

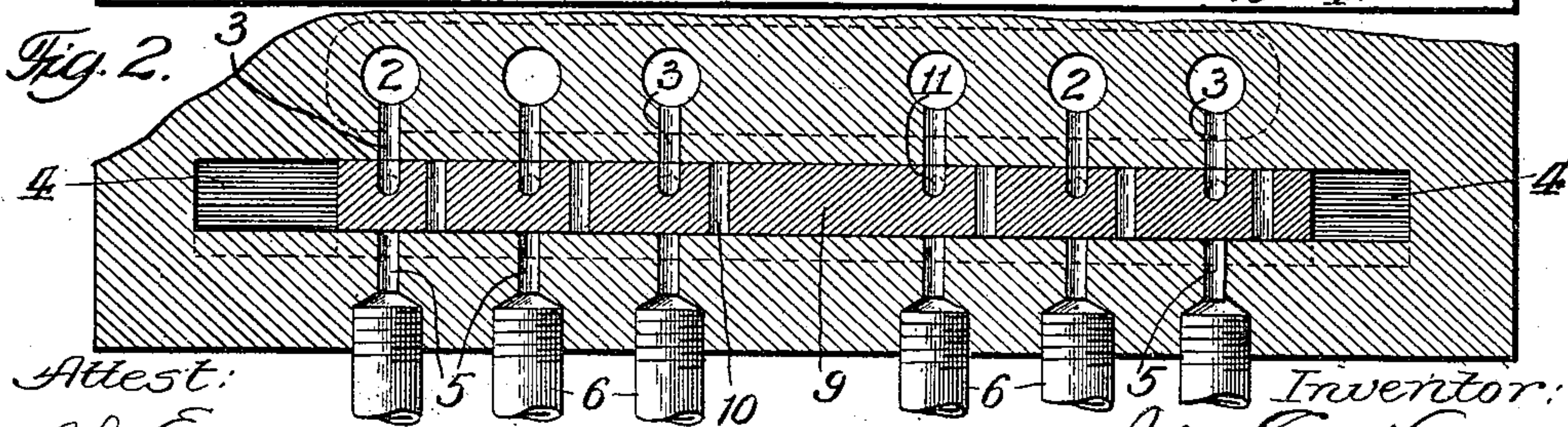
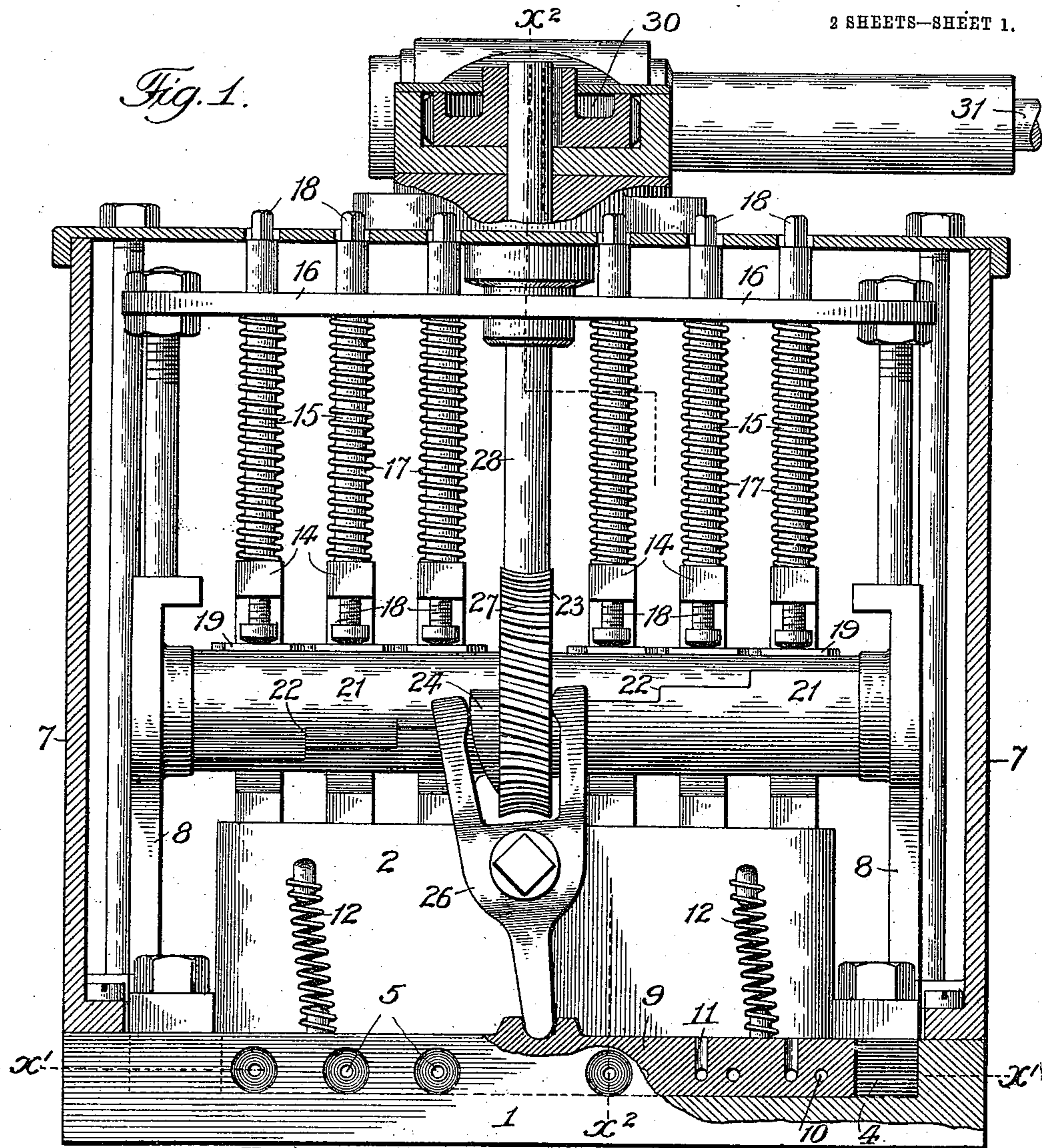
J. C. HILL.  
LUBRICATOR.

