No. 832,573. PATENTED OCT. 2, 1906.

W. L. FOLDEN.

OIL PUMP.

APPLICATION FILED JUNE 19, 1906.

2 SHEETS—SHEET 1.

Fig. 2.

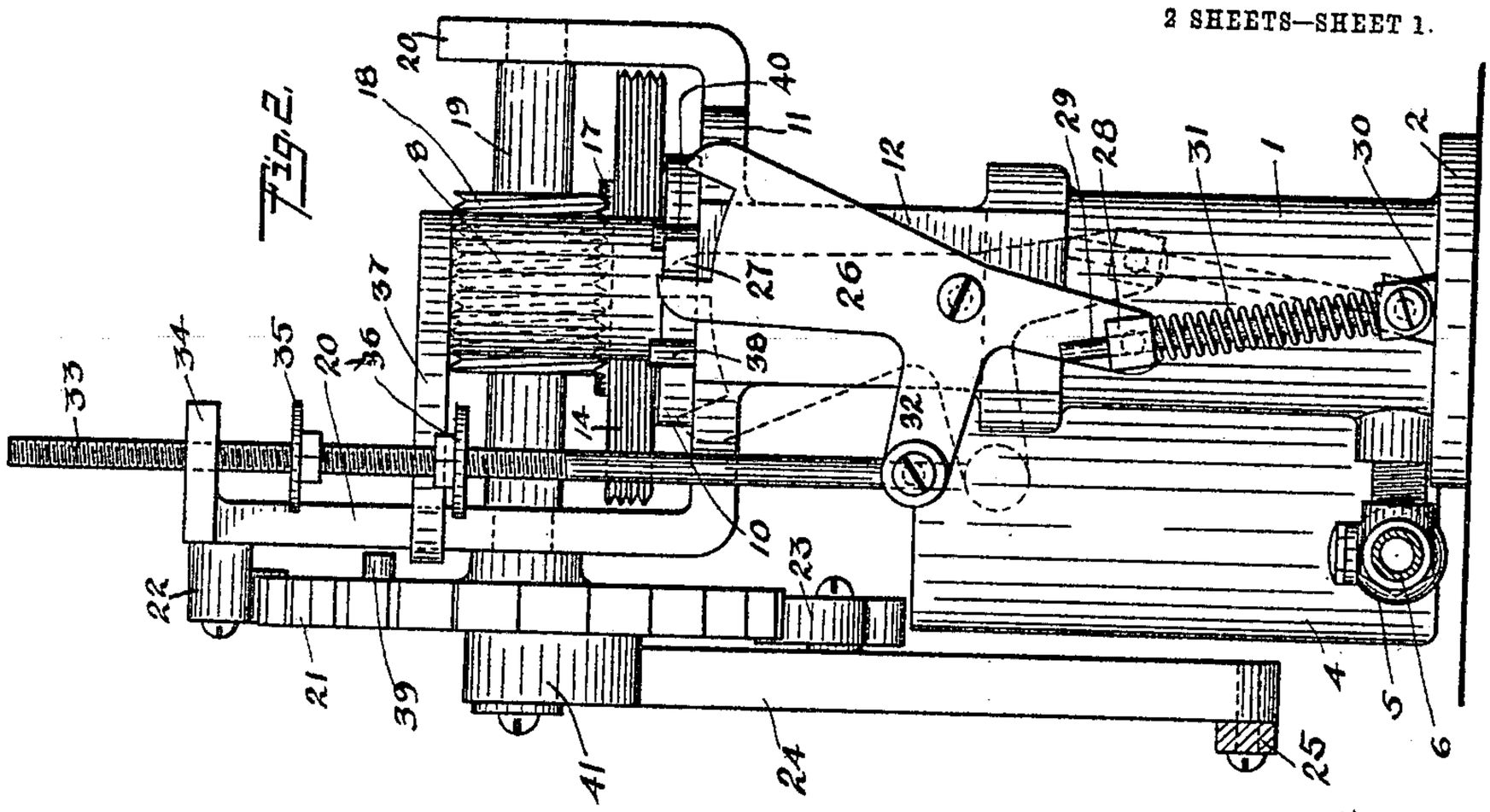
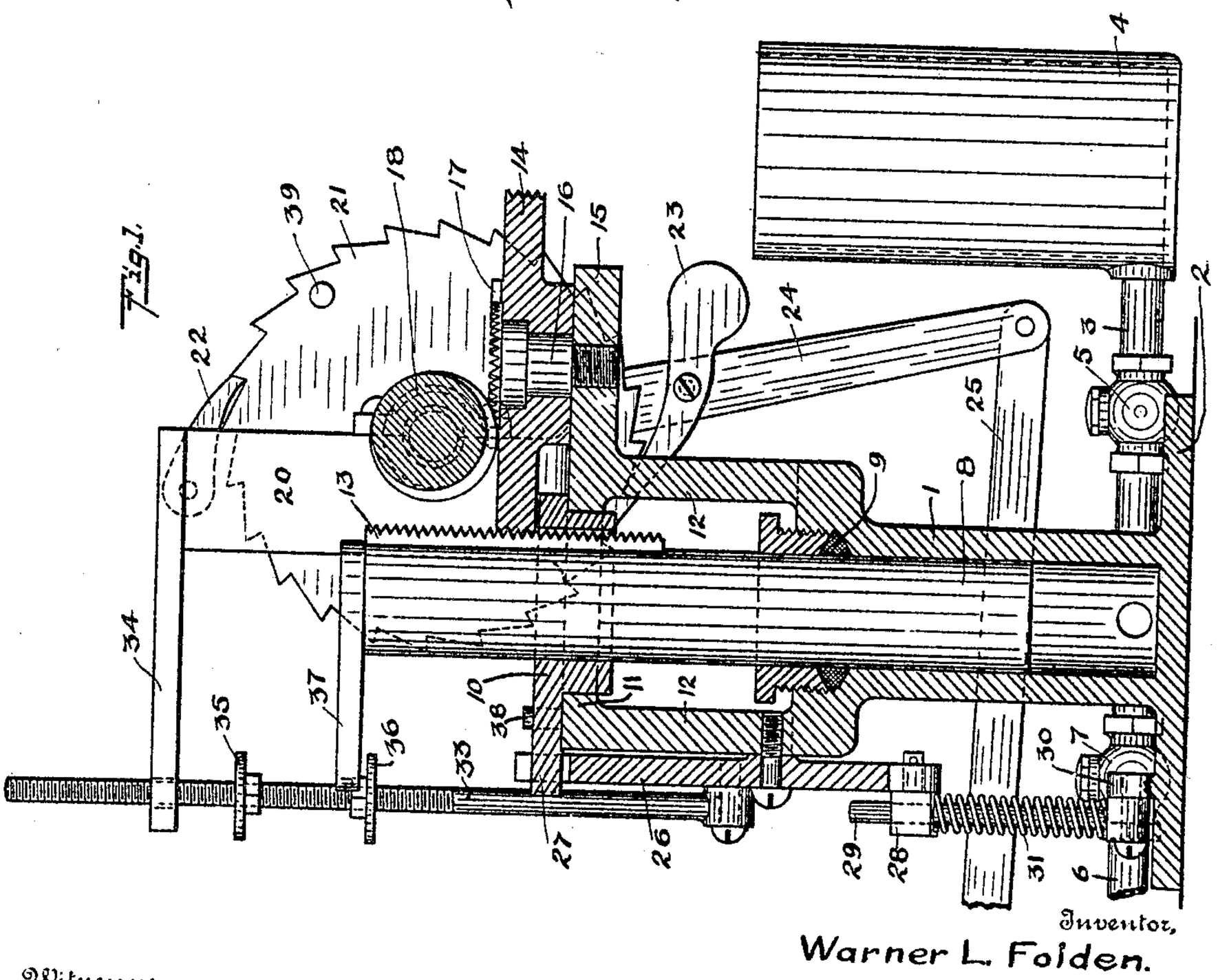


