(No Model.)

W. F. MATTES & J. F. LEWIS.

LUBRICATOR.

No. 499,434. Patented June 13, 1893.

FIG. 1.

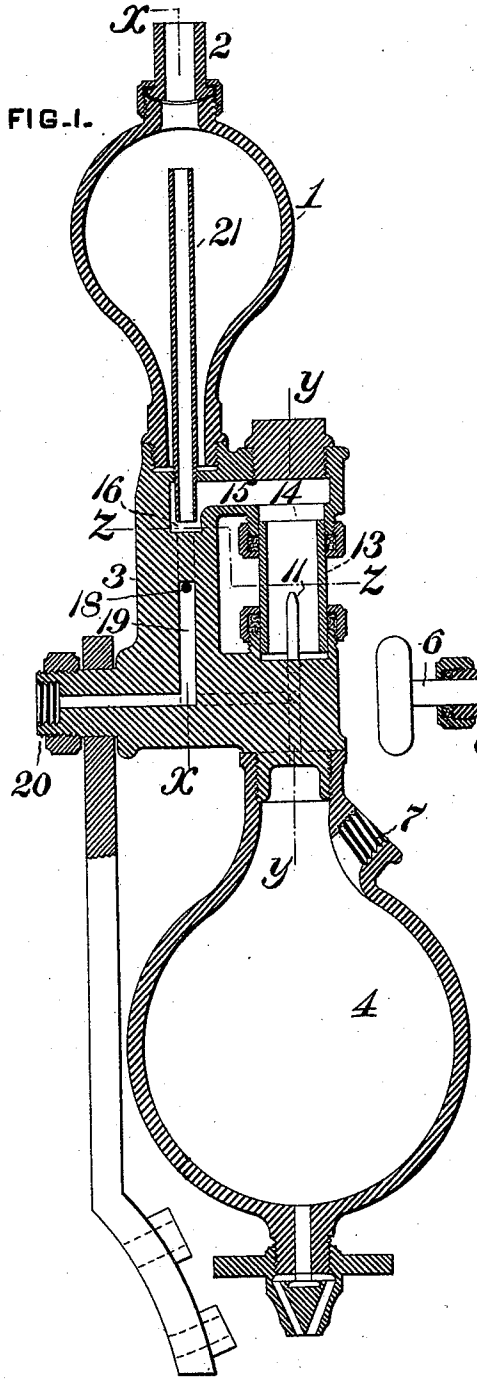


FIG. 3.

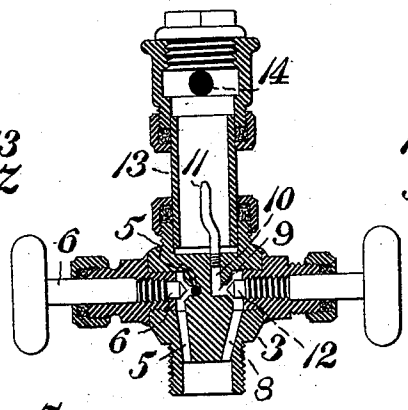


FIG. 2.

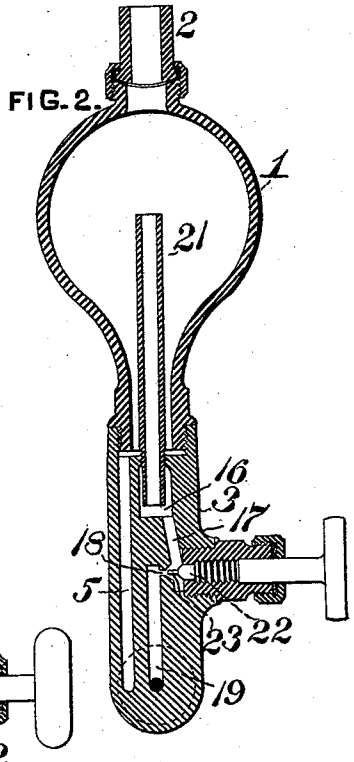
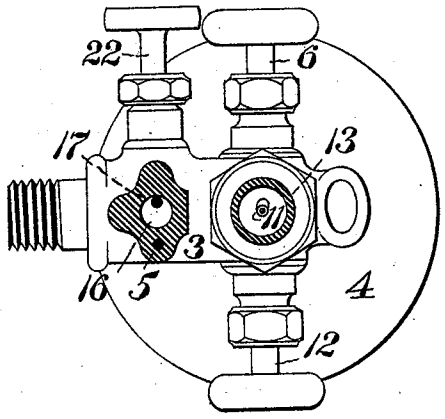


