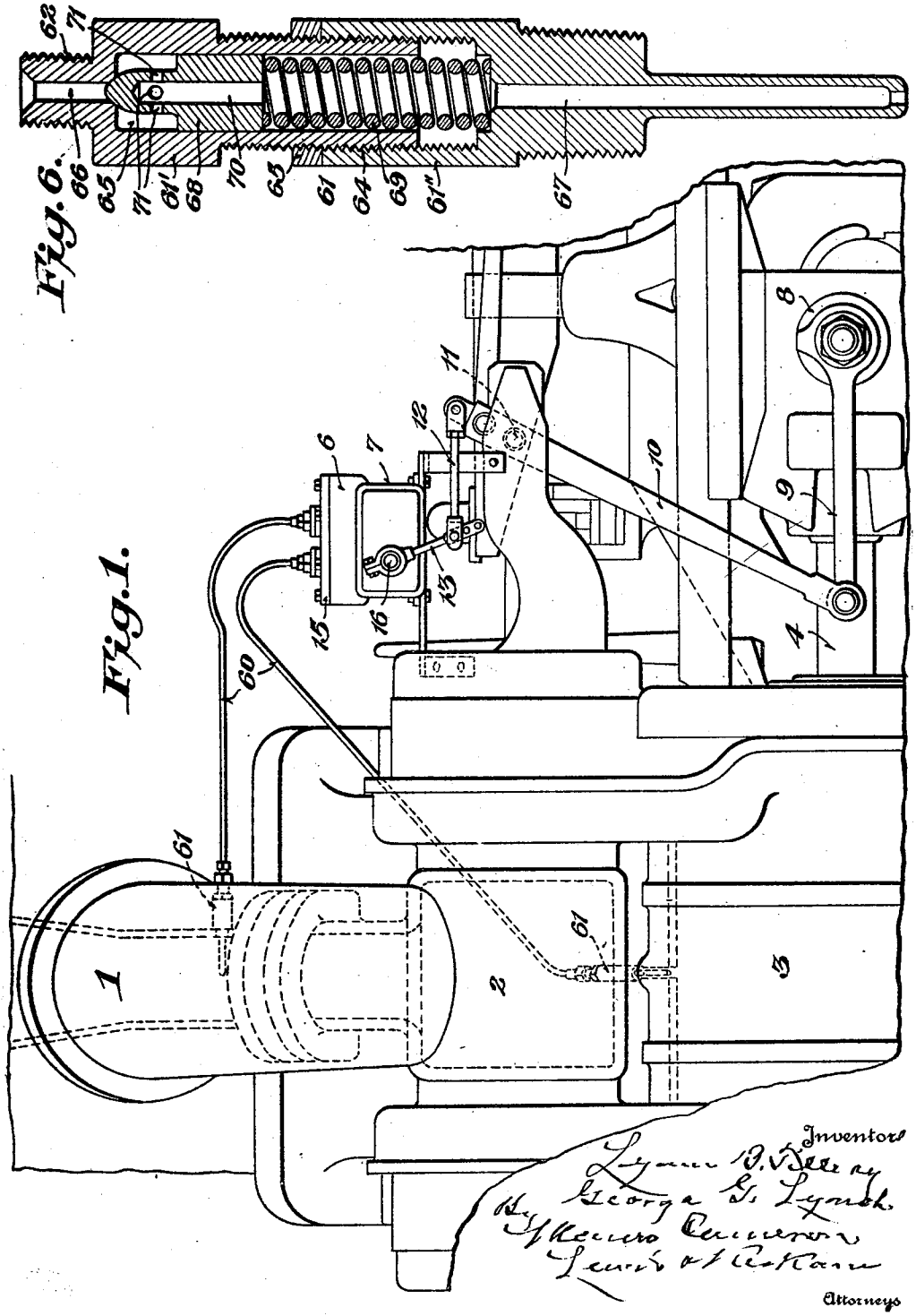
Feb. 28, 1928. 1,660,899

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FORCE FEED LUBRICATOR

Filed Dec. 10. 1926 3 Sheets-Sheet 1



