No. 771,052. PATENTED SEPT. 27, 1904.

J. H. A. FORTIN.

LUBRICATOR.

APPLICATION FILED JAN. 10, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 6.

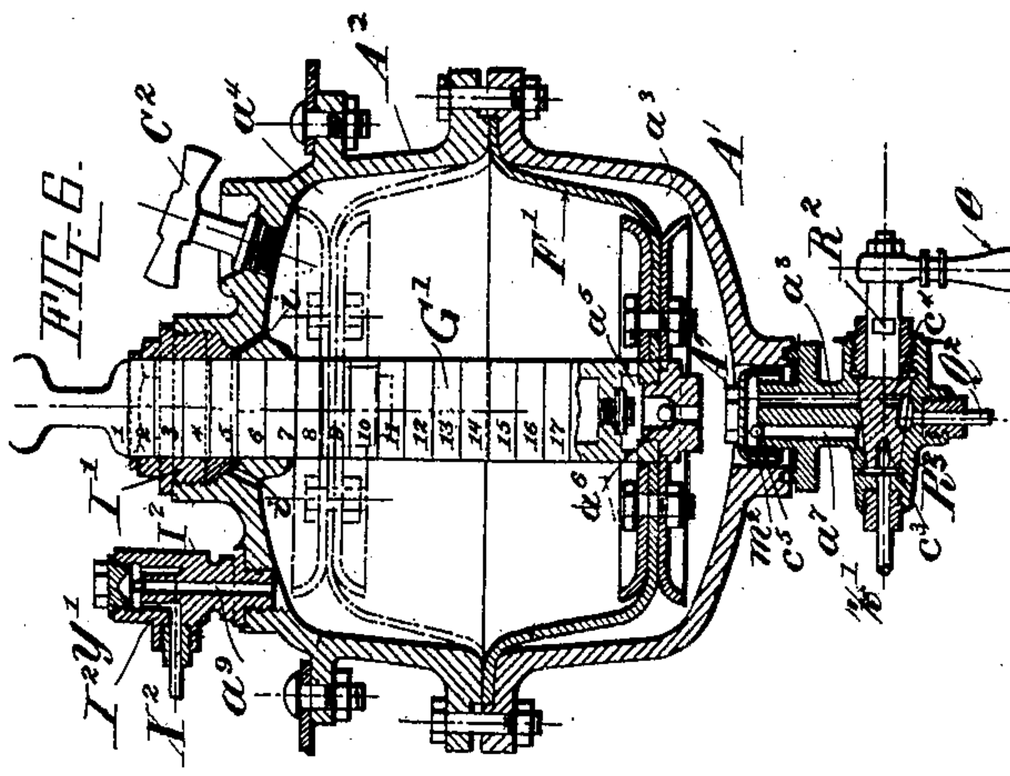


FIG. 7.