APPLICATION FILED FEB. 26, 1906.

910,060.

Patented Jan. 19, 1909.

2 SHEETS—SHEET 1.



Attest:

*John Enders*

*M. H. Holmes.*

Inventor:

*John C. Hill,*

*by Robert Burns*  
*Attorney*



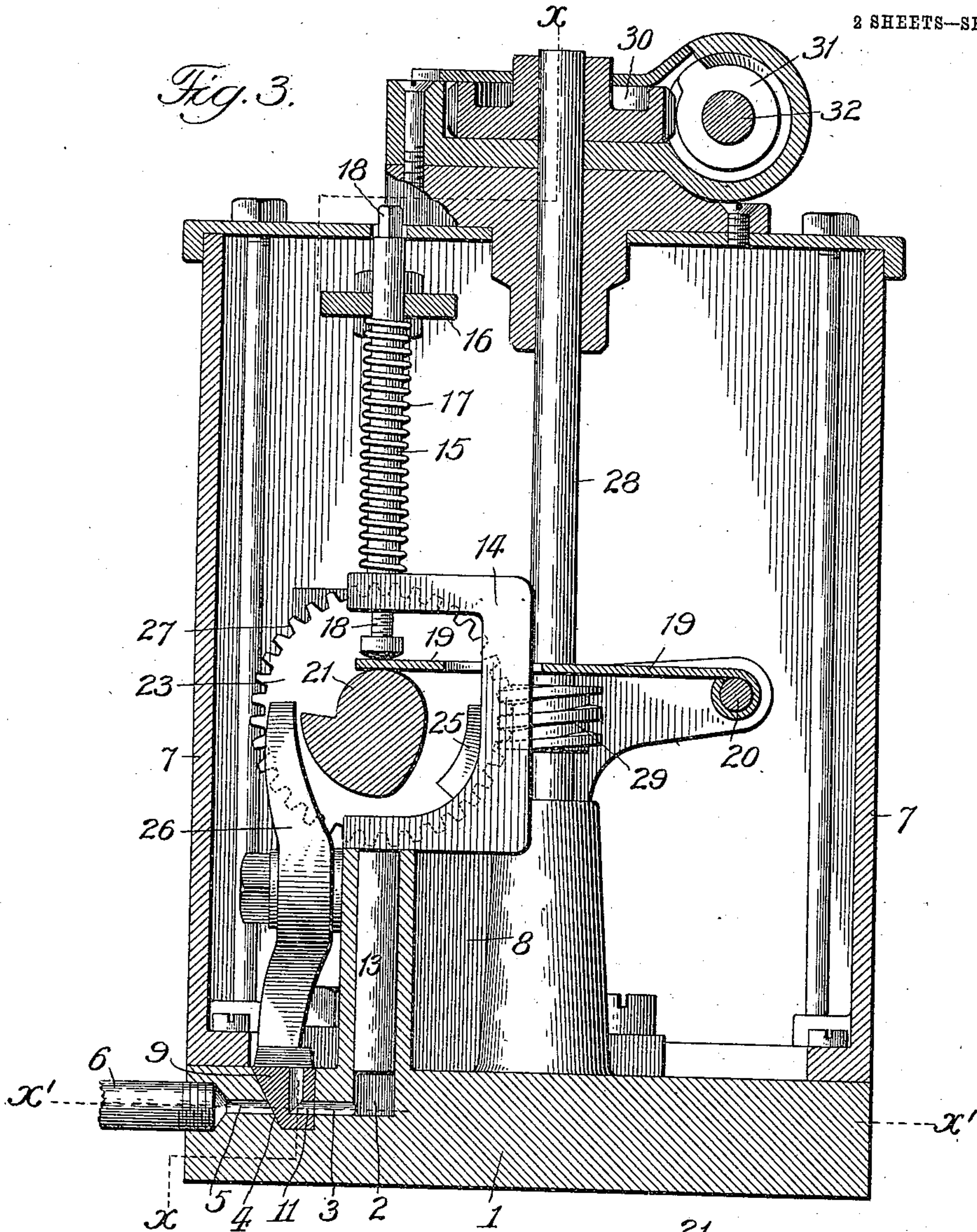
