No. 799,574. PATENTED SEPT. 12, 1905.

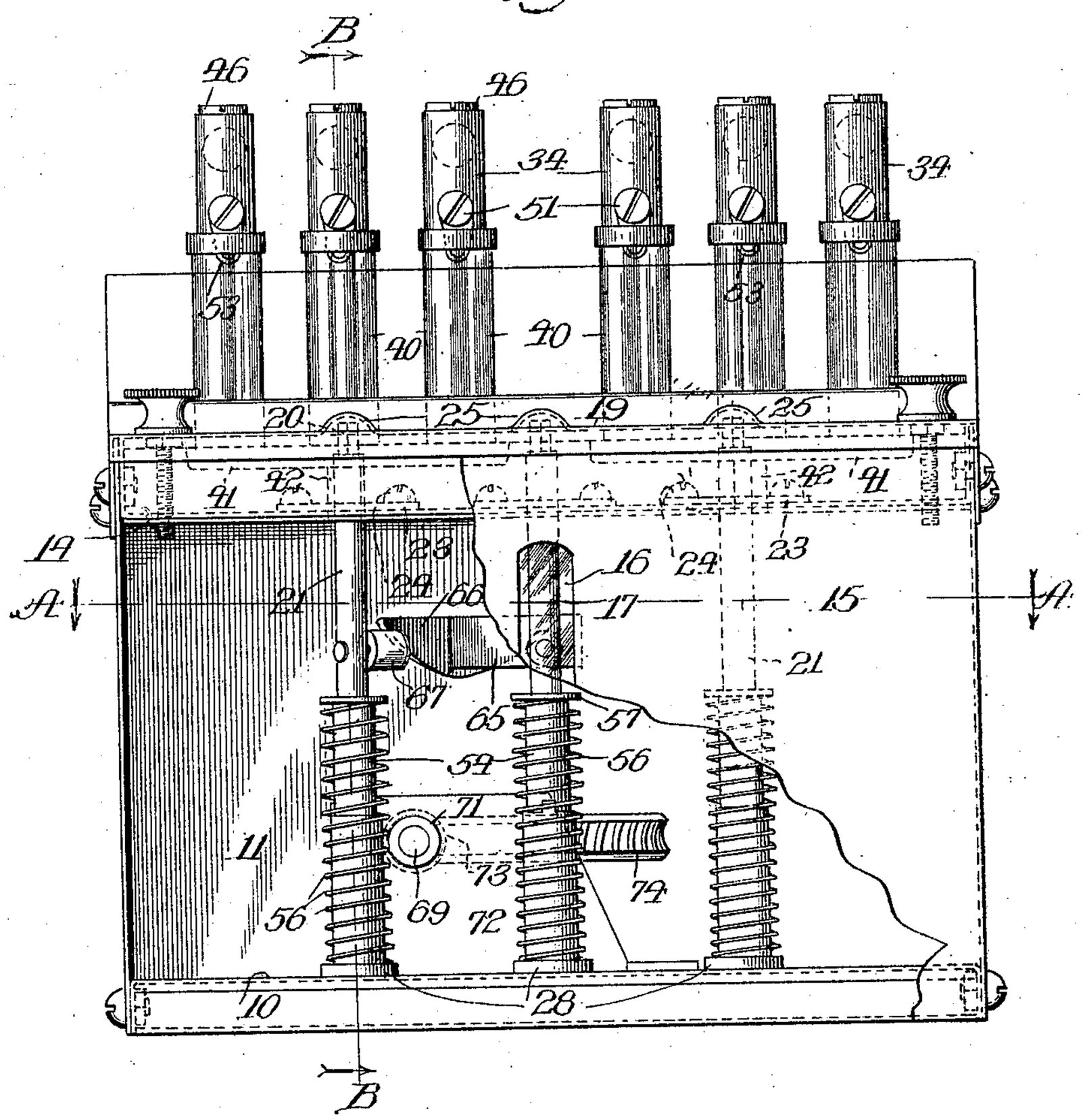
E. NEELY.

FORCE FEED LUBRICATING PUMP.

APPLICATION FILED JUNE 10, 1905.

3 SHEETS—SHEET 1.

Fig. 1

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3 SHEETS—SHEET 2.

