

No. 766,756.

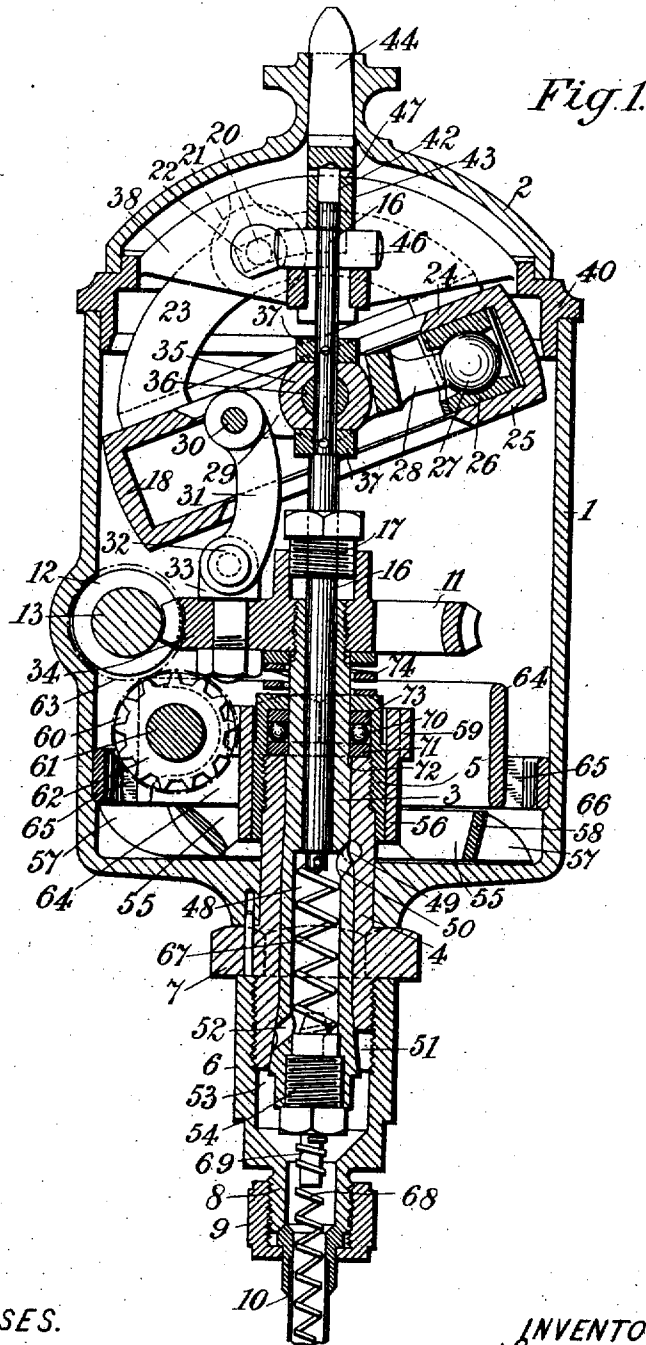
PATENTED AUG. 2, 1904.