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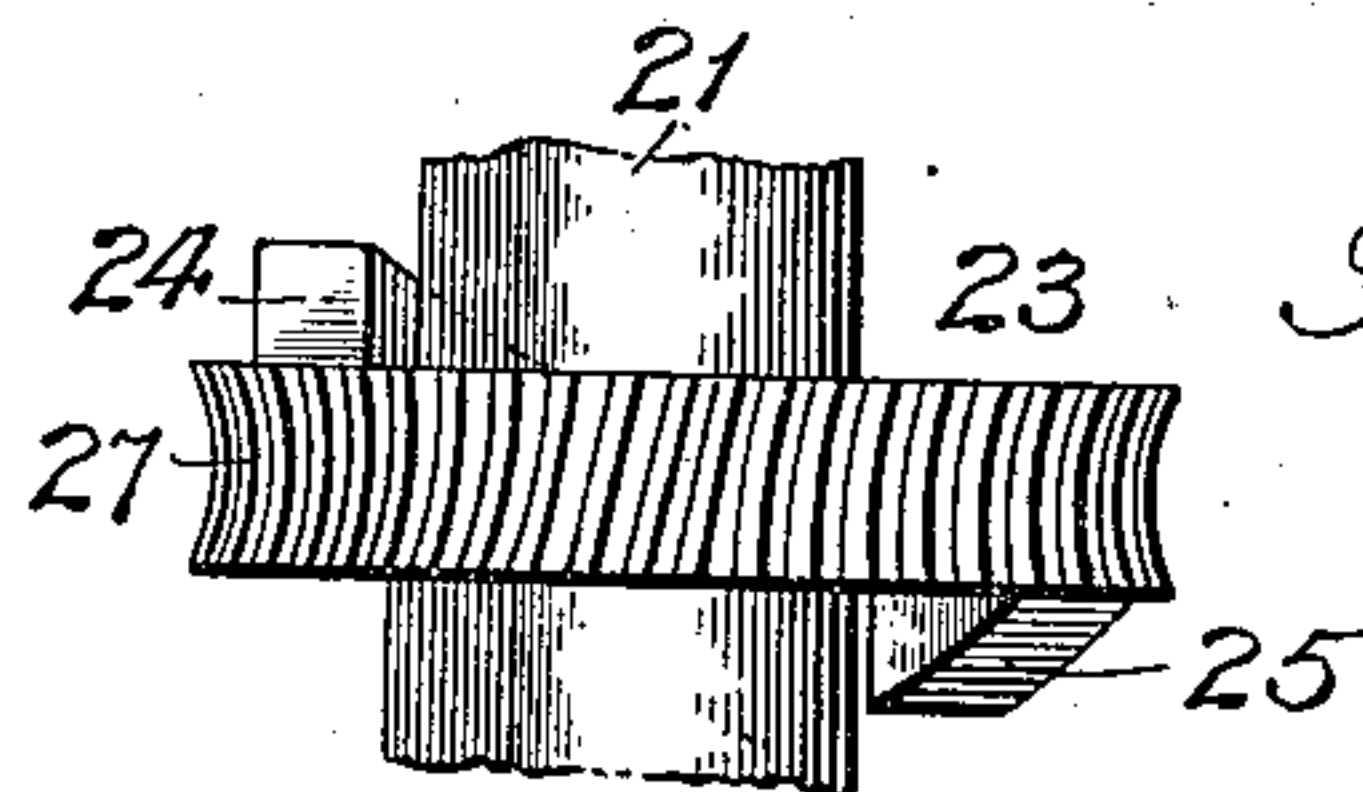
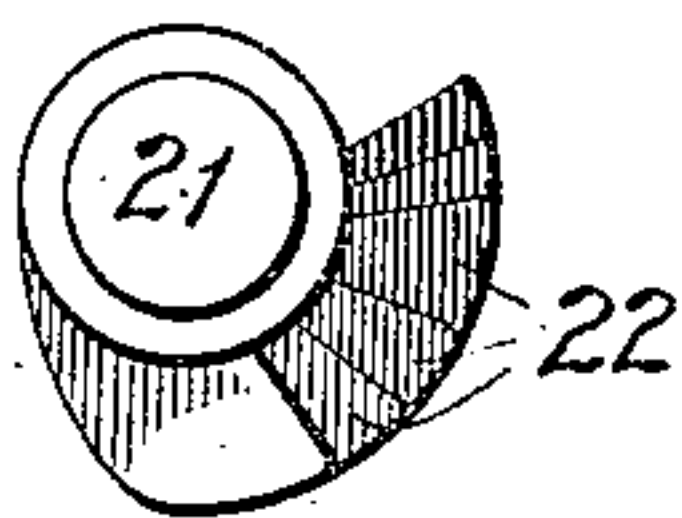
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*Fig. 4.*