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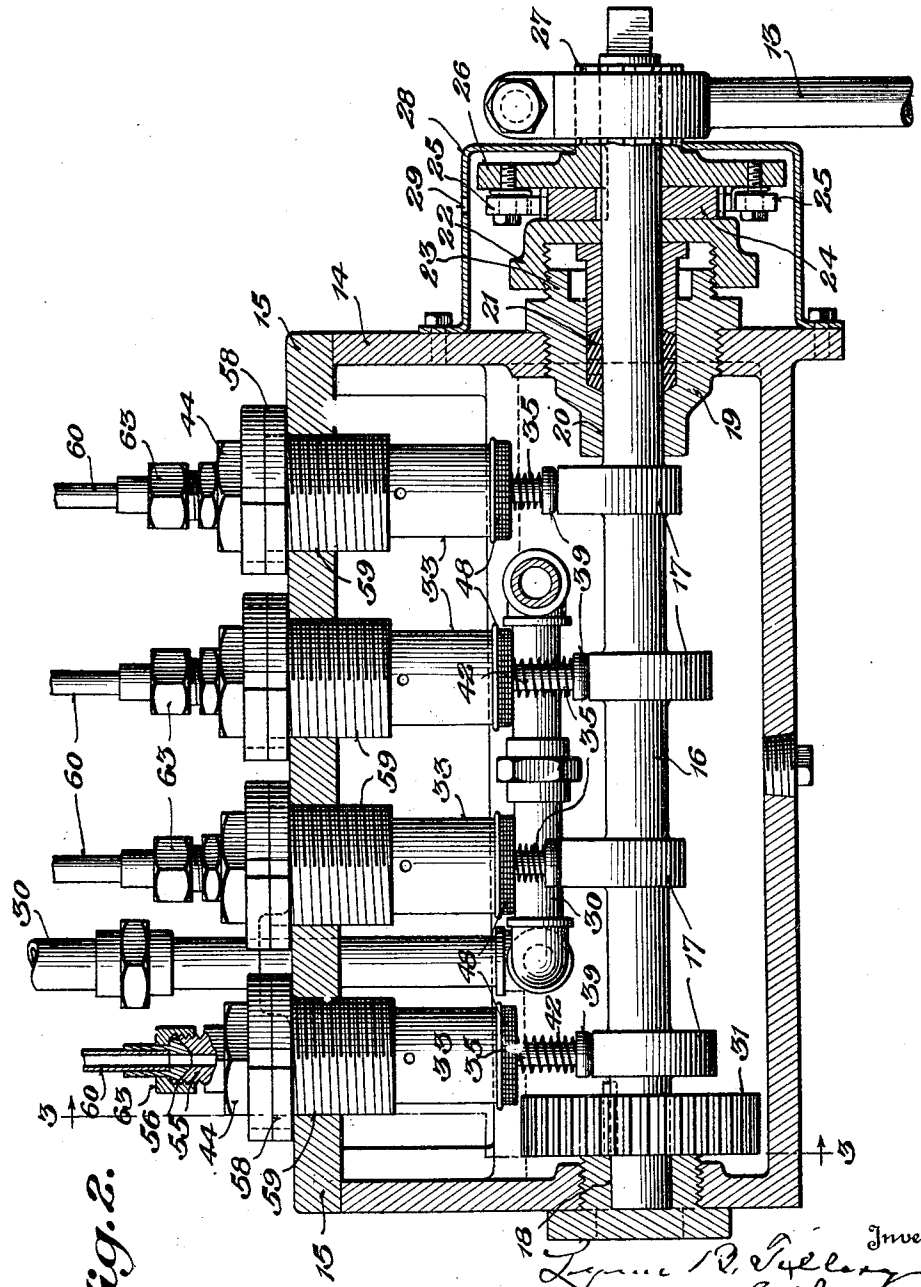


Fig. 2.

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Fig. 3.

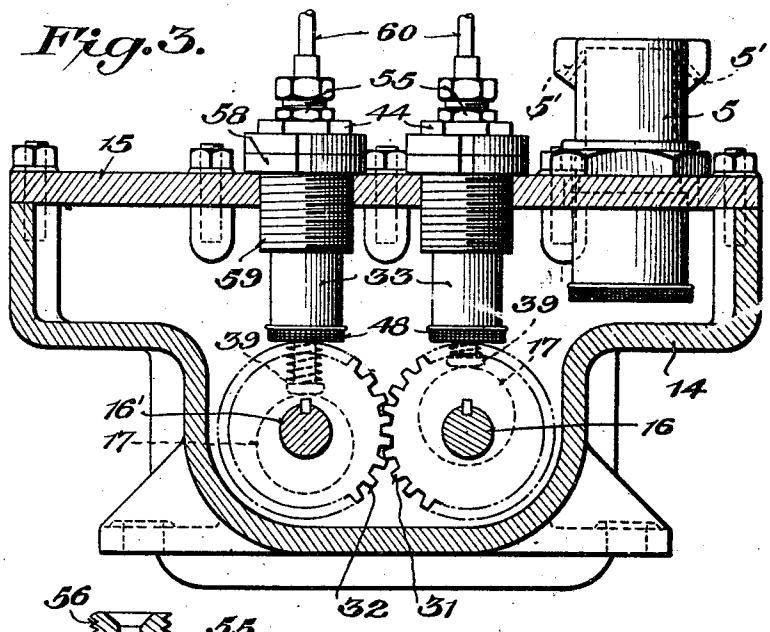


Fig. 4.

