Aug. 20, 1935. O. F. LILLIA 2,012,244

PUMP

Filed Nov. 15, 1928 2 Sheets-Sheet 1

Fig. 1.

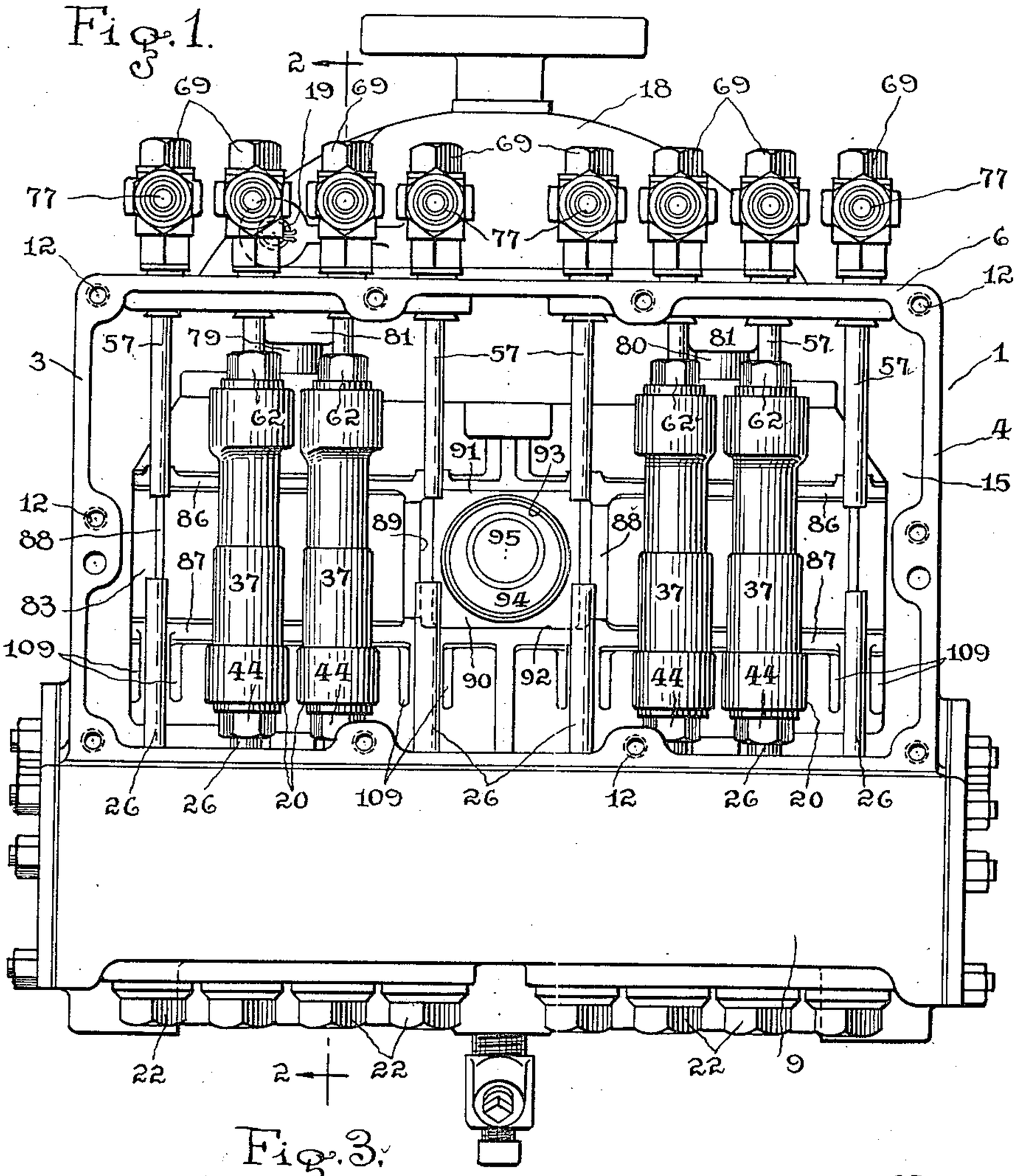

Fig. 3.