*Fig. 5.*

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# UNITED STATES PATENT OFFICE.

JOHN C. HILL, OF CHICAGO, ILLINOIS.

## LUBRICATOR.

No. 910,060.

Specification of Letters Patent.

Patented Jan. 19, 1909.

Application filed February 26, 1906. Serial No. 302,839.

*To all whom it may concern:*

Be it known that I, JOHN C. HILL, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lubricators, of which the following is a specification.

This invention relates to force feed lubricators of the multiple delivery type, and has for its object to provide a simple, durable and efficient structural formation and combination of parts whereby a positive and multiple feed of the lubricant is attained without the use of inlet and outlet check valves, and with which the amount of lubricant fed by each individual delivery can be independently adjusted or regulated as required, all as will hereinafter more fully appear.

In the accompanying drawings illustrative of the present invention:—Figure 1 is a longitudinal vertical sectional elevation on line  $x-x$  Fig. 3. Fig. 2 is a detail horizontal section on line  $x'-x'$ , Figs. 1 and 3. Fig. 3 is a transverse vertical section on line  $x^2-x^2$ , Fig. 1. Fig. 4 is an end elevation of the operating cam. Fig. 5 is a detail plan of same, showing the arrangement of the inclined projections by which the sliding valve of the series of pumps is intermittently reciprocated.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings:—1 is the bottom plate or base of the apparatus provided with a longitudinal row of pump cylinders or chambers 2, the inclosing walls of which in the preferred construction of the present invention, as shown in Fig. 3, form an integral part of the base 1, with the inlet-outlet ports 3, arranged transversely in said base.