Fig. 2

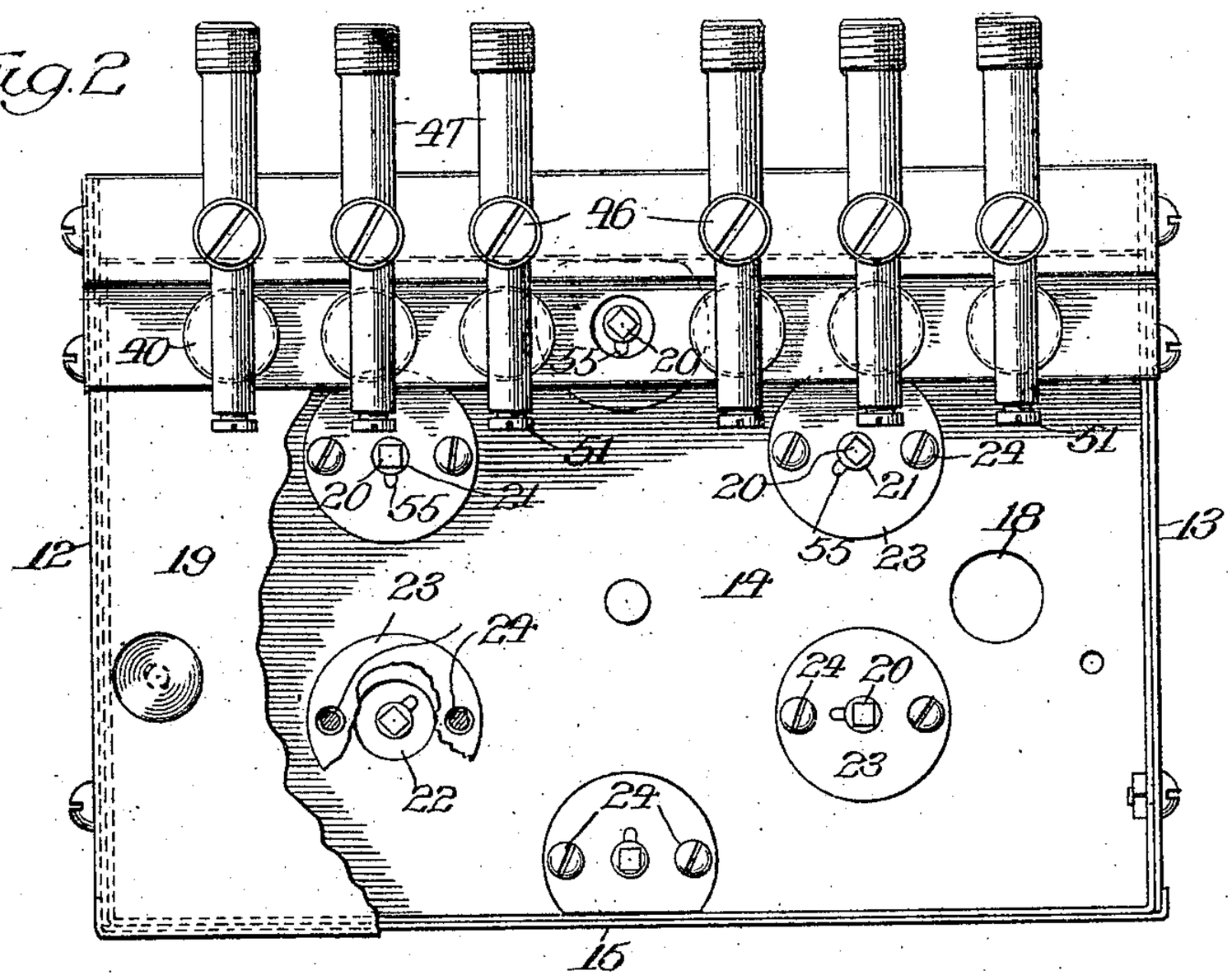
