

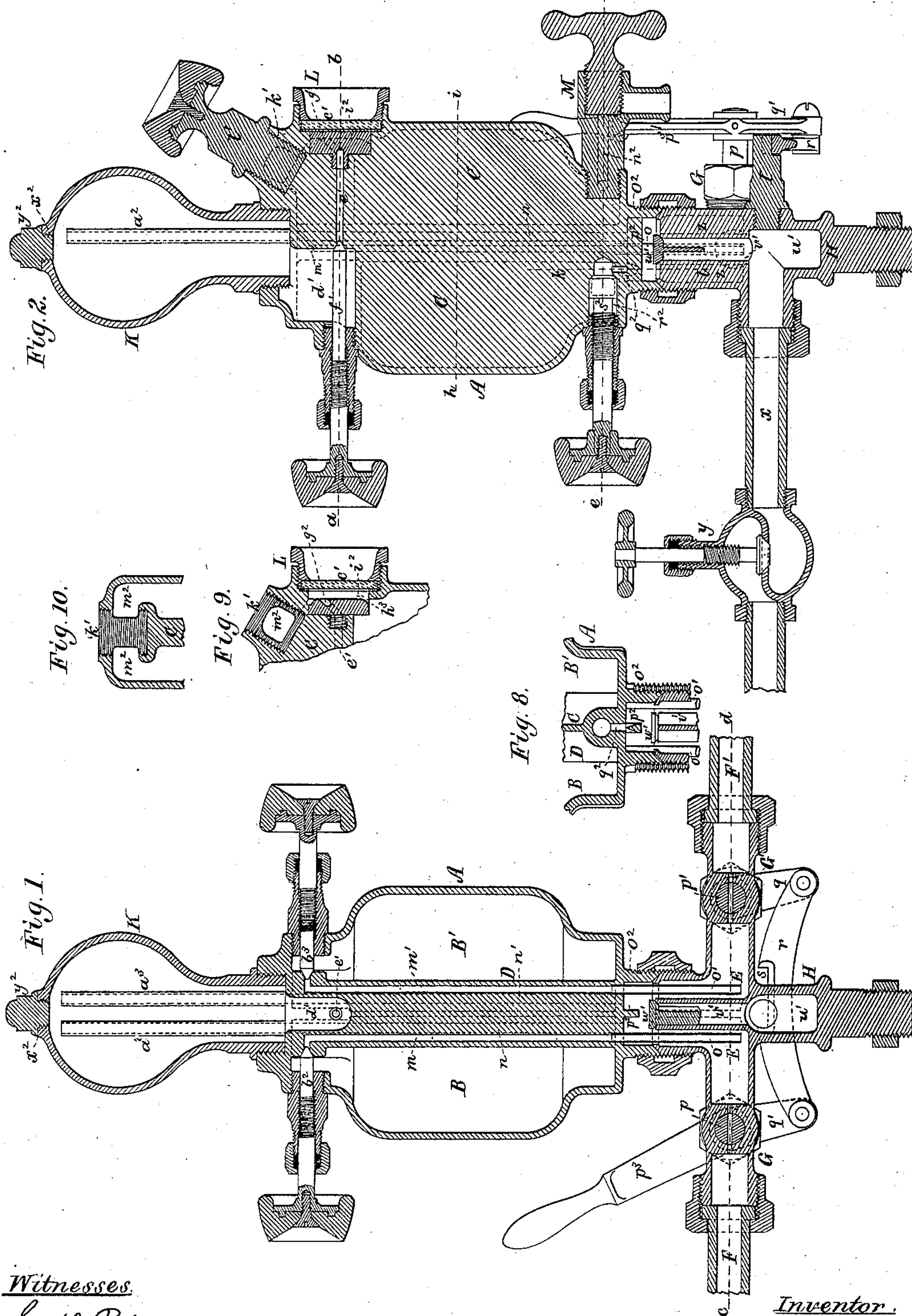
(No Model.)

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STEAM ENGINE LUBRICATOR.

No. 322,912.

Patented July 28, 1885.



Witnesses

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W. H. Preston

Inventor

Warren H. Craig  
by R. H. Lacy atty.