4 is a longitudinal channel formed in the base 1 and having opposed walls which constitute the seat for the single controlling slide valve hereinafter described; through the inner of said walls the aforesaid inlet-outlet ports 3 open, while through the outer of said walls a series of outlet ports or passages 5, open, and are connected by suitable pipe connections 6, with the respective bearings or parts to be lubricated.

7 is a casing or housing secured near the margin of the base 1 and adapted to inclose the pump mechanisms, and contain a supply of the lubricant to be pumped, as usual in the present type of apparatus.

8 is an upwardly extending frame fixed on the base 1, for the support of the pump operating mechanism hereinafter set forth.

9 is the controlling slide valve above referred to having sliding contact with the aforesaid exposed walls of the longitudinal channel 4, and receiving intermittent reciprocation by mechanism hereinafter described; such valve is formed with a series of ports or passages 10 extending transversely through the valve as shown in Fig. 2, and which in one position of the valve are adapted to register the inlet-outlet ports 3, of the pump chambers with the before described outlet passages 5 in the base 1; such valve is also formed with a series of angular passages 11 extending from the top of the valve to the inner side of the same, as shown in Fig. 3, and while in the other position of the valve these angular passages are adapted to register the inlet-outlet ports 3, of the pump chambers with the interior of the housing 7 and the supply of lubricant contained therein. In the present improvement the said passages 10 and 11 are arranged in alternate relation to each other as shown in Figs. 1 and 2, and the arrangement is such that in one position of said valve, the pump chambers will be in communication with the interior of the housing to take a supply of the lubricant, and in the other position of the valve communication between the pump chamber and the tank will be closed, and communication opened between the pump chambers and the series of outlet passages 5 having connection with the bearings to be lubricated.

12 are springs tending to hold the valve 9 to its seat in the channel 4 while permitting a free longitudinal reciprocation of the valve. Said springs are arranged between opposed studs on the valve and a stationary part of the pump mechanism, as illustrated in Fig. 1.

13 are the series of pump pistons or plungers moving in the row of pump chambers 2, aforesaid, with their upper ends connected to the series of open front yokes 14, which span the operating cam shaft hereinafter described.

15 are a vertical series of tubular guide stems at the tops of the yokes 14, in vertical alinement with the pump 13, preferably, and moving in a longitudinal guide bar 16, on the frame 8, aforesaid.

105

110



17 are a series of springs surrounding the guide stems 15, and arranged between the guide bar 16, and the tops of the yokes 14, with a normal tendency to forcibly depress 5 said yokes and the pump plungers 13 carried thereby.

18 are a series of vertically adjustable screws passing down through the tubular guide stems 15, and screwing through the 10 top members of the yokes 14, and preferably provided with enlarged lower ends for bearing against the series of interposed bearing bars or fingers hereinafter described. When so desired the tubular guide stems 15, and 15 adjustable screws may be formed integrally to attain the functions of the separate parts.

19 are the series of bearing bars or fingers above referred to, pivoted on a longitudinal rod 20, carried by the frame 8, with their 20 forward and free ends below the lower ends of the adjustable screws 18, to have bearing contact on the lifting cams hereinafter described. With such arrangement the direct wear is upon said bars so that when much 25 worn they can be readily and economically replaced.

21 is a longitudinally extending cam shaft journaled in the frame 8, aforesaid; such cam shaft is common to the series of yokes 30 14, and their individual accessories, and in the preferred form of the present invention such cam shaft is formed with a series of steps 22 in its cam portion, as shown in Figs. 1 and 4, so that the down or active stroke of 35 the series of pump plungers will take place serially, the one following the other in short succession, and the whole taking place in a small part of one rotation of the cam shaft.

23 is a disk or rim rotating in unison with 40 the cam shaft 21, and preferably carried thereon; such disk is provided with a pair of inclines or cams 24, 25, arranged in diametric relation and projecting longitudinally from opposite sides of such disks as 45 illustrated in Figs. 1, 2 and 5.

26 is a vertical lever pivoted to a fixed part of the machine, with its lower arm in operative engagement with the slide valve 9, while its upper end is forked to straddle 50 the disk 23, to be intermittently moved in one direction by the cam or incline 24, and in the other direction by the cam or incline 25, during a continued operation of the apparatus.