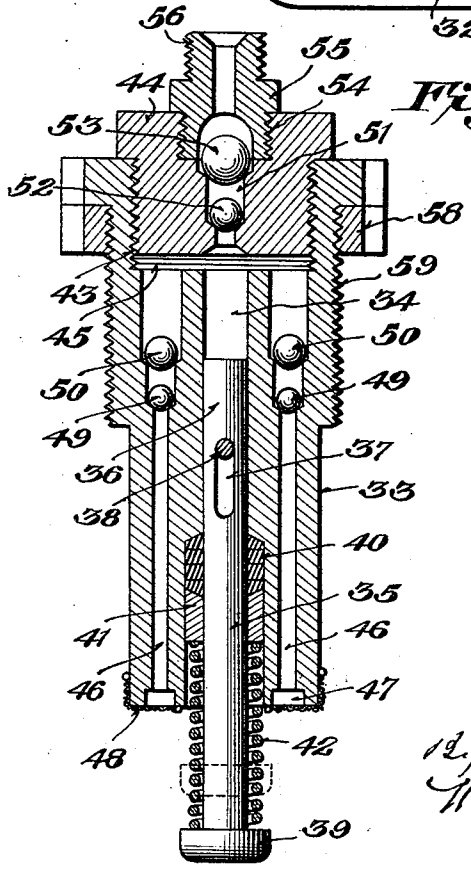
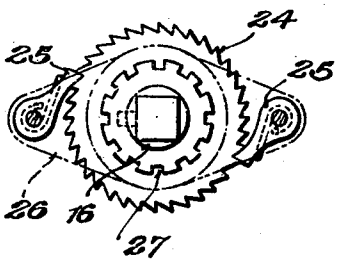


Fig. 5.



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UNITED STATES PATENT OFFICE.

LYNN B. TILLERY AND GEORGE G. LYNCH, OF WILMINGTON, NORTH CAROLINA, ASSIGNORS TO KENNEDY CORPORATION, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

FORCE-FEED LUBRICATOR.

Application filed December 10, 1926. Serial No. 153,954.

This invention relates to force feed lubricators, and has for its object to provide a lubricator of this type of rugged, simple and inexpensive construction, from which the pumping member may be readily removed for replacement or repairs and readily returned to place, and which can be readily and finely adjusted, without the use of special tools, for the purpose of regulating the amount of lubricant delivered thereby.

With this object in view the invention, generally stated, comprises a reservoir, preferably in the form of a cast metal box without ports, passages or valve seats, and which does not require precise and accurate machining other than to secure the proper alignment of the power shaft and the holes, preferably in the top or cover of the reservoir, in which pumping sections are adjustably mounted in a manner to effect ready and fine adjustment. In the form of the invention herein shown for the purposes of illustration, there is provided a plurality of intergeared parallel shafts driven from any suitable source of power, and preferably intermittently driven, on which shafts are a series of cams. In the top or cover portion of the reservoir are a series of interiorly-threaded openings for receiving the pumping sections which are screwed therein, each section being in proper alignment with a cam on the shaft which is to operate it. This cam acts on the exposed end of a piston rod to impart an inward or pumping stroke to the pump piston, the outward or suction stroke being effected by a spring forcing the piston rod outward when the same is relieved from the action of the cam. A suitable stop is provided whereby the outward extent of the stroke due to said spring is limited. By reason of the screw-threaded connection of the pump with the top of the reservoir, the pump may be moved toward or from its actuating cam by simply screwing the pump as a unit in or out through the opening in the cover. Furthermore, the entire pump unit may be readily removed for replacement or repairs by simply unscrewing it from its seat in the cover a wrench being all that is necessary for this purpose.

