

