C. W. MANZEL.

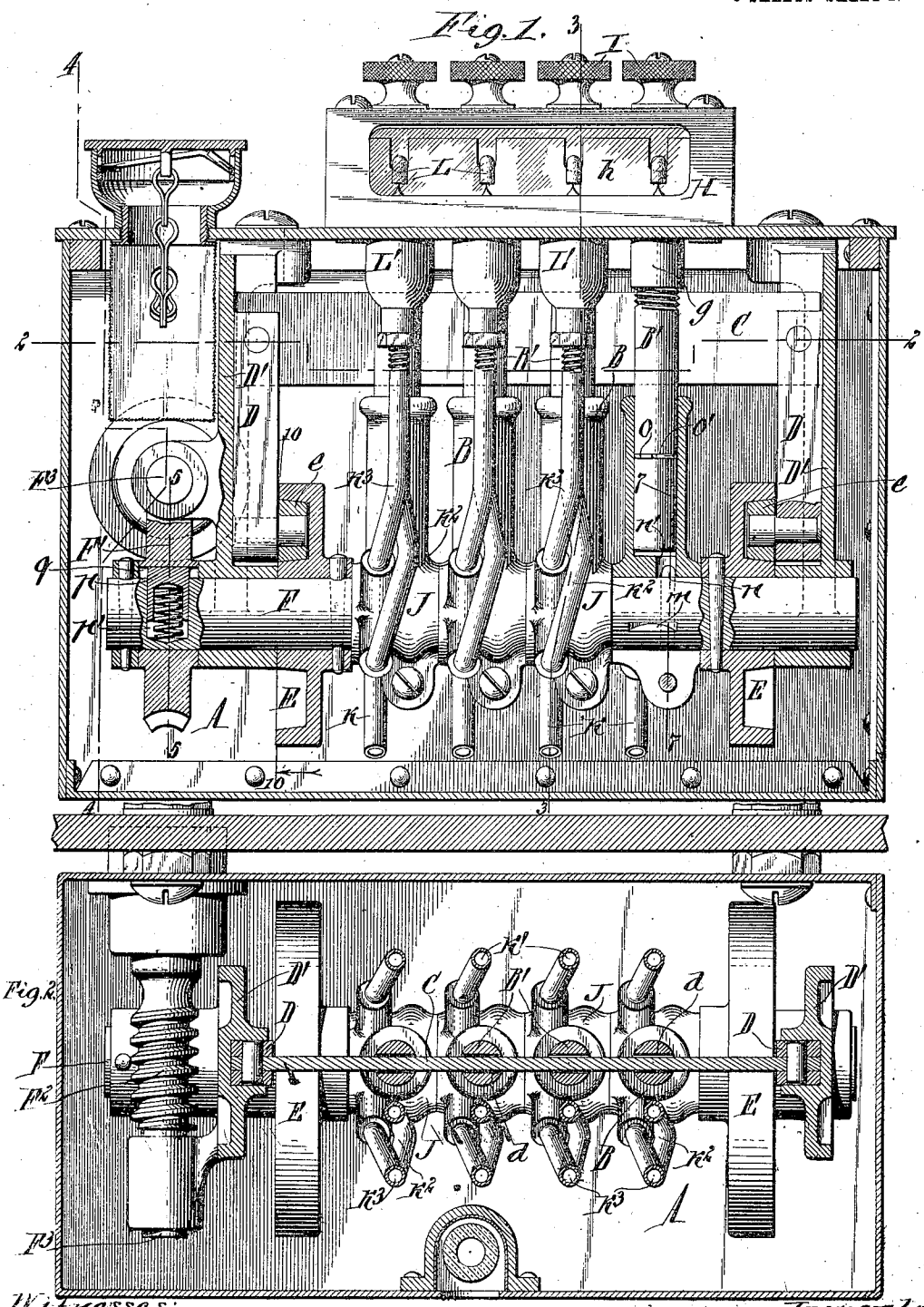
FORCE FEED LUBRICATOR.

APPLICATION FILED SEPT. 25, 1909.

1,069,450.