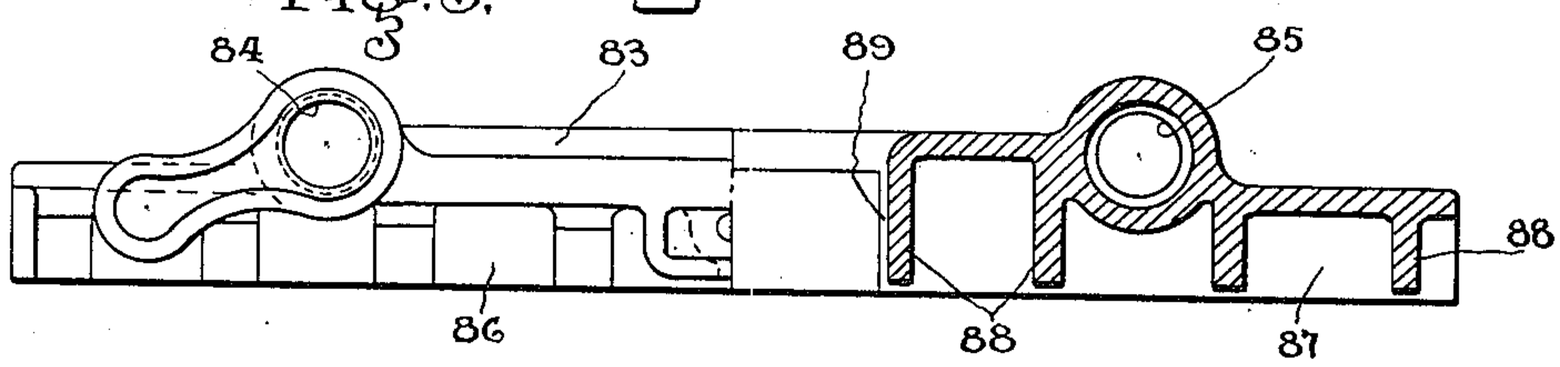

Fig. 4.