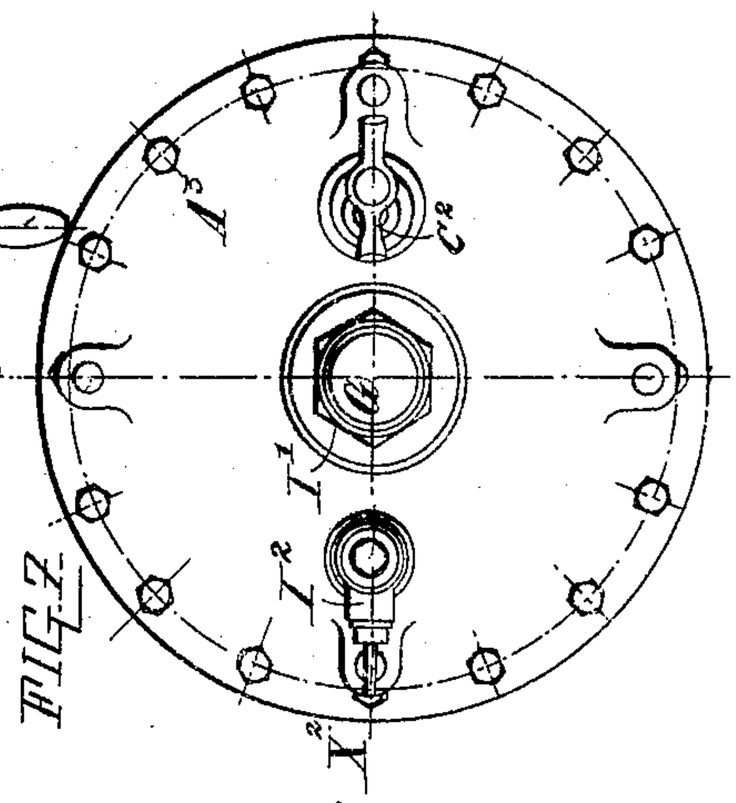


FIG. 2.

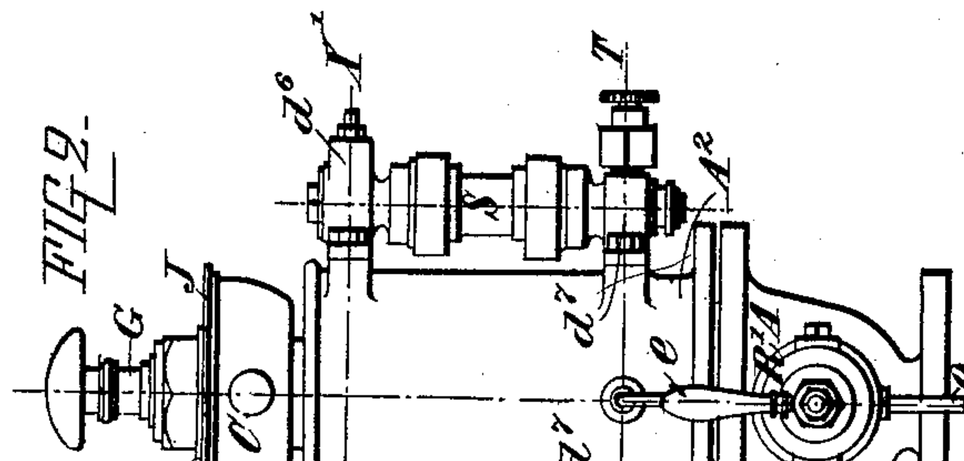


FIG. 5.

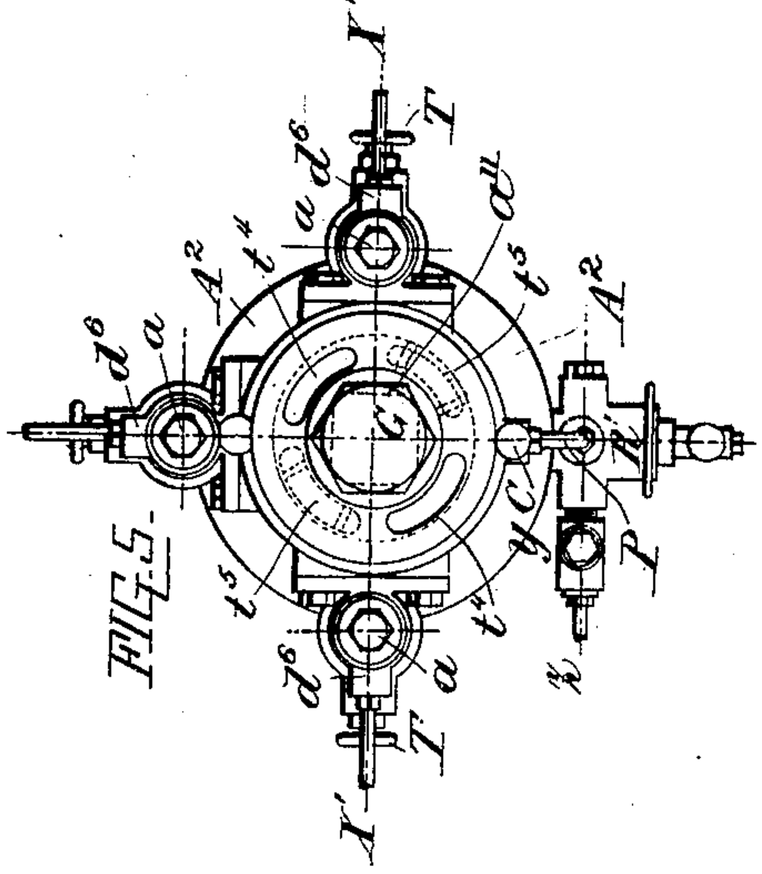


FIG. 1.

