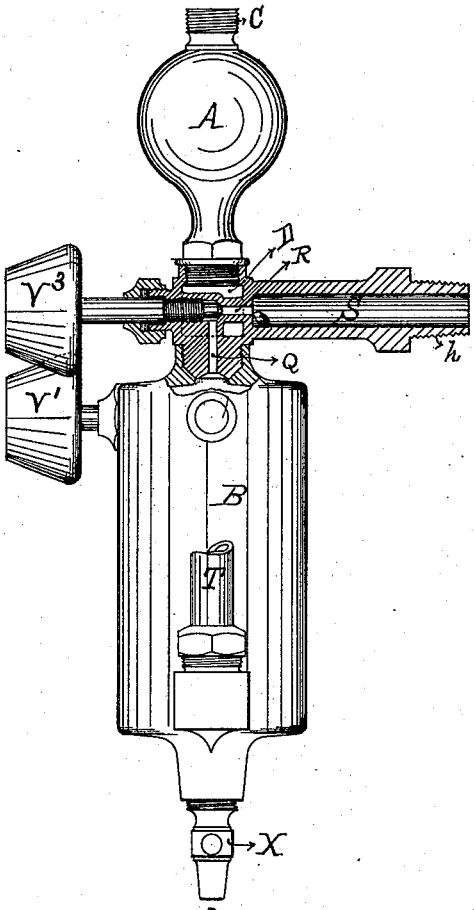



FIG. 4.

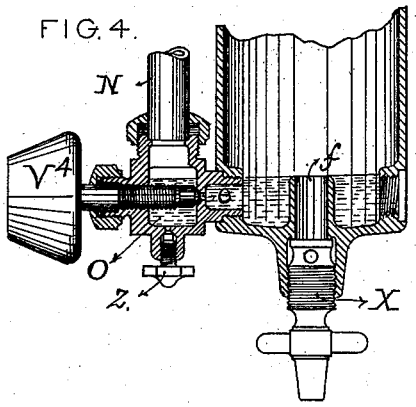
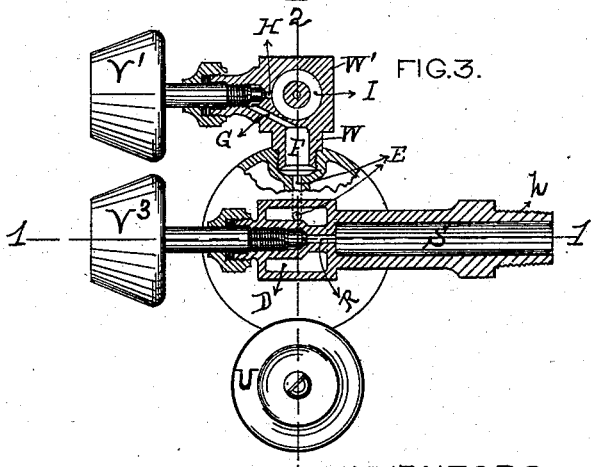



FIG. 3.

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# UNITED STATES PATENT OFFICE.

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## LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 384,051, dated June 5, 1888.

Application filed January 25, 1888. Serial No. 261,921. (No model.)

*To all whom it may concern:*

Be it known that we, RODNEY MASON and JESSE M. SMITH, of Detroit, in the county of Wayne and State of Michigan, have jointly invented an Improvement in Lubricators, of which the following is a specification.