Fig. 1.



Witnesses:
J. McShramek
J. E. Armstrong

Inventor,
Warner L. Folden.

By David O. Barnell,

Attorney.

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2 SHEETS—SHEET 2.

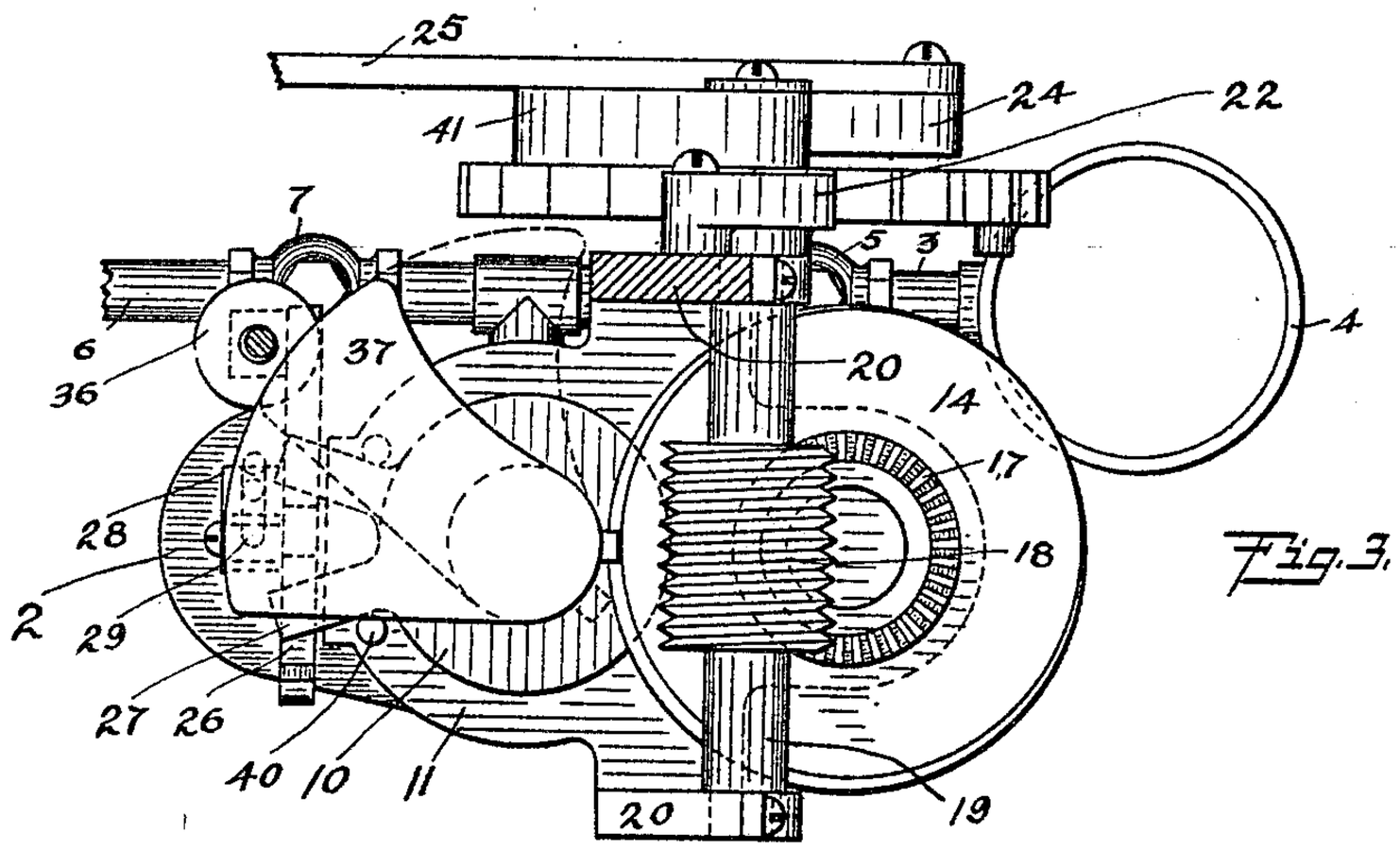

Fig. 3.