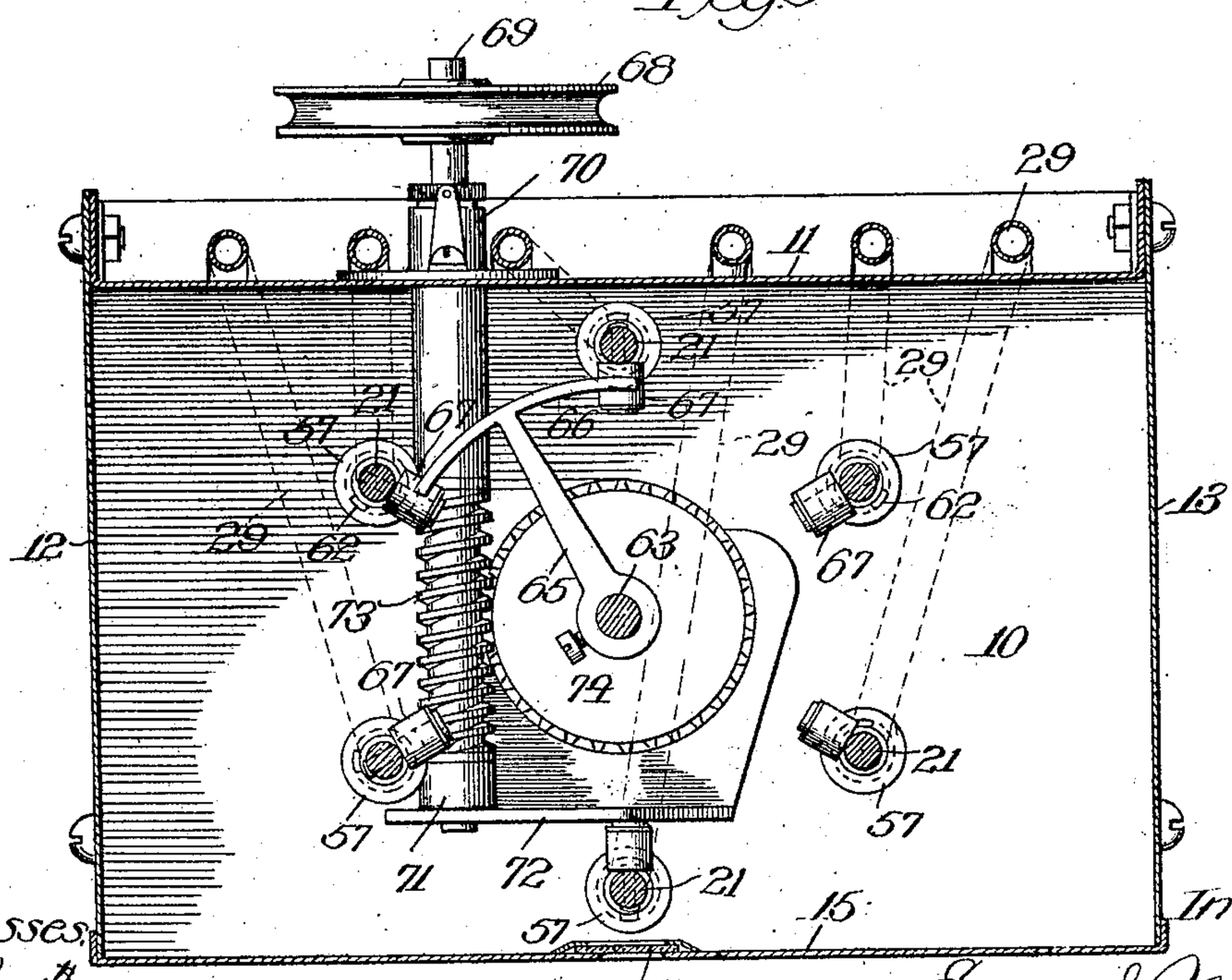