Lubricators especially designed for feeding oil in regulated and observable quantities to the valve-chests or cylinders of steam-engines and operated by water introduced under hydrostatic pressure in regulated quantities to displace the oil have been in common use. These machines have been made to operate in a variety of ways. In the earliest machines patented in this country the oil was made to drop through a steam-filled glass chamber. Subsequently water was made to drop through a glass chamber filled with the lubricating-oil, which was displaced in equal quantities. When black lubricating-oil came into general use, then these machines ceased to be efficacious, because such oil, being opaque, concealed the descending drops of water. To obviate this, the attempt was made to fill the sight-feed glass with a transparent oil and the oil-reservoir with opaque lubricating-oil; but as no adequate provision was made for keeping the two oils separate the experiment failed, because the transparent oil soon became discolored by the opaque oil, from which it was only separated by a valve near the bottom, which had to be opened when the lubricator was put in operation, thus bringing the two into contact. Machines were contrived with a water-filled glass chamber, into the bottom of which the oil was delivered when expelled from the oil reservoir by water admitted thereto in regulated quantities. Such oil rising through the water in the sight-feed glass flowed away through a pipe to the place to be lubricated. Subsequently lubricators were contrived in which water was admitted in regulated quantities at the top of a sight-feed glass filled with air under compression due to the steam-pressure, through which the water fell into the lubricating oil in the bottom of the sight-feed, passing thence into the oil-reservoir and displacing an equal quantity of oil, which was delivered out of the top into the discharge-pipe. In this class of lubricators the degree of compression of the air was dependent upon the amount of steam-pressure, and in testing them practically we have found it impossible to retain the air under any considerable pressure, the air escaping through the packing at the top of the sight-glass, so that the sight-feed glass gradually filled with lubricating-oil, which concealed the descending drops of water. These various machines are generally designated under the distinguishing names of "up-drop sight-feed lubricators" and "down-drop sight-feed lubricators."

Our invention belongs to the class of down-drop sight-feed lubricators, and more specifically to the second class, hereinbefore first set forth, in which water admitted in regulated quantities is caused to descend through an oil-filled sight-glass.

Our invention is, however, distinguished from the machines heretofore used in this, that instead of permitting the sight-feed glass to be filled with the oil used for lubricating taken from the oil-chamber, we use two kinds of oil—one for lubricating, with which the oil-reservoir is filled, and the other a transparent oil or other equivalent sufficiently-transparent liquid of lighter specific gravity than water and with which the water will not readily mingle—with which the sight-feed glass is filled, and through which the water, admitted in regulated quantities, falls by gravity into water contained in the chamber below the sight-feed, which is so connected with the interior of the oil-chamber that the lubricating-oil is constantly excluded from the sight-feed glass by an interposed water seal, which prevents the transparent liquid from escaping into the oil-reservoir, or the opaque oil contained in the latter from passing into the sight-feed glass. The means by which this result is accomplished are set forth in the annexed drawings, which make a part of this specification, in which—

Figure 1 is a vertical central section on the line 2 2 of Fig. 3. Fig. 2 is an elevation, partly in section, on the line 1 1 of Fig. 3. Fig. 3 is a horizontal section on the lines 3 3 and 3 3 of Fig. 1. Fig. 4 is a vertical section showing an alternative construction of the interposed water seal.

The same letters are employed in all the figures in the indication of identical parts.

A is the condensation-chamber, wherein

steam, introduced through a pipe at C is condensed.

B is the oil-reservoir, in which the lubricating-oil is stored. It may be filled by removing the filler-plug U and pouring the oil into the ordinary gage-glass, T, which is connected at the top and bottom with the oil-reservoir. The water of condensation runs down into the chamber D, and from thence through the passage E into a chamber, F, whence it passes through the passage G under the end of the horizontal valve V′ when open, thence through the passage H into an annular chamber, I, which surrounds the dropper-plug M, and thence flows through the short and upwardly-inclined passage K over the valve-seat L, under the end of valve $V^2$, (when opened.) Thence it flows downward through the dropper-plug M, passing through a small tubular duct, M′, until it forms a drop on the end of the nipple $M^2$. The condensation-chamber and passage leading to the nipple $M^2$ form the hydrostatic column. This dropper-plug is supported in an arm, W, extending horizontally from the upper part of the oil-reservoir B, and the dropper-plug M is tapped into it and constructed with a hexagonal or other head, to receive a wrench, by means of which said plug can be screwed in or out. This arm has on its outer end an enlargement, W′, with a vertical hole formed through it, the lower end of which receives the upper end of the sight-feed glass N, held in place by a nut and properly packed, in the usual manner. The valve-stem $V^2$ is tapped into the dropper-plug, and its lower end shuts onto a conical valve-seat, L.

