H. W. HANCOCK.

FORCE FEED LUBRICATOR.

APPLICATION FILED MAR. 18, 1907.

1,003,254. Patented Sept. 12, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

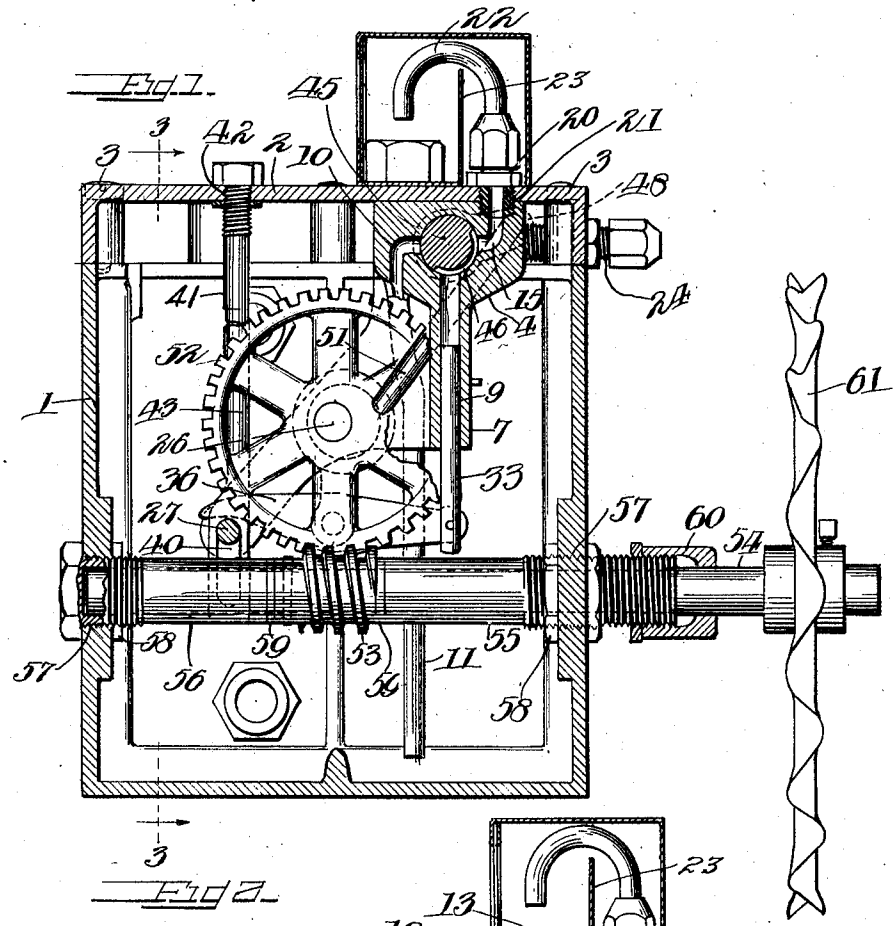
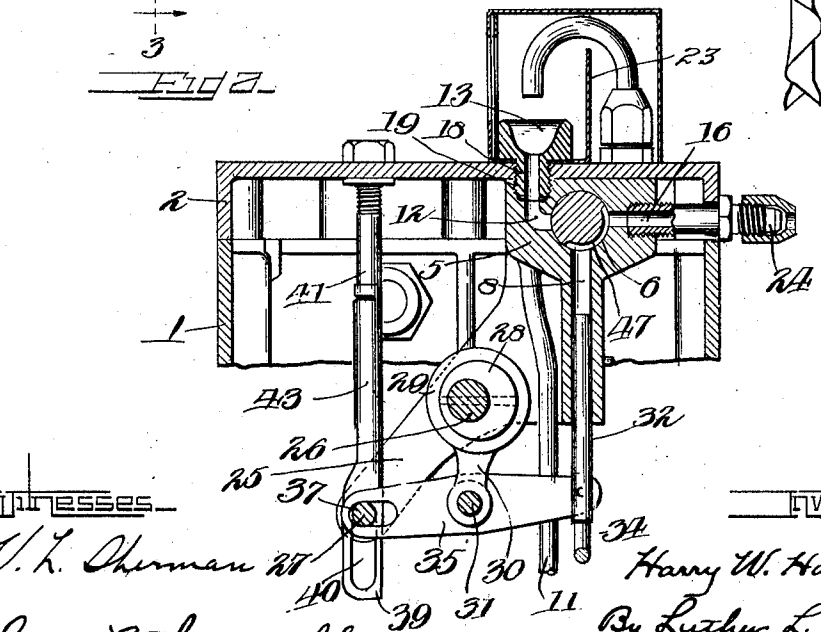