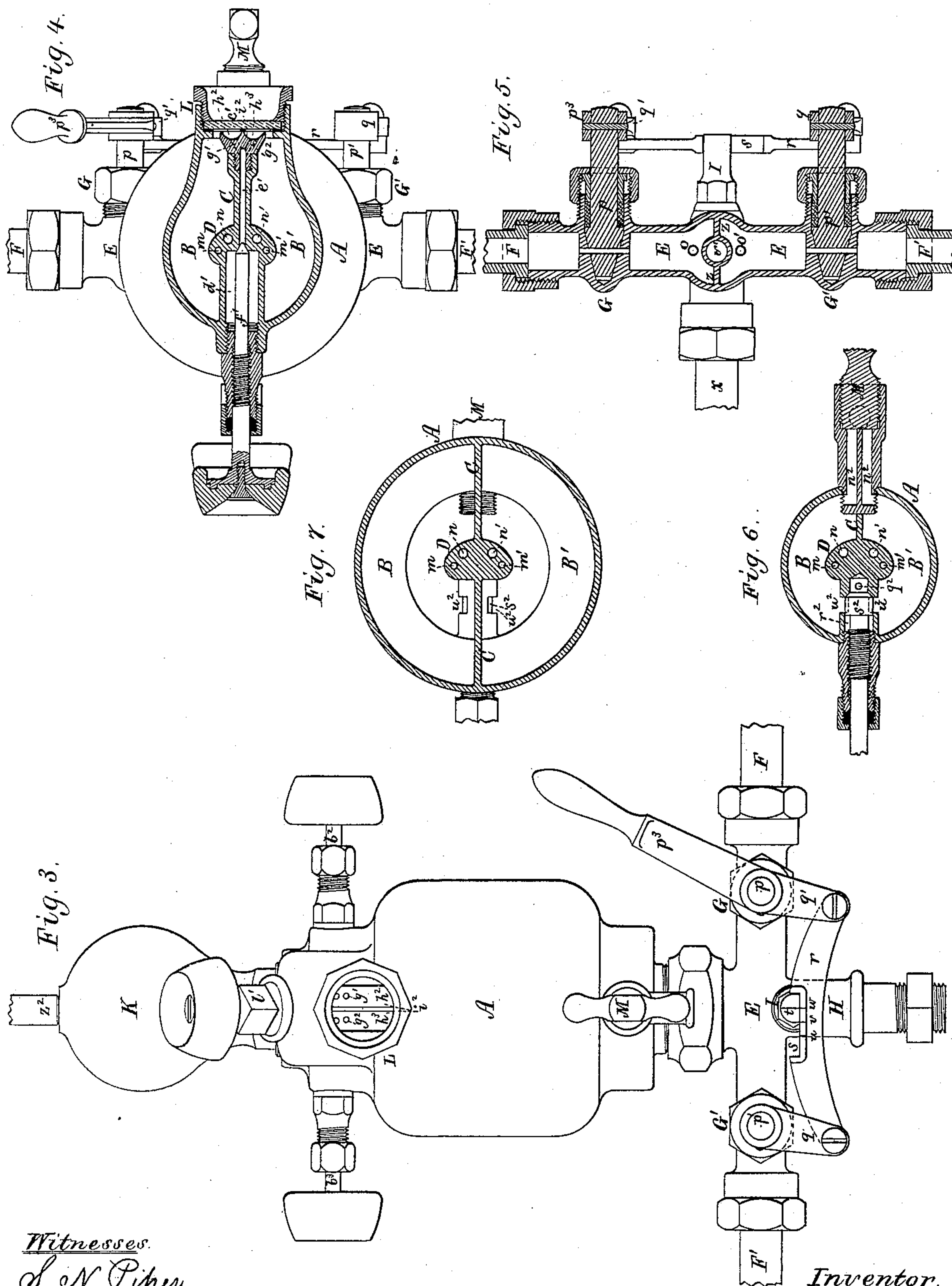
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# UNITED STATES PATENT OFFICE.

WARREN HILLIARD CRAIG, OF LAWRENCE, MASSACHUSETTS.