55 Any ordinary or usual operating mechanism may be employed to impart a slow rotation to the cam shaft 21, without departing from the spirit of the present invention; the mechanism shown in the drawings consists in an arrangement of parts as follows:—

60 27 is a worm wheel carried by the cam shaft and preferably formed by the provision of a series of worm teeth in the periphery of the disk or rim 23 aforesaid. 28 is a vertical shaft carrying an endless screw or worm 29

which meshes with and drives the aforesaid worm wheel 27. 30 is a worm wheel on the upper end of the vertical shaft 28; and 31 is an endless worm or screw on a horizontal shaft 32, meshing with and driving the said 70 worm wheel 30; the shaft 32 in turn receiving motion from a convenient power source.

The operation of the apparatus is as follows:—With the series of pump plungers in their depressed position, as shown in the 75 drawings, and with the valve 9 in a position to register the pump chambers with the interior of the housing 7, and with a continued rotation of the cam shaft 21, the series of yokes and their connections are 80 gradually lifted by the cam formation into their fully raised position, previous to which the incline 25 moves against the lever 26 to shift the valve 9 longitudinally to close 85 the communication between the pump chambers and the interior of the housing 7, and open communication between the pump chambers and the outlet passages 5. With the series of yokes, etc., fully raised and the 90 pump chambers filled with the lubricant, the cam projections of the cam shaft move from under the yokes, and the same are forcibly depressed by the springs 17 to discharge the lubricant from the pump chambers through the outlet passages 5, and to 95 the points of use. A continued rotation of the cam shaft shifts the valve 9 back to its original position through the instrumentality of the incline 24, to begin again a 100 fresh cycle of the operations just described.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A force feed lubricator, comprising a pump casing provided with a longitudinal 105 row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, means for actuating 110 said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with 115 the pump chambers, and means for imparting intermittent reciprocation to the valve.

2. A force feed lubricator, comprising a pump casing provided with a longitudinal 120 row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, means for actuating 125 said plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to 130



alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve.

3. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

4. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

5. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam for moving the plungers in one direction, a series of springs moving the plungers in the other direction, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve.

6. A force feed lubricator comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam for moving the plungers in one direction, a series of springs moving the plungers in the other direction, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely ar-

anged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve.

7. A force feed lubricator comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam for moving the plungers in one direction, a series of springs moving the plungers in the other direction, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

8. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam for moving the plungers in one direction, a series of springs moving the plungers in the other direction, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

9. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, means for actuating said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chamber, springs for holding said valve to its seat, and means for imparting intermittent reciprocation to the valve.

10. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers,



means for actuating said plungers, a reciprocating valve having its seat in said channel and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve.

11. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, means for actuating said plungers, a reciprocating valve having its seat in said channel and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting reciprocation to the valve in unison with the plungers aforesaid.

12. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, means for actuating said plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve having its seat in said channel and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve.

13. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, means for actuating said plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve having its seat in said channel and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve in unison with said plungers.

14. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into

the opposite side of said seat, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

15. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

16. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, means for actuating said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve, the same comprising a pivoted lever operatively connected to the valve and a rotary cam disk operatively engaging said lever.

17. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve, the same comprising a pivoted lever operatively connected to the



valve and a rotary cam disk operatively engaging said lever.

18. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat, with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, means for actuating said plungers, a reciprocating valve having its seat in said channel and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means for imparting intermittent reciprocation to the valve, the same comprising a pivoted lever operatively connected to the valve and a rotary cam disk operatively engaging said lever.

19. A force feed lubricator, comprising a pump casing provided with a longitudinal channel forming a valve seat with a row of outlet passages opening into one side of said seat and with a row of pump chambers provided with inlet-outlet ports opening into the opposite side of said seat, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to the valve, the same comprising a pivoted lever.

20. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers in said pump chambers, individual open front yokes carried by the plungers, guide stems carried by said yokes, a rotary cam common to the series of yokes, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to the valve.

21. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, individual

open front yokes carried by the plungers, guide stems carried by said yokes, a rotary cam moving the plungers in one direction, a series of springs moving the plungers in the other direction, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to the valve.

22. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers and having a step formation of its cam projection, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

23. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam common to the series of plungers and having a step formation of its cam projection, means for individually adjusting the stroke of said plungers, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump chambers, and means intermediate of said cam and valve for imparting intermittent reciprocation to said valve.