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

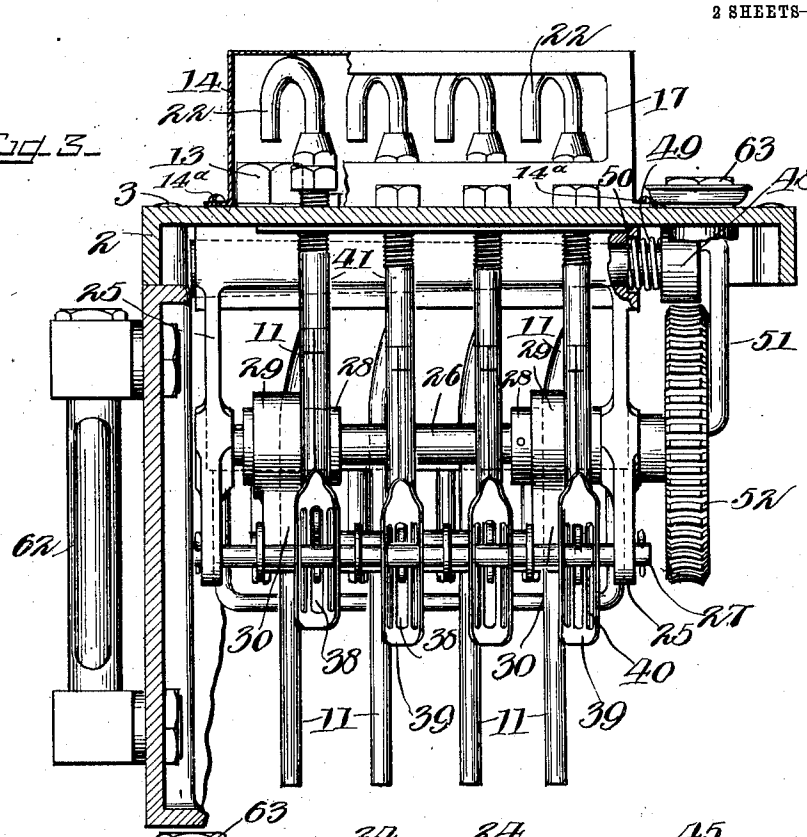

Fig. 4.

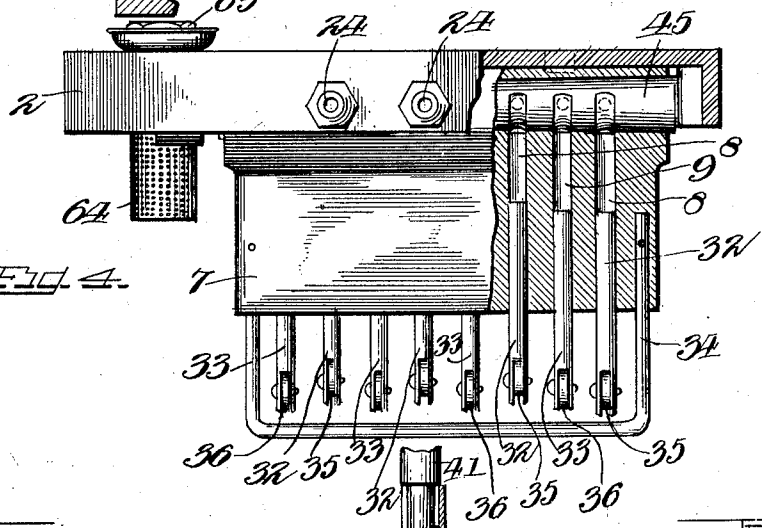

Fig. 5.

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UNITED STATES PATENT OFFICE.

HARRY W. HANCOCK, OF CHICAGO, ILLINOIS.

FORCE-FEED LUBRICATOR.

1,003,254. Specification of Letters Patent. **Patented Sept. 12, 1911.**

Application filed March 18, 1907. Serial No. 363,115.

To all whom it may concern:

Be it known that I, HARRY W. HANCOCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Force-Feed Lubricators, of which the following is a specification.

One of the objects of this invention is the provision, in a multiple-feed lubricator, of improved means for independently varying the amount of lubricant forced to each delivery point.

Another object of the invention is the combination, in a unitary machine, of means for positively feeding lubricant from a reservoir to a sight feed and for positively feeding lubricant from the sight feed to the bearing or bearings to be oiled.