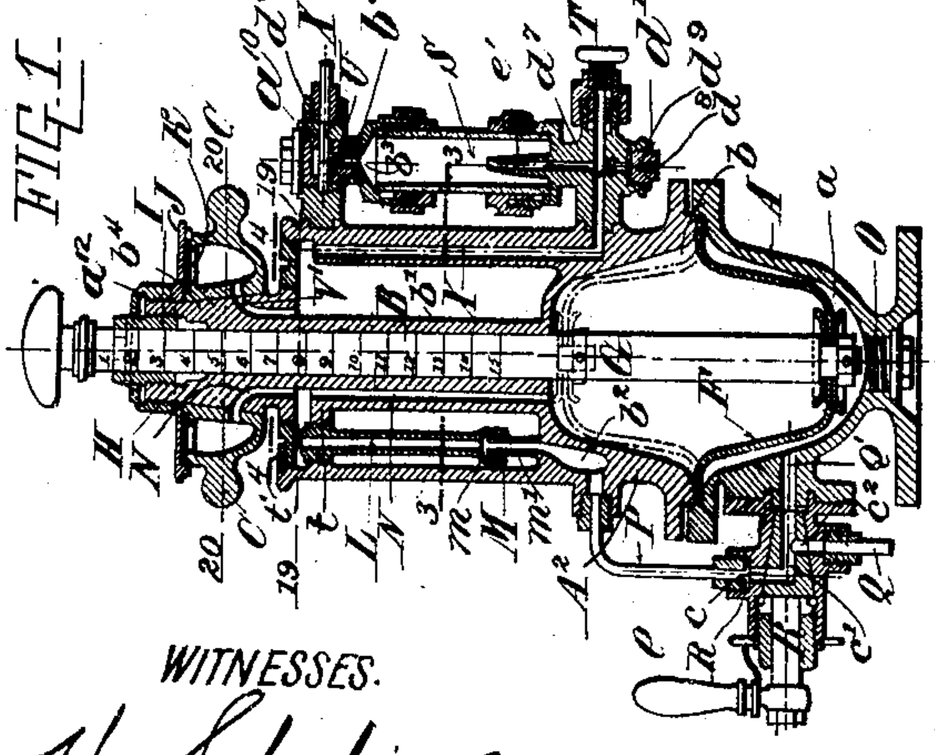


FIG. 3.

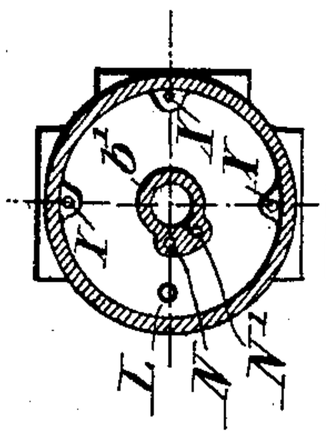
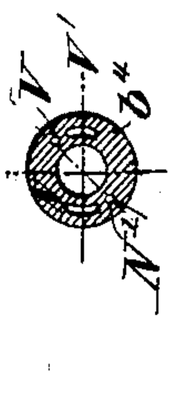


FIG. 4.



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No. 771,052. PATENTED SEPT. 27, 1904.

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LUBRICATOR.

APPLICATION FILED JAN. 10, 1901.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 12.