Patented Aug. 5, 1913.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

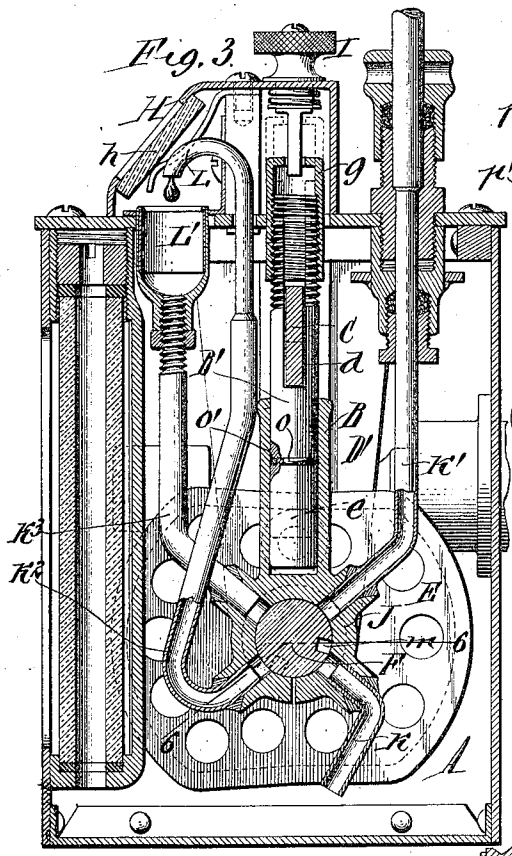


Fig. 5.

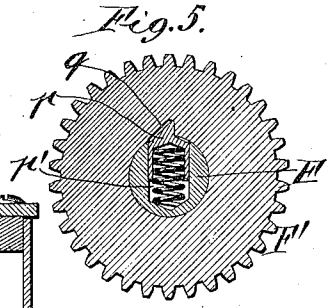


Fig. 6.

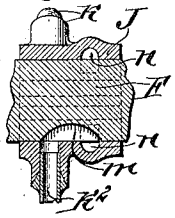


Fig. 7.

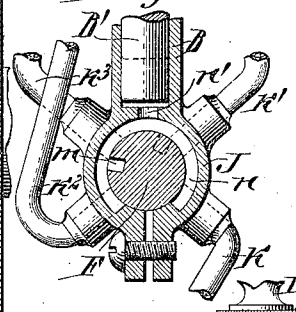


Fig. 8.

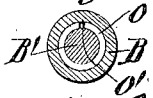


Fig. 9.

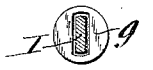


Fig. 4.

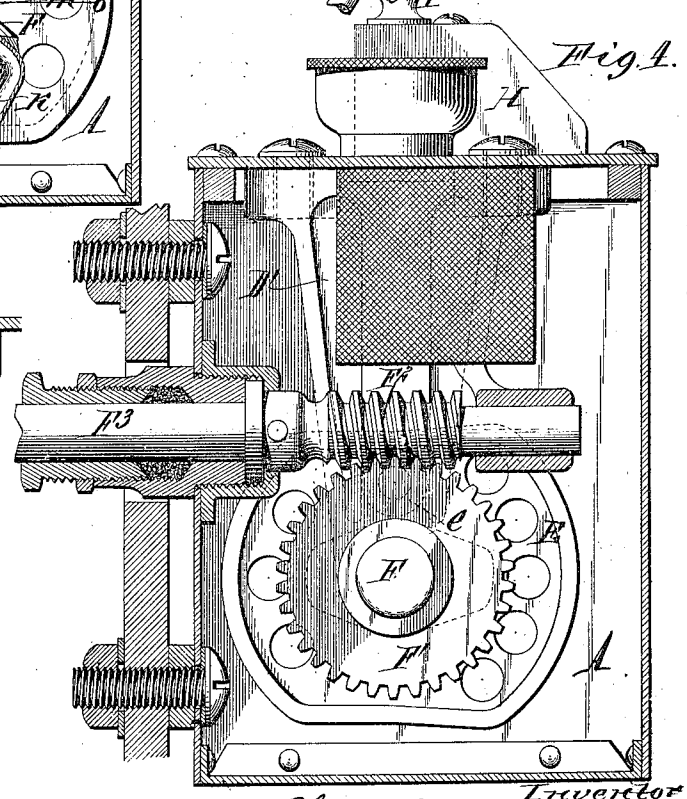
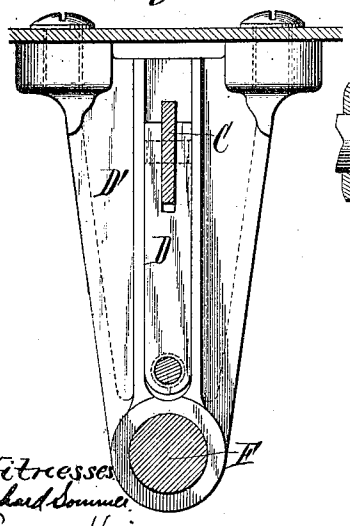


Fig. 10.