A further object is to provide such an arrangement of the pumping mechanism as will prevent the entrapping and alternate compression and expansion of a body of air in the pump cylinders.

The invention also relates to an arrangement of the means for forcing the oil to and from the sight feed adapted to prevent the production of pressure in said sight feed.

The invention further relates to the other improvements in force-feed lubricators hereinafter set forth.

In the accompanying drawings, Figure 1 is a vertical sectional view through a force-feed lubricator embodying the features of my invention. In this view the mechanism is shown in the position assumed when some of the plungers are forcing oil from their cylinders to the sight feed, and certain other plungers are forcing oil from their cylinders to the bearings to be lubricated. Fig. 2 is a fragmental sectional view similar to that of Fig. 1, but taken in a different vertical plane. Fig. 3 is a vertical sectional view taken on the plane of dotted line 3 3 of Fig. 1. Fig. 4 is a fragmental view taken from the side opposite to that seen in Fig. 3. Fig. 5 is a detail view illustrating the connection between the adjusting screws and the lost-motion members.

The force-feed lubricator herein illustrated is provided with a sight-feed mounted upon the body or casing of the lubricator, but it will be understood that, if desired, the sight feed may be located at a distance from the lubricator, the two devices being connected by suitable pipes.

I have selected for illustration a force-feed lubricator arranged to supply oil to four delivery points, but it will be understood that any number of bearings may be supplied from one lubricator, a multiplication of the pump units being the only change required from the construction herein shown.

The casing 1, which serves as the oil reservoir, and incloses all of the mechanism of the lubricator, is herein represented as consisting of a casting, but if desirable it may be formed from steel or brass sheet-material. It is substantially rectangular, and is provided with a cover 2 secured thereto by means of screws 3. To the under side of the cover 2 is secured a casting 4 comprising a valve casing 5 having therein a tapering longitudinal chamber 6, and a web 7 having formed therein eight vertically extending cylindrical openings, said web with its openings constituting four pump cylinders 8 and four pump cylinders 9 alternating in position. In the valve casing 5 are formed four intake ports 10 communicating with the lower portion of the casing 1 by means of pipes 11, and four intake ports 12 communicating with cups 13 in the sight feed casing 14, said intake ports 10 and 12 alternating in position in one side of the valve casing. In the opposite side of said casing are formed four outlet ports 15 leading to the sight feed, and four outlet ports 16 leading to the delivery points. The sight feed casing 14 has a glass-covered sight opening 17 in its forward side. Said casing is secured to the cover 2 by screws 14^a. The cups 13, four in number, have tubular externally screw-threaded stems 18 which lie within correspondingly screw-threaded openings 19 in the casting 4. Tubular screws 20 lie within screw-threaded openings 21 in said casting and communicate with the outlet ports 15. To the upper ends of said screws are attached curved tubes 22 arranged to discharge the oil pumped from the reservoir into the cups 13. A mirror 23, of polished metal, extending vertically within the sight feed casing 14 behind the delivery ends of the curved tubes 22 may be provided, if desired, in order to render the drops discharged from said tubes more readily visible to the observer. The screw-threaded members 18 and 20, it will be seen, serve to secure the casting 4 firmly to the cover 2. Tubes (not shown)

leading to the delivery points are placed in communication with the outlet ports 16 by means of union screw-studs 24.

The casting 4 comprises two arms 25 carrying a rotatably mounted shaft 26 and a fixed stop rod 27. Upon the shaft 26 are rigidly mounted two eccentrics 28 provided with straps 29 having fixed thereto depending arms 30. In the lower ends of said arms is mounted a pivot pin 31. In the pump cylinders 8 and 9 are slidably mounted vertically disposed pump plungers 32 and 33, respectively. A stop rail 34 is rigidly attached to the web 7 and extends at the sides of and below the bank of plungers 32 and 33 to limit the downward movement of the plungers 33. In the operation of the machine, the stop rail 34 does not limit the downward movement of said plungers. It is provided to prevent possible accidental displacement of said plungers when the mechanism is removed from its casing. The plungers 32 are pivotally connected at their lower ends with levers 35 and the plungers 33 with levers 36, all of which levers are pivotally mounted upon the pivot pin 31. In the forward ends of the levers 35 are formed elongated openings 37 through which the stop rod 27 extends. The corresponding ends of the levers 36 extend through slotted openings 38 formed in adjustably mounted lost-motion members 39. In opposite sides of said members are formed two elongated openings 40 through which the stop rod 27 passes. By reference to Figs. 1 and 3 it will be seen that the ends of the levers 36 lie between the stop rod 27 and the upper end walls of the slotted openings 38. The lost-motion members 39 are rotatably connected in any suitable way with screws 41 extending through screw-threaded openings 42 in the cover 2. The screws 41 fit their openings tightly so as to be frictionally locked against accidental movement. In the present instance, the lost-motion members 39 are stamped from sheet metal, each comprising a tubular stem 43 into which the screw 41 extends. Said screw has an annular groove 44 (Fig. 5) formed therein, and a portion of the tubular stem 43 is slitted and bent inwardly to lie in said groove. The screw 41 and lost-motion member 39 are thus rotatably connected, but held from longitudinal movement with relation to each other.