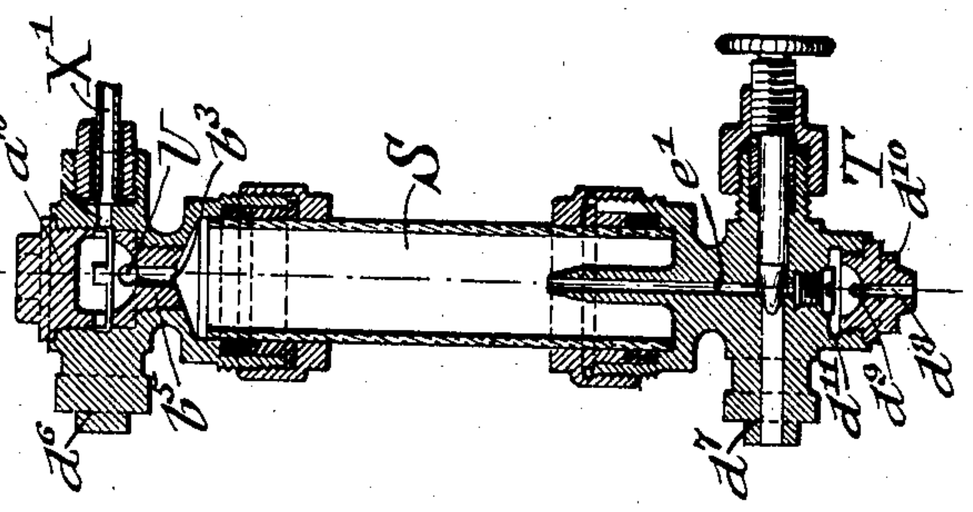


Fig. 9

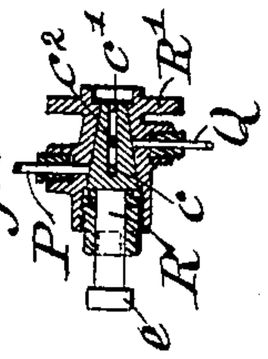


Fig. 11.

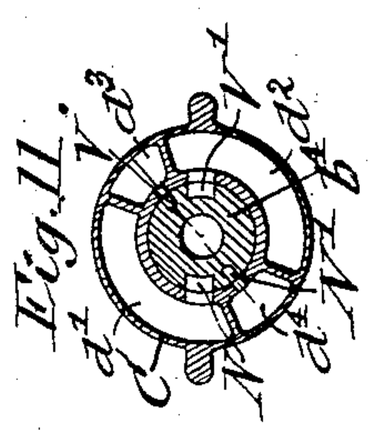


Fig. 8.

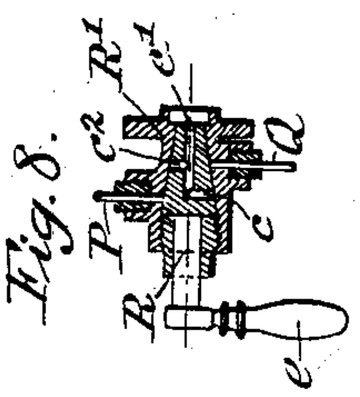
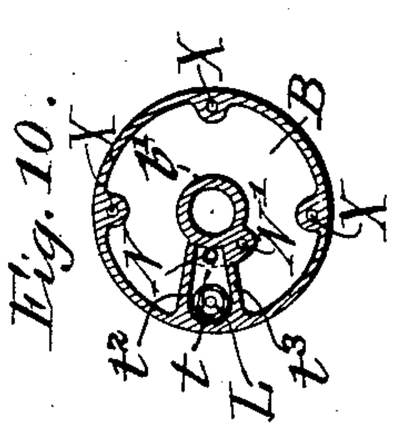


Fig. 10.



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No. 771,052. Patented September 27, 1904.

UNITED STATES PATENT OFFICE.

JULES HENRI A. FORTIN, OF RAISMES, FRANCE.

LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 771,052, dated September 27, 1904.

Application filed January 10, 1901. Serial No. 42,774. (No model.)

To all whom it may concern:

Be it known that I, JULES HENRI ALEXANDRE FORTIN, a citizen of the Republic of France, residing at Raismes, France, have invented certain new and useful Improvements in Lubricators, of which the following is a specification.

