June 30, 1964 R. F. URSO 3,139,156

SIGHT FEED LUBRICATOR

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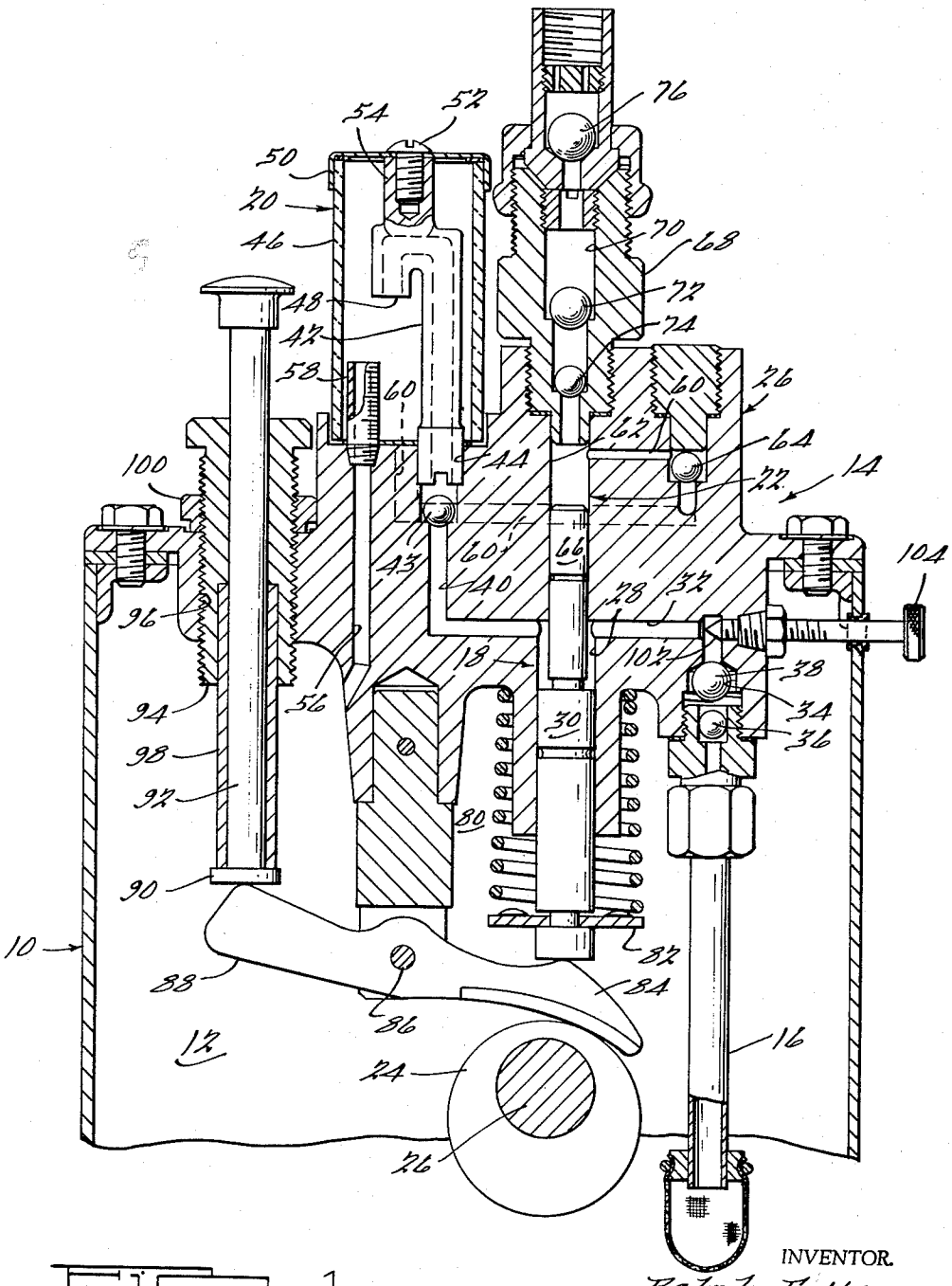


Fig. 1.

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Fig. 2.