## STEAM-ENGINE LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 322,912, dated July 28, 1885.

Application filed June 1, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, WARREN HILLIARD CRAIG, of Lawrence, in the county of Essex, of the Commonwealth of Massachusetts, have  
5 invented a new and useful Improvement in Steam-Engine Lubricators; and I do hereby declare the same to be described in the following specification, and represented in the accompanying drawings, of which—

10 Figures 1 and 2 are vertical and transverse sections, and Fig. 3 a front elevation, of a lubricator containing my invention, the nature of which is defined in the claims hereinafter presented. The planes of the two sections  
15 are at right angles to each other. Fig. 4 is a horizontal section taken on line *a b* of Fig. 2. Fig. 5 is a horizontal section taken on line *c d* of Fig. 1. Fig. 6 is a horizontal section taken on line *e f* of Fig. 2. Fig. 7 is a  
20 horizontal section taken on line *h i* of Fig. 2. Fig. 8 is a vertical section on line *k l* of Fig. 2. Fig. 9 is a vertical section taken through the middle of one of the concave sight-feed deflecting-flutes. Fig. 10 is a section taken through  
25 the oil-feeding ducts, to be described.

This lubricator is intended for oiling at one and the same time both of the piston-cylinders of a locomotive steam-engine; and for this purpose it has an oil-reservoir, A, whose interior  
30 space is divided into two separate chambers, B and B', by a partition, C, going through it at its axis, such partition having at its middle an enlargement or vertical column extending from top to bottom of the reservoir. The said  
35 column has through it lengthwise or vertically four passages, *m* and *m'* and *n* and *n'*. The two passages *m* and *m'* have tubes *o* and *o'* (see Fig. 1) leading down from them into a cylindrical tube or chamber, E, arranged be-  
40 low the oil-reservoir, and opening at its ends into two pipes, F and F', which, in practice, communicate with the valve-chests of the two engine-cylinders. The said chamber is provided with two cocks, G and G', for either  
45 opening or closing communication with it and the said pipe F and F'. The plug *p* of one of these cocks has a hand-lever, *p<sup>3</sup>*, fixed to it, (see Figs. 1 and 2,) the plug *p'* of the other cock having a crank, *q*, extending down from  
50 it, and connected with the shorter arm *q'* of the said lever by a curved link, *r*, which is pivoted to the said crank and arm. On mov-

ing the lever both plugs will be simultaneously turned, so as to either close or open communication between the chamber E and the pipes 55 F and F'. The link *r* has a rectangular notch, *s*, made in it at its crown, as represented, there being projected into the notch from a standard, H, extending from and below the chamber E, a finger, I, having down the middle of 60 its outer end a vertical mark, *t*, with other marks, *u*, *v*, and *w*, made on the link *r*, to indicate when the cocks G and G' are fully or partially opened or are closed. The standard H has within it a chamber, *u'*, from which a tubu- 65 lar neck, *v'*, projects upward between the pipes *o* and *o'*, as shown in Fig. 1. There is within the upper part of the neck *v'* a check-valve, *w'*, which is to prevent oil from being discharged from the lubricator into the boiler. 70

The steam from the boiler passes into the chamber *u'* by means of a conduit, *x*, provided with a stop-cock, *y*. (See Fig. 2.) From the hollow neck *v'* partitions *z z* (see Fig. 5) extend diametrically across the chamber E 75 from the bottom thereof to the top of the neck. These partitions, with the neck, serve as barriers to prevent the oil that may flow out of either of the tubes *o o'* from passing backward, out of its true course, into the pipe 80 F or F'. From the chamber E the steam passes upward through the passages *n* and *n'* in the column D, and thence through pipes *a<sup>2</sup>* and *a<sup>3</sup>*, leading from the top of the column upward into the condenser K. (See Figs. 1 85 and 2.) At their upper parts the passages *m* and *m'* are provided with screw-plugs *b<sup>2</sup> b<sup>3</sup>* to their mouths, such plugs being to regulate the flow of oil from the reservoir A into the said passages. 90