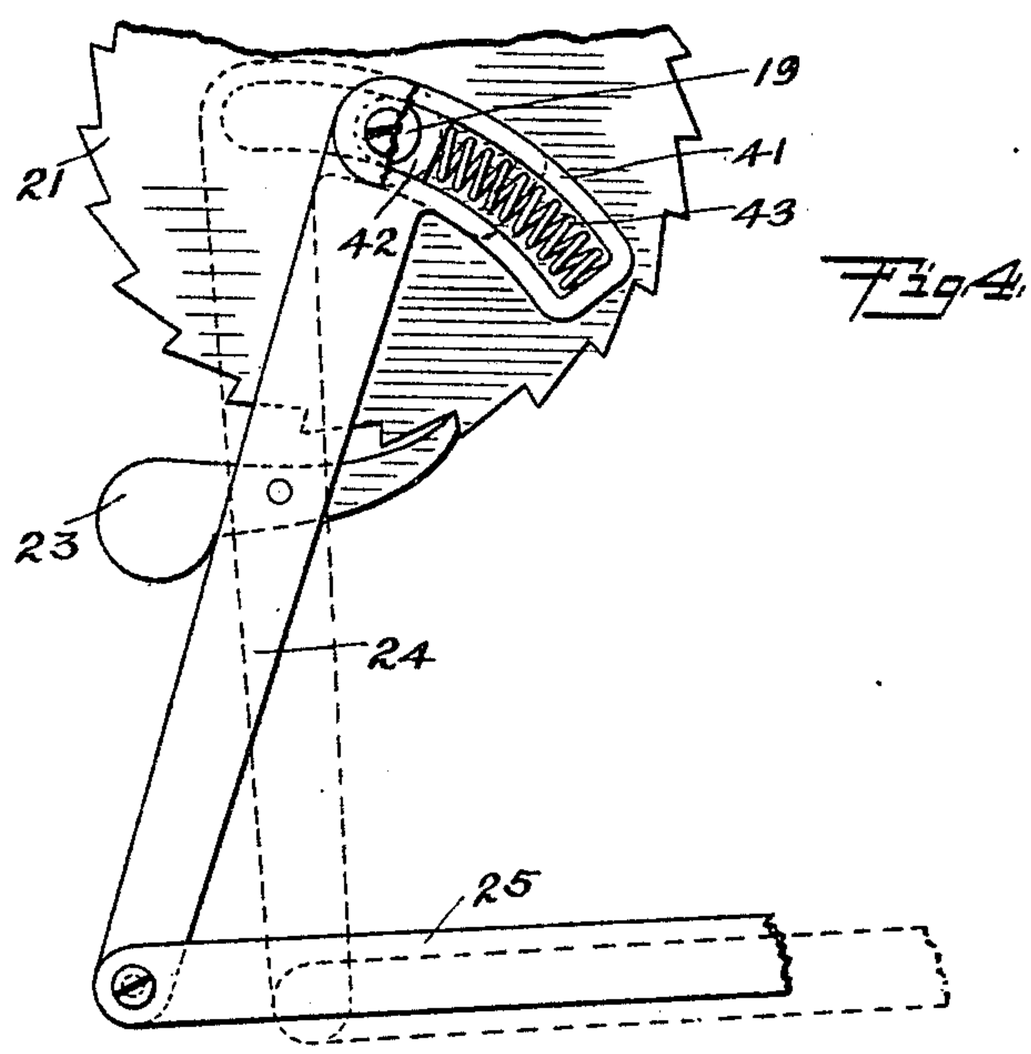

Fig. 4.

Witnesses:
J. M. Thramer
J. E. Armstrong

Inventor,
Warner L. Folden.

By David D. Barnell,

Attorney.

UNITED STATES PATENT OFFICE.

WARNER L. FOLDEN, OF LINCOLN, NEBRASKA, ASSIGNOR OF ONE-HALF TO LYDA E. MACK, OF LINCOLN, NEBRASKA.

OIL-PUMP.

No. 832,573. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed June 19, 1906. Serial No. 322,469.

To all whom it may concern:

Be it known that I, WARNER L. FOLDEN, a citizen of the United States, and a resident of Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Oil-Pumps, of which the following is a specification.

My invention relates to oil-pumps or force-feed lubricators; and it is the object thereof to provide a pump for feeding oil for engine lubrication, the pump being driven from any reciprocating part of the engine and the pump-piston being driven very slowly in one direction to make the pressure-stroke thereof and with relative rapidity on the return or suction stroke thereof.

A further object of my invention is to provide positive means for making the return stroke of the piston as well as the pressure-stroke thereof, the piston at the end of the pressure-stroke being disengaged from the slow-moving parts of the train of driving mechanism and at the same time engaged with a rapidly-moving part of the driving mechanism, said rapidly-moving part of the driving mechanism moving the piston on the suction-stroke, and at the end of said stroke the engagement being again automatically changed to the slow-moving parts of the driving mechanism.

A construction embodying my invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical section of the device on the axis of the pump-cylinder. Fig. 2 is a side elevation thereof. Fig. 3 is a plan view thereof, partly in section; and Fig. 4 is a detail elevation of the pawl-crank, showing the spring-release thereon for preventing breakage of the parts should the discharge-pipe of the pump be shut off or the pump be inoperative for any reason.