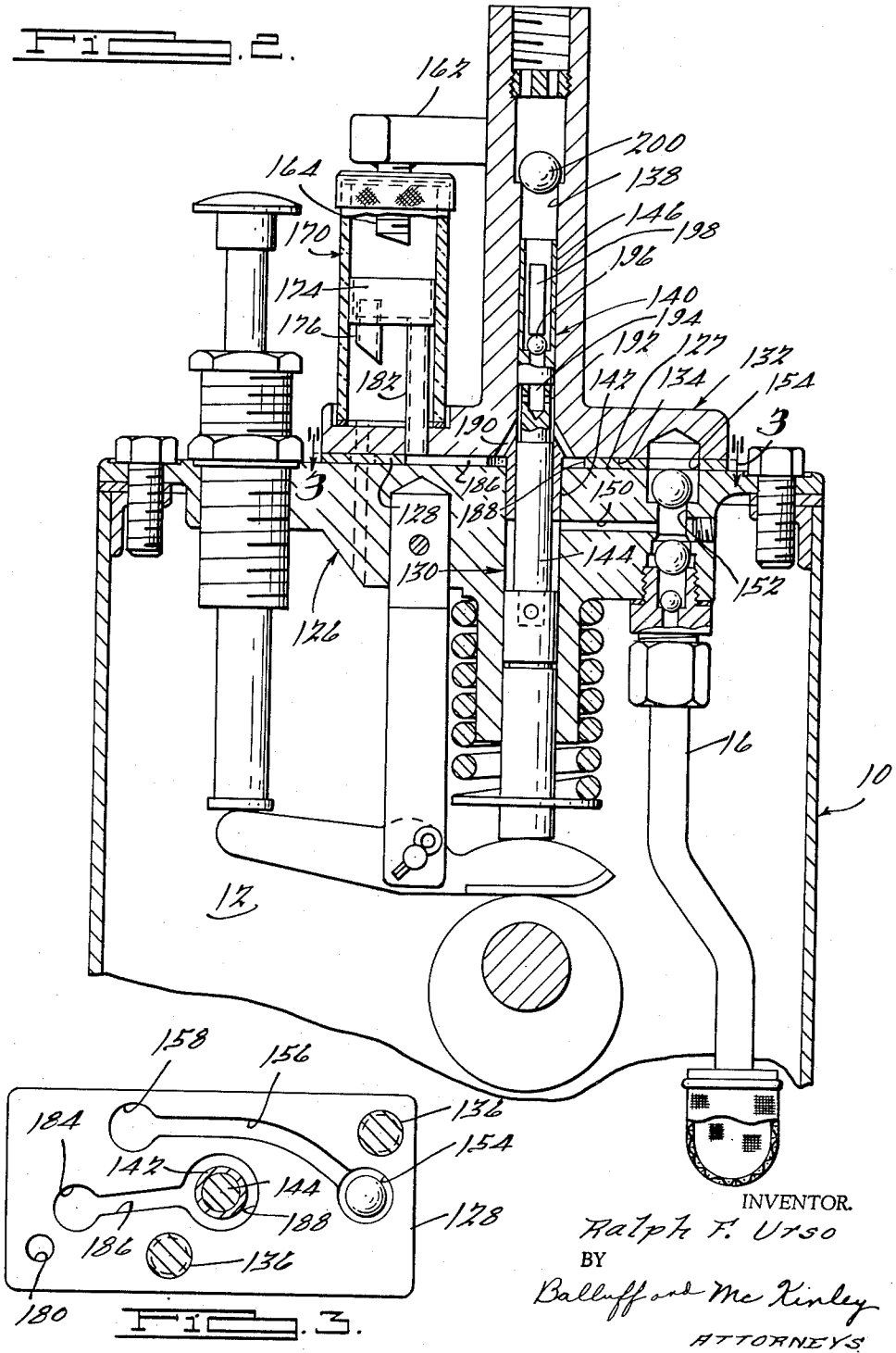


Fig. 3.

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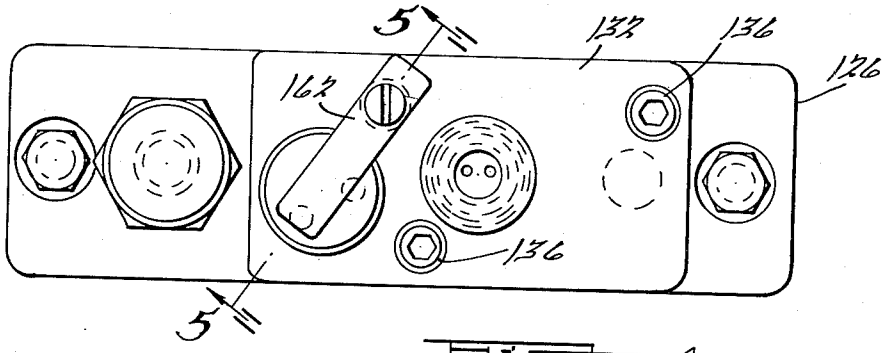


FIG. 4.