L. CHAPMAN.
LUBRICATOR.

APPLICATION FILED APR. 13, 1904.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES.
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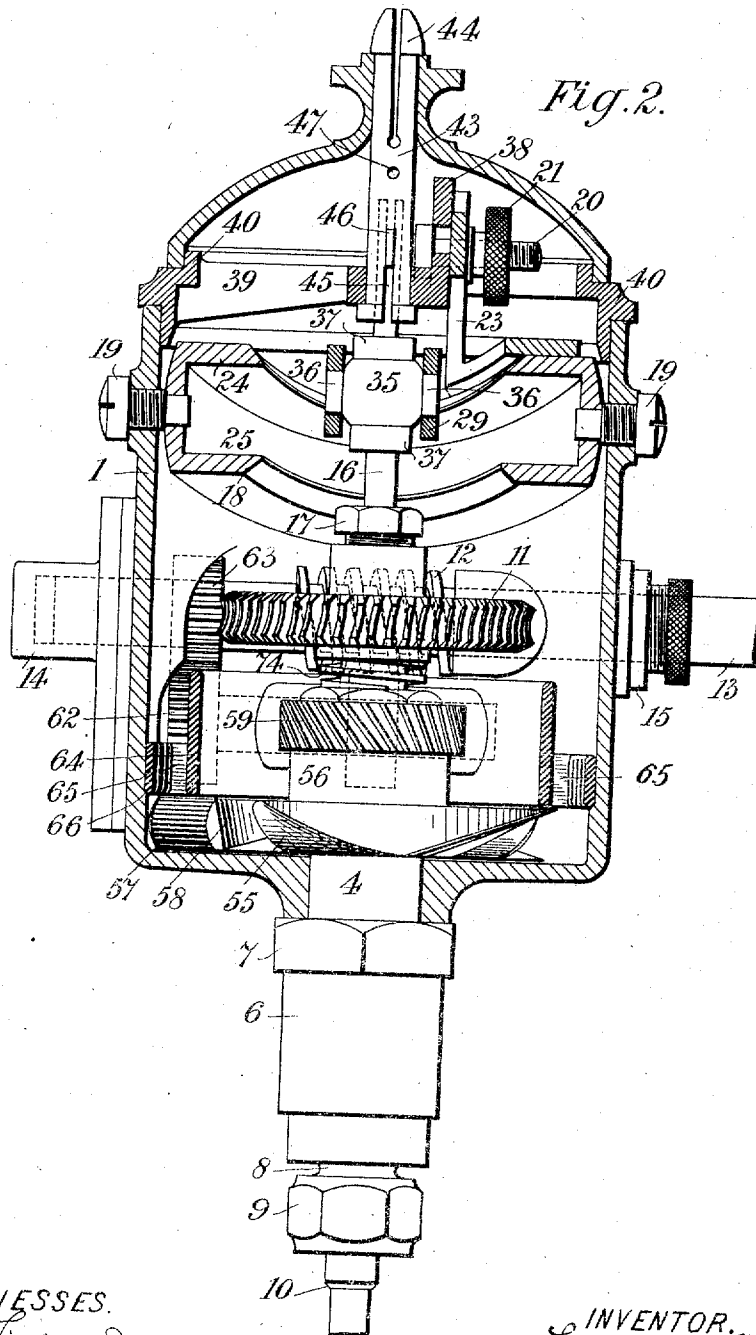
PATENTED AUG. 2, 1904.

L. CHAPMAN.
LUBRICATOR.

APPLICATION FILED APR. 18, 1904.

NO MODEL.

4 SHEETS—SHEET 2.



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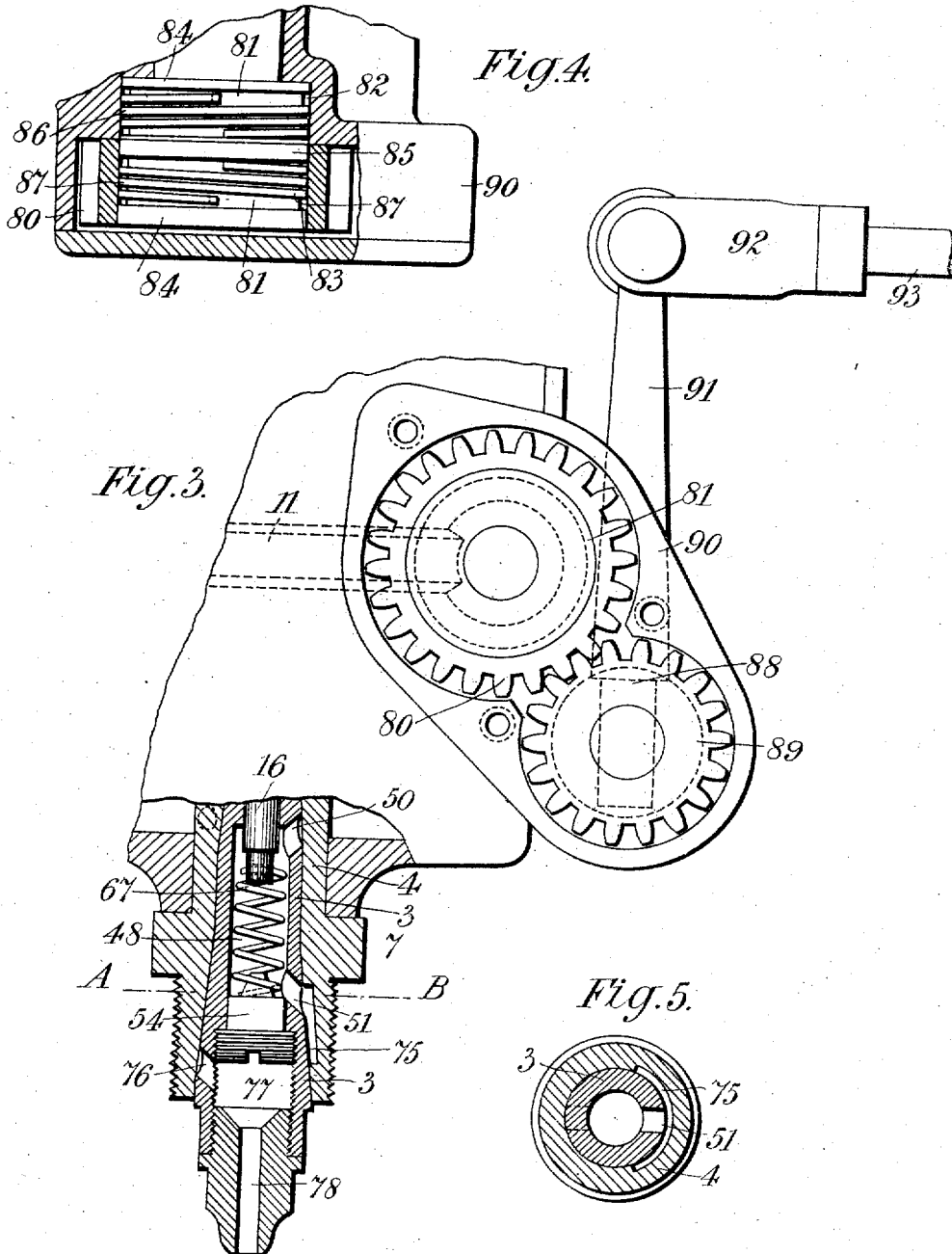
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 6.