The inventive idea is capable of receiving a variety of mechanical expressions, one of which for the purpose of illustrating the invention is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings:

Fig. 1 shows a fragmentary portion of a locomotive with the invention applied thereto, for the purpose of lubricating the parts in the steam chest and the locomotive cylinder, the parts being shown in elevation;

Fig. 2 is a longitudinal section through the reservoir with parts shown in elevation;

Fig. 3 is a transverse vertical section on the line 3—3, Fig. 2;

Fig. 4 is a vertical section through one of the pumping units;

Fig. 5 is a detail of the pawl-and-ratchet mechanism through which the applied power acts to revolve the cam shafts in the reservoir; and

Fig. 6 is a sectional view of the terminal end of the delivery conduit of the lubricator.

While, for the purpose of illustration, the invention is shown as applied to parts of a locomotive, it will be readily understood that the lubricator is capable of use in connection with a variety of machines where force lubrication is desired.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, and first to Fig. 1, 1 is the steam trunk of a locomotive, 2 the valve chest and 3 the engine cylinder, the piston of which actuates the piston rod 4 connected to the drive wheels. The lubricator 6 is mounted on a bracket 7 secured to the engine structure and is operated from any suitable moving part of the locomotive. As here shown, an eccentric 8 is suitably mounted on one of the drive wheels, and operates an eccentric rod 9 pivotally connected to one end of a lever 10 fulcrumed at 11. Said lever is connected at its other end to a link 12, which link actuates an arm 13 mounted to rock freely on the projecting end of one of the pump actuating cam shafts, to be hereinafter described, and through a pawl-and-ratchet connection with said shaft revolves the same with an intermittent step by step action.

Referring now to Fig. 2, 14 is a reservoir preferably in the form of a cast metal box,

having a cover 15, preferably also of cast metal, and secured thereto in any suitable manner. A shaft 16, provided with a plurality of space cams 17, here shown as four in number, is mounted in suitable bearings in the end walls of the reservoir. The bearing 18 is inserted through a screw-threaded opening in one of the end walls and is in the form of a flanged cup, so that when it is screwed into the opening provided therefor, it receives the end of the shaft 16, while at the same time, effectually closing the opening in the reservoir wall, as will be readily understood from an inspection of Fig. 2. The other bearing 19 is screw-threaded into the opposite end wall of the reservoir, and preferably projects thereinto on one side and therefrom on the other side, the bearing proper for the shaft being provided at 20 in the inwardly projecting part. A packing gland 21 is provided, which gland is forced into effective packing contact with the shaft by means of a cap 22 screw-threaded onto a projecting flange 23 of the bearing part 19, said cap being centrally perforated and the shaft 16 projecting outward through said central perforation. Exterior to the cap 22, a ratchet wheel 24 is keyed to the shaft and is actuated by a pair of ratchets 25, 25 pivoted to a disc 26 free to turn on the shaft 16 immediately adjacent to the ratchet wheel 24. Disc 26 has a hub 27 to which the rock arm 13 is firmly secured, to the end that said arm shall impart an oscillatory movement to the disc 26 and through the ratchets 25 impart a step by step turning movement to the shaft 16. Preferably, the exterior portion of the bearing 19, the ratchet wheel and the ratchet bearing disc 26 are enclosed in a suitable housing 28 bolted to the end wall of the reservoir, said housing being provided with a port 29 through which the ratchet mechanism may be oiled. The housing 28 has a central opening through the wall thereof through which the end of the shaft 16 projects to receive the rock-arm 13.

A capped filling opening 5 (Fig. 3) having suitable air vent ports 5′ is provided. For the purpose of warming the oil in the reservoir, when desired, the same is preferably provided with a heating pipe 30 for conducting steam or other heating medium through the lubricant in the reservoir.

Referring now to Fig. 3, the reservoir has two parallel shafts 16 (heretofore described), and 16′ extending longitudinally therethrough parallel to each other and in the same horizontal plane, and each of said shafts is provided with suitable cams 17, as illustrated in Fig. 2. The shaft 16 is rotated by the pawl-and-ratchet connection, heretofore described. The end of said shaft opposite to said pawl-and-ratchet connection is provided with a gear wheel 31 keyed to the shaft and meshing with a gear wheel 32 keyed to the shaft 16′, as clearly shown in Fig. 3. By this means, shafts 16 and 16′ are revolved, though in opposite directions.