Fig. 3

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3 SHEETS—SHEET 3.

Fig 4

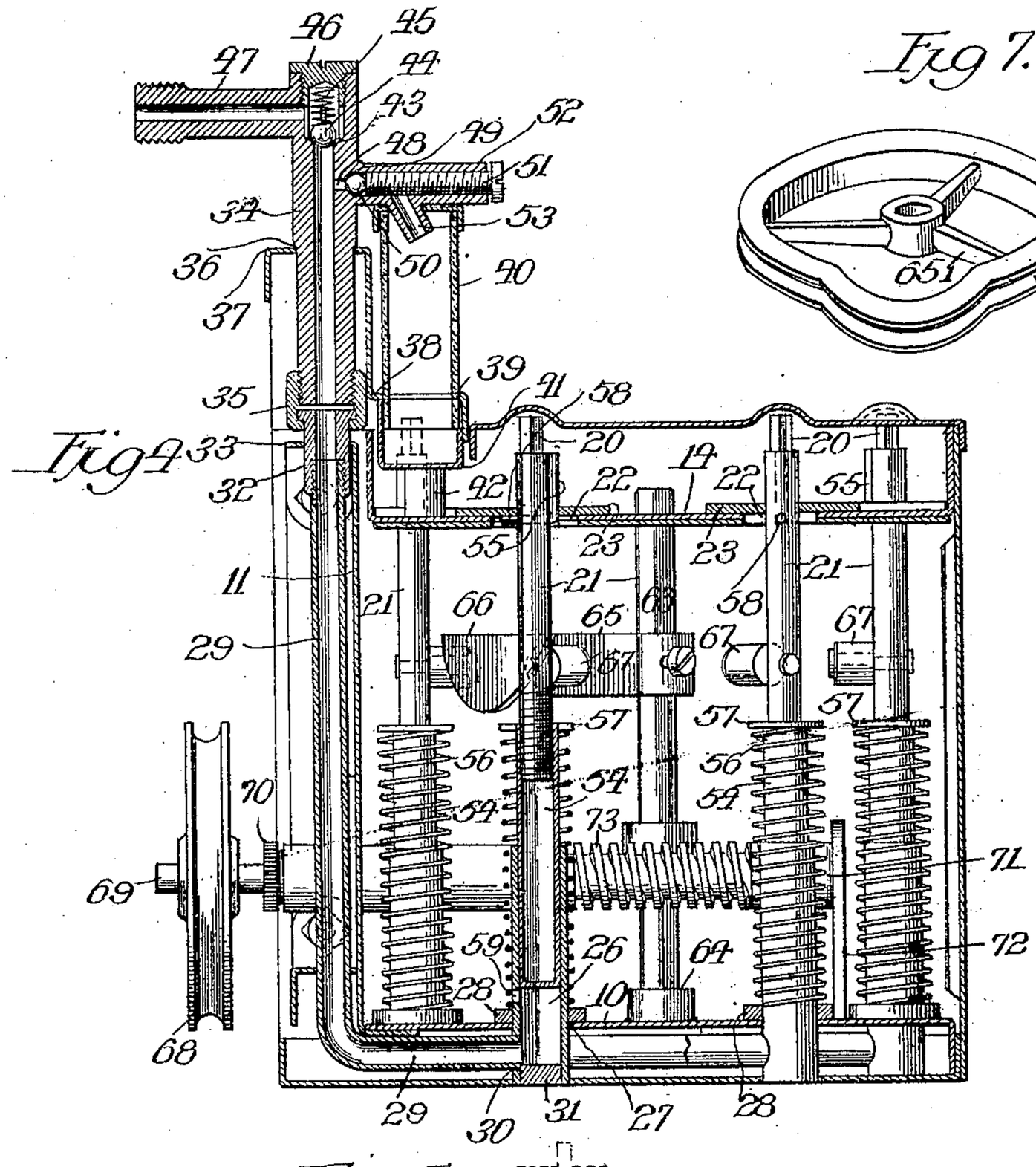



Fig 7.




Fig. 5.

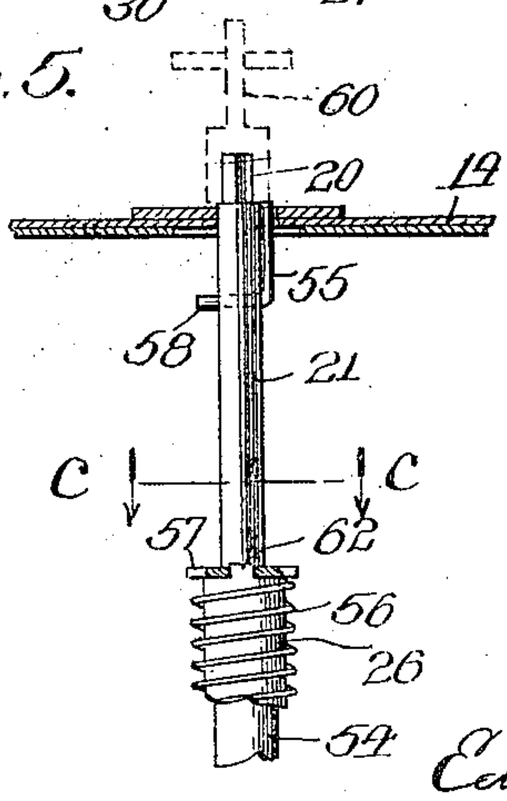
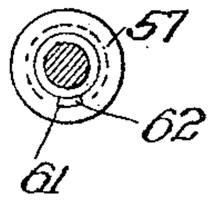



Fig. 6.




Witnesses:
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# UNITED STATES PATENT OFFICE.

EDWARD NEELY, OF CHICAGO, ILLINOIS.

## FORCE-FEED LUBRICATING-PUMP.

No. 799,574. Specification of Letters Patent. Patented Sept. 12, 1905.

Application filed June 10, 1905. Serial No. 264,576.

*To all whom it may concern:*

Be it known that I, EDWARD NEELY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Force-Feed Lubricating-Pumps, of which the following is a specification.

My invention is concerned with a novel force-feed lubricating apparatus, and it is designed, primarily, to produce a device of the class described which shall be extremely simple in its construction, effective in its operation, and which can be cheaply constructed even where a very considerable number of pumps is employed in a single apparatus.

One feature of my invention consists of the novel and simple actuating mechanism by which the rotary movement of a driving-shaft is transformed into the successive reciprocations of a plurality of pump-pistons.