In the valve chamber 6 is rotatably mounted a rock valve 45 tapered to conform to said chamber. In the periphery of said valve are formed grooves constituting four ports 46 adapted to connect the intake ports 10 with the pump cylinders 9 and said pump cylinders with the outlet ports 15, and four ports 47 adapted to connect the intake ports 12 with the pump cylinders 8, and said last mentioned pump cylinders with the outlet ports 16. Upon the projecting smaller end of the rock valve 45 is fixed a crank arm 48. A coil spring 49 surrounding the rock valve 45 and bearing at its opposite ends against said crank arm and an annular shoulder 50 in the valve casing 5 holds said rock valve properly seated. The crank arm 48 is connected by means of a connecting rod 51 with a worm wheel 52 fixed upon one end of the shaft 26. The worm-wheel 52 meshes with a worm 53 fixed upon a shaft 54. Said shaft extends through two bearing sleeves 55 and 56 lying within alined openings 57 in opposite walls of the casing 1. The sleeves 55 and 56 are externally screw-threaded to receive nuts 58 for locking said sleeves in place in said openings. Between the ends of the sleeves 55 and 56 and the worm 53 are placed fiber washers 59. Upon the outer end of the bearing sleeve 55 is turned a stuffing nut 60. Any suitable means may be provided for rotating the shaft 54, as, for example, a pulley 61 fixed on said shaft and arranged to carry a round belt (not shown) driven from any suitable source of power. If desired, a gage glass 62 may be mounted upon one side of the casing 1 to indicate the level of the oil therein. Oil is admitted to the reservoir through an opening arranged to be closed by a screw plug 63, a strainer 64 being disposed beneath said filling opening.

In use, the reservoir is filled with oil and the outlet ports 16 connected with the delivery points by means of suitable tubing (not shown herein). Power being communicated to the shaft 54, the shaft 26 is rotated, rocking the levers 35 and 36 and reciprocating the plungers 32 and 33. It will be noted that the levers 36 connected with the plungers that force the oil from the reservoir to the sight feed, may be considered as having adjustable or movable fulcra by reason of their forward ends lying between the stop rod 27 and the lost motion members 39. It will be apparent that the upward rocking movement communicated to said levers by the eccentrics 28 will not be effective to raise the plungers 33 until the forward ends of said levers engage the upper end walls of the slots 38 in the lost-motion members 39. Similarly the downward movement of said levers does not cause a downward or suction movement of said plungers until the forward ends of said levers bear against the stop rod 27. The amount of oil pumped from the reservoir to each cup 13 in the sight feed casing 14 may be regulated as desired by turning the screws 41 to raise or lower the lost-motion members 39, thus providing means for independently regulating the amount of oil fed to the individual bearings. The levers 35 are pivoted on the stop rod 27 as described, consequently all of the movement imparted to said levers by the eccentrics 28 is transmitted to the plungers

32, save for the slight amount lost by reason of the elongated openings 37, which is negligible. It will be seen that the pumps which force oil from the sight feed to the delivery points are of fixed capacity, while the pumps delivering to the sight feed are adjustable in capacity, their maximum capacity being not greater than that of the first-mentioned set of pumps. Pressure in the sight feed greater than atmospheric pressure, therefore, is impossible, thus preventing leakage of oil from said sight feed. The rotation of the shaft 26 causes a rocking movement of the valve 45 through the medium of the crank 48 and the connecting rod 51, said valve being rocked at the proper intervals, first to connect the reservoir with the pump cylinders 9, and the pump cylinders 8 with the sight feed, and then to connect the pump cylinders 9 with the sight feed, and the pump cylinders 8 with the outlet ports 16.