Referring to Fig. 4, 33 is a pump cylinder having a central cylinder bore 34 within which plays a piston rod 35 whose upper end 36 acts as a piston in said bore. This rod is provided with a slot 37 through which passes a pin 38. The piston rod 35 is provided with an enlarged head 39 and suitable packing 40 surrounds the rod within the cylinder walls and has a packing gland 41, between which and the head 39 a coil spring 42 reacts and normally holds the piston rod extended outwardly to the limit of the movement permitted by the pin 38, as clearly shown in Fig. 4. The upper end of the pump cylinder body has an enlarged cylindrical chamber 43 formed therein, which chamber is in open communication with the cylinder bore 34, and a plug 44 is screw-threaded into said chamber 43, but without extending to the bottom of the chamber 43, so that a cylindrical space 45 is left in open communication with the piston cylinder 34. The space 45 is in communication through suitable suction channels or conduits 46, 46, with the interior of the reservoir, the bottom ends of said conduits 46 preferably opening into an annular channel 47 formed in the bottom of the cylinder wall and protected by a screen 48. In the upper end of each of the conduits 46 check valves 49, 50 are provided of the usual or any suitable construction.

The plug 44 has a central opening 51 formed therethrough in which are located check valves 52, 53, preferably of the ball type as shown. The outer portion of the plug 44 has an interiorly screw-threaded chamber 54 formed therein to receive a nipple 55 chambered to permit the movement of the check valve 53. This nipple is provided with a central bore connecting with the check valve chamber, and is preferably exteriorly screw-threaded at its outer portion as shown at 56.

The upper exterior portion of the pump cylinder body 33 is screw-threaded as shown at 57, and a lock nut 58 is threaded thereon.

This element or unit, constructed as described and as shown in Fig. 4, constitutes a single and complete pumping unit. Preferably, a plurality of such units are employed in connection with the lubricator reservoir and are mounted through screw-threaded openings 59, Fig. 2, formed in the top or cover 15 of the reservoir, each of said openings being interiorly screw-threaded to receive the screw-threaded portion 57 of the pump cylinder unit 33. Each of said openings 59 is so situated that when the pump unit is inserted therein the lower end 39 of the piston rod will be brought into proper operative relation with one of the cams 17

on either the shaft 16 or 16′, as the case may be. The cam will act to impart the inward or pumping stroke to the piston rod, and the spring 42 will act to impart the outward or suction stroke thereto, the limits of which latter stroke are determined by the stop pin 38 with which the upper end of the slot 37 comes in contact. The length of this latter slot is such that the pin 38 does not interfere with the inward or pumping stroke imparted by the cam.

It will be appreciated that the position of the pump section, and hence the lower end 39 of the piston rod, can be adjusted with relation to the cam by screwing the pump unit inward or outward, as the case may be. If the adjustment be such that the end 39 of the piston rod remains at all times in contact with the surface of the cam controlling its revolution, then the full or maximum pumping stroke will be obtained at each revolution of the cam. If, on the other hand, the pumping section be adjusted so that it loses contact with the cam when that portion of the cam which is nearest to the axis of the shaft 16 is uppermost, then the stroke imparted by the cam to the piston will be diminished and the length of the stroke will depend upon the extent of the surface of the cam with which it remains in contact during the revolution thereof. By this means the amount of lubricant delivered at each stroke of the piston in the pump unit may be regulated to a nicety and without the employment of any other tool than a wrench to turn the pump unit so as to adjust it inward or outward, as may be desired, and, when such adjustment has been secured, to set the locking nut 58 to maintain such adjustment.

It will be thoroughly appreciated that the pump unit may be readily removed as a whole for the purpose of repairs or replacements by simply unscrewing it from its seat in such cover, and this is accomplished like the adjustments of the pump unit, without the use of any other tools than a simple wrench.

Secured to screw-threaded extension 56 of the nipple 55 is a tube 60 which terminates in an enlarged portion 61, see Fig. 1. The particular construction of this enlarged terminal portion is shown in detail in Fig. 6. The tube 60 is connected to said enlarged portion at 62, preferably by means of a screw-threaded coupling nut similar to that shown at 63 in Fig. 2. This enlarged portion 61 is composed of two sections, 61′ and 61″ coupled together by screw-threaded connection, as shown at 64. A locking nut 65 is employed to maintain the parts in the desired relative position. The part 61′ has a chamber 65 formed therein with which a port 66 leading through the nipple 62 communicates, and the part 61″ has a delivery conduit 67 extending outwardly therefrom. Within the chamber 65 of the part 61′ is a valve 68 held yieldingly in a position to close port 66 by coil spring 69. This valve 68 has a central bore 70 open at the end of the valve adjacent the spring 69, and closed at its forward end but having lateral ports 71 opening therefrom into the chamber 65.