At the upper part of the oil-reservoir A is the sight-feed L, which is a tubular projection provided with a glass pane, *c'*, arranged within and across it. In rear of the glass pane and the column D there is a chamber, *d'*, 95 that at top opens into the condenser. From this chamber a passage, *e'*, leads through the partition C toward the glass pane, and is provided with a screw-plug, *f'*, for regulating the flow of water from the condenser into the said 100 passage. From the passage *e'* two branch passages, *g' g<sup>2</sup>*, lead to two vertical flutes, *h<sup>2</sup> h<sup>3</sup>*, of a mirror or reflector, *i<sup>2</sup>*, which on its front bears closely against the rear face of the glass



pane. The concave grooves or flutes  $h^2$   $h^3$  extend vertically through the front face of the mirror. The drops of water from the passage  $e'$  pass down through the flutes and directly  
5 in rear of the glass pane and thence into the oil-reservoir, into which the flutes at their lower as well as their upper ends open.

On looking upon the glass pane a spectator can see the drops of water as they pass from  
10 the condenser through the flutes, from which they run into the chambers of the oil-reservoir. As the water of condensation may accumulate in such chamber it will sink below the oil therein, and cause it to flow into the  
15 passages leading from them into the chamber E, from whence such oil will be carried to the engine-cylinders by the steam when passing in opposite directions out of such chamber and into the valve chambers of such  
20 cylinders.

Above the passage  $e'$  there is to the oil-reservoir a cylindrical induct or oil-feeding mouth,  $k'$ , closed at its bottom and provided with a screw-stopple,  $l'$ , that screws into such  
25 mouth down to the said bottom thereof, and serves to close two branch passages,  $m^2$ , leading laterally out of the said mouth  $k'$  and into the chambers B and B'. On withdrawing the stopple  $l'$  from the mouth  $k'$  and pouring oil  
30 into such mouth, such oil will flow at once through both the branch passages  $m^2$  into the said two chambers, B and B'.

At the lower part of the oil-reservoir there is a drainage-cock, M, which communicates  
35 with the two chambers B and B' by two separate passages,  $n^2$ , (see Fig. 6,) they being to drain both chambers at once when the cock M is opened. Extending diametrically across the neck  $o^2$  at the base of the oil-reservoir there  
40 is a bar,  $p^2$ , triangular in transverse section in that portion of it which crosses the passage  $q^2$ , and arranged as represented in Figs. 1, 2, and 8. This bar answers two purposes—viz., as a stop to check the rise of the valve  $w'$ , and as a  
45 means of dividing the stream of oil when escaping from the oil-reservoir through said passage  $q^2$ , leading through the bottom thereof into the chamber E. This division of the stream is to cause it to flow as nearly equally as possible  
50 down opposite sides of the neck  $v'$  into the chamber E.

In the lower part of the oil-reservoir A is another chamber,  $r^2$ , having within it a screw-plug,  $s^2$ , to open or close the passage  $q^2$ , such  
55 chamber having passages  $u^2$  opening laterally from it into the chambers B and B'. (See Fig. 6.) On drawing back the screw-plug so as to uncover the passages  $q^2$  and  $u^2$ , the oil from the two chambers B and B' may be discharged directly into the chamber E, such being to allow of the lubricator being used like an ordinary "tallow-cock," when necessary.

Instead of the steam being introduced into the lubricator at its lower part, as described,  
65 it may be let into the condenser at its upper part, such condenser being shown in the drawings as having an opening,  $x^2$ , in its crown,

into which opening a plug,  $y^2$ , is screwed. On removing the plug from the opening a pipe leading therefrom to the boiler may be screwed  
70 into the opening, such pipe being shown at  $z^2$  in Fig. 3.

The oil-reservoir, its cross-partition, and the column extending up through the latter are cast or founded in a single piece of metal  
75 coupled with and opening into the chamber E or part containing such, as shown in the drawings.

From the above it will be seen that the herebefore-described lubricator is a duplex one,  
80 it having with its oil-reservoir a single condenser; and, besides, it has in the oil-reservoir not only the divisional partition, but within such partition, at its middle, and projecting in opposite directions from it, a column integral  
85 or in one piece with it and the reservoir, and having four passages,  $m$ ,  $m'$ ,  $n$ , and  $n'$ , leading upward through it, (the said column.) Furthermore, the reservoir has a sight-feed, through which the drops of water, as they pass from  
90 the condenser to the two sections or chambers of the reservoir, can be seen through one pane, they at the time passing down through the two flutes of the reflector.