FIG. 4.



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LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 499,434, dated June 13, 1893.

Application filed August 5, 1892. Serial No. 442,220. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. MATTES, residing at West Superior, in the county of Douglas and State of Wisconsin, and JOHN F. LEWIS, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, citizens of the United States, have invented or discovered certain new and useful Improvements in Lubricators, of which improvements the following is a specification.

The invention described herein relates to certain improvements in automatic lubricators and has for its object a construction of lubricator capable of feeding with regularity into the steam chests and cylinders of engines.

Our improved lubricator is more especially applicable to that class of engines, such as locomotives and some kinds of hoisting engines, in which the pressure to be fed against is subject to frequent and violent variations, from full boiler pressure to zero, or even a considerable vacuum.

The invention is shown as embodied in a lubricator of the well known "up drop" type in which the oil is displaced by water obtained by condensation of steam and passes upward through the water by virtue of the greater specific gravity of the latter.

In all lubricators which depend for their operation upon either differences in specific gravities or the attraction of gravitation, it is essential that the internal pressures upon different parts be equalized and maintained with considerable uniformity. It frequently happens, however, that this condition cannot be met, as, for instance, in the case of locomotives using steam heavily on an up grade until a summit be passed, and then running the down grade without steam, so that the actions of the pistons actually create a semi-vacuum in the steam chests.

A lubricator constructed in accordance with our invention, maintains and equalizes the maximum pressure available upon the lubricator under all possible variations in the working conditions of the engine; and furthermore so heats and vaporizes the oil by a jet of live steam as to render its subsequent distribution and application to all working parts of the cylinders uniform, efficient and certain, whether the connection be made to one or several cylinders.

In the accompanying drawings forming a part of this specification, Figure 1 is a sectional elevation of our improved lubricator; Figs. 2 and 3 similar views, the planes of section being indicated by the lines x—x and y—y, respectively, Fig. 1; and Fig. 4 is a horizontal section on the line z—z, Fig. 1.

In the practice of our invention, the condensing chamber 1 is connected by a pipe 2 to a reliable steam supply, preferably with the dome of the boiler, and is attached at its lower end to the frame 3. Water of condensation is conducted from the chamber 1 to the reservoir 4, by passages 5 formed in the frame 3, the flow being controlled by a hand operated valve 6, as shown in Figs. 3 and 4. As the oil which is charged into the reservoir through the filling plug 7, is displaced by the inflowing water of condensation, it rises up through the passage 8, port 9, which is controlled by a hand operated valve 12—passage 10 and tube 11 forming the upper end of passage 10, and terminating within the glass tube 13. The flow of the oil is so regulated by the valve 12, that it is discharged drop by drop from the end of the tube 11 and rises up through the water contained in the sight-feed tube 13 into the chamber 14. The water in the tube stands at about the level of the table 15 of the chamber 14, so that the oil will flow slowly over this table into the recess or pocket 16. From the pocket or recess 16 extends a passage 17, which is connected by a small port 18 to the passage 19 extending to the end of the nipple 20, where connection is made to the pipe leading to the cylinder or cylinders. Live steam is conducted into the chamber 14 by a tube 21, which projects up sufficiently far into the condensing chamber 1 to prevent water of condensation from passing down into the chamber 14, and the lower end of said tube extends down into the pocket or recess 16, for a purpose to be hereinafter stated. The flow of oil and steam through

the port 18 is preferably regulated by a hand operated valve 22, which is provided at its end with projecting point 23 adapted to pass through the port and clear it of any obstruction. It is apparent that by closing valve 22, thus stopping the working of the lubricator, the water of condensation will rise in the condensing chamber 1 far enough to flow over into the tube 21, through the chamber 14 and into the glass tube 13, thus providing a convenient and quick way of filling the glass tube 13.