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3 SHEETS—SHEET 3.

Fig. 11.

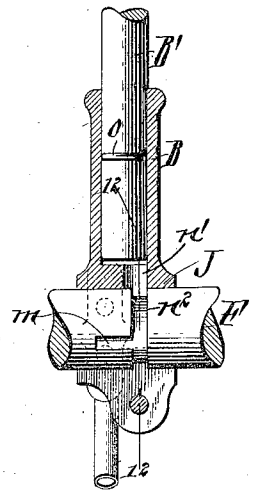
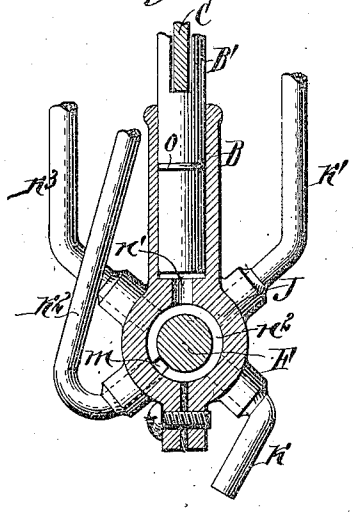


Fig. 12.



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UNITED STATES PATENT OFFICE.

CHARLES W. MANZEL, OF BUFFALO, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MANZEL BROS. CO., OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

FORCE-FEED LUBRICATOR.

1,069,450. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed September 25, 1909. Serial No. 519,528.

To all whom it may concern:

Be it known that I, CHARLES W. MANZEL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Force-Feed Lubricators, of which the following is a specification.

This invention relates to the class of force-feed lubricators having a sight-feed and means for regulating the quantity of oil delivered by the pumps, and more particularly to lubricators comprising a number of pumps arranged side by side in an oil reservoir and controlled by a ported valve-shaft common to the several pumps.

One of the objects of the invention is to simplify the construction and reduce the cost of this type of lubricators.

Additional objects are to provide the pumps with simple and convenient means for adjusting the stroke of the pump-pistons to feed a greater or less quantity of lubricant, as desired, and to improve the construction of the lubricator in other respects.

In the accompanying drawings consisting of three sheets: Figure 1 is a sectional elevation of the lubricator. Fig. 2 is a horizontal section on line 2—2, Fig. 1. Figs. 3, 4 and 5 are transverse sections on the correspondingly numbered lines in Fig. 1. Fig. 6 is a fragmentary horizontal section on line 6—6, Fig. 3. Fig. 7 is a transverse section on line 7—7, Fig. 1, showing a different position of the valve-shaft. Fig. 8 is a cross section of one of the pumps, showing the piston-retarding ring. Fig. 9 is a cross section of one of the piston-adjusting buttons and thimbles. Fig. 10 is a transverse section on line 10—10, Fig. 1. Fig. 11 is a fragmentary sectional elevation of one of the pumps, showing a modified construction of the valve-shaft. Fig. 12 is a transverse section on line 12—12, Fig. 11.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates the customary oil reservoir and B the pump cylinders, preferably arranged therein, and containing the pistons B^1. The several pistons are preferably actuated by a common cross head C passing through a longitudinal slot d in each piston, these slots being longer than the width of the cross head for the purpose hereinafter described. The cross head is secured at its ends to vertical slides D guided in grooved hangers or brackets D^1 secured at their upper ends to the cover of the reservoir. The cross head is reciprocated by rotary cams E the grooves of which receive rollers e carried by the slides D, these cams being secured to a horizontal valve-shaft F which is driven by any suitable means. In the preferred construction shown, the shaft has a worm wheel F^1 which meshes with a worm F^2 mounted on a driving shaft F^3 which receives power from any suitable source.