In the construction shown the pump-cylinder 1 has a suitable base 2 formed thereon and integral therewith. Near the bottom of the cylinder the same is connected by a pipe 3 to an oil-reservoir 4, a check-valve 5 being placed in said pipe. The discharge-pipe 6 is led to any desired point, said pipe having therein a check-valve 7, as shown. The piston 8 is of the solid-rod type and enters the cylinder through a packing-gland 9. Near the upper end of the piston the same passes through a sleeve 10, which is revolubly held in the guide-head 11, carried on the standards 12, extending up from the body of the cylinder 1. On the side of the piston and extending through a groove or keyway in the sleeve 10 is a screw-rack 13, which is normally engaged by the threaded periphery of the disk 14. Said disk 14 is revolubly held by the stud 16 on the shelf 15, extending out from the side of the guide-head 11. On the upper face of the disk 14 is a worm-gear 17, which is engaged by a worm 18, carried on the horizontal shaft 19, journaled in bearings formed in the standards 20, extending up from the guide-head 11, as shown. On one end of the horizontal shaft 19 is secured the ratchet 21, which is engaged by a pawl 22, pivotally mounted on one of the standards 20, said pawl preventing backward movement of the ratchet. The ratchet is actuated by the pawl 23, carried on the pawl-crank 24, which is pivotally mounted on the end of the horizontal shaft 19. The lower end of the pawl-crank 24 is connected by the rod 25 with any reciprocating part of the engine.

It will be apparent that the actuation of the piston through the described train of mechanism will be very slow relative to the speed of reciprocation of the pawl-crank, as the ratchet is advanced but one or two teeth at each reciprocation of the said crank, the worm-gear 17 is advanced but one tooth at each revolution of the ratchet, and the piston is advanced but one tooth of the screw-rack at each revolution of the worm-gear 17. Thus the piston will be driven at a very slow speed on the pressure-stroke thereof, any desired variation of said speed being accomplished by varying the stroke of the pawl-crank, so that the pawl 23 will advance the ratchet a greater or less number of teeth at each stroke thereof.

The suction or return stroke of the piston is caused to be made by the following mechanism: On the side of one of the standards 12 is pivotally secured the tumbler-lever 26, having thereon a forked end extending up past the guide-head 11 to engage the laterally-extending arm 27 on the sleeve 10. At the lower end of the tumbler-lever is carried the swivel-block 28, through which passes the rod 29, which extends downwardly and is pivotally connected with the lug 30 on the cylinder-base 2. Around said rod 29 is placed the coil-spring 31, which constantly exerts an upward pressure on the swivel-block 28. At one side of the pivotal center of the tumbler-lever is an arm 32, to which is connected the rod 33, the same extending upwardly

therefrom and passing through the guide-arm 34, which is shown as formed by an extension of one of the standards 20. The upper portion of the rod 33 is threaded and has screwed thereon the collars 35 and 36. On the top of the piston 8 is a fan-shaped plate or sector 37, which extends out between the collars 35 and 36 and is adapted to engage said collars to push the rod 33 upwardly or downwardly, and thereby actuate the tumbler-lever. Now, during the first part of the downward movement of the piston the position of the tumbler-lever is as shown in full lines in Fig. 2; but when the piston has descended to a little below the position shown the sector 37 engages the collar 36, pushing the rod 33 downward, turning the tumbler-lever and compressing the spring 31 until the lower end of the lever passes the dead-center, whereupon the expansion of the said spring 31 throws the lever over to the position shown by the dotted lines in said Fig. 2. The forked end of the tumbler-lever in turning to said position engages the arm 27 on the sleeve 10 and turns the same around against the stop-pin 38, as shown by the dotted position thereof in Fig. 3, said rotary movement of the sleeve 10 also turning the piston 8 and bringing the screw-rack 13 and the sector 37 to the positions shown by the dotted lines in said Fig. 3. While the screw-rack is thus disengaged from the disk 14 the sector 37 is in position to be engaged by the pin 39 on the ratchet 21. During the next revolution of the ratchet said pin 39 engages the sector and rapidly carries the piston on its upward or suction stroke. Near the end of said upward stroke the sector 37 engages the collar 35 on the rod 33 and again actuates the tumbler-lever, causing the same to return to the original position shown in full lines in Fig. 2. This movement of the tumbler-lever of course again actuates the collar 10, turning the arm 27 against the stop-pin 40 and rotating the piston to reëngage the screw-rack 13 with the disk 14 and carry the sector 37 out of the path of the pin 39 on the ratchet, these parts again occupying the positions shown in full lines in Fig. 3. The suction-stroke of the piston is thus made in a time not exceeding that of one revolution of the ratchet 21, and immediately at the end of said suction-stroke the piston is again started on the slow downward pressure-stroke, traveling at a uniform speed throughout said stroke and until the beginning of the next rapid upward stroke.