The lower end of the sight-feed glass is held by a nut on the arm Y, extending from the lower part of the oil-reservoir B in the usual manner. The outer end of this arm is formed with an enlargement, Y′, to receive the sight-feed glass, and a passage for the water is formed through the arm. In this arm and underneath the sight-feed glass N is a water-chamber, O, out of which a pipe, P, extends into the interior of the oil-reservoir.

Z is a drip-valve for draining the chamber O.

The passage K forms a water seal to prevent the oil from floating up through the water-column to the top of the condensation-water.

In the case illustrated in Fig. 1, which is the one we prefer, the pipe P is extended upward, as shown, and terminates in the dome at the top of the oil-reservoir at a level above that of the top of the hole through the enlargement W′ on the outer end of the arm W, which holds the dropper-plug M. These parts O and P form a water seal separating the two oil-chambers and furnish the sole communication between them, retaining the transparent oil in its own proper chamber and preventing the lubricating-oil from flowing into the sight-feed glass.

A tubular discharge for the oil is formed at Q, leading up through the chamber D and communicating with the discharge-pipe S through a small passage, R, closed at its inner or receiving end by the end of the stem of valve $V^3$. The discharge pipe S has a thread cut in its end at *h* to receive a coupling, by which the oil may be carried to the steam-pipe or valve-chest.

A drip-valve, X, is placed in the lower end of the oil-reservoir to draw off the water in the usual manner.

We have shown in Fig. 4 another form of water-trap for introducing the feed-water into the oil-reservoir instead of the pipe P. The opening from the water-chamber is made directly into the bottom of the oil-reservoir B. In this case to form a water seal it is necessary that the drain-pipe *f* shall be extended up into the oil-reservoir until it is above the level of the discharge-pipe *e* from the chamber O. In this case, also, to retain the contents of the sight-feed glass when the oil-reservoir is opened, a valve, $V^4$, must be attached, as shown, to shut against a valve-seat at *e*.

The machine thus constructed is connected in the usual manner with a steam pipe or chamber by a pipe leading to the condensation-chamber, and another leading from the oil-discharge pipe S. It is charged and operated as follows: The valve V′, which regulates the admission of water, must be closed to shut off the water of condensation accumulated in the chamber A. The valve $V^3$ must also be closed to prevent the inflow of steam through the pipe S. The filler-plug U should also be removed. The valve $V^2$ is also removed, and then the dropper-plug M is screwed out, opening the upper end of the sight-feed glass and the hole through the enlargement W′ on the outer end of the arm W above it. Water should then be poured in through the sight-feed glass until the water-chamber O and pipe P are filled—say until the water shows in the bottom of the sight-feed glass. That glass is then filled by pouring in some sufficiently-transparent oil or other analogous liquid, through which water will descend by gravity without combining therewith. We have used that kind of kerosene-oil known as "water-white kerosene" with satisfactory results. We do not desire, however, to be limited to the use of any particular liquid, as a great variety of oils and analogous liquids may be employed. This transparent or semi-transparent liquid should be poured in until it overflows the top of the vertical hole through the enlargement W′ of arm W above the sight-feed glass. In doing this the oil will press the water partly out of the water-chamber O and into the pipe P; but it cannot overflow the same, because the mouth of the pipe P is higher than the upper end of the vertical hole through the enlargement W′ of arm W. Water will remain in the bottom of the chamber O, as indicated in Fig. 1 by the shade-lines, and when the oil passes the level indicated by the line *d* it will flow up through

the water. It is therefore desirable that when the machine is ready for operation the water shall be somewhat above that line.