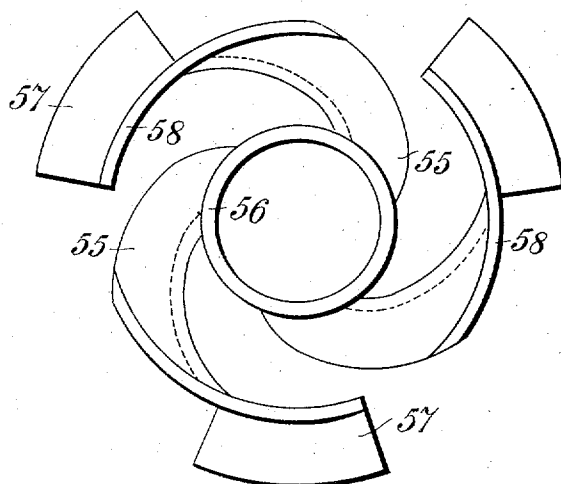
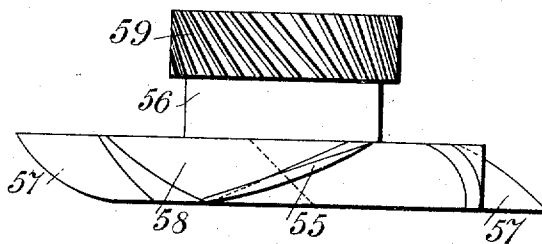


Fig. 7.



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UNITED STATES PATENT OFFICE.

LEONARD CHAPMAN, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF
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LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 766,756, dated August 2, 1904.

Application filed April 18, 1904. Serial No. 203,753. (No model.)

To all whom it may concern:

Be it known that I, LEONARD CHAPMAN, a subject of the King of Great Britain, residing at London, England, have invented a certain new and useful Improvement in Lubricators, of which the following is a specification.

This invention relates to an improvement in lubricators, the object being to provide a lubricator adapted for feeding semifluid or thick lubricating material, particularly graphite and oil or the like, where the graphite has a tendency to settle down from the oil in which it is in suspension.

The lubricator comprises a container having a suitable cover within which is arranged means for pumping suitable quantities of the lubricant to a chamber to which it is admitted through ports or valves and from which it is withdrawn and conveyed to the steam-space. Means are provided for controlling the amount of lubricant so conveyed and also means for stirring or agitating the latter, so that the solid matter shall be kept in suspension in the liquid and prevented from settling.