Each pump piston is externally screw threaded at its upper end to receive an internally-threaded sleeve or thimble g, the lower end of which forms a stop adapted to be encountered by the cross head. The latter reciprocates the piston by striking the lower end of its slot on the downward stroke of the head and by striking the lower end of the thimble or stop g on its upward stroke. By changing the distance between the thimble and the lower end of the piston-slot, the cross-head has more or less lost motion relative to the piston, thus increasing or reducing the stroke of the piston and correspondingly regulating the quantity of oil delivered by the pump.

In the construction shown, the adjustable thimbles extend through the cover of the reservoir and are inclosed by a sight-feed chamber H. They are adjusted on the pistons by rotary knobs or buttons I passing through the top of said chamber and having angular shanks which enter corresponding openings in the closed tops of the thimbles, whereby the latter are compelled to turn with the buttons and at the same time permitted to move vertically thereon.

At the lower end of each pump cylinder is a valve case J which is preferably integral therewith, the several cases receiving the common rotary valve or valve-shaft F. Communicating with different sides of each valve case are the inlet and discharge conduits k, k^1 of the corresponding pump and the direct and return conduits k^2, k^3 of the corresponding sight feed device. The latter preferably comprises a spout L at the upper end of the direct conduit k^2 and a cup L^1 at the upper end of the return conduit, the spout being visible through the transparent pane h of the sight-feed chamber H. The several conduits k, k^1, k^2 and k^3 of each valve case are preferably arranged in the

same plane transversely of the case, as best shown in Figs. 1 and 3, the inlet conduit k communicating with the oil reservoir and being arranged opposite the direct sight feed conduit k^2, while the sight-feed return conduit k^3 and the pump discharge conduit k^1 are arranged in similar opposing relation.

Within each valve-case the valve shaft F is provided with a peripheral longitudinal port m one end of which is arranged to register successively with the several conduits k, k^2, k^3 and k^1, in the order named. The other end of said port communicates in all operative positions thereof with a port or conduit n which in turn communicates with the corresponding pump cylinder by a passage n^1 in the bottom of the latter, as shown in Fig. 7. By the rotation of the valve shaft, the pump cylinder is thus successively connected with the reservoir A through the inlet conduit k; sight feed conduits k^2, k^3 and final discharge conduit k^1, the oil being drawn from the reservoir into the pump cylinder on the first upward stroke of the piston, forced through the direct sight-feed conduit k^2 on its downward stroke, again drawn into the pump cylinder on the second upward stroke of the piston, and finally expelled through the discharge conduit k^1 to the part to be lubricated, on the next downward stroke of the piston.

As shown in Fig. 6, the connecting port n of each valve case is offset or arranged out of line with the adjacent ends of the several conduits k, k^1, k^2 and k^3 and preferably consists of a groove or channel formed in the inner side of the valve case concentrically with the valve-shaft and of sufficient length to extend around the portions of the case to which said several conduits are connected, as seen in Fig. 7. If desired, this connecting groove or port may be formed in the valve-shaft instead of in the valve-case, as shown at n^2 in Figs. 11 and 12, the operation of the lubricator being the same in both cases.

The cams E are so shaped as to move the pistons upward when the valve-ports m register with the inlet conduit k and the return sight feed conduit k^3, and to move them downward when said ports register with the direct sight-feed conduit k^2 and pump discharge conduit k^1, the cams having suitable dwells which allow the pistons to remain at rest during the intervals that said valve ports break register with said several conduits.

When a minute feeding of the lubricant is required, it is desirable that the pump-pistons should not be free to descend by gravity independently of the cross head C during its movement, otherwise an excessive quantity of oil will be delivered by the pumps. To prevent this, each piston is provided with a retarding device preferably consisting of a split elastic ring o seated in an annular groove o^1 of the piston and bearing constantly against the inner side of the pump cylinder, so as to yieldingly and frictionally hold the piston in place until positively moved by the cross head.