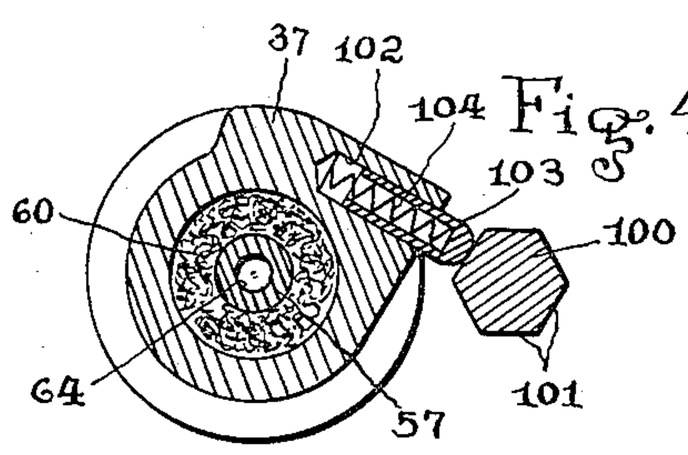

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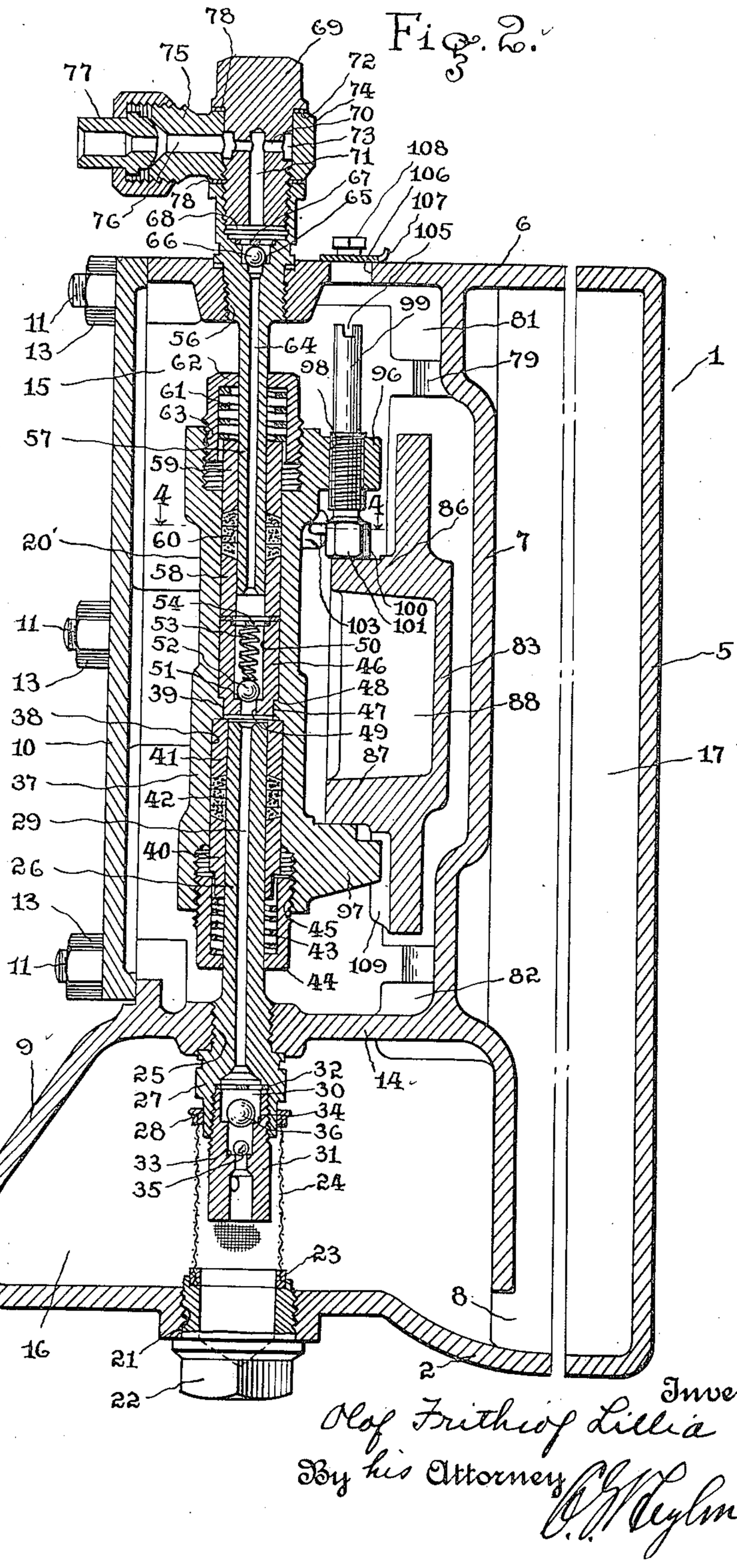
Fig. 2.



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Patented Aug. 20, 1935 2,012,244

UNITED STATES PATENT OFFICE

2,012,244

PUMP

Olof Frithiof Lillia, Detroit, Mich., assignor to Detroit Lubricator Company, Detroit, Mich., a corporation of Michigan

Application November 15, 1928, Serial No. 319,715

15 Claims. (Cl. 184—27)

My invention relates to new and useful improvements in pumps, and more particularly to pumps of the reciprocating type.

An object of my invention is to provide means for regulating the displacement of a fluid delivery pump.

Another object is to provide means whereby a plurality of pumps actuated by a common driving member may be independently regulated to provide a desired discharge from each of the pumps.

The invention consists in the improved construction and combination of parts, to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated a preferred embodiment of my invention, in which drawings—

Figure 1 is a view in front elevation of my invention as embodied in a lubricator of the force feed type having the front cover plate removed, and certain of the pump cylinders omitted for clarity of illustration;

Fig. 2 is a view in vertical section on the line 2—2 of Fig. 1;

Fig. 3 is a detail plan view, partially in horizontal central section of a pump actuating member, and

Fig. 4 is a detail section on the line 4—4 of Fig. 2.

