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FORCE-FEED LUBRICATOR.


In the name of the United States of America, Patentee.

I, HENRY WINKENWERDER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Force-Feed Lubricators, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The main object of this invention is to automatically feed a lubricant, particularly one of thick or dense consistency, to the variable rate and to generate the construction and operation of apparatus for this purpose.

It consists in certain novel features of construction and in the peculiar arrangement and combination of parts, hereinafter particularly described, and defined in the claims.

In the accompanying drawings like characters designate the same parts in the several figures.

Figure 1 is a side elevation of a lubricator embodying my invention. Fig. 2 is a vertical section of the same, cutting the plungercylinder axially. Fig. 3 is a vertical section on the line 3 3, Fig. 4, cutting the plungercylinder transversely. Fig. 5 is a horizontal section on the line 4 4, Fig. 3; and Fig. 5 is a view, partly in side elevation and partly in vertical section, of a modified form of the lubricator.

Referring to Figs. 1 to 4, inclusive, a designates a lubricant-reservoir, which is provided with a detachable cover b and with a piston c, having a stem d passing upwardly through a stuffing-box in the cover. The stem d indicates by the extent of its protrusion from the cover the position of the piston and the quantity of lubricant contained in the reservoir, and to determine the quantity at any time with greater certainty and ease the stem may be graduated. e is a cylinder having a straight bore with stuffing-boxes f, f at the ends and lateral and discharge ports g and h; one connected by a pipe or passage i with the upper part of reservoir a and the other by a pipe or passage j with the steam chest cylinder or other part to which lubricant is to be supplied. The lower part of the reservoir a is connected by a pipe or passage k with the boiler or other source of pressure against which the lubricant is to be fed. Two plungers l and m are fitted in the straight bore of the cylinder e and project therefrom in opposite directions throughout the stuffing-boxes c, m and c are reciprocating slides fitted in ways p parallel with the cylinder e and connected one with each of said plungers.

A cam q, having working faces r and s arranged in different planes one in advance of the other, is mounted on a transverse shaft t within openings in said slides. The slide s has a screw n threaded in an ear thereon in position to engage with the slide m, and thus regulate and determine the degree of separation of the plungers l and m. v is a ratchet-wheel fixed on the cam-shaft t and held from backward rotation by a dog w. x is a rocker- arm loosely mounted on said shaft and provided with a pawl y, which is held by a spring in engagement with said ratchet-wheel. This arm is adapted to be connected in the usual way with any convenient movable part of the engine or machine to which the lubricator is applied. It is provided with a series of holes, as shown in Fig. 1, for making this connection at different distances from the shaft t, and thereby varying the extent of the movement of the pawl y, which turns the ratchet-wheel and determines the rate of feed. This form of the lubricator operates as follows: Assuming that the lubricator is applied to a steam-engine, the pipe, j being connected with the steam chest or cylinder and the pipe or passage k with the boiler, to fill the reservoir a with lubricant steam is shut off and water of condensation below the piston c is drawn off by closing and opening suitable cocks (not shown) in the connection between the lower end of the reservoir and the steam-supply pipe or boiler. The cover is removed, the piston c moved down to the bottom of the reservoir, which is then filled with the lubricant above the piston. The cover b being replaced, and steam admitted to the reservoir below the piston c, the lubricator is ready for operation. When the engine is started, the cam q is intermittently turned in the direc-
tion of the arrow on Fig. 2, more or less, according to the adjustment of the actuating connection with the arm a. Starting with the plungers in the positions in which they are shown in Fig. 2, the plunger m having just been separated from the plunger l to admit a charge of lubricant between them, the cam acts on the slide e to advance both plungers simultaneously until said charge is brought opposite the port h, the plunger m being carried along with the plunger m by engagement of the screw w with the slide e. The advance movement of the plunger m being arrested, the face of the cam engaging the slide n continues to advance the plunger l, thereby forcing the lubricant through the port h into the pipe j. The plungers being brought together, thus expelling the lubricant between them, are then moved back together to receive another charge from the supply-port g by the engagement of the face r of the cam with the opposite face on the slide e. In the return movement the plunger l, with the slide w, is actuated by engagement of the plunger m with the plunger l. When the plungers have completed the return movement, the plunger m is again advanced independently of the plunger l by the engagement of the cam-face r with the opposing face of the slide e until the screw w engages the slide n, whereupon both plungers are advanced together. The separation of the plungers in this way admits a charge of lubricant between them from the reservoir, from which it is forced by the pressure of steam on the under side of piston e, the volume of each charge being determined by the adjustment of the screw w.

The area of the lower end of said piston, which is exposed to steam-pressure, being greater than the area of the upper end to the extent of the area of the piston-rod d, subjects the lubricant in the reservoir to a pressure somewhat greater than that against which it is to be fed and imparts its flow through the connection g and port y into the space between the plungers l and m, when they are brought into receiving position. This is of prime importance with thick stiff lubricants, which do not flow readily and with which it is impracticable to use check-valves.

In my improved apparatus the lubricant is forced from the reservoir by fluid-pressure, the reservoir and positively delivered in exact predetermined charges to the feed pipe or passage leading to the bearing or other part to be lubricated. By varying the length of the arm x or the distance of its actuating connection from the axis on which it swings the frequency of the delivery of the charges of lubricant may be varied, and by adjusting the screw w the size or volume of the charges may be varied, thereby regulating the feed in two ways.