This invention relates to certain improvements in devices for lubricating steam and other engines and other machinery; and the invention consists in certain details of construction and combinations of parts, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central section through a lubricator embodying my invention. Fig. 2 is a side view of the same, partly in section. Fig. 3 is a horizontal section on line 3 3, Fig. 1. Fig. 4 is a horizontal section on line 4 4, Fig. 1. Fig. 5 is a plan view of the lubricator shown in the preceding figures. Fig. 6 is a vertical central section through another form of lubricator embodying my invention. Fig. 7 is a top view of the same. Figs. 8 and 9 are detail central sections through a three-way cock employed in the apparatus shown in Fig. 1. Fig. 10 is a horizontal section on line 19 19, Fig. 1. Fig. 11 is a horizontal section on line 20 20, Fig. 1; and Fig. 12 is a vertical central section, on an enlarged scale, through one of the sight-feed glasses and its connections.

Similar letters of reference indicate corresponding parts.

Referring to the lubricator shown in Figs. 1, 2, 3, 4, 5, 8, 9, 10, 11, and 12, A indicates the lower part, and A^2 the upper part, of a compression-chamber, which is of any suitable form—such, for instance, as that shown—and which is provided at its interior with a flexible diaphragm F, which is of such form as to be capable of movement within the chamber, thereby dividing the same into two compartments *a b* of variable capacity. The diaphragm F may be made of vulcanized rubber with an inner layer of textile material, of some suitable vegetable fiber, of sewed or beaten leather, of asbestos, or of any other suitable material, so combined as to withstand well wear and tear and hot water should the case require it. It may also in some cases be made of thin metal. To the diaphragm F is attached a piston-rod G, which extends to the outside of the apparatus and is preferably provided with graduations, as shown, whereby to indicate the position of the diaphragm, and thus the quantity of oil remaining in the device. The guide *b'* of the piston-rod extends through the reservoir B and is provided with an enlargement having two ducts N N', one of which, as N, communicates at its lower end with the compartment *b* and at its upper end with a connecting compartment formed by the outer casing-wall of the reservoir B, the guide *b'*, a horizontal diaphragm or plate *t*, the cover *t'* of the oil-reservoir, and two vertical partitions t^2 t^3, Fig. 10, and continues in upward direction from said compartment through the enlarged head b^4 of the guide *b'* and thence in outward direction, terminating at the side of the head. The second duct, N', extends from the compartment *b* also in upward direction, but does not communicate with said connecting compartment, but passes directly and continuously through the enlargement of the guide *b'* and terminates at the side of the enlarged head b^4 a short distance from the duct N. From the diaphragm or plate *t* extends in downward direction in the reservoir a tube L, which terminates at its lower end in the upper member of a hydraulic seal M, the lower member of which communicates by a bore b^2 and pipe P with the casing R' of a three-way valve R. From the casing R' pipes Q and Z also extend, and said valve is provided with connected bores *c c'*, adapted to place the pipe P in communication with a bore Q' in the part A leading to the lower compartment *a* of the compression-chamber, and from said bore *c'* a branch bore c^2 extends in such position as to place said bore *c'* in communication with the discharge-pipe Q. The bore *c* serves also when the valve is in proper position to place the pipe Z, supplying exhaust-steam, in communication with the bore *c'*, whence the steam passes into the lower compartment *a*, the bore c^2 being in this case out of communication with pipe Q. From the upper part of the reservoir extend