Another feature consists of a novel adjustment by which the amount of oil moved at each stroke of a piston may be varied. As these devices have hitherto been constructed the piston has been actuated by some reciprocating member, such as a cross-head, having a fixed movement, and lost-motion connections were employed between the piston and cross-head, so that any desired portion of the movement of the cross-head might be imparted to the piston. In my improved construction the piston always has a uniform stroke, and the amount of the discharge is varied by adjusting the piston so that it shall have a greater or less movement beyond a supply-port in the pump-cylinder, which must be closed by the piston before it forces the oil into the discharge-pipe.

Another feature consists of the novel sight-feed test, by which the amount of oil pumped by each piston may be observed and which may also be adjusted to regulate the amount of oil that is forced by the pump to the point to be lubricated.

Another feature of my invention consists of the construction by which I am enabled to build up the tank of sheet metal and dispense with many of the castings which have heretofore been deemed necessary in the manufacture of these devices.

To illustrate my invention, I annex hereto three sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a front elevation of the lubricator as would be seen if looking at it from the driver's seat if it were located on the dashboard of an automobile, a portion of the casing being broken away to disclose some of the interior mechanism. Fig. 2 is a top plan view of the same with a portion of the top of the casing broken away. Fig. 3 is a plan view in section on the line A A of Fig. 1. Fig. 4 is a vertical section on the line B B of Fig. 1. Fig. 5 is a detail showing how the position of the piston is adjusted to vary the amount of oil delivered by any pump. Fig. 6 is a plan view in section on the line C C of Fig. 5, and Fig. 7 is a perspective view of a modification in the actuating mechanism.

The body of the reservoir proper is preferably made up of sheet metal and consists of the bottom 10, the back 11, the sides 12 and 13, the top 14, and the front 15, the front being preferably formed with the longitudinal slot 16, which is closed by the glass strip 17, secured thereto in any suitable manner, the object of the glass strip being to provide means for observing how much oil is in the reservoir, the oil being introduced through the aperture 18, formed in the top. A cover-plate 19 is preferably employed and located at some distance from the top plate 14, so as to form a space for the squared upper ends 20 of the piston-rods 21, which project through apertures 22, formed in the top, and bearings for the piston-rods are formed in the metallic disks 23, secured in any desired manner, as by the screws 24, on the upper surface of the top plate 14, as clearly shown in Figs. 2 and 4. The apertures in the disks 23 through which the screws pass are larger than the screws, so that the disks can be shifted slightly to accurately position the pistons and piston-rods. When the disks 23 are removed by loosening the screws, the piston-rod and piston can be removed from the reservoir without dismantling the apparatus. The cover 19 may be provided with the bosses 25 to accommodate the squared upper ends 20, as shown. The top, bottom, front, back, and side pieces are secured together in any desired manner to make the joints liquid-tight, and for properly bracing them and securing the necessary rigidity some of the pieces are provided with angular flanges coöperating with the parts at right angles thereto, as will be readily seen from the drawings. The different parts may be secured together, as shown, by screws and the joints made liquid-tight by soldering them.