Referring to the drawings by characters of reference, 1 designates generally a casing of a lubricator of the force feed type such as is employed in the lubrication of moving engine parts, and particularly the parts of a locomotive engine. The casing 1 serves as a support for certain pump means to be described, and comprises a substantially rectangular bottom wall 2 from which rise substantially vertical side walls 3, 4, and a rear wall 5. The side and rear walls support a top wall 6, from which depends a partition 7 which joins the side walls 3, 4 and extends adjacent to the bottom wall 2 leaving a passage 8 therebeneath. The front of the casing 1 is closed to substantially one-third of its height by a wall 9, above which and closing the remainder of the front is a cover plate or member 10 which is removably secured in place by studs 11 screwed into tapped holes 12 in the casing, and by nuts 13. At the top of the front wall 9 is a horizontal partition 14 which joins the side walls 3, 4 and the partition 7, and divides the front portion of the casing 1 into a pump chamber 15 and an oil chamber 16. The rear portion of the casing 1 between partition 7 and wall 5 forms an oil reservoir 17. Through the top wall 6 is a filling opening which opens into reservoir 17, and is closed by a cover or cap member 18 hinged to the casing 1 by a hinge pin 19.

In the pump chamber 15 are a plurality of alined and laterally spaced pumps 20 which are positioned in a common vertical plane substantially parallel to partition 7 and which are of similar construction so that a detailed description of one of the pumps 20 will suffice for all. Any desired number of pumps may be employed, depending upon the number of feed lines which the lubricator is to supply. Through the base 2 beneath partition 14 is an aperture 21 which is closed by a screw plug 22 which supports and has secured thereto, as at 23, a filter medium 24, preferably a substantially cylindrical wire screen of fine mesh. Directly above the aperture 21 is an internally threaded aperture 25 through the partition 14 into which is threaded a fixed pump plunger or piston 26 which extends upwardly into chamber 15 and has, at its lower end, a head 27 which fits tightly into the upper end of strainer 24, as at 28. Longitudinally through the plunger 26 is a hollow bore 29 which opens at its lower end into an internally threaded recess 30 in head 27. Secured in the recess 30 by a hollow plug 31 is a valve retaining spider 32. The bore of plug 31 is enlarged in successive stages to provide upwardly facing valve seats 33, 34 for cooperation with valve members 35, 36, preferably of the ball check type which open upwardly to permit flow from chamber 16 to the bore 29. Mounted on the fixed plunger 26 for vertical reciprocation is a pump cylinder 37 having a longitudinal bore 38 therethrough with an internal annular flange 39 substantially midway of its length. Within the bore 38 surrounding the plunger 27 are spaced guide sleeves 40, 41 and between which and around the plunger 26 are packing rings 42 of any suitable material. The rings 42 are compressed axially and expanded radially to prevent escape of oil between the plunger 26 and the sleeves 40, 41 by a coil spring 43 which surrounds plunger 26 and seats on sleeve 40, and which is held under compression by a packing nut 44 threaded into the cylinder bore 38, as at 45. Within the bore 38 is a valve sleeve member 46 which is of reduced diameter, as at 47, to fit within the flange 39, the reduction forming an annular shoulder 48 which seats on the flange 39 to support member 46. The member 46 has a longitudinal bore 49 which is enlarged, as at 50, to provide a valve chamber and an upwardly facing annular valve seat 51 for coopera-

tion with a valve 52, preferably of the ball type, which is normally held to its seat by a spring member 53 held under compression by a spider 54 which is fixed to member 46, preferably by burnishing the same over onto the spider 54. Through the top wall 6 in vertical axial alinement with the fixed piston or plunger 26 is an internally threaded aperture 56 into which is threaded a second pump plunger or piston 57 which extends downward through wall 6 into the bore 38 of cylinder 37. Within the bore 38 above spider 54 are spaced guide sleeves 58, 59, which surround plunger 57, the sleeve 58 seating on the spider 54, and between the sleeves 58, 59 are packing rings 60 which surround the plunger 57. Acting on the sleeve 59 and surrounding plunger 57 is a spring member 61, preferably of the coil type, which is held under compression by a packing nut 62 threaded into the upper end of cylinder 37, as at 63. The spring member 61 serves to compress the packing rings 60 axially and expand them radially to prevent leakage of oil past the plunger 57. The cross-sectional area of plunger 57 is substantially one-half the cross-sectional area of plunger 26, so that reciprocation of the cylinder 37 will deliver oil on both the up and the down strokes. Longitudinally through the plunger 57 is a bore 64 which is enlarged at its upper end to provide an annular shoulder 65 serving as a valve seat for cooperation with a valve 66, preferably of the ball type, which is retained in the enlargement of the bore 64 by a spider 67, preferably fixed in place by burnishing, or the like. The enlargement of bore 64 opens into an internally threaded recess 68 into which is threaded a plug 69 through which is a passage 70 transverse to the longitudinal axis of the plunger 57. In the plug 69 is an axial passage 71 which opens from the recess 68 into the passage 70. Surrounding the plug 69 in the horizontal plane of passage 70 is a circumferential bearing recess 72, within which the plug 69 has a circumferential groove 73 communicating with the ends of passage 70. Journaled in the bearing recess 72 is a ring member 74 having a radial boss or extension 75 through which is a passage 76 substantially in the plane of passage 70 and which opens at its inner end into the groove 73. The outer end of boss 75 may be provided with a nipple connection 77 for union with a feed line or conduit (not shown) for delivery of lubricant to the engine working parts. Leakage between ring member 74 and plug 69 may be prevented by the use of gaskets 78, or the like.