24. A force feed lubricator, comprising a pump casing provided with a longitudinal row of outlet passages and with a like row of pump chambers each provided with an inlet-outlet passage in line with the aforesaid outlet passages, a series of plungers moving in said pump chambers, a rotary cam having a step formation of its cam projection and adapted to move the plungers in one direction, a series of springs for moving the plungers in the other direction, a reciprocating valve common to the series of pump chambers and formed with a series of transversely arranged angular and straight passages in alternated relation and adapted to alternately register with the pump cham-



bers, and means for imparting intermittent reciprocation to the valve.

25. A force feed lubricator, comprising a pump casing with an outlet passage and with a pump chamber having an inlet-outlet passage in line with the aforesaid outlet passage, a plunger moving in said pump chamber, an open front yoke carried by the plunger, guide stems carried by said yoke, a rotary cam engaging said yoke, a controlling valve formed with an angular and a straight passage, and adapted to alternately register with the pump chamber, and means intermediate of said cam and valve for imparting intermittent motion to the valve.

26. A force feed lubricator, comprising a pump casing with an outlet passage and with a pump chamber having an inlet-outlet passage in line with the aforesaid outlet passage, a plunger moving in said pump chamber, an open front yoke carried by the plunger, guide stems carried by said yoke, a rotary cam moving said plunger in one direction, a spring moving the plunger in the opposite direction, a controlling valve formed with an angular and a straight passage and adapted to alternately register with the pump chamber, and means intermediate of said cam and valve for imparting intermittent motion to the valve.

27. A force feed lubricator, comprising a pump casing with an outlet passage and with a pump chamber having an inlet-outlet passage in line with the aforesaid outlet passage, a plunger moving in said pump chamber, an open front yoke carried by the plunger, guide stems carried by said yoke, a rotary cam engaging said yoke, means for adjusting the stroke of the plunger, a controlling valve formed with an angular and a straight passage and adapted to alternately register with the pump chamber, and means intermediate of said cam and valve for imparting intermittent motion to the valve.

28. A force feed lubricator, comprising a pump casing with an outlet passage, and with a pump chamber having an inlet-outlet passage, a plunger moving in said pump chamber, an open front yoke carried by the plunger, guide stems carried by said yoke, a rotary cam moving said plunger in one direction, a spring moving the plunger in the opposite direction, means for adjusting the stroke of the plunger, a controlling valve formed with an angular and a straight passage and adapted to alternately register with the pump chamber, and means inter-

mediate of said cam and valve for imparting intermittent motion to the valve.

29. In a force feed lubricator, the combination with an oil reservoir, of a pump chamber and a valve chamber arranged within said reservoir, a plunger in said pump chamber, a reciprocating valve in said valve chamber arranged to establish communication between said reservoir and said pump chamber and between said pump chamber and a suitable outlet, and operating mechanism in said reservoir for said plunger and said valve, substantially as described.

30. The combination with an oil tank, of a casting in said tank forming a cylinder and provided with a transverse bore at one end of the cylinder and an inlet and a discharge passage leading from said bore, a piston in the cylinder; a valve member in said bore formed with a passage adapted to connect the cylinder with the discharge passage when the valve member is in one position and a passage adapted to connect the cylinder with the inlet passage, when the valve member is in another position, and means for reciprocating said valve member and piston in timed relation.

31. The combination with an oil tank, of a series of cylinders in said tank, a valve member formed with an inlet and a discharge passage for each of said cylinders, pistons in the cylinders, and means for reciprocating the pistons and valve member in timed relation to alternately bring the inlet and discharge passages into communication with the cylinders.

32. The combination with an oil tank, of a casting in said tank formed with a series of cylinders and provided with a longitudinal bore into which one end of the cylinders open and an inlet and a discharge passage for each cylinder opening into said bore, a valve member in said bore formed with passages adapted to connect the discharge passages with the cylinders and provided with passages adapted to connect the inlet passages with said cylinders and means for actuating the pistons and reciprocating the valve member in timed relation to the pistons.

Signed at Chicago, Illinois, this 20th day of February 1906.

JOHN C. HILL.

Witnesses:

ROBERT BURNS,  
P. C. HILL.