in downward direction suitable oil-ducts X X X for conducting away the oil. Each duct X communicates at its lower end with a duct e' in the lower support d^7 of a sight-feed glass S, said bore extending in upward direction and communicating with the interior of the glass. A needle-valve T controls the passage of oil from X to e'. The upper support d^6 of the sight-feed glass S is provided with an exit-duct b^3 for the oil, said duct being arranged partly in a removable plug b^5, which serves to support a ball U, forming a ball check-valve in said duct. In line with the glass S is also located in said support a removable plug a^{10} for facilitating cleaning of the parts. A discharge-pipe X', communicating with b^3, serves for conducting the oil away to the place of use. For charging the oil-reservoir B with oil and the upper compartment b of the compression-chamber with water a funnel-shaped cup C is provided, which is mounted rotatably by means of a suitable, preferably conical, bearing upon the upper part of the device—as, for instance, upon the enlarged upper end or head b^4 of the guide-sleeve b'—and normally closed by suitable slotted covers J K, the lower cover K of which is secured frictionally or otherwise to the cup C, so as to turn with the same when the cup is rotated, and is provided with arc-shaped slots t^5. (Indicated in dotted lines in Fig. 5.) The enlarged upper end or head b^4 is preferably provided with a "flat" or number of "flats" at its screw-threaded upper portion, as indicated in dotted lines at a'' in Fig. 5. The upper cover J is provided with an opening of corresponding shape, so as to fit upon said upper portion, and is thereby prevented from turning with the cup when the latter is rotated. The upper cover J fits upon the cup and incloses with the cup the inner cover, as indicated in Fig. 1, and is provided with slots t^4. (Shown in full lines in Fig. 5.) A nut a^{12} is screwed upon the upper end of the enlarged portion b^4, thereby securing the cover J in place. The slots of said covers when placed in register by turning the cup, and thereby the cover K, for a portion of a rotation, permit supplying the oil or water into the cup C. The cup is divided at its interior by suitable partitions into four compartments d' d^2 d^3 d^4, Fig. 11, the larger, d' d^2, of which are adapted to communicate, respectively, by means of suitable openings in the inner wall of the cup with the duct N and with a duct V' of the enlarged head b^4, which delivers into the oil-reservoir B. The smaller compartments d^3 d^4 communicate by suitable openings with the duct N' and with a duct V in the head b^4, opening into the oil-reservoir B. A suitable stuffing-box H and gland I secure tight connection between the piston-rod G and the head b^4 of its guide-sleeve. The lower compartment a of the compression-chamber is provided with a removable plug O, giving access to the chamber. In the pipe Z is preferably located a suitable check-valve y, preventing backflow in said pipe. For facilitating cleaning of the sight-feed glass a bore d^8, provided with a suitable ball check-valve d^9, is arranged in a plug d^{10} of the lower support d^7 of the glass. In case for any reason it is desired to permanently close the duct or bore, so as to prevent access through the same to the interior of the gage-glass, this is done by means of a plug d^{11}, Fig. 12. The operation of this lubricator is as follows: The valve R is set by its handle in closed position, shutting off all communication through the same. The lubricator is then inverted, the plug O removed, water poured into the lower compartment until filled, the plug O replaced, and the lubricator returned to normal position, the diaphragm being in lowermost position, as in Fig. 1. The cup C, carrying the cover K, is turned by hand or any suitable tool, so as to bring the slots t^4 t^5, Fig. 5, of the covers in register and give access to the larger compartments d' d^2 and place the openings of the cup C in communication with the ducts N N' V V', as shown in Fig. 11. Water is now supplied into the compartment d', whence it passes through duct N into the connecting compartment and thence through continuation of duct N into the upper compartment b of the compression-chamber until the same is filled. The upper end of the tube L projects slightly above the diaphragm t, and the communicating portion of the bore N is of less, or at all events no larger, diameter than the outgoing portion. Hence the water does not to any extent pass down said tube L, but is conducted away through N as fast as it arrives in the connecting compartment. Should a small quantity of water pass through the tube L into the oil-reservoir B, this would not interfere with the proper working of the apparatus. Air escapes from the compartment b during the entrance of the water therein by way of duct N' and compartment d^4, which is also open to the atmosphere by the slots t^4 t^5. Oil is now supplied through compartment d^2 and duct V' into the oil-reservoir, in which it rises, floating upon the surface of any water in the reservoir, and the air displaced escapes by way of duct d^3 and the slots in the covers J K. When filled, the cup C and cover K are rotated so as to close the cup and so as to move all the openings of the same out of register with the ducts N N' V V' and close the ducts at their upper ends. The valve R is now turned into the position shown in Fig. 9, whereby pipe Z supplies steam under suitable pressure, preferably low, as exhaust-steam, to the compartment a, the steam condensing as it contacts with the water, and thereby slowly increasing the volume of water in the compartment in addition to exercising pressure upon the same. The needle-valve T is opened slightly, and the pressure on the diaphragm