The oil-reservoir has a chamber below it,  
95 into which it opens, and from which pipes are led in opposite directions to the valve-chests of the two engine-cylinders, such pipes being provided with stop-cocks simultaneously operated by a lever and mechanism and index-  
100 finger, as hereinbefore explained, such being to close the oil-passages to the cylinders without requiring any interference with the valves or cocks, that in the upper part of the reservoir regulating the feed of the water of con-  
105 densation from the condenser through the sight-feed and into the oil-reservoir.

With my lubricator it is not necessary, as with most, if not all, others, to allow small jets of steam to pass into the engine-cylinder on  
110 the steam being cut off at the throttle-valve, such jets often being productive of injurious effects, as on a stoppage of the locomotive these jets are apt to accumulate steam in the cylinders, so as to render it difficult to start  
115 the engine either forward or backward. The simple mechanism adopted by me, and hereinbefore described, for opening and closing the steam-ducts from the oil-reservoir to the valve-chests of the cylinder, enables an engineer to  
120 overcome this difficulty by operating the valve-lever without any necessity of moving the plugs of the feed-cocks of the lubricator. The oil that in the interim may pass into the sight-chamber below the oil-reservoir becomes  
125 stored in such chamber, while the cocks at its ends are closed, and instead of being wasted is ready for use when they are next opened. By having the sight-feed constructed as described the rate of feed of the drops of water  
130 in their passage to the two sections of the oil-reservoir can be seen at once through a single pane rather than through two separate ones. The duplex fluted or concave light-reflector



communicates with the oil-reservoir both at top and bottom thereof, and also with the condenser, as described. Furthermore, the draining devices at the bottom of the oil-reservoir serve to drain it entirely, or in case of accident, as mentioned, to enable the lubricator to be used as an ordinary "tallow cock," and in so doing to feed oil at once to both of the cylinders.

10 I claim—

1. The oil-reservoir as provided with the divisional partition C and column D, arranged in it as described, and having in the said column, lengthwise thereof, the two oil and the two steam passages  $m\ m'$  and  $n\ n'$ , all being substantially as set forth.

2. The oil-reservoir provided with the transverse partition C, with its column D, having oil and steam passages, as set forth, the sight-feed L, and the chamber  $d'$ , and the passage  $e'$ , leading from such chamber  $d'$ , and provided with branch educts communicating with the two flutes of the sight-feed, all being arranged substantially as set forth, and the chamber  $d'$  being provided at top with an opening to communicate with the condenser when fixed to and arranged above the oil-reservoir, as represented.

3. The combination of the condenser K and the chamber E, and its steam-induct  $x\ w'$ , and discharge-cocks G G', with the oil-reservoir A, arranged between such chamber and condenser, and provided with a sight-feed, L, divisional partition C, and oil and steam passages  $m, m', n,$  and  $n'$ , extending within such partition or its enlargement or column D, and communicating with the condenser and the chamber E, all being substantially as set forth.

4. The combination of the index-finger I, recessed link  $r$ , crank  $q$ , and the lever  $p^3$ , with the chamber E, and its steam induct and discharge cocks G and G', arranged and communicating with the condenser and the chambers B and B' of the oil-reservoir, substantially as set forth.

5. The sight-feed L, having the two separate reflecting-flutes arranged in rear of and close against its glass pane, and communicating with the condenser, and the chambers B and B' of the oil-reservoir, substantially as set forth.

6. The chamber E, connected with the oil-reservoir at its lower part, and provided with the steam-induct  $w'$ , its tubular neck  $v'$ , and partitions  $z\ z$ , and with the check-valve  $w'$ , arranged in such neck, extended upward through and beyond the chamber E, substantially as represented.

7. The duplex oil-reservoir A, provided in its lower part with the drainage-cock M, communicating by separate passages with the two chambers B and B' of such reservoir, all being substantially as described, such cock being to simultaneously drain both chambers, as explained.