The pump-cylinders 26, as best seen in Fig. 4, are conveniently and cheaply constructed of short metal tubes, which are set vertically and which extend through apertures 27 in the bottom plate 10, they preferably being positioned and to some extent supported by the collars 28, resting on the bottom plate and through which the cylinders pass. The collars 28 are preferably soldered to the bottom 10 and the cylinders 26, so as to form a liquid-tight joint, and solder may also be applied to the under side of the bottom plate to solder the cylinders 26 to the bottom plate. The discharge-pipes 29 are preferably made of tubing of a smaller diameter than the cylinders 26 and are conveniently secured thereto without the customary threaded connections by being passed into the proper sized and shaped apertures 30, formed, preferably, in the sides of the bottoms of the cylinders 26 beneath the bottom plate 10, the ends of the discharge-pipes 29 being securely soldered in the bottoms of the cylinders 26 to make a liquid-tight joint. The bottoms of the cylinders 26 may be conveniently closed by the stamped metallic blanks 31, which are also soldered in place to make the joint liquid-tight. The upper ends of the discharge-pipes 29 are shown as screwed into the enlarged portions 32, which are supported by the flange 33, through which they pass and which may be turned over from the top of the back piece 11. These ends 32 are secured to the bottoms of the valve-casings 34 by the unions 35. The valve-casings are shown as supported by the shoulders 36 in suitably-shaped apertures formed in the top of the shelf 37, which extends across the rear of the reservoir and which has secured thereto and conveniently constructed from the same sheet of metal a lower step or shelf 38, which has the apertures 39 therein of suitable size and shape to accommodate the short glass sight-feed tubes 40, whose bottoms pass therethrough. There is one of these sight-feed tubes 40 in front of each valve-casing 34, and they are shown as being provided with metallic troughs 41—one on each half of the apparatus—into which troughs the oil dropping through the glasses 40 falls and from which it flows through the short tubes 42 back into the reservoir. The valve-casing 34 is provided at 43 with a valve-seat, with which coöperates the check-valve 44, which preferably takes the form of a steel ball and which is preferably held down by the helically-coiled expanding-spring 45, interposed between it and the cap-screw 46, closing the vertical channel extending through the valve-casing. Beyond the valve 44 is the branch pipe 47, which is adapted to be connected to the pipe leading to the particular mechanism to be lubricated. Leading from the vertical channel in the casing 34 below the check-valve 44 is the short passage 48, which terminates in a valve-seat 49, adapted to be closed by the ball 50, which is held in place by the set-screw 51, screwed into the extension 52 of the valve-casing. A discharge-nozzle 53 is preferably formed on the under surface of the branch 52 and discharges any oil that may pass through the passage 48 drop by drop through the glass 40, where its rate of movement may be observed. By unscrewing the set-screw 51 so that the valve 50 is practically wide open the entire amount discharged by a piston at a single reciprocation will be discharged through the sight-glass 40, and by counting the number of drops the rate of feed with the particular adjustment of the piston observed can be noted. By setting the screw 51 so that the ball 50 will more or less completely close the passage I am enabled to graduate the amount of oil that will be discharged to the point to be lubricated by the pump, as I can set the screw so that if the pump is discharging, say, six drops any number of the drops desired can be allowed to pass back through the nozzle 53, while the remaining portion will be discharged to the point to be lubricated.

The pump-cylinders 26 have the pistons 54 coöperating therewith and preferably formed of tubes with their bottoms closed, as seen, and with their upper ends threaded, into which are screwed the lower ends of the piston-rods 21. These piston-rods are held from turning by means of splines 55, which coöperate with correspondingly-shaped recesses in the disks 23. As the piston-rods 21 are shown as moved positively only downward and with the bottoms of the helically-coiled expanding-springs 56 interposed between the collars 28 and the collars or flanges 57, secured to or formed on the tops of the pistons 54, a stop 58 must be provided to limit the upward movement of the piston-rods 21, and I conveniently form the stop 58 and the spline 55 from a single piece of wire, which is passed through an aperture in the piston-rod 21 and one end turned up and soldered thereto to form the spline 55. The oil is admitted to the cylinders 26 by the supply-ports 59, which are located near the bottom 10 of the reservoir. As the bottom of the piston 54 must pass the supply-port 59 and close it, thus taking the place of the check-valve ordinarily employed in pumps, before the oil will be forced into the discharge-pipe 29, it will be apparent that if I adjust the piston 54 up or down on the piston-rod 21 I can vary the portion of its stroke that is effective. As the reservoir is filled with oil, it is necessary to arrange it so that any adjustment can be effected from the outside, and to this end I employ the squared ends 20 of the piston-rods 21, which are adapted to be turned by keys, such as indicated in dotted lines at 60 in Fig. 5, when the cover 19 is removed. Before the piston-rod 21 can be turned it must, of course, be shoved down far enough so that the spline 55 passes beneath the disk 23, and

as the piston might then rotate with the piston-rod as the latter is turned I provide an aperture 61 in the collar 57, and projecting upward from the top of each of the cylinders 26 is a lug 62, which is adapted to catch in the aperture 61 and prevent any further rotation of the piston 54 as soon as the aperture and lug have been brought in register by the continued turning of the piston-rod 21 in its abnormal depressed position. When the piston is thus held from movement, it will be apparent that the piston-rod 21 can be screwed into or out of it to thereby diminish or increase the amount of oil discharged at each reciprocation of the piston.

The piston-rods 21 may be reciprocated in any desired manner; but I preferably employ a shaft 63, which is parallel to said piston-rods and which is journaled in a bearing 64, projecting upward from the center of the bottom plate 10, and in a suitable aperture formed in the top plate 14. Where a plurality of pumps are employed with a single shaft 63, the various cylinders are grouped in a circle about the shaft 63 as a center, and an actuating-arm 65 is secured to the shaft and provided at its outer end with the wiping-cam 66, which is adapted to engage the projection 67 on the inner sides of the piston-rods 21, said projection preferably taking the form of an antifriction-roller. As the shaft 63 is rotated by any suitable means, it will be apparent that the piston-rods will be depressed one after another, but not at the same time. By this construction it will be apparent that the power of the shaft is being exerted almost continuously, for the reason that as soon as the wiping-cam 66 passes one piston-rod it engages another, and thus the apparatus is made to operate uniformly and evenly.