at its lower side causes it to rise and force the water in the compartment *b* through bore N into the connecting compartment before referred to and thence through tube L and the hydraulic seal M into the oil-reservoir at the lower portion of the same, causing the level of the oil to rise until finally oil flows into the ducts X at the upper part of the reservoir and thence into duct *e'* by way of the needle-valve into the sight-feed glass S and through duct b^3 and pipe X' to the place of use. The flow of oil is regulated by turning the needle-valve until the exact quantity required is fed. As the diaphragm rises the piston-rod G is moved outwardly, and when by the position of the same it is shown that the diaphragm is nearly at the limit of its motion the valve R is turned into the position indicated in Fig. 1 and the cup C, with cover K, rotated, so as to open the ducts to atmospheric air, as when filling. Water now flows out from the oil-reservoir through the seal M, duct b^2, pipe P, ducts *c c' c²* and pipe Q, and from the compartment *a* through ducts *q' c'* c^2 and pipe Q, the piston-rod and diaphragm descending by gravity. When the piston-rod arrives at its initial position, Fig. 1, and water in this manner flows from the pipe Q, it is an indication that the water has descended in the oil-reservoir to the level of the lower member of the seal M. There may be and ordinarily will be a thin layer of oil remaining in this water, the apparatus being so constructed that the upward movement of the diaphragm during working and the resulting upward movement of the water in the oil reservoir B, with the oil above it, is arrested for safety before said water-level arrives at the upper ends of the ducts X within the reservoir. This thin layer of oil, however, cannot escape when running off the water through the seal M because of the upper overhanging portion *n* of the seal, which is constructed projecting downwardly over the lower portion *n'* to a depth exceeding the thickness of said oil layer. The water having been discharged as described, the valve R is turned into the position shown in Fig. 1 and the upper compartment *b* and reservoir B charged with water and oil, respectively, as before described, cup C closed and turned, and the valve R set as in Fig. 9, and the operation of the device continues. For cleaning the sight-feed glass or adjacent parts when the device is not in use the plugs a^{10} and d^{11} may be removed, the plug d^{10} replaced, a small syringe or force-pump applied to the bore d^8, the needle-valve opened, and a cleaning liquid run through the glass. By removing plugs a^{10} and b^5 access is given for cleaning the glass by cotton-waste or other suitable material.

Figs. 6 and 7 illustrate a modified construction of compression-chamber. The compression-chamber shown does not contain oil, but is adapted to be connected by means of pipe X^2 with an oil-containing device or oil-reservoir, which may be, for example, of the same construction as that shown in Fig. 1, the pipe X^2 being connected to the lower end of duct N. A number of such reservoirs may be connected to a single pipe X^2, whereby independent compressors for each oil-reservoir are dispensed with and a simultaneous and uniform flow obtained for all reservoirs. Inasmuch as the construction of the oil-reservoir does not essentially differ from that shown in Fig. 1, no separate illustration from that of Fig. 1 is made. In the device shown in Fig. 6 A' represents the lower, and A^2 the upper, part of a suitable reservoir, which is divided into a lower compartment a^3 and an upper compartment a^4 by a flexible diaphragm F', to which is attached the lower end of a piston-rod G', which passes through the upper part A^2 of the reservoir. To the lower part A' is connected the casing R^3 of a three-way valve R^2, said casing having two ducts a^7 a^8, communicating with the compartment a^3. To the casing R^3 are connected a steam-supply pipe Z' and a pipe Q^2 for conducting the water from said reservoir. A bore c^3 in the valve R^2 connects the pipe Z' with duct a^7 when the valve is in proper position, and a bore c^4 connects the duct a^8 with pipe Q^2 when in a different position. In the piston-rod G' is located a duct a^5, connecting the compartments a^3 a^4 and having a ball check-valve a^6. At the upper part of the reservoir are arranged a removable plug C^2, a plug *l'*, through which the piston-rod G' passes and which normally closes two air-vents *i*, and a discharge connection I^2, having a bore a^9 communicating with the discharge-pipe X^2 and provided with a ball check-valve *y'*. When the apparatus is to be closed, a packing is inserted between the lower end of the plug I' and the opposed seat formed in the wall of the casing, the plug screwed down, and thereby the vent-openings *i* tightly closed and the piston-rod packed. The operation of this device is as follows: The device is inverted, the valve and its casing removed, and the lower compartment a^3 charged with water. The valve and the casing are then replaced and the device restored to its normal position. The diaphragm being in the position shown in Fig. 1 and the valve R^2 closed, the plugs C^2 and I' are removed and the compartment a^4 charged with water, the air displaced escaping by way of the vents *i*. The plugs are replaced and the valve R^2 turned, so as to place the lower compartment a^3 and the steam-pipe Z' in communication through bore c^3. The steam exerts pressure on the diaphragm, raises the same and forces thereby the water in the upper compartment out through bore a^9 and pipe X^2. The valve a^6 retains its position as in Fig. 6, owing to the excess of pressure in the upper compartment. The reason of the greater pressure in the upper compartment is that the effective area of the