Referring to the accompanying drawings, Figure 1 is a vertical section through a lubricator constructed in accordance with this invention. Fig. 2 is a similar section taken on a line at right angles to Fig. 1. Fig. 3 is a modification thereof. Fig. 4 is a sectional plan of a part of Fig. 3. Fig. 5 is a transverse section on line A B, Fig. 3; and Figs. 6 and 7 are respectively a plan and elevation of the stirring or agitating device.

1 is the container, and 2 the cover therefor, within the lower part of which container a revoluble pump-barrel spindle 3 is arranged, which rotates in a housing 4, secured to the body of the container 1 by a cap-nut 5. The housing extends through the bottom of the container and is threaded on its outer and lower extremity to receive a socket 6, which is screwed home against a hexagon 7 on said housing. The lower part of the socket terminates in a threaded nipple 8 to receive a cap-nut 9, by means of which the delivery-pipe 10 to the steam-space is connected with the socket 6 and thence with the container.

The pump-barrel 3 carries screwed thereon

a worm-wheel 11, gearing with a worm 12, mounted within the container on a driving-shaft 13, one end of said shaft being carried in a blind bearing 14 and the other end passing out through a stuffing-box and gland 15 in the casing 1 and adapted to be driven by any suitable means. Arranged to slide vertically within the upper part of the pump-barrel 3 is a plunger 16, which is prevented from turning by means hereinafter described and the working of which is rendered air-tight by a stuffing-box and gland 17, through which it passes.

In the upper part of the container is located an internally-channeled swash-ring 18, pivoted on trunnions 19, screwed into the container-casing, so that said ring 18 may be canted over at an angle by the adjustment of a bolt 20 and thumb-nut 21 working in a quadrant-slot 22 in a segmental plate 23 or like suitable means.

In the space between the upper and lower flanges 24 25 of the ring 18 are two cups 26, which form the socket for the ball end 27 of a lever 28, in the forked end 29 of which is jointed by a pin 30 a curved link 31, the lower end of which is in turn jointed by a pin 32 in a double eye 33, secured to an arm 34 of the worm-wheel 11, so that any rotation of the latter carries the ball end and socket of the lever 28 round with it in the guide formed by the channeled swash-ring 18 and imparts to said lever a universal reciprocating motion. Within the fork of the lever 28 is also carried a spherical cross-head 35 and pins 36, through which cross-head passes the upper part of the plunger 16, provided immediately above and below said cross-head with fixed collars 37, so that any rocking action of the lever 28, due to the angle at which the channeled swash-ring 18 is canted, imparts a corresponding vertical reciprocation to the plunger 16.

To the upper face of the ring 18 is secured an angle-bracket 38, which carries the bolt 20 and thumb-nut 21 for fixing the angle of said ring, the segmental plate 23 in which said bolt works being carried by the cross-web 39 of the crown-ring 40 of the container.

The upper part of the plunger 16 is guided in a recess 42, bored in the lower part of a stud 43, the upper part of which terminates in a split acorn 44 in the cover 2, which acorn must be sprung together before the cover can be removed. A long slot 45 is formed in the upper end of the plunger, which carries a cotter 46, passed through a slot in said stud 43, whereby the plunger is prevented from rotating, but is free to reciprocate vertically. The upper part of said stud is provided with an air-hole 47, communicating with the recess 42 therein.

The lower part of the pump-barrel spindle 3 is chambered at 48 to receive the lubricant, which is admitted through suction-ports 49 and 50 in the housing and pump-barrel, respectively, being drawn from the container into the pump-barrel by the action of the plunger 16, and delivery-ports 51 and 52 are also provided in the housing and pump-barrel, whereby the lubricant is delivered to a chamber 53 in the socket communicating with the delivery-pipe 10, which ports 49 50 and 51 52 alternately correspond and miss each other, and are thus opened and closed by the rotation of the pump-barrel during practically the whole of the up-and-down stroke of the plunger 16, only sufficient lap or cover being provided to obviate the possibility of both passages being open at the same time. The lower part of the pump-barrel 3 is closed by a plug 54 within the chamber 53 in the socket 6.