Within the pump chamber 15 is the driving mechanism for the pump cylinders 37. Adjacent the partition 7 and spaced equidistant from the vertical center line of casing 1 are vertical guide rods 79, 80 which are fixed at their upper ends in bosses 81 depending from top wall 6 and at their lower ends in bosses 82 on the partition 14. Supported on rods 79, 80 is a reciprocating means comprising a plate member 83 having vertical bores 84, 85 therethrough, through which rods 79, 80 pass. Projecting forward from member 83 are substantially horizontal parallel vertically spaced ribs or flanges 86, 87, which may be connected by spaced vertical ribs 88 for strengthening the plate member 83. Substantially central of the plate is a transverse rectangular opening 89 in which is positioned for horizontal movement a slide block 90, the top and bottom faces 91, 92 of which are in sliding engagement with the top and bottom walls respectively of the opening 89. Transversely through slide block 90 is a cylindrical aperture 93 which serves as a journal bearing for an eccentric 94 which is fixed on a drive shaft 95. The shaft 95 may be journaled in any suitable manner for rotation, but is preferably supported in journal bearings (not shown) carried by depending partition 7 and cover member 10, and projects from member 10 for engagement by any suitable means for rotating the same. Projecting from cylinders 37 adjacent the top and bottom ends thereof are horizontal lugs or flanges 96, 97 respectively which serve as abutments, and which over and under lie the ribs 86, 87 respectively, but which are spaced apart vertically a greater distance than the ribs 86, 87. Each of lugs 96 has a vertical tapped hole 98 therethrough which overlies rib 86, and threaded through each hole 98 is an adjustment pin or screw member 99 for cooperation with rib 86 and having a polygonal portion 100 providing abutment faces 101. Each of the pins 99 with its lug 96 provides an adjustable abutment. In the wall of each cylinder 37 is a horizontal cylindrical socket 102 which is positioned at a point within the vertical limits of adjustment of the head 100. Within socket 102 is a pin or detent member 103 which is longitudinally slidable therein and normally pressed into engagement with a face 101 of the portion 100 by a spring member 104 to thereby hold the member 99 in adjusted position. The upper end of each member 99 is provided with a slot or kerf 105 for engagement by an adjusting tool such as a screw driver. Through the top wall 6 of casing 1 is an opening 106 which is directly above the members 99 for access thereto and which is closed by a cover member 107 pivoted on a pin 108 so that it may be swung into or out of closing relation to opening 106. Extending forward from the plate member 83 beneath the rib 87 are pairs of vertical spaced guide members 109 which cooperate with lugs 97 to guide the vertical reciprocation of the cylinders 37 and prevent rotation of the cylinders on the pistons or plungers.

The operation of my device is as follows: The nipples 77 are connected to conduits or pipes (not shown) which lead to the engine parts to be lubricated, and the shaft 95 is operatively connected to a drive means which will rotate the shaft and thereby cause vertical reciprocation of the plate member 83. The reservoir 17 and chamber 16 are then filled with oil or other fluid lubricant by means of the filling opening normally closed by cover member 18. It will be noted that the cross-sectional area of plunger 57 is substantially one-half the cross-sectional area of plunger 26 and therefore reciprocation of cylinder 37 will cause a continuous feed of oil since the piston 26 on the down stroke of cylinder 37 will force twice as much oil above check valve 52 as can be retained in the cylinder thereabove, and upon the up-stroke the oil retained above valve 52 will be displaced by piston 57. In Fig. 2, the pump 20 is shown as adjusted for maximum feed, since the member 99 is in engagement with flange 86 and lug 97 is in engagement with flange 87 so that cylinder 37 must move with and to the full extent of the stroke or movement of member 83. Any of the pumps 20 may have the feed therefrom discontinued by sliding cover member 107 from slot 106, and then unscrewing the member 99 to raise the head 100 until the distance between head 100 and lug 97 is greater than the distance between the top and bottom faces of flanges 86, 87 respectively plus the stroke of