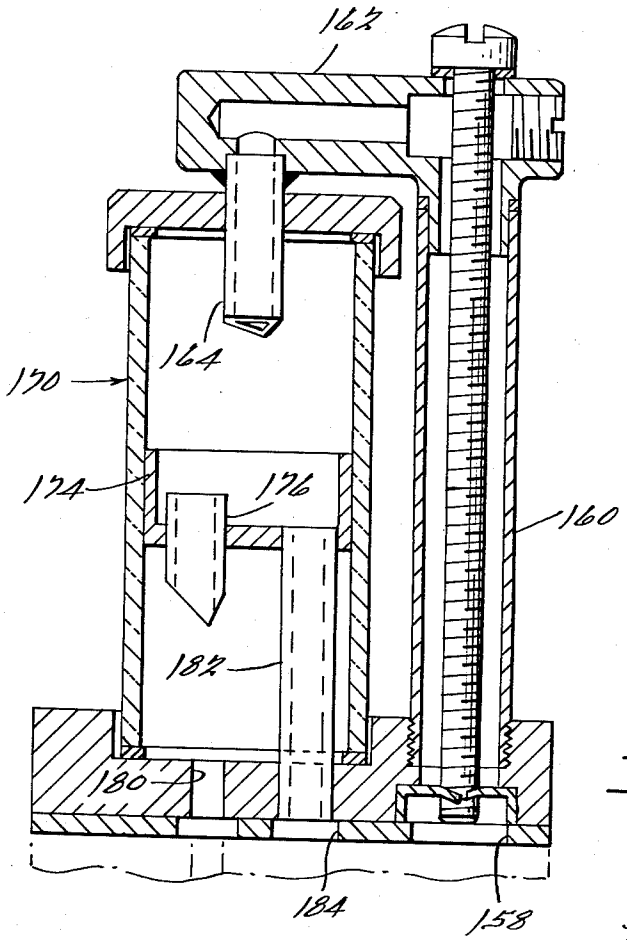


FIG. 5.

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3,139,156
SIGHT FEED LUBRICATOR

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2 Claims. (Cl. 184—27)

This invention relates to force feed lubricators of the sight feed type adapted for supplying a measured quantity of lubricant for automated gas engines and compressors for pipe line service and other similar applications. The operation of such lubricators is regulated in accordance with the specific requirements of the machine lubricated thereby. The oil employed in such lubricators is commonly taken from the crankcase of such an engine and supplied to the reservoir of the lubricator by the oil pump of the engine. The entrained or absorbed air in the oils used and the more volatile ends thereof tend to separate and accumulate in force feed lubricators, causing the lubricator to vapor lock and quit pumping, with resulting damage to the engines and compressors due to lack of lubrication. Defoaming agents have been resorted to but have not eliminated the difficulty. My invention eliminates vapor lock and the resulting difficulties now encountered in such lubricators. In the preferred form of my invention it is possible for the operator to determine readily the rate at which lubricant is being supplied by the lubricator to the bearings, cylinder walls, packing glands, etc.

A principal object of the invention is to provide a new and improved force feed lubricator which will handle aerated lubricating oils without vapor lock.

Another object of the invention is to provide a sight feed lubricator which will accurately and readily indicate the rate at which oil is being pumped to the bearings, cylinder walls, packing glands, etc.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are three sheets, which by way of illustration show preferred embodiments of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

FIG. 1 is a cross sectional view of a lubricator embodying the invention;

FIG. 2 is a similar view of a modified form of the invention;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a plan view of the lubricator shown in FIG. 2; and

FIG. 5 is an enlarged sectional view through the sight feed and taken generally along the line 5—5 of FIG. 4.