Another and very important reason for carrying the tube 21 only part way to the top of condensing chamber 1, is that in case of any sudden rush of water into the condensing chamber from "priming" or "foaming" in the boiler, or from any other cause whatever, the surplus water will flow over into said tube 21, passing out with the steam and oil; thereby maintaining the equalization of the hydrostatic pressure and preventing any sudden variations in the rate of feed.

In operating the lubricator, the reservoir 4 having been filled, steam is admitted into the condensing chamber and the valves 12 and 22 are closed until sufficient steam has condensed to fill 13. The valves 12 and 22 are then opened and feeding begins. As the water of condensation flows down through the passage 5 into the reservoir 4, an equal quantity of oil is forced up through the passages and ports 8, 9 and 10 and tube 11. The oil rises up through the water in tube 13 and flows over the table 15 into the pocket or recess 16 in chamber 14. From the pocket or recess 16, the oil passes with live steam entering through the tube 21, down through the passage 17, port 18, passage 19 and pipe connected with the latter, to the cylinder or cylinders to be lubricated.

In order to effect a uniform and constant operation of the lubricator irrespective of the pressure of the cylinders, it is necessary to maintain a substantially equal pressure in the condensing chamber, the oil reservoir, the feeding chamber 14 and the passages and ports connecting said chambers and reservoir. This equality of pressure is maintained by so choking the discharge passage from the feeding chamber, that the steam escaping through said passage will not sensibly or materially reduce the pressure in the feed chamber. This choking of the discharge passages from the feed chamber may be effected by simply reducing the size of said passage or passages at some point along their length, but it is preferred to effect the choking by means of a port 18 controlled by a valve 22, as affording means for regulating the flow of steam in accordance with the differences of pressure in the feed chamber and cylinder. By thus reducing the discharge passage, a constant and uniform flow of oil to the cylinder can be maintained, and the only effect produced by a reduction of pressure in the cylinders, is a slight increase in the percentage of steam passing with the oil through the port 18, no variation in the rate of oil feed being apparent.

Another valuable result effected by our improvement, especially when in use upon a locomotive running a down grade with steam shut off, is that the oil in passing through the port 18 is effectually sprayed by the steam and passes onto the valves of the engine as an oily vapor, which is the best possible condition for its thorough and effective distribution.

The valve 22 is not essential to the working of this lubricator provided the port 18 is made small enough to maintain the requisite pressure with the feed chamber, but so small a port or opening is liable to stoppage. By employing a valve the port may be made larger, thereby reducing the liability to stoppage, and by adding the point or projection 23 to said valve any obstruction can be easily removed. And further the employment of this valve avoids the necessity of any valve between the lubricator and steam chest.

It is not essential that the port 18, and valve when the latter is employed, should be located within the lubricator itself, as they would be operative at any point along the passages or pipe connecting the feed chamber and steam chest; but they are preferably located in the frame 3 at the point shown, for the following reasons: The engineer can stop the working of the lubricator by simply closing the valve 22, without disturbing the other valves. The closing of valve 22 also provides for the quick filling of the feed glass 13 with water, as hereinbefore shown.