In lubricators of this kind, the ports of the valve-shaft have a certain amount of lead, *i. e.*, they begin to register with the conduits connected with the valve-case before the pistons begin their forcing stroke. It follows that in case the valve-shaft is turned backward by the reversal of the engine or motor which drives the lubricator pumps, the ports of the valve-shaft will be thrown out of register with said conduits during the forcing stroke of the pistons, blocking the latter and rendering the cams E or other parts of the lubricator liable to be broken. To obviate this danger, one of the power transmitting wheels between the driving shaft and the valve-shaft is connected with its shaft by a clutch which permits it to turn backward independently of the shaft when the motor is reversed, so as not to transmit such motion to the valve-shaft. In the preferred construction shown, Fig. 5, the clutch consists of a spring-pressed ratchet pawl p sliding in a transverse socket p^1 in the valve-shaft and bearing normally with its abrupt face against the corresponding face of a recess q in the bore of the worm wheel F^1. This pawl is pressed outward by its spring.

The sight-feed device as well as the driving mechanism of the pumps and other parts of the lubricator may be modified without departing from the spirit of the invention, and I do not therefore wish to be limited to the particular construction herein shown and described.

I claim as my invention:

1. In a force-feed lubricator, the combination of a reservoir, a pump having inlet and discharge conduits, a sight-feed device having direct and return conduits connecting it with the pump, a controlling valve having a port arranged to register successively with said inlet conduit, sight feed conduits and discharge conduit, and a conduit connecting the pump cylinder with said valve-port in all operative positions of the latter.

2. In a force-feed lubricator, the combination of a reservoir, a pump having inlet and discharge conduits, a sight-feed device having direct and return conduits connecting it with the pump, a rotary valve having a port arranged to register successively with said inlet conduit, sight feed conduits and discharge-conduit, and a conduit connecting the pump cylinder with said valve-port in all operative positions of the latter.

3. In a force-feed lubricator, the combination of a reservoir, a sight feed device, a pump, a valve-case connected with the pump and having pump inlet and discharge con-

duits and direct and return conduits connecting it with the sight-feed device, and a rotary valve in said case having a single port arranged to register successively with said several conduits, one of the elements of the valve mechanism—the valve and case having a port connecting the pump cylinder with said valve-port in all positions in which the latter registers with one of said conduits.

4. In a force-feed lubricator, the combination of a reservoir, a sight feed device, a pump, a valve-case connected with the pump and having pump inlet and discharge conduits and direct and return conduits connecting it with the sight-feed device, and a rotary valve in said case having a single port arranged to register successively with said several conduits, the valve-case having a port connecting the pump cylinder with said valve-port in all positions in which the latter registers with one of said conduits.

5. In a force-feed lubricator, the combination of a reservoir, a sight feed device, a pump, a valve-case connected with the pump and having pump inlet and discharge conduits and direct and return conduits connecting it with the sight-feed device, and a rotary valve in said case having a single port arranged to register successively with said several conduits, the valve-case having in its inner side a channel arranged concentrically with the valve and extending along the several points at which said conduits join the valve case, said channel connecting the pump cylinder with said valve-port in all operative positions of the latter.

6. In a force-feed lubricator, the combination of a reservoir, a pump, a sight-feed device, a valve-case connected with the pump-cylinder and having a pump-inlet, a sight feed inlet, a sight-feed outlet and a pump outlet arranged on different sides thereof but in line with one another, a rotary valve in said case having a port arranged to register successively with said several inlets and outlets, and a conduit connecting said valve-port with the pump cylinder in all operative positions thereof and arranged out of line with said inlets and outlets.

7. In a force-feed lubricator, the combination of a reservoir, a pump, a sight-feed device, a valve-case connected with the pump-cylinder and having a pump-inlet, a sight feed inlet, a sight-feed outlet and a pump outlet arranged on different sides thereof but in line with one another, and a rotary valve in said case having a port arranged to register successively with said several inlets and outlets, the valve-case having in its inner side a channel arranged concentrically with said valve and connecting said valve-port with the pump cylinder in all operative positions thereof, said concentric port being out of line with said inlets and outlets.

8. In a force-feed lubricator, the combination of a pump cylinder, a screw threaded piston arranged therein and having a longitudinal slot, an actuating head arranged in said slot, a screw threaded thimble engaging the piston above said head and having an angular opening in its top, and a rotary adjusting button external to the lubricator having an angular shank which engages said thimble-opening.

Witness my hand this 22d day of September, 1909.

CHARLES W. MANZEL.

Witnesses:
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E. M. GRAHAM