8. The combination, with the duplex oil-reservoir A, of the deflecting-bar  $p^2$ , arranged

over the valve  $w'$ , and extending across the neck  $o^2$ , projecting down from such oil-reservoir, as represented, such bar being for the purposes as specified.

9. The duplex oil-reservoir provided at top with the oil-feeding mouth  $k'$ , and its two branch passages,  $m^2$ , opening therefrom into the two chambers B and B' of such reservoir, and also with the stopple  $l'$ , to screw into such mouth and against its bottom and across the said passages, all being substantially as set forth.

10. The duplex oil-reservoir provided with the chamber  $r^2$ , having passages  $w^2$  leading laterally from it into the two chambers B and B' of such reservoir, and also having a passage,  $q^2$ , leading from it into the neck  $o^2$ , and provided with a screw-plug,  $s^2$ , for opening and closing such passages, all being substantially as set forth.

11. The duplex oil-reservoir having in it the two separate oil-chambers, and the sight-feed communicating with such chambers and the condenser, as described, and also having the chamber  $d'$  arranged in the upper part of it, (the said reservoir,) and opening into the condenser and provided not only with a passage leading from it to the two flutes of the sight-feed, but with a screw-plug to close the said passage, all being substantially as set forth.

12. The combination, with the condenser K and the oil-reservoir A, and with the chamber E arranged below such reservoir and communicating therewith, and having an induct and cocks, as described, of the partition C, extending across the reservoir and provided with the central column, D, and its passages  $m\ m'\ n\ n'$  and pipes  $a^2\ a^3\ o\ o'$ , leading from such passages into the said chamber and condenser, such reservoir having a sight-feed, as described, to its two chambers, and also having means of regulating the passage of water from the condenser to the two flutes of such sight-feed, and also being provided with means or cocks for draining such reservoir either outside of or into the said chamber E, all being substantially as represented.

13. The combination of the condenser with the oil-reservoir, having in it two separate chambers for holding oil, and also a water-inlet from the condenser and an oil-discharge passage to each of such chambers, and with a chamber below such reservoir and opening into its oil-discharge passages and provided with two educts and cocks thereto, all being substantially and to operate as set forth.

14. The combination of the condenser with the oil-reservoir having two separate oil-chambers within it, and provided with a sight-feed, substantially as described, communicating with the condenser and reservoir, and having a stop-cock or screw-plug to regulate the flow of water from such condenser into the compartments or flutes of said sight-feed, such oil-reservoir having below it a steam induction and eduction chamber and passages leading



from the upper parts of the oil-chambers into such steam-induction chamber, all being essentially as represented.

15. A displacement-lubricator having a duplex oil-reservoir with oil-discharge passages to each oil-holding part thereof, and also having a valve to each of such passages, in combination with a water-chamber from which water can be admitted to each of the said oil-holding parts of such duplex oil-reservoir.

16. The combination of a lubricator consisting of an oil-reservoir and a steam-condenser arranged to communicate with each other, and having a valve between them to open and close such communication, with a concaved light-reflector set in close proximity to a glass pane or window arranged in the oil-reservoir, and having a water-passage leading from the condenser to the concaved face of such reflector, so that the water from the condenser may be seen as it passes through the channel so formed on its way to the oil-reservoir.

17. The combination of a displacement-lubricator having a duplex or double-chambered oil-reservoir provided with an oil-discharge passage to each oil-holding chamber or part of such reservoir, and with a valve to such pas-

sage, with a water-chamber from which water can be admitted and seen through a glass as it may enter either part of said duplex oil-reservoir.

18. The combination of a lubricator having a steam-condenser and an oil-reservoir provided with two oil-discharge passages leading from the latter, with an oil receiving and distributing chamber having two discharge-pipes leading from it and provided with a valve to each, such valve having mechanism by which they may be opened or closed by one lever, all being substantially as described.

19. The combination, with a lubricator provided with an oil-reservoir and a steam-condenser, of an oil-discharge chamber having valves to open and close its oil-discharge pipes, and provided with mechanism to be operated by one lever or handle, the said chamber being to communicate with the oil-reservoir and steam-condenser, substantially in manner and for the purpose as set forth.

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Witnesses:

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