As illustrated in FIG. 1 of the drawings, a forced feed lubricator embodying the invention comprises in general a casing 10 providing a reservoir 12, and a series of pump structures 14 mounted on the casing 10. Each pump structure includes a supply conduit 16 depending into the lubricating oil in the reservoir 12 whereby oil from the reservoir is supplied to the pump indicated generally at 18, a sight feed 20, a high pressure pump indicated generally at 22, and a means including a rotary cam 24 for effecting the simultaneous operation of the pumps 18 and 22. An adequate supply of oil is maintained in the reservoir by the engine oil pump or otherwise. Rotary shaft 26 which carries cam 24 is power driven by the engine or by a separate motor, such as an electric motor, which operates during operation of the engine or other device supplied with lubricant from the lubricator, in such a manner that operation of the lubricator is regulated according

to the speed and requirements of the device to be lubricated.

As illustrated in FIG. 1, each pump structure comprises a body 26 removably secured to the top of the casing 10 and provided with a cylinder bore 28 forming the cylinder of the reciprocating pump 18. A piston 30 is reciprocable in the bore 28 and on its retractile or down stroke draws lubricant into the cylinder 28 through the inlet passage 32 and the supply conduit 16 which at its upper end is secured in an inlet 34 which communicates with the passage 32.

Ball check valves 36 and 38 prevent the return flow of lubricant through the passage 32 and the conduit 16 during the discharge stroke of the piston 30. The discharge conduit 40 at one end communicates with the cylinder bore 28 and at its other end with the interior of a tube 42 which is mounted in a socket 44 in the body 26. Check valve 43 prevents return flow through conduit 40. The tube 42 is disposed within the sight glass 46 of the sight feed 20 and is arranged so that the lubricant discharged from the pump 18 will be discharged from the downturned upper end 48 of the tube into the sight feed. A cap 50 secures the sight glass 46 in a socket in the upper part of the body 26, and the cap 50 is secured by means of a screw 52 threaded into a tapped opening in boss 54 secured to the upper end of the tube 42.

A pressure equalizing conduit 56 communicates at its lower end with the reservoir 12 and at its upper end with the interior of the sight feed 20 whereby the interior of the sight feed is maintained under atmospheric pressure, the same as that prevailing in the reservoir 12 above the lubricant therein. The upper end of the conduit 56 is formed by a standpipe 58 mounted in the bottom wall of the sight feed 20 whereby lubricant discharged from the pipe 42 into the sight feed 20 collects in a pool in the bottom of the sight feed up to the level determined by the top of the standpipe 58. Lubricant is supplied from the pool in the bottom of the sight feed 20 through a conduit 60 to the cylinder bore 62 of the pump 22, the conduit 60 having a check valve 64 therein so as to prevent return flow of oil through the conduit 60 upon the discharge stroke of the piston 66.

A fitting 68 threadedly secured in a tapped opening in the body 26 in line with the cylinder bore 62 provides a discharge conduit and connection 70 for the pump 22 whereby the lubricant discharged by said pump will be supplied to a conduit connected to the fitting 68 and to the device to be lubricated. Check valves 72 and 74 are provided in the conduit 70 so as to prevent return flow of lubricant from the fitting 68 back to the cylinder bore 62. A further check valve 76 is provided at the discharge end of the fitting 68.

The pump 22 is a high pressure pump and is adapted for pumping oil at pressures of the order of 6000 lbs. per square inch or greater. The piston 66 of the pump 22 is in effect a smaller diameter extension of the piston 30 of the pump 18 whereby the pumps are simultaneously operated.

A coil spring 80 confined between the body 26 and a disc 82 carried by an extension of the piston 30 reacts on the pistons 30 and 66 so as to effect the retractile stroke thereof. The rotary cam 24 reacts on one end of a rocker 84 pivoted at 86 and serves to effect the discharge stroke of the pistons 30 and 66. The other end 88 of the rocker is disposed so as to engage an adjustable stop 90 which serves to limit the amplitude of oscillation of the rocker 84 whereby to limit the retractile strokes of the pistons 30 and 66 and thereby the capacities of the pumps 18 and 22.

The stop 90 comprises a head on the lower end of a pin 92 which freely reciprocates in a guide 94 which is threadedly adjustable in a threaded opening 96 in the

body **26**, the sleeve **98** which forms a part of the guide **94** functioning to abut the stop **90** for limiting its upward travel. It will be evident that when the lock nut **100** is released, the guide **94** may be raised or lowered in the opening **96** by threading the guide **94** in one direction or the other, thereby serving to define the upper limit of travel of the stop **90**. It will be evident that when the stop **90** engages the lower end of the sleeve **98** upon clockwise rotation of the rocker **84**, such clockwise rotation will be limited due to the abutment of the end **86** with the stop **90** and this will serve to limit the retractile stroke of the pistons **30** and **66**. That part of the pin **92** which projects above the guide **94** will accurately indicate the discharge stroke of the pistons **30** and **66** and may be manually depressed when there is little or no resistance to flush the lubricator.

