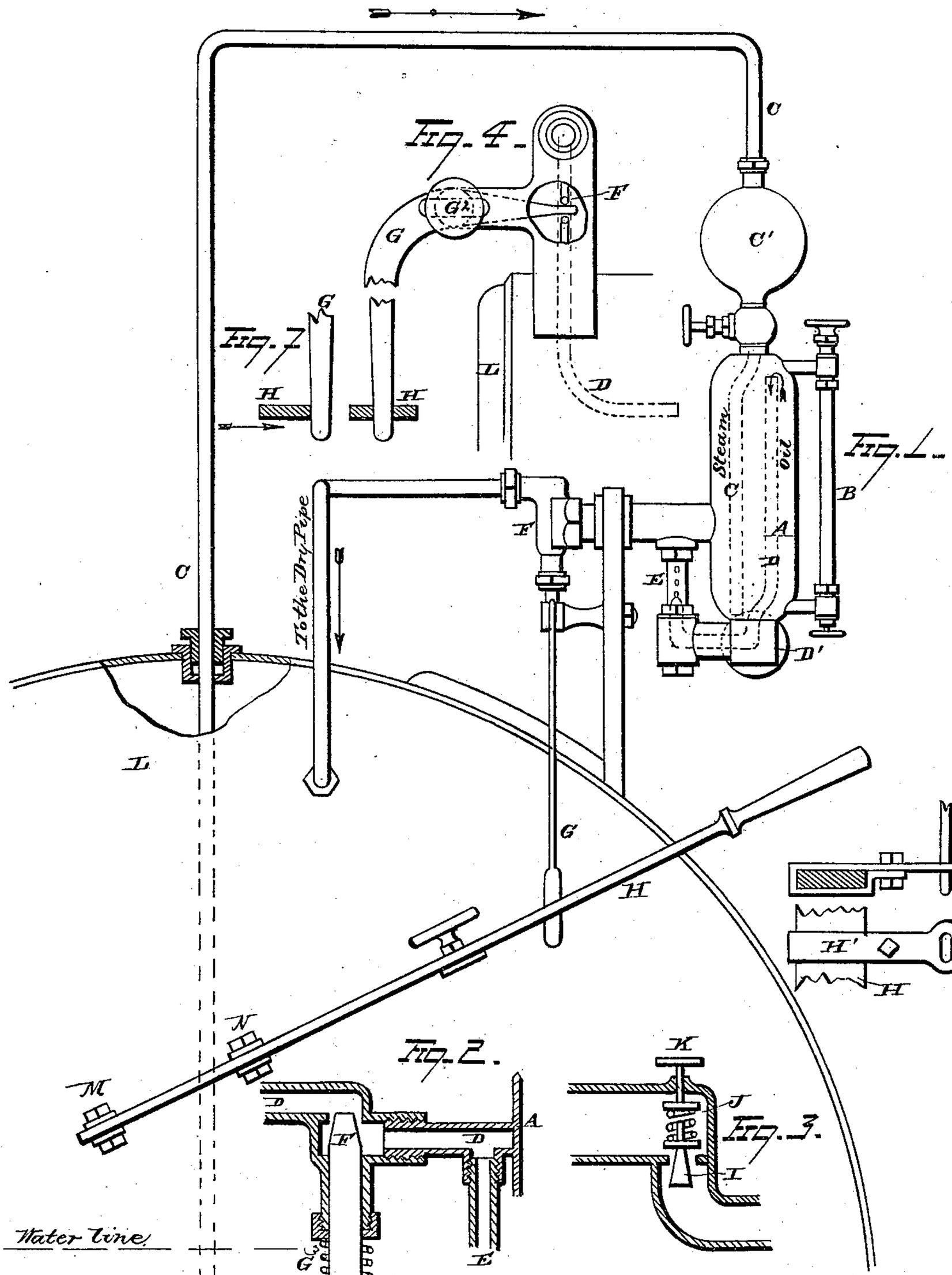
(No Model.)

H. C. HODGES.

Lubricator.

No. 236,434. Patented Jan. 11, 1881.



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LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 236,434, dated January 11, 1881.

Application filed June 14, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. HODGES, of Detroit, county of Wayne, State of Michigan, have invented a new and useful Improvement in Lubricators; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists in a peculiar relative construction of the oil-exit pipe and a valve therein for closing off the flow of oil, the arrangement being such that there shall be no vapor-chamber between the valve and the water in the water-chambers; but, on the contrary, the space from the valve-seat to the point of discharge of the oil into the water-chamber shall always be filled with liquid, either water or oil and water; also, in combining such a valve with the throttle-actuating mechanism, so that the oil is turned on or cut off by the operation of turning on or cutting off the steam from the cylinders; also, in so arranging the valve and so connecting it with the throttle-actuating mechanism that the degree of opening through the valve shall, as the throttle is actuated, be proportionate to the amount of steam-pressure introduced into the dry-pipe from the throttle-valve; also, in providing a valve which shall be located entirely within the oil-exit passage and operate automatically, the valve being so constructed as to automatically increase or decrease the valve-aperture as the back-pressure from the dry-pipe is increased or decreased, respectively.