Force-feed lubricators comprising a pump drawing from a sight feed and in which the pump plunger has a downward or horizontal expelling movement have proven unreliable in practical use. This is due to the fact that the air drawn in with the oil rises to the top of the oil, and when the lubricator is working against a considerable pressure this air is compressed at each pump stroke. After a certain pressure is reached the air in the pump cylinder is compressed to such an extent that no oil is drawn into the cylinder upon the upward or suction movement of the plunger, the air in the sylinder simply being expanded and compressed with the movement of the piston. I have overcome this defect by inverting the pump cylinders so that the upward movement of the plungers becomes the expelling movement, and the air is forced from the pump cylinders ahead of the oil. At each downward stroke of the plungers 32 the oil discharged into the cups 13 by the plungers 33 is drawn, together with more or less air, into the cylinders 8, the air, of course, filling the upper ends of said cylinders. When the valve member 45 is rocked to connect the pump cylinders 8 with the outlet ports 16, this body of air is forced out of said cylinders by the upwardly-moving plungers 32 ahead of the oil also expelled from said cylinders. The valve member 45 being then rocked to cut off the cylinders 8 from the ports 16 and to connect said cylinders with the cups 13, the plungers 32 draw in a fresh charge of oil and air. It will thus be seen that no air will be entrapped in the cylinders 8 to prevent oil from entering said cylinders upon the suction movement of the plungers 32.

The sight feed casing, the means for attaching the delivery leads, and all of the mechanism save the drive shaft 54 are attached to the cover 2, so that by removing the screws 3, all of the mechanism may be lifted from the casing 1, when desired.

I desire it to be understood that in the practical manufacture of this lubricator I do not regard myself as limited to the precise construction herein described, inasmuch as many departures from said construction may be made within the scope of the invention.

I claim as my invention:

1. In a force-feed lubricator, in combination, two pumps comprising two cylinders, one of said cylinders having an inlet and the other cylinder having an outlet; a receptacle intermediate said cylinders; and a single valve member adapted properly to connect said cylinders with said receptacle, the first mentioned cylinder with its inlet and the second mentioned cylinder with its outlet.

2. In a force-feed lubricator, in combination a plurality of pump cylinders arranged side by side, a plunger for each cylinder; a lever pivoted at one end directly to each plunger and fulcrumed at its other end; a rod engaging the midportions of all of the levers; an eccentric shaft; and links connecting said eccentric shaft with the end portions of said rod.

3. In a force-feed lubricator, in combination, two cylinders; a plunger in each cylinder; a lever for each of said plungers connected at one end thereto; a stop rod, one of said levers being pivoted on said stop rod; and an adjustably-mounted lost-motion member between which and said stop rod the opposite end of said other lever is confined.

4. In a force-feed lubricator, in combination, a fixed stop member; an adjustably-mounted lost-motion member having a slot therein through which said stop member passes, said lost-motion member having a second slot therein; and a pump mechanism comprising a lever extending into said last mentioned slot.

5. In a force-feed lubricator, an actuating lever, a supporting member and a lost motion member having a slot therein for said lever and another slot therein for said supporting member, said lost-motion member having an attaching stem.

6. A lost-motion member for force-feed lubricators formed from sheet metal and comprising a slotted portion and a tubular stem.

7. The combination, with a sight feed casing, a member upon which said casing is mounted, and a pump mechanism, of a cup in said sight feed casing having a screw-threaded stem adapted to enter a screw-threaded opening in the frame of said pump mechanism, for securing said pump mechanism and the member upon which said sight feed casing is mounted together.

8. In a force-feed lubricator, in combination, a plurality of pump cylinders arranged

side by side; a plunger in each of said cylinders; levers, each pivoted at one end to one of said plungers; means engaging the opposite ends of said levers; a rod passing through all of said levers between their ends; a rotary shaft; and an eccentric at each end of said shaft and connected with the corresponding end of said rod.

9. In a force-feed lubricator, in combination, a bank of pump-cylinders; a bank of lost-motion devices opposite said bank of cylinders; plungers in said cylinders; means extending from said plungers to said lost-motion devices; and means for actuating the last mentioned means to move said plungers.

10. In a force-feed lubricator, in combination, a bank of pump-cylinders; a bank of lost-motion devices opposite said bank of cylinders; plungers in said cylinders; levers extending from said plungers to said lost-motion devices; and means between said banks for moving said levers.

11. In a force-feed lubricator, a reservoir having a cover, a pump cylinder and a plunger therein, a fixed fulcrum member, an adjustable fulcrum member extending through the cover of the reservoir, a lever for operating said plunger, one end of said lever extending between the fixed and adjustable fulcrum members, and the other end connecting with the pump plunger.

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Witnesses:
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