member 83, i. e., the distance member 83 is moved in one direction by the eccentric 94. When the member 99 has been so adjusted, it will be apparent that movement of member 83 will not be imparted to the cylinder 37 which has been so adjusted while cylinders not so adjusted will be reciprocated by movement of member 83. By screwing the member 99 toward the flange 86 from the position in which feed is discontinued, any degree of movement of member 83 may be imparted to the adjusted cylinder 37 and consequently any rate of feed of the pump may be obtained. The detents 103 serve as locks to prevent rotation and change of setting of screw members 99 during operation of the pump.

Although I have described my invention as embodied in a lubricator pump, it will, of course, be understood that the same may be employed on reciprocating pumps having other uses than the pumping of lubricant.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A pump of the character described, comprising cooperating relatively reciprocable piston and cylinder members, reciprocating means, guide means cooperable with and compelling straight line movement of said means, the reciprocable member having abutment means in the plane of movement of said reciprocating means, said abutment means being spaced longitudinally of the reciprocable member a distance greater than the stroke of said reciprocating means, and means to cause operative engagement of said reciprocating means and said abutment means whereby said reciprocating means will move said reciprocable member.

2. A pump of the character described, comprising cooperating relatively reciprocable piston and cylinder members, reciprocating means, guide means cooperable with and compelling straight line movement of said means, the reciprocable member having abutment means in the plane of movement of said reciprocating means, said abutment means being spaced longitudinally of the reciprocable member a distance greater than the stroke of said reciprocating means, and adjustable means to cause operative engagement of said reciprocating means and said abutment means whereby said reciprocating means will move said reciprocable member, said adjustable means being operative to regulate the stroke imparted to said reciprocable member by said reciprocating means.

3. A pump of the character described, comprising cooperating relatively reciprocable piston and cylinder members, reciprocating means, guide means cooperable with and compelling straight line movement of said means, the reciprocable member having abutment means in the plane of movement of said reciprocating means, said abutment means being spaced longitudinally of the reciprocable member a distance greater than the stroke of said reciprocating means, adjustable means to cause operative engagement of said reciprocating means and said abutment means whereby said reciprocating means will move said reciprocable member, said adjustable means being operative to regulate the stroke imparted to said reciprocable member by said reciprocating means, and means to hold said adjustable means in adjusted position.

4. A pump of the character described, comprising a fixed piston and a cylinder mounted thereon for reciprocation, reciprocating means, guide means cooperable with and compelling straight line movement of said means, said cylinder having means spaced longitudinally thereof, said third-named means being in the plane of movement of said reciprocating means, means to cause operative engagement of said reciprocating means and said third-named means whereby said reciprocating means will move said cylinder, said reciprocating means having a guide groove, and means on said cylinder extending into said groove to prevent rotation of said cylinder relative to said piston.

5. A pump of the character described, comprising a fixed piston and a cylinder mounted thereon for reciprocation, spaced members projecting from said cylinder in longitudinal alinement, reciprocating means positioned between said members, guide means cooperable with and compelling straight line movement of said means, the length of the stroke of said means being less than the distance between said members, and means carried by one of said members and operable to engage said reciprocating means and hold said reciprocating means in engagement with and against movement relative to the other of said members whereby said reciprocating means will impart its full stroke to said cylinder.

6. A pump of the character described, comprising a fixed piston having a cylinder mounted thereon for reciprocation, a plate member mounted for reciprocation longitudinally of said cylinder, flanges projecting from said member toward said cylinder, lugs on said cylinder over and underlying said flanges, the distance between said lugs being greater than the distance between said flanges plus the stroke of said member, and adjustable means carried by one of said lugs and movable into the path of movement of one of said flanges whereby said one flange will engage said adjustable means upon one stroke of a reciprocation of said plate member and the other flange will engage the other lug upon the reverse stroke of the reciprocation to thereby reciprocate said cylinder.