In the drawings, Figure 1 is a view of an apparatus embodying my invention; Fig. 2, a sectional view, illustrating the valve in the exit-pipe and the relative arrangement of the adjacent parts of the lubricator; Fig. 3, a variation showing an automatic valve mechanism; Fig. 4, a bell-crank mechanism for operating the valve shown in Fig. 2; Figs. 5 and 6, a means for attaching the bell-crank to the throttle-actuating mechanism; Fig. 7, a means for working the valve by the throttle-lever without the two being in any way connected.

Heretofore great difficulty has been experienced with lubricators in which there are both direct and back pressure of steam and which discharge into the dry-pipe or other steam-pipe, owing to the sudden escape of an undue amount of oil at the moment of closing off the steam from the said dry-pipe or steam-pipe. When the steam-entrance and oil-exit pipes lead into the same steam-pipe this escape is doubtless due to the sudden expansion of vapor under tension which is pent up within the lubricator. When the steam is led from the boiler or other constant steam-source and the oil-pipe delivers into the dry-pipe, this escape is caused by the preponderance of direct pressure from the lubricator when the pressure is cut off from the dry-pipe and oil-exit. This last difficulty has been partially overcome by locating an automatic valve, or valve connecting with the throttle-actuating mechanism, in the oil-exit pipe, so arranged that as steam was shut off from the dry-pipe the valve would close; but difficulty has still been experienced owing to the fact that there has been a vapor space or chamber left at some point between the valve and the reservoir, so that as soon as the valve had closed the vapor thus cut off and housed in under tension would, by condensation, relax its tension, and the pressure of the steam in the reservoir would force the oil into and fill this space, so that as soon as the valve was again opened all this volume of oil would pass at once into the dry-pipe and be wasted. This difficulty has been relieved in a degree by tapping said space and leading a relief-pipe to the steam-pressure of the boiler; but I overcome this difficulty and avoid the necessity of a relief-pipe by so constructing the lubricator relatively to the said valve in the oil-exit pipe that there shall be no space left that shall not be completely filled with liquid between the valve and the oil in the reservoir in which such condensation could take place. By such construction dependence does not have to be placed upon a relief-pipe, which, in lubricators that feed by gravity or by the hydrostatic principle, might still permit the oil to accumulate back of the valve and fill the chamber; but the oil is prevented in my device by

a solid bank of liquid, which, being incompressible, affords a certain stoppage against any more flow of oil from the reservoir.

In carrying out my invention, A is the oil-chamber of a lubricator of the kind known as "visible-feed" lubricators, in which the oil is caused, on its way to the parts to be lubricated, to rise in visible drops through water in a transparent water-chamber, and thus indicate the rate of feed of the oil to the parts to be lubricated.

B is an indicator-tube to show the amount of oil left in the reservoir; C, a steam-pipe leading from the boiler, and preferably from below the water-level, though it may be from the steam-space, into the lubricator, and preferably to the bottom of the oil-chamber, as shown, though it may discharge into the chamber at or near the top, in which case there should be a water-trap, in order to prevent the oil from passing back up this pipe.

D is the oil-conduit leading from the chamber A to the dry-pipe or other steam-pipe connected with the parts to be lubricated.

E is a transparent water-chamber located on the line of passage of the oil through the oil-conduit D, so that the oil passing out from the chamber A through the pipe D and governed by the regulating-valve D′ will rise in visible drops through the water in the transparent chamber.

F is a valve located in the oil-exit pipe at a point on a level above the water-chamber, and in such relation thereto and the other portions of the device that the oil, in passing through the valve, will leave no space behind it between the valve-seat and the chamber A that is not completely filled with liquid. The valve F may be of any suitable character—either a plunger-valve, as shown, or an ordinary stop-cock or other suitable contrivance, though I prefer a valve of the character shown which will graduate the size of the valve-aperture to correspond with the amount of steam-pressure admitted into the dry-pipe. The valve is connected by a bell-crank lever or other device, G, with the throttle-lever H, or with a clip, H′, which is connected with the throttle-lever, so that as the throttle is actuated to turn or shut off steam from the dry-pipe the valve-aperture is simultaneously opened or closed, and is correspondingly opened or closed in a proportionate degree to the amount of steam turned on or off by the throttle-lever.

I do not limit myself to the employment of a valve which shall be connected directly or indirectly with the throttle-actuating mechanism, because the essential feature of my invention is the location of the valve and the relative construction of the parts so as to leave no empty space between it and the oil-chamber, and because an automatic valve may be employed with good effect. Such an automatic valve is shown in Fig. 3. It is tapering in form, and has a spring, J, and regulating-screw K above it, so that the valve may graduate the size of the aperture and the spring serve to maintain the feed of oil at a uniform rate, no matter what disparity of relative pressure there may be in the lubricator and the dry-pipe.