The capacity of the pump **18** is greater (by about 10%) than that of the pump **22** whereby oil will accumulate in a pool in the bottom of the sight feed **20**, and the excess will be returned through the overflow connection **56** to the reservoir. The ability of the pump **18** to maintain a pool of oil in the bottom of the sight feed **20** is a clear indication of the operation of the pump **18**. A shut-off valve **102** controlled by knob **104** is provided in the oil inlet passage **32** to the cylinder bore **28** whereby the oil supply to the cylinder bore **28** may be shut off while the lubricator is running. This will, of course, shut off the supply of oil to the sight feed **20**. However, so long as there is oil in the pool in the bottom of the sight feed **20**, oil will be supplied through the conduit **60** to the high pressure pump **22**, and if the pump **22** is functioning properly, the oil level of the pool in the bottom of the sight feed **20** should recede.

The outside of the sight feed **20** may be calibrated so that an operator may observe the rate at which the level of the oil in the sight feed falls when valve **102** is closed as a means of determining the rate at which oil is being discharged from the pump **22**. In normal operation, of course, the valve **102** is open. However, this valve along with the sight feed makes it possible for an operator to check the discharge rate of the pump **22**. Because the oil is supplied by gravity to the pump **22** from the pool in the bottom of the sight feed, and the interior of the sight feed **20** is under atmospheric pressure, and because of the disposition of the discharge from the pump, it will be evident that so long as the pool of oil is maintained in the bottom of the sight feed there will be no opportunity for vapor to accumulate in the pump **22** or in the conduit **60** through which oil is supplied to the pump **22** from the pool in the bottom of the sight feed.

In the modification of FIGS. 2, 3, 4 and 5, the system is essentially the same as that just described, and the construction is the same except in the following particulars.

In this case the pump structure comprises a lower body member **126** which is mounted on the upper end of the casing **10**, said body member **126** having a flat upper surface **127** upon which a gasket **128** is seated. The gasket **128**, shown in plan view in FIG. 3, may be formed of nylon or stainless steel or any other suitable material. The lower body member **126** includes a supply pump **130** corresponding with the pump **18**, and the means for operating and adjusting the pump **130** are the same as those illustrated in FIG. 1.

An upper pump body member **132** having a lower flat surface **134** is seated on the gasket **128** and bolted to the lower body member **126** by recessed head screws **136** so as to form an integral unit therewith. The upper body member **132** is formed to provide a cylinder bore **138** for the high pressure pump indicated generally at **140**, which corresponds with the high pressure pump **22**. The upper body member **132** is provided with an integral cylindrical extension **142** which forms a guide for the extension **144**, the end of which forms the piston **146** of the pump **140**.

The supply conduit for the pump **130** may be the same as illustrated in FIG. 1 and includes a passage **150** which communicates with the upper end of the supply tube **16**. In the case of FIG. 2, the discharge conduit for the pump **130** includes a vertical passage **152** which at its upper end communicates with a hole **154** in the gasket **128**. A slot **156** in the gasket **128** communicates at one end with the hole **154** and at its other end with a hole **158** which, in turn, communicates with the interior of a pipe **160** secured to body **132**. The pipe **160** and the hollow fitting **162** secured to the upper end thereof, together with the hollow nozzle **164**, are the equivalent of the tube **42** of the structure illustrated in FIG. 1 and are arranged to discharge the oil discharged from the pump **130** into the sight feed **170**.

Intermediate its height the sight feed is provided with a cup **174** which serves to collect oil discharged from the nozzle **164**, and a hollow standpipe **176** is secured in the bottom of the cup **174** so as to limit the depth of the pool of oil which collects in the cup **174**. At its lower end the standpipe **176** discharges into the lower end of the sight feed, and from the lower end of the sight feed a pressure equalizing conduit **180** serves to conduct lubricant discharged from the standpipe **176** back to the reservoir **12**.