To prevent the pump-barrel from becoming jammed in the housing by the pressure against which the lubricant has to be delivered, a ball thrust-bearing 70 is located in the space between the cap-nut 3 and the top of the housing, the balls being placed between a collar 71, resting on the top of the housing and on a shoulder 72 formed on the pump-barrel, and a similar collar 73, pressing against the under side of the cap-nut 5. In the event of a vacuum being formed in the steam-space to which the lubricant is delivered and to which the lower end of the spindle is also exposed the latter is prevented from leaving its seatings in the housing, (which are preferably, as shown, slightly coned,) and thus permitting leakage from the container by a spring-washer 74, placed between the top of the cap 5 and the under side of the worm-wheel 11.

Within the lower part of the container is a stirring device for the purpose of keeping the lubricant in the container in constant motion, which may be of any suitable form, but which preferably consists of a number of backwardly-curved downwardly-inclined curved blades 55, which spring from a central boss in the form of a sleeve 56, adapted to rotate about the cylindrical surface of the cap-nut 5, which forms the bearing for said sleeve. The said blades carry on their outer ends upwardly or re-

versely inclined curved blades 57, separated therefrom by a wall 58. The upper part of the sleeve carries or has formed upon it a worm-wheel 59, which meshes with a worm 60 on a jack-shaft 61, said shaft having keyed thereon a pinion 62, engaging an equal pinion 63 on the driving-shaft 13, whereby the stirrer is rotated at the same rate as the worm-wheel 11 and pump-barrel 3. Immediately above the blades of the stirrer is located a cylindrical trunk or screen 64, supported on a spider 65, which rests on a shoulder 66 in the lower part of the container-casing 1. By this means the column of liquid is drawn downward within the screen 64 by the downwardly-curved inner blades 55 and impelled radially outward under the lower edge of said screen and projected upward between the grids of the spider 65 by the action of the upwardly-curved outer blades 57, the screen 64 assisting in the circulation of the lubricant down the middle and up the sides of the container. The lubricant is likewise kept in motion within the pump-barrel 3 by means of a wire spiral 67, one end of which is threaded through a hole in the lower extremity of the plunger 16, the other end resting loosely upon the plug 54, so that although the spiral does not revolve the rotation of the pump-barrel around it produces the same effect, and the motion is further enhanced by the compression and extension of the spiral 67 due to the reciprocation of the plunger. Agitation of the lubricant in the chamber 53 and the delivery-pipe 10 is similarly produced by a like wire spiral 68, fastened to a spigot 69, projecting from the end of the plug 54 in the pump-barrel, with which it revolves, its lower extremity being free.

In the modification illustrated in Figs. 3, 4, and 5 the lubricator is shown arranged to screw directly into the steam-space, and the suction-ports 50 and 49 in the pump-barrel and housing are arranged as already described; but the delivery-port 51 opens from the pump-barrel into a space 75, formed in the housing and which extends partially around the pump-barrel, which is here coned and which extends below the housing and has an additional delivery-port 76 on the opposite side to the delivery-port 51, said port 76 being arranged beneath the plug 54, closing the pump-barrel, so that as the latter rotates and closes its delivery-port 51 the lower delivery-port 76 opens into a chamber 77 in the housing, from which the contents drain into the steam-space 78. Such an arrangement forms a non-return valve in the pump-barrel, since at no time can there be direct communication between the three ports 50, 51, and 52. Means are also shown in Figs. 3 and 4 of imparting rotary motion to the worm-wheel 11 to rotate the pump-barrel and reciprocate the plunger through the means already described from some reciprocating part of the engine to which

it is applied, such as the valve-rod. Such means comprise a toothed ring 80, to which is keyed a disk 81, in which are formed two recesses 82 83, Fig. 4, leaving a collar 84 at each end and a collar 85 in the center. In the recesses are located, respectively, right and left hand coiled springs 86 87, of square-section wire, one end of each spring being fixed to the disk. The toothed ring 80 gears with a pinion 88 on a spindle 89, carried in a casing 90, which incloses the whole, and on the spindle is mounted a lever 91, in turn pivoted to a link 92, screwed or otherwise suitably connected with a lever 93, which receives the reciprocating motion from the valve-rod of the engine. This reciprocating motion through the lever 91 oscillates the spindle 89, pinion 88, and toothed ring 80, the latter running freely over its coil in one direction; but in the opposite direction the coil is expanded and grips the ring firmly, thus turning the reciprocating motion of the valve-rod into rotary motion in one direction. To prevent the worm-shaft from turning in the other direction, the reverse-spring locks the disk on the backward movement of the toothed ring.