At each pumping stroke of the piston rod 35 in the pump unit, lubricant is forced past the valves 52 and 53 into the tube 60. On the return of the suction stroke, valves 52 and 53 close, and valves 49 and 50 open and lubricant is drawn through the suction conduits 46 past the screens 48 and into the space 45 and the cylinder 34. At the next pumping stroke, lubricant is again forced past the valves 52 and 53 into the tube 60, and, this tube being filled with lubricant, each stroke of the piston rod 35 forces the lubricant against the valve 68 lifting the same against the tension of the spring 69, and lubricant passes into the chamber 65 through the ports 71, conduit 70, and the spring 69, into the delivery conduit 67, and at the cessation of the pumping stroke of the piston rod 35, the spring 69 acts to close the valve 68 thereby preventing the entrance of steam into the tube 60.

It will be observed that all the parts of the improved lubricator are extremely simple and rugged in construction, the pump unit of such lubricator being one that may be quickly removed and replaced and accurately adjusted, that the delivery end of the lubricator is of simple construction and one wherein the tension of the spring controlling the valve therein may be accurately adjusted by simply screwing the parts 61′, 61″ together to the desired degree.

While one illustrative embodiment of the inventive idea has been described in detail, the scope of the invention is not limited to such embodiment, or otherwise, than by the terms of the appended claims.

What is claimed is:

1. In a force feed lubricator, the combination of an oil reservoir, a pump cylinder mounted therein, a piston and piston rod in said cylinder, a spring imparting the outward or suction thrust to said rod, a stop limiting said thrust, a cam imparting the inward or pumping thrust to said rod, and means for adjusting said cylinder toward and from said cam.

2. In a force feed lubricator, the combination of an oil reservoir, a pump cylinder screwed into the top thereof whereby said cylinder is readily adjustable and removable, a piston and piston rod in said cylinder, means imparting the outward or suction thrust to said rod, means limiting said thrust, and means imparting the inward or pumping thrust to said rod.

3. In a force feed lubricator, the combina-

tion of an oil reservoir, a pump cylinder screw-threaded through the top of said reservoir, a conduit in the walls of said cylinder leading from the interior of said reservoir to the delivery end of said cylinder, a piston and piston rod in said cylinder, yielding means exerting a continual outward or suction thrust on said rod, means limiting said thrust, and power means imparting intermittent inward or pumping thrusts to said rod.

4. In a force feed lubricator, the combination of an oil reservoir, a pump cylinder screwed into the top thereof whereby said cylinder is readily adjustable and removable, a piston and piston rod in said cylinder, means imparting the outward or suction thrust to said rod, means limiting said thrust, means imparting the inward or pumping thrust to said rod, and a delivery conduit connected to the delivery end of said cylinder.

5. In a force feed lubricator, the combination of an oil reservoir having an interiorly-threaded opening in its top, a pumping unit threaded into said opening and projecting into said reservoir, said unit comprising a cylinder and piston and a suction conduit leading from the interior of said reservoir to the front of said piston, means within said reservoir at a fixed distance from the top thereof for imparting the inward or pumping stroke to said piston, means imparting the outward or suction stroke to said piston, and means limiting the extent of said last-mentioned stroke.

6. In a force feed lubricator, the combination of an oil reservoir, a pump cylinder screwed into the top thereof whereby said cylinder is readily adjustable and removable, a piston and piston rod in said cylinder, means imparting the outward or suction thrust to said rod, means limiting said thrust, means imparting the inward or pumping thrust to said rod, a tube leading from the delivery end of said cylinder and terminating in an enlarged exteriorly screw-threaded cylinder, a cylindrical interiorly-threaded member into which said enlargement is screwed, a valve closing the entrance of said tube into said enlarged cylinder, said valve having an interior passage with a port leading therefrom to the interior of said enlarged cylinder, a spring reacting between said interiorly-threaded member and said valve, and a delivery conduit leading outward from said member.

7. In a force feed lubricator, the combination of a reservoir, a shaft mounted to turn therein, means for turning the same, a second shaft mounted to turn in said reservoir and geared to said first-named shaft, a series of cams on each of said shafts, a plurality of pump units adjustably mounted in the top of said reservoir and each projecting thereinto opposite one of said cams, each of said units comprising a piston rod and a spring imparting an outward thrust thereto and a stop limiting said outward thrust, whereby the different pump units may be adjusted to deliver different amounts of lubricant.

In testimony whereof we have signed this specification.

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GEORGE G. LYNCH.