A tube **182** in the lower part of the sight feed **170** communicates at its upper end with the interior of the cup **174**, and at its lower end with a hole **184** in the gasket **128**. A slot **186** in the gasket **128** communicates at one end with a hole **184** and at its other end with a hole **188** through which the guide **142** extends.

Ducts **190** formed in the upper body **132** communicate at their lower ends with the hole **188** in the gasket and at their upper ends with the lower end of the cylinder bore **138** adjacent a reduced portion of the extension **144**. The reduced portion of the extension **144** is provided with a cross passage **192** which communicates with a small diameter bore **194** in the lower end of the hollow piston **146**. A ball valve **196** is disposed at the upper end of the bore **194** and functions as a check valve to prevent flow of oil downwardly into the bore **194**. A weight **198** within the hollow piston **146** rests upon the check valve **196** so as to bias it toward its seat formed by the shoulder of the two-diameter bore in the piston **146**, while permitting upward flow of oil within the hollow piston upon the retractile stroke thereof.

A spring loaded ball check **200** seats on the upper end of the cylinder bore **138** so as to prevent return flow of oil and seal the discharge end of cylinder **138** upon the retractile stroke of the piston **146**. Upon the retractile stroke of the piston, oil from the pool formed by the cup **174** will flow through the pipe **182** and the conduit provided by the hole **184**, the slot **186**, and the hole **188** in the gasket **128**, through the ducts **190** into the cylinder bore **138**, and thence through the cross passage **192** into the small bore **194** in the lower end of the piston **146**, and thence past the check valve **196** into the large diameter bore in the upper end of the piston **146**.

With the sight feed arrangement as illustrated in this modification, it will be possible to observe the drop by drop feed of lubricant from the pump **130** into the cup **174**, and the drop by drop flow of excess lubricant from the standpipe **176** into the bottom of the sight feed. The capacity of the pump **130** is greater than that of the pump **140** so that an adequate supply of lubricant will be accumulated in the bottom of the cup **174** for the pump **140** while permitting the return of excess lubricant to the reservoir through the overflow conduit **180**. As the interior of the sight feed **170** will be under atmospheric pressure, the same as the reservoir **12**, there can be no accumulation of vapor in the sight feed **170**, which is not subjected to the suction pressure of the pump **140**. Thus the inlet to the pump **140** will always be flooded and there can be no accumulation of vapor in the high pressure pump since the discharge from this pump is directly upward.

While I have illustrated and described preferred em-

bodiments of my invention, it is understood that these are capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a lubricator, a casing providing a lubricant reservoir, a pump structure mounted on said reservoir and comprising a first body having a pump cylinder therein, a piston reciprocable in said cylinder, drive means for effecting the reciprocation of said piston, means for supplying lubricant from said reservoir to said pump cylinder upon the retraction of said piston in said pump cylinder, a second body mounted on said first body and having a pump cylinder therein, a gasket between said bodies, a sight feed mounted on one of said bodies, a conduit interconnecting the discharge side of the pump cylinder in said first body and the upper end of said sight feed whereby lubricant discharged from the pump cylinder in said first body is discharged into said sight feed, said sight feed including provisions arranged to collect lubricant discharged into said sight feed in a pool, a conduit interconnecting said pool and the pump cylinder in said second body whereby lubricant is supplied from said pool by gravity flow to the pump cylinder in said second body, said conduits being formed in part by said gasket, an overflow from said pool leading back to said reservoir, and a piston reciprocable in the pump cylinder in said second body and mechanically connected to the first-mentioned piston so as to be reciprocable therewith, the quantity of oil supplied to the sight feed by said first-mentioned pump cylinder and the piston therein being greater than required

by the pump cylinder and its associated piston in said second body member.

2. In a lubricator, a lubricant reservoir, a two-stage pump, a conduit communicating at one end with said reservoir and at its other end with one of the stages of said pump whereby lubricant is supplied to said one stage of said pump, a sight feed connected to the discharge side of said one stage and having a pool for collecting lubricant, a conduit connected at one end to said pool and at its other end to the intake of the other stage of said pump whereby lubricant is supplied by gravity from said pool to said other stage of said pump, and an overflow from said pool communicating with said reservoir, the interior of said sight feed and the lubricant in said pool being exposed to atmospheric pressure, said lubricator being characterized in that said pump stages are aligned and formed by two bodies with a gasket therebetween and in that one of said conduits is formed in part by a slot in said gasket, and in that the discharge from each of said stages is at the upper end thereof.

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