The operation of the invention is, shortly, as follows: The swash-ring 18 is canted over to any desired angle, according to whether a greater or less quantity of lubricant is to be fed to the steam-space, by moving the belt 20 in the quadrant-slot 22 and is fixed in that position by tightening up the thumb-nut 21 against the plate 23. This canting of the ring causes a reciprocating action of the lever 28, when one end, 27, is carried round by reason of the attachment of the forked end 29 to the link 31 and double eye 33, mounted on the worm-wheel 11. The reciprocation of said lever is communicated through the spherical cross-head 35 to the plunger 16, and suction takes place within the rotary pump-barrel 3. The rotation of the pump-barrel brings the open port 50 therein opposite a corresponding port 49 in the housing 4 when the suction of the reciprocating plunger 16 draws some of the lubricant from the container within the chamber 48 in said pump-barrel on the upstroke of said plunger. The ports 50 and 49 then close, and the lubricant in the chamber 48 is delivered on the downstroke of the plunger through a port 51 in the lower part of the chamber 48, which corresponds with a port 52 in the housing 4 and which now opens into the chamber 53 in the socket 6, whence it is conveyed to the steam-space by means of the delivery-pipe 10. During the whole of this operation the lubricant is kept stirred by the device already described, which is driven through the intermediate gearing from the same shaft as the worm-wheel and pump-barrel. This stirring action is maintained even when no lubricant is being delivered, which is the case when the swash-ring is set horizontal, in which posi-

tion the lever 28 is simply carried round in one plane, in the guide formed by the channeled ring 18, no reciprocation thereof or of the plunger taking place, and a consequent absence of suction causing a cessation in the flow of lubricant.

What I claim is—

1. In a lubricator, the combination with a container for the lubricant, of pumping means operating within the container to feed the lubricant, a swash-ring and means for adjusting position of same and connected with the pumping means, whereby the action of the latter can be varied.

2. In a lubricator, the combination with a container for the lubricant, of pumping means operating within the container to feed the lubricant, a guide-ring, and a lever controlled by the position of same and connected with the pumping means whereby the action of the latter can be varied.

3. In a lubricator, the combination with a container for the lubricant, of a pump-barrel arranged within the container, a plunger working therein, a worm-wheel for revolving said pump-barrel, means for rotating said wheel, a lever, means for rotating same from said worm-wheel, and means for imparting an up-and-down motion to said lever to reciprocate said plunger to feed the lubricant.

4. In a lubricator, the combination with a container for the lubricant, of a pump-barrel having ports therein arranged within the container, a part surrounding said barrel having corresponding ports, a plunger working in said barrel, a worm-wheel for revolving said barrel, means for rotating said wheel, a lever, means for rotating same from said worm-wheel, and means for imparting an up-and-down motion to said lever to reciprocate said plunger to feed the lubricant.

5. In a lubricator, the combination with a container for the lubricant, of a pump-barrel arranged within the container, a plunger working therein, and a pivoted guide-ring and connections between the latter, the pump-barrel and the plunger, to reciprocate the latter to feed the lubricant.

6. In a lubricator, the combination with a container for the lubricant, of a pump-barrel arranged within the container, a plunger working therein, a worm-wheel fast to said pump-barrel, a worm on a driven shaft engaging said worm-wheel to rotate said pump-barrel, a guide-ring pivotally suspended within the container, means for canting said ring, a link pivoted on said worm-wheel and a lever pivotally attached to the link, to the plunger, and to the guide-ring to reciprocate the plunger to feed the lubricant.

7. In a lubricator, the combination with a container for the lubricant, of a pump-barrel having suction and delivery ports therein, and means for rotating said pump-barrel, a

housing therefor having similar ports arranged to alternately correspond with and miss said ports in the pump-barrel, a socket carried by said housing, having a chamber therein, into which the ports in said housing
5 are adapted to open, a feed-pipe opening from said socket-chamber, a plunger in said pump-barrel, and means for reciprocating same, whereby the lubricant is drawn from the container and delivered to the feed-pipe.