7. A pump of the character described, comprising a fixed piston having a cylinder mounted thereon for reciprocation, a plate member mounted for reciprocation longitudinally of said cylinder, flanges projecting from said member toward said cylinder, lugs on said cylinder over and underlying said flanges, the distance between said lugs being greater than the distance between said flanges plus the stroke of said member, adjustable means carried by one of said lugs and movable into the path of movement of one of said flanges whereby said one flange will engage said adjustable means upon one stroke of a reciprocation of said plate member and the other flange will engage the other lug upon the reverse stroke of the reciprocation to thereby reciprocate said cylinder, means to guide the reciprocation of said cylinder, and means to hold said adjustable means in adjusted position.

8. A pump of the character described, comprising cooperating piston and cylinder members, a plate member positioned laterally of and reciprocable longitudinally of said members and having a flange extending toward said members, one of said first-named members being reciprocable relative to the other of said members and having abutment means adapted for driving engagement with said flange, and means to regulate the reciprocation imparted to the reciprocable one of said first-named members by said plate member.

9. A pump of the character described, com-

prising cooperating relatively reciprocable piston and cylinder members, a plate member reciprocable longitudinally of said members, guide means for said plate member, the reciprocable one of said first-named members having longitudinally spaced members cooperable with said plate member, and adjustable means to impart the reciprocation of said plate member to the reciprocable one of said first-named members.

10. A pump of the character described, comprising cooperating relatively reciprocable piston and cylinder members, a plate member reciprocable longitudinally of said members, a fixed guide member extending substantially parallel to the relatively reciprocable members, means on said plate member cooperable with said guide member to guide the reciprocation of said plate member, the reciprocable one of said first-named members having longitudinally spaced members cooperable with said plate member, and means to cause engagement between said spaced members and said plate member whereby to transmit the reciprocation of said plate member to the reciprocable one of said first-named members.

11. A pump of the character described, comprising cooperable relatively reciprocable piston and cylinder members, a plate member reciprocable longitudinally of said members, said plate member having spaced flanges extending toward and transverse to the path of movement of the reciprocable one of said first-named members, and means carried by the reciprocable one of said first-named members cooperable with said flanges for regulating the movement imparted to the reciprocable one of said first-named members by said plate member.

12. A pump of the character described, comprising cooperable relatively reciprocable piston and cylinder members, a plate member reciprocable longitudinally of said members, said plate member having spaced flanges extending toward and transverse to the path of movement of the reciprocable one of said first-named members, means carried by the reciprocable one of said first-named members cooperable with said flanges for regulating the movement imparted to the reciprocable one of said first-named members by said plate member, and guide means on said plate member cooperable with the reciprocable one of said first-named members.

13. A pump of the character described, comprising relatively reciprocable piston and cylinder members, a plate member movable relative to said members and being guided for reciprocating movement substantially parallel to the plane of movement of the reciprocable one of said members, said plate member having a bearing, an eccentric journaled in said bearing and being operable to impart movement to said plate member, and motion transmitting means operatively positioned between said one reciprocable member and said plate member for determining the extent of motion of said plate member transmitted to said one reciprocable member.

14. In a lubricator of the character described, a plurality of pumps, each of said pumps comprising relatively reciprocable piston and cylinder members, a plate member movable relative to said reciprocable members and guided for reciprocation substantially parallel to the reciprocable ones of said members, means acting on said plate member to reciprocate said plate member, and motion transmitting means projecting laterally from each of the reciprocable ones of said relatively reciprocable members and cooperating with said plate member, said motion transmitting means extending transversely to said plate member and acting to transmit the motion of said plate member to each of the reciprocable ones of said relatively reciprocable members.

15. In a lubricator of the character described, a plurality of pumps, each comprising relatively reciprocable piston and cylinder members, a plate member having a bearing and guided for reciprocation substantially parallel to the reciprocable ones of said members, eccentric means journaled in said bearing and acting on said plate member to reciprocate said plate member, and adjustable means operatively positioned between said plate member and each of the reciprocable ones of said relatively reciprocable members for transmitting the motion of said plate member to the reciprocable ones of said relatively reciprocable members.

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