In Fig. 7 I have illustrated a modification which I may employ in which the single arm 65 is replaced by a plurality of arms 65′ or a disk carrying on its periphery the grooved cam 66′. When the grooved cam is thus employed, it will be apparent that the springs 59 may be dispensed with, as the piston will then be lifted and held up by the lower rim of the cam. This modification, however, has the objection of interfering with the adjustment of the position of the pistons, as described in connection with the operation of the preferred form.

The shaft 63 may be slowly rotated in any desired manner; but I preferably employ the grooved pulley-wheel 68, secured on the outer end of the horizontal shaft 69, which passes into the back of the reservoir through the stuffing-box 70 and has its other end journaled in the bearing 71, formed in the bearing-bracket 72, secured on the bottom of the reservoir. The pulley-wheel 68 may be rotated by proper driving connection from any part of the apparatus to be lubricated or otherwise, and its rotation through the medium of the worm 73, secured on the shaft 69, will slowly rotate the worm-gear 74, which is secured to the shaft 53.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

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

1. In a device of the class described, the combination with the central actuating-shaft, of the plurality of pump-cylinders grouped about said shaft, pistons for said cylinders, and a radial cam member carried by said shaft and coöperating with the pistons to actuate the same.

2. In a device of the class described, the combination with the central actuating-shaft, of the plurality of pump-cylinders grouped about said shaft, pistons for said cylinders, a radial arm carrying a wiping-cam on its end, and lugs on the pistons engaged by said cam.

3. In a device of the class described, the combination with a reservoir, of an actuating-shaft centrally journaled in the bottom and top of the reservoir, the plurality of pump-cylinders grouped about said shaft and secured to the bottom of the reservoir, pistons for said cylinders, and a radial cam member carried by said shaft and coöperating with the pistons to actuate the same.

4. In a device of the class described, the combination with a reservoir, of the actuating-shaft centrally located therein and journaled in the top and bottom thereof, the plurality of pump-cylinders grouped in a circle about said shaft and secured to the bottom of the reservoir, pistons for said cylinders, lugs on the pistons, and a radial arm on said shaft carrying a wiping-cam coöperating with the lugs.

5. In a device of the class described, the combination with a reservoir, of an actuating-shaft centrally journaled in the bottom and top of the reservoir, the plurality of pump-cylinders grouped about said shaft and secured to the bottom of the reservoir, pistons for said cylinders, a radial cam member carried by said shaft and coöperating with the pistons to actuate the same, sight-feeds corresponding to the pumps located above the reservoir, and discharge-pipes leading from the bottoms of the pumps to the sight-feeds.

6. In a device of the class described, the combination with a reservoir, of an actuating-shaft centrally journaled in the bottom and top of the reservoir, the plurality of pump-cylinders grouped about said shaft and secured to the bottom of the reservoir, pistons for said cylinders, a radial cam member carried by said shaft and coöperating with the

pistons to actuate the same, sight-feeds corresponding to the pumps located above the reservoir, discharge-pipes leading from the bottoms of the pumps to the sight-feeds, check-valves in said discharge-pipes beyond the sight-feed, and means for limiting the amount of lubricant that may pass through the sight-feeds.

7. In a device of the class described, the reservoir for the lubricant having the holes in the bottom thereof, with the vertical pump-cylinder tubes projecting downward through the holes and secured therein, the smaller discharge-pipes entering the apertures in the sides of the cylinder-tubes below the bottom of the reservoir and secured therein, and the blanks secured in the bottom of the cylinder-tubes to close the same.

8. In a device of the class described, the combination with the reservoir for the lubricant having the holes in the bottom thereof, of the central actuating-shaft journaled in the top and bottom of the reservoir, the plurality of vertical pump-cylinder tubes grouped in a circle about said shaft and projecting down through the holes in the bottom of the reservoir and secured therein, the discharge-pipes of smaller diameter than the pump-cylinders entering said cylinders below the bottom of the reservoir and secured therein, the pistons in said cylinders, and a radial cam member carried by said shaft and coöperating with the pistons to actuate the same.

9. In a device of the class described, the combination with the reservoir, of the pump-cylinder extending through the bottom of the reservoir and having the port therein above said bottom, the discharge-pipe opening into the cylinder below the bottom of the reservoir, the check-valve in the discharge-pipe, the piston reciprocating in said cylinder, and means for reciprocating the piston.