The oil-pipe D may enter the top of the boiler or the end of the boiler, as desired.

The steam-pipe C passes nearly to the bottom of the chamber A, and preferably into a small cup-shaped cavity, so that a few drops of water in the bottom of the chamber A will form a water-seal, to prevent the oil from passing up the steam-pipe.

The pivot G^2 of the lever G may have a movement to or from the valve F, so as to regulate the throw of the valve to correspond with that of the throttle-lever, and a spring, G′, may be suitably located to permit the throttle-lever to have a little motion after the valve F has been closed.

It is not essential that the valve F should be connected with the throttle-actuating mechanism when it is to be actuated by it, but only that it should be in such relation thereto that by actuating the throttle the valve is simultaneously actuated. Thus a spring, G^3, may be suitably arranged to open the valve whenever the throttle-lever is drawn out, and the valve be closed by the throttle-lever simply coming in contact with the lever G, as shown in Fig. 7.

G′ is a condenser for use when steam and not water is passed through the pipe C.

The operation of the device is as follows: Steam or water entering through the pipe C forms at once a water-seal at the bottom of the chamber A, and lifting the oil causes the latter to pass down through the oil-pipe D. The flow of the oil is regulated by the valve D′, and passing thence is delivered into and caused to rise in regular visible drops through the water in the transparent water-chamber E. It then passes on through the valve F to the dry-pipe. It is apparent, therefore, that the pressure in the chamber A is maintained constant at the boiler-pressure, while that in the dry-pipe varies with the amount admitted through the throttle-valve. Consequently, if the valve-aperture at F remained invariable, the oil would flow sluggishly when a full head of steam is on, and more and more rapidly as steam is shut off. The valve F, however, being of tapered form and governed by the throttle-actuating mechanism, or automatically by the spring J and regulating-screw K, gradually opens as the pressure in the dry-pipe is increased, and gradually closes as that pressure is diminished, until it closes entirely just before the throttle is fully closed, and in this way the feed of oil through the transparent chamber is preserved uniform. Moreover, as shown in Fig. 4, the valve, being located on a level above all the parts between it and the oil-chamber, causes all those parts to be filled with liquid. Therefore, when steam is shut off entirely from the dry-pipe, or when for any other reason the valve F is closed, no condense-chamber is left

in those parts which would otherwise, as condensation took place, cause the oil to flow until they were filled; but, on the contrary, the flow of oil is stopped absolutely as soon as the valve is closed, and the space between the valve and chamber A being completely filled with liquid, not a drop can pass until the valve is again opened by the operation of opening the throttle.

It will thus be seen that by constructing the parts adjacent to the valve so that no vapor-space is left between the valve and the top of the water-chamber the whole difficulty of the oil wasting is avoided without the necessity of any relief-pipes or other boiler-connections, and that when the valve is once closed not a single drop of oil can thereafter rise through the water-chamber until the valve is again opened.

I am aware that the oil-discharge valve of a lubricator has been connected with and adapted to be operated by the throttle-actuating lever, and hence I would have it understood that I make no broad claim to such combination of parts.

What I claim is—

1. In a lubricator, the combination, with the oil-exit conduit and a transparent water-chamber, through which the oil rises in visible drops, of a valve located in the oil-exit conduit between the transparent water-chamber and point of discharge, the construction of the parts being such that no vapor-chamber is formed between the valve and water-chamber, and so that the parts between said valve and oil-chamber shall, when in operation, be completely filled with liquid, substantially as set forth.

2. In a lubricator, the combination, with the oil-exit conduit and a transparent water-chamber, through which oil rises in visible drops, of a valve located in the oil-exit conduit between the transparent water-chamber and point of discharge, those portions of the oil-passage between the valve-seat and the oil-chamber being at a lower level than the valve-seat, and constructed to avoid the formation of any vapor-chamber between the valve and water-chamber, substantially as set forth.

3. In a lubricator, the combination, with the oil-exit conduit and a transparent water-chamber, through which oil rises in visible drops, of a valve located in the oil-exit at a higher level than that portion of the oil-exit conduit between the valve and oil-chamber, and devices for closing the valve as steam is cut off from the dry-pipe and for opening said valve when steam is admitted to the dry-pipe, substantially as set forth.

4. In a lubricator, the combination, with the oil-exit pipe, of a valve located therein at a point higher than the parts between the valve and the oil-chamber, and actuating devices adjacent to the throttle-lever, the construction being such that the valve is actuated by the throttle-actuating mechanism, substantially as set forth.

5. In a lubricator, the combination, with the oil-exit pipe, of a valve located therein at a level higher than the parts between it and the oil-chamber, and valve-actuating mechanism connected with the throttle-actuating mechanism, substantially as set forth.

6. In a lubricator, the combination, with the oil-exit conduit, of a valve located therein, a spring for opening the said valve, and an actuating-arm extending adjacent to the throttle mechanism, so as to close the valve by contact therewith as the throttle is closed, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

HENRY C. HODGES.

Witnesses:

WM. M. PORTER,

S. E. THOMAS.