When the transparent-oil chamber has been filled, the dropper-plug (without valve $V^2$) should be screwed down onto its seat. While this is being done the oil will rise in the passage M′ and expel the air, and also fill, to some extent, the chamber above the valve-seat L, which seat is also below the level of the mouth of the pipe P, and thus exclude the air from that side of the apparatus. The valve $V^2$ should then be screwed down onto its seat and the oil-reservoir B filled with oil to the top of the feed hole and the stopper U screwed on. The machine is then ready for operation. The valves V′ and $V^3$ should then be opened and then water admitted under hydrostatic pressure and regulated by opening the valve $V^2$. As the steam-pressure at S counterbalances that at C, the hydrostatic column will exert its force in driving the water into chamber I, forcing the oil before it through K and down through M′ until the water shows at $M^2$. By means of the valve $V^2$ the outflow of the water can be regulated so that it shall form in drops, gradually growing until they overcome the buoyancy of the oil, and drop by gravity into the water chamber O, displacing the water until pipe P is full, when it will overflow and fall, also drop by drop, through the lubricating-oil into the bottom of B. Each successive drop will cause the oil to rise in the passage Q until it overflows into pipe S, first driving before it any air in the top of the dome and duct. When this has been done, there will be a mass of liquid entirely filling the chambers between the steam above the condenser and the steam in the pipe S, and consequently freedom from that pulsation which is due to the expansion and compression of air confined in pockets in the machines in common use.

When the oil-reservoir has become filled with water, the valves V′ and $V^3$ should be closed, and then the water can be drawn off in the usual manner and the reservoir refilled without in any degree disturbing the conditions existing in the sight-feed glass and its connected parts. If at any time it is desired to empty that side, it may be done by means of the drip-valve Z.

In filling a machine with a water seal like that of Fig. 4 the valve $V^4$ must be used to cut off communication whenever either side is to be opened.

What we claim as our invention jointly, and desire to secure by Letters Patent, is—

1. A hydrostatic displacement down-drop lubricator combining in its construction a transparent oil filled sight-feed glass, a reservoir for lubricating-oil, and an interposed water seal separating and confining the oils in their respective chambers, substantially as set forth.

2. In combination with a sight-feed-glass chamber and an oil-reservoir, B, respectively, provided with means for filling them independently, an interposed water-seal forming the sole communication between said chambers, a hydrostatic column for supplying water in regulated quantities to the former, and an oil-discharge pipe for delivering oil from the oil-reservoir, substantially as set forth.

3. In combination with the sight-feed glass of a down-water-drop lubricator and the oil-reservoir, respectively, provided with means for independently filling them with oil, a pipe, P, leading up from the bottom of the sight-feed chamber to a level above that of the top of the sight-feed chamber, through which it is filled, substantially as set forth.

4. In combination with the condensation-chamber and oil-reservoir, an intermediate sight-feed having the plug M, constructed with water-ways and externally threaded, substantially as set forth.

5. In combination with the condensation-chamber and oil-reservoir, an intermediate sight-chamber, and externally screw-threaded plug M, constructed with water-ways, and a detachable valve, $V^2$, for expelling the air from the passages when the plug is forced into place after the sight-feed chamber has been independently filled with oil, substantially as set forth.

6. In combination with the condensation-chamber, independently oil-filled sight-feed chamber, and oil-reservoir B, a water seal in the passage between the condenser and the sight-feed chamber to prevent the escape of the oil from the latter upwardly, and a second water seal between the sight-feed chamber and the oil-reservoir B, to prevent the passage of oil from either into the other, substantially as set forth.

Executed by us, in the presence of two attesting witnesses, this 21st day of January, A. D. 1888.

RODNEY MASON.
JESSE M. SMITH.

In presence of—
F. G. RUSSELL,
AROUET RICHMOND.