8. In a lubricator, the combination with a container for the lubricant, of a pump-barrel, a worm-wheel thereon, a worm on a driven shaft gearing therewith to rotate said pump-barrel, fixed collars on said plunger, a cross-head between said collars, a lever pivotally attached to said cross-head, a link carried by said worm-wheel and attached to said lever, a ball-and-socket joint on said lever, a ring
15 pivotally suspended within the container to form a guide for said lever, and means for canting said ring, and thus reciprocating the lever and the plunger to feed the lubricant.

9. In a lubricator, the combination with a container for the lubricant, of a pump-barrel and means for rotating the same, a plunger, means for reciprocating the latter, a channeled pivotally-suspended swash-ring, a segmental slotted plate carried thereon, a bolt
25 riding in said slotted plate, and an angle-bracket fixed to the container carrying said bolt and thumb-nut, whereby said swash-ring can be canted over to govern the reciprocations of said plunger.

10. In a lubricator, the combination with a container for the lubricant, a pump-barrel, means for rotating same, and a plunger and means for reciprocating same, of a stirring device in said container whereby the lubricant is kept in motion within the container.

11. In a lubricator, the combination with a container for the lubricant, of a pump-barrel and means for rotating same, a plunger and means for reciprocating same, a housing for said pump-barrel, and a stirring device in the pump-barrel attached to said plunger, compressible under the action of the plunger.

12. In a lubricator, the combination with a container for the lubricant, a pump-barrel, a plunger, means for reciprocating same, a delivery-pipe connected to the container, a flexible spiral stirrer located in said delivery-pipe and means for rotating same.

13. In a lubricator, the combination with a container for the lubricant, of a pump-barrel having a chamber therein, means for rotating same, a plunger and means for reciprocating same, a housing for said pump-barrel, a socket having a chamber therein attached to the
60 pump-barrel, and a stirring device in said pump-barrel chamber attached to said plunger compressible under the action of the latter.

14. In a lubricator of the character described, the combination with a container, of

a pump-barrel having suction and delivery ports therein, means for rotating such barrel and for feeding the lubricant, a housing having a suction-port therein corresponding with the suction-port in said pump-barrel, said housing having a chambered recess communicating with the steam-space and with which the delivery-ports in the pump-barrel alternately correspond, to deliver the lubricant therein to the chambered recess and thence to the said steam-space.

15. In a lubricator of the character described, the combination with a container for the lubricant, of a pump-barrel, means for rotating said pump-barrel and for feeding the lubricant, a housing in which the pump-barrel rotates and is seated, and a ball-bearing interposed between the housing and the pump-barrel.

16. In a lubricator, the combination with a container for the lubricant, of a pump-barrel arranged therein, a plunger working in said pump-barrel, means for rotating said barrel and reciprocating said plunger, a worm-wheel fast on the pump-barrel, a shaft, a worm on same, a disk fast on said shaft having recesses formed therein, collars within the recesses, right and left hand coiled springs located in said recesses each fixed at one end and abutting against said collars, a toothed ring fast on said disk, a spindle, a pinion on said spindle gearing with said toothed ring, a lever on said spindle, and means for reciprocating the lever.

17. In a lubricator, a stirring device comprising a number of downwardly-inclined radiating blades, an upwardly-inclined blade on the end of each of said downwardly-inclined blades, and means for rotating said device.

18. In a lubricator, a stirring device comprising a central boss, a number of downwardly-inclined backwardly-curved blades radiating therefrom, an upwardly-inclined blade on the end of each of said downwardly-inclined blades, a wall separating each of said upwardly and downwardly curved blades, and means for rotating said device.

19. In a lubricator, a stirring device comprising a central boss, a number of downwardly-inclined blades radiating therefrom, an upwardly-inclined curved blade on the end of each of said downwardly-inclined blades, a wall separating each of said upwardly and downwardly inclined blades, and means for rotating said device.

20. In a lubricator, the combination of a stirring device comprising a number of downwardly-inclined radiating blades, an adjustably-inclined blade on the end of each of said downwardly-inclined blades, means for rotating said device, and a fixed screen located close to the point of change of the blades.

21. In a lubricator, the combination with a stirring device comprising a number of down-

wardly-inclined radiating blades, an upwardly-inclined blade on the end of each of said downwardly-inclined blades, a wall separating each of said upwardly and downwardly inclined blades, means for rotating said device, a fixed screen located above said device and means for supporting said screen in position.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEONARD CHAPMAN.

Witnesses:

ALLEN PARRY JONES,
A. KNIGHT CROAD.