It sometimes happens in case of a stoppage of the passages from the feed chamber—as, for instance, occurs in closing valve 22—that the oil will continue to flow from the reservoir to the feed chamber, but as it cannot escape from the discharge passage, it will flow up through the tube 21. It will be readily understood that this abnormal operation of the lubricator might continue for some time without discovery by the engineer, as the oil is passing properly through the sight tube. In order to overcome this objectionable feature, the tube 21 forming the direct steam connection to the feed chamber, is extended down into the recess or pocket 16, as hereinbefore described, so that in case of a stoppage of the discharge passages, the water of condensation in the chamber 14 and tube 21 will flow into the pocket and close the lower end of the tube, preventing the flow of any oil thereinto. It will be readily seen therefore, that the closing of valve 22 at the point located in frame 3, performs the three-fold operation of stopping the flow of oil to the cylinder or cylinders; quickly supplies the feed glass 13 with water and in combination with the recess or pocket 16 effectually prevents any of the oil passing up through the tube 21 and thence

into the boiler. Supposing the valve 22 to have been closed for a while; the tube 21, recess 16, feed chamber 14 and glass tube 13 being filled with water as described. Upon opening valve 22 the effect will be that the surplus water is upper part of the condenser 1, in the tube 21 and recess 16 will pass out with the oil and steam through the port 18 and passage 19, thus preventing any increase in the hydrostatic pressure. The result is that the lubricator gets to work at the same rate of feed as before and there is no necessity for changing the set of the water valve 6 or the oil regulating valve 12.

It will be observed that the frame 3 is a strong, heavy casting, with the feed chamber and all the passages and ports, except the tube 11 and the glass tube 13, formed by drilling. The form and shape of the frame allow room therein for the valve 22; permit suspending the lubricator at or near the center of gravity and bring the sight-feed glass to the front so that an unobstructed view of the feed is had from three directions. It will also be observed that the line of strain in the frame is all below the feed glass 13, thus practically eliminating the danger of breaking the glass by any sudden wrenching or jarring.

It is apparent that the construction of the frame 3 and the location therein of port 18 and valve 22 provides for the continual passage of live steam through the entire length thereof, thereby keeping the frame, and consequently the oil and water, very hot and preventing all chances of chilling. At the same time it is not so hot but what the reservoir may be opened without the oil boiling. It will also be noticed that the feed glass 13 being in front, it can be very easily and quickly removed and a new one substituted by simply taking out the screw plug shown above it.

For convenience in stating our claims we will sub-divide lubricators, whether of the "up-drop" or "down-drop" types, in three principal parts, viz.: the oil chamber which is the reservoir 4; the condensing chamber 1 and the frame 3 comprising within itself or attached thereto the passages 5, valves 6, passages and ports 8, 9 and 10, valve 12, tube 11, glass tube 13, feed chamber 14, recess or pocket 16, tube 21, passage 17, port 18, valve 22 and passage 19, including all connections shown and described.

We claim herein as our invention—

1. The combination in a lubricator, of an oil reservoir, a condenser connected to the reservoir, a frame provided with a feed chamber and passages connecting the feed chamber with the reservoir and the parts to be lubricated and tube for conducting steam to the feed chamber, its lower end extending into a pocket formed in the bottom of the feed chamber, substantially as set forth.

2. The combination in a lubricator of an oil reservoir, a condenser connected to the reservoir, a frame provided with a feed chamber and passages connecting the feed chamber with the parts to be lubricated, a valve arranged in said passages, and a tube for conducting steam to the feed chamber, the lower end of said tube extending into a pocket formed in the bottom of the feed chamber, substantially as set forth.

3. In a lubricator the combination of a frame having a feed chamber formed therein and provided with outlet passages connecting the feed chamber with the parts to be lubricated, a condenser and an oil reservoir attached to the frame and connected by passages formed in the frame, a sight tube secured in the frame and connected with the reservoir by passages formed in the frame, valves for controlling the flow of oil from the reservoir and from the feed chamber and a tube for conducting steam to the feed chamber, its lower end extending into a pocket or recess in the bottom of said chamber, substantially as set forth.

4. A lubricator having in combination a feed chamber provided with a recess or pocket and a tube forming the direct steam connection to the feed chamber, the lower end of said tube terminating within the pocket or recess, substantially as set forth.

In testimony whereof we have hereunto set our hands.

WILLIAM F. MATTES.
JOHN F. LEWIS.

Witnesses:
LOUIS T. MATTES,
JAMES WALDRON.