upper side of the diaphragm is reduced by that of the rod G projecting from the casing. The steam entering the lower compartment a^3 rapidly condenses and supplies thereby under usual conditions of working a quantity of water in the lower compartment approximately the same as that flowing out of the upper compartment. When the diaphragm has reached the limit of its upward motion, it is returned by the attendant into its initial position by simply pressing on the end of the rod and forcing it thereby in inward direction. By this act the pressure in the lower compartment is rendered greater than in the upper compartment, and the water in the lower compartment flows through bore a^5, lifts valve a^6, and enters the upper compartment, the operation of discharging the same from said compartment being then carried on as described with reference to the water originally supplied therein, no recharging being necessary. The cock R^2 is not ordinarily employed for running off water from the reservoir, that operation not being necessary, but is necessary when cleaning the reservoir by flushing or for withdrawing the water when putting the device out of operation for a time. A ball check-valve c^5, guarding the bore a^7 and secured in place by a cap m^2, prevents backflow of water into the pipe Z'. It is obvious that the upper and lower portions A' A^2, respectively, of the compression-chamber may be made of uniform diameter throughout in the form of a cylinder, in which case the flexible diaphragm may be dispensed with and a piston-head packed at its rim by a suitable annular gasket of rubber or other material may be employed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A lubricator, comprising a compression-chamber, a diaphragm dividing the same into two compartments, means for supplying steam under pressure to the lower compartment, an oil-reservoir, a hydraulic seal in the lower part of the oil-reservoir formed by a depending upper tubular portion and an upwardly-projecting inner portion entering the same, fluid-conducting means connecting the upper portion with the upper compartment of said compression-chamber, fluid-conducting means connecting the lower portion with the lower compartment of said chamber, and means for conducting the oil away from said oil-reservoir.

2. A lubricator, comprising a compression-chamber, a diaphragm dividing the same into two compartments, means for supplying steam under pressure to the lower compartment, an oil-reservoir, a hydraulic seal in the lower part of the oil-reservoir formed by an upper portion open at its lower end and a lower tubular portion projecting upwardly into the same, fluid-conducting means connecting the upper portion with the upper compartment of said compression-chamber, fluid-conducting means connecting the lower portion with the lower compartment of said chamber, an outlet for discharging liquid from said oil-reservoir through said lower portion and fluid-conducting means, and means connected with said oil-reservoir for conducting the oil away from the same at its upper portion.

3. A lubricator, comprising a compression-chamber, a diaphragm dividing the same into two compartments, a graduated piston-rod secured at one end to said diaphragm and projecting at the outside of the lubricator, means for supplying steam under pressure to the lower compartment of said chamber, an oil-reservoir, a hydraulic seal in the lower part of said oil-reservoir formed by an upper tubular portion open at its lower end and a lower tubular portion projecting upwardly into engagement with the same, fluid-conducting means connecting the upper portion with the upper compartment, fluid-conducting means connecting the lower portion with the lower compartment, a valve in said latter fluid-conducting means, discharge-fluid-conducting means for the oil, adapted to intake at the upper part of the oil-reservoir, sight-feed glasses connected one with each of said discharge-fluid-conducting means, a needle-valve for each sight-feed glass, a discharge-fluid-conducting means for conducting the oil away from said glass, and a check-valve in said discharge-duct.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JULES HENRI A. FORTIN.

Witnesses:

FR. WARGNY,

ED. MODENER.