10. In a device of the class described, the combination with the reservoir, of the centrally-located actuating-shaft journaled in the top and bottom thereof, the plurality of pump-cylinders grouped in a circle about said actuating-shaft and extending through the bottom of the reservoir and having the ports therein above the bottom of the reservoir, the discharge-pipes opening into the cylinder below the bottom of the reservoir, the check-valves in the discharge-pipe, the pistons reciprocating in said cylinder, and a radial cam member carried by said shaft and coöperating with the pistons to actuate the same.

11. In a device of the class described, the combination with the pump-cylinder having the supply-port therein closed by the movement of the piston, the piston reciprocating therein, and means for adjusting the position of the piston relative to the supply-port to determine the amount of liquid discharged thereby.

12. In a device of the class described, the combination with the pump-cylinder having the supply-port therein closed by the movement of the piston, the hollow threaded piston reciprocating therein, a piston-rod screwed into the piston, and means for reciprocating the piston-rod a fixed distance between fixed points.

13. In a device of the class described, the combination with a reservoir, of the pump-cylinder having the supply-port therein closed by the movement of the piston, the hollow threaded piston reciprocating therein, the threaded piston-rod screwed into the piston and reciprocating through the top of the reservoir, means for preventing the rotation of the piston-rods in their normal position, means for rotating the piston-rods from outside of the reservoir when in an abnormal position, and means for holding the piston from rotation when the rod is in its abnormal position.

14. In a device of the class described, the combination with a reservoir, of the pump-cylinder having the supply-port therein closed by the movement of the piston, the hollow threaded piston reciprocating therein, the threaded piston-rod screwed into the piston and reciprocating through the top of the reservoir, splines connected to the piston-rods and normally in corresponding recesses in the reservoir-top, the angular outer ends of the piston-rods adapted to receive keys, and means for holding the piston from rotation when the piston-rods are pushed in to free the splines from the top of the reservoir.

15. In a device of the class described, the combination with a reservoir, of the pump-cylinder having the supply-port therein closed by the movement of the piston, the hollow threaded piston reciprocating therein, the threaded piston-rod screwed into the piston and reciprocating through the top of the reservoir, splines connected to the piston-rods and normally in corresponding recesses in the reservoir-top, the angular outer ends of the piston-rods adapted to receive keys, and a cooperating projection and recess on the cylinder and piston to be engaged when the piston-rod is depressed.

16. In a device of the class described, the combination with a reservoir, of the pump-cylinder having the supply-port therein closed by the movement of the piston, the hollow threaded piston reciprocating therein, the threaded piston-rod screwed into the piston and reciprocating through the top of the reservoir, splines connected to the piston-rods and normally in corresponding recesses in the reservoir-top, the angular outer ends of the piston-rods adapted to receive keys, an apertured collar on the top of the piston, and a lug on the top of the cylinder adapted to engage the aperture in the collar when the piston-rod is depressed and rotated.

17. In a device of the class described, the

combination with the pump-cylinder having the supply-port therein closed by the movement of the piston, a hollow threaded piston reciprocating therein, the piston-rod screwed into the piston, the apertured collar secured to the top of the piston-rod, the helically-coiled expanding-spring surrounding the cylinder between its bottom and the collar on the piston-rod, and the lug on the top of the cylinder adapted to coöperate with the recess in the collar, for the purpose described.

18. In a device of the class described, the combination with the discharge-pipe, of the check-valve therein, said pipe having a valve-seat in the pipe below the check-valve, the ball coöperating therewith, a set-screw to control the position of the collar, and the discharge-nozzle for the valve.

19. In a device of the class described, the combination with the reservoir, of the pump connected therewith, the discharge-pipe, the check-valve in the discharge-pipe adjacent the reservoir, said pipe having a valve-seat in the discharge-pipe below the check-valve, a ball coöperating with the valve-seat, a set-screw to control the position of the ball, a glass pipe adapted to discharge into the reservoir, and a nozzle connected with the valve-seat to discharge into the glass pipe.

20. In a device of the class described, the combination with the reservoir, of the pump-cylinder secured therein, the piston-rod cooperating therewith and projecting through the top of the reservoir, means for reciprocating the piston-rod, and the laterally-adjustable bearing for the piston-rod secured to the top of the reservoir.

21. In a device of the class described, the combination with the reservoir, of the pump-cylinder secured therein, the piston-rod cooperating therewith and projecting through the top of the reservoir, means for reciprocating the piston-rod, and the laterally-adjustable bearing for the piston-rod secured to the top of the reservoir, and consisting of the disk 23 having the apertures for set-screws larger than the diameter of the screws.

In witness whereof I have hereunto set my hand this 6th day of June, 1905.

EDWARD NEELY.

Witnesses:
JOHN H. MCELROY,
M. S. REEDER.