To prevent possible breakage of the mechanism by shutting off of the discharge-pipe leading from the pump-cylinder or from any other cause which would prevent normal movement of the piston or its driving mechanism, I provide in connection with the pawl-crank the spring-release device. (Shown in Fig. 4.) At the upper end of said pawl-crank is a head 41, having an arcuate slot therein, of which the generating center is the same as the pivotal center of the pawl 23. The shaft 19 passes through one end of said arcuate slot and is normally held against said end of the slot, as shown, by the slidable half-box 42, which fits within the slot and is constantly pressed against the shaft by the coil-spring 43, which also lies within the slot, as shown. The tension of the said spring is made such that under normal working conditions the ratchet will be actuated by the reciprocation of the crank, which will move around the center of the shaft 19. However, should an excessive pull be required to move the ratchet then the spring 43 will be compressed and the pawl-crank will oscillate about the pivotal center of the pawl 23, as indicated in dotted lines in Fig. 4, thus leaving the ratchet at standstill until the pressure required to move the same is less than the tension on the spring 43.

It will be apparent that by the construction shown no stress greater than that required to compress the spring 43 can be placed on the crank or, proportionally, on any other part of the driving mechanism.

Now, having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device of the class described, a pump-cylinder, a piston working therein, a reciprocating rod, a speed-reducing train of mechanism connecting said rod with the piston for driving the same in one direction, and automatic means for disengaging the driving connections of the piston at the end of the slow-speed stroke thereof and engaging the same with a rapidly-moving portion of the same mechanism, said rapidly-moving portion of the driving mechanism actuating the piston on the return stroke thereof.

2. In a force-feed lubricator, a pump-cylinder having valved connections with an oil-reservoir and a discharge-pipe, a piston working in said cylinder, a reciprocating rod, a speed-reducing train of mechanism connecting said rod and the piston for slowly forcing the piston in one direction, means carried by the piston for engaging a rapidly-moving part of the driving mechanism to drive the piston in the other direction, and means controlled by movement of the piston for causing engagement and actuation thereof alternately by the slow-moving portion of the driving mechanism and the rapid-moving portion thereof.

3. In an oil-pump, a pump-cylinder, a piston working therein, a laterally-extending plate carried by the piston, a shaft, means for driving the same, a worm carried thereby, a worm-gear driven by said worm, a threaded disk carrying said worm-gear, a screw-rack carried by the piston and adapted to be engaged by the threaded disk to actuate the piston at a slow speed relative to that of the

driving-shaft, and means for causing alternate engagement of the screw-rack with the threaded disk and of the laterally-extending plate on the piston with rapid-moving means carried by the driving-shaft.

4. An oil-pump comprising a cylinder having valved connections with an oil-reservoir and a discharge-pipe, a piston working in said cylinder, a reciprocating drive-rod, a pawl-crank and pawl actuated thereby, a ratchet driven by said pawl, speed-reducing mechanism connecting said ratchet and the piston whereby relatively rapid movement of the ratchet will slowly actuate the piston, and means for disengaging the piston and said speed-reducing mechanism and driving the piston directly from the ratchet.

5. In an oil-pump, a pump-cylinder, a piston working therein, a train of driving mechanism for said piston of which parts move at a slow speed and other parts at a relatively high speed, means carried by the piston for engagement with the slow-speed portion of the driving mechanism, other means carried thereby for engaging the high-speed portion of the driving mechanism, said means being alternately engageable with the driving mechanism by axial rotation of the piston, a tumbler-lever, connecting means by which movement of said lever will rotate the piston, and a rod for tripping said tumbler-lever, the said rod being actuated by the piston adjacent each end of its stroke.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

WARNER L. FOLDEN.

Witnesses:
O. A. ROBINSON,
L. O. KING.