Referring to Fig. 5, showing a modification of the lubricator, the mechanism for actuating the lubricant measuring and feeding plungers is varied somewhat from that shown in the preceding figures; but in other respects the apparatus is essentially the same. The plunger m is connected with a lever s, carried by the slide n', with which the other plunger l is connected. The lever s is fulcrumed to an arm 2, which is pivoted to the slide n' and is formed with a segment of a worm-gear 3, meshing with a worm 4, journaled on said slide and serving to adjust the fulcrum of the lever s. A fork-lever 5, embracing the cam q', is fulcrumed to the slide n' and formed with a transverse groove or recess, in which a block 6, pivoted to the lever s, is adjustable held. In this form of the lubricator, the rotation of the cam q in the direction indicated by the arrow actuates the slide n', which carries the plunger l and the levers s and 5, and thus produces the simultaneous movement of both plungers l and m back and forth from one port to the other. At or near the limits of the movement of the slide n' the lever 5 is actuated in a transverse direction by said cam and operates through the lever s to move the plunger m independently of the plunger l, so as to separate them at the supply-port g and bring them together at the discharge-port h. The degree of separation of the plungers and the size or volume of the charge of lubricant is determined and regulated by the adjustment of the worm 4. In other respects the operation of this form of the lubricator is essentially the same as that shown in the preceding figures.

Various changes other than those specified may be made in the details of the apparatus without departure from the principle and intended scope of the invention.

I claim:

1. In a force-feed lubricator the combination of a reservoir provided with a piston and having a constant fluid-pressure connection on one side of the piston and a lubricant-delivery connection on the other side, and measuring and forcing mechanism independent of said piston, constructed and arranged to feed a lubricant from said reservoir against pressure, substantially as described.

2. In a force-feed lubricator the combination of a reservoir having a fluid-pressure connection and a delivery connection, a piston fitted in said reservoir and provided with a rod projecting through the delivery end thereof and serving to indicate the position of the piston and the quantity of lubricant contained in the reservoir, and measuring and forcing mechanism independent of the piston, constructed and arranged to feed the lubricant from said reservoir at a predetermined rate against pressure, substantially as described.

3. In a force-feed lubricator the combination of a reservoir, a piston fitted therein, a rod projecting through the delivery end thereof and serving to indicate the position of the piston and the quantity of lubricant contained in the reservoir, and measuring and forcing mechanism independent of the piston, constructed and arranged to feed the lubricant from said reservoir at a predetermined rate against pressure, substantially as described.
connection with a source of constant fluid-pressure and a lubricant-delivery connection communicating with said reservoir on opposite sides of said piston, and adjustable measuring and forcing mechanism independent of said piston, constructed and arranged to feed the lubricant at a predetermined rate against pressure, substantially as described.

4. In a force-feed lubricator the combination of a reservoir, a piston fitted therein, a connection with a source of constant fluid-pressure and a lubricant-delivery connection communicating with said reservoir on opposite sides of said piston, and lubricant measuring and forcing mechanism comprising a cylinder having a supply-port connected with said reservoir and a discharge-port, two reciprocating plungers fitted in said cylinder, means for moving said plungers back and forth between said ports and for separating them at the supply-port to receive a charge and for bringing them together at the discharge-port to expel the charge, and means for varying the extent of separation of the plungers and the volume of the charge, substantially as described.

5. In a force-feed lubricator the combination of a lubricant-reservoir, a cylinder having a supply-port connected therewith and a discharge-port, two reciprocating slides, one of which is capable of a limited movement independently of the other, means for varying the extent of such independent movement, means for actuating said slides, and plungers fitted in said cylinder and connected with said slides, substantially as described.

6. In a force-feed lubricator the combination of a lubricant-reservoir, a cylinder having a supply-port connected therewith and a discharge-port, two reciprocating plungers fitted in said cylinder and movable back and forth therein from one port to the other, slides connected with said plungers, and a cam for actuating said slides one of which is provided with an adjustable abutment arranged to engage with the other and to determine the degree of separation of the plungers, substantially as described.

7. In a force-feed lubricator the combination of a lubricant-reservoir, a cylinder having supply and discharge ports, the supply-port being connected with said reservoir, opposing plungers fitted in said cylinder and projecting through stuffing-boxes at the opposite ends thereof, reciprocating slides connected with said plungers, a cam adapted to actuate said slides and to move the plungers together back and forth from one port to the other, separating them at the supply-port to receive a charge and bringing them together at the discharge-port to expel the charge, one of the slides being provided with an adjusting-screw arranged to engage the other slide and to determine the extent of separation of the plungers, substantially as described.

8. In a force-feed lubricator the combination of a reservoir, a piston fitted therein, a lubricant-delivery connection communicating with said reservoir on one side of said piston, measuring and forcing mechanism independent of said piston constructed and arranged to feed a lubricant from said reservoir against pressure, and a connection with a source of constant fluid-pressure communicating with said reservoir on the opposite side of said piston and operating thereon independently of the said measuring and forcing mechanism, substantially as described.

9. In a force-feed lubricator the combination with a lubricant-reservoir of lubricant measuring and forcing mechanism comprising a cylinder having a supply-port connected with said reservoir and a discharge-port, two reciprocating plungers fitted in said cylinder, means for moving said plungers back and forth between said ports and for separating them at the supply-port to receive a charge and for bringing them together at the discharge-port to expel the charge, and means for varying the extent of separation of the plungers and the volume of the charge, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses.

HENRY WINKENWERDER.

Witnesses:

CHAS. L. GOSS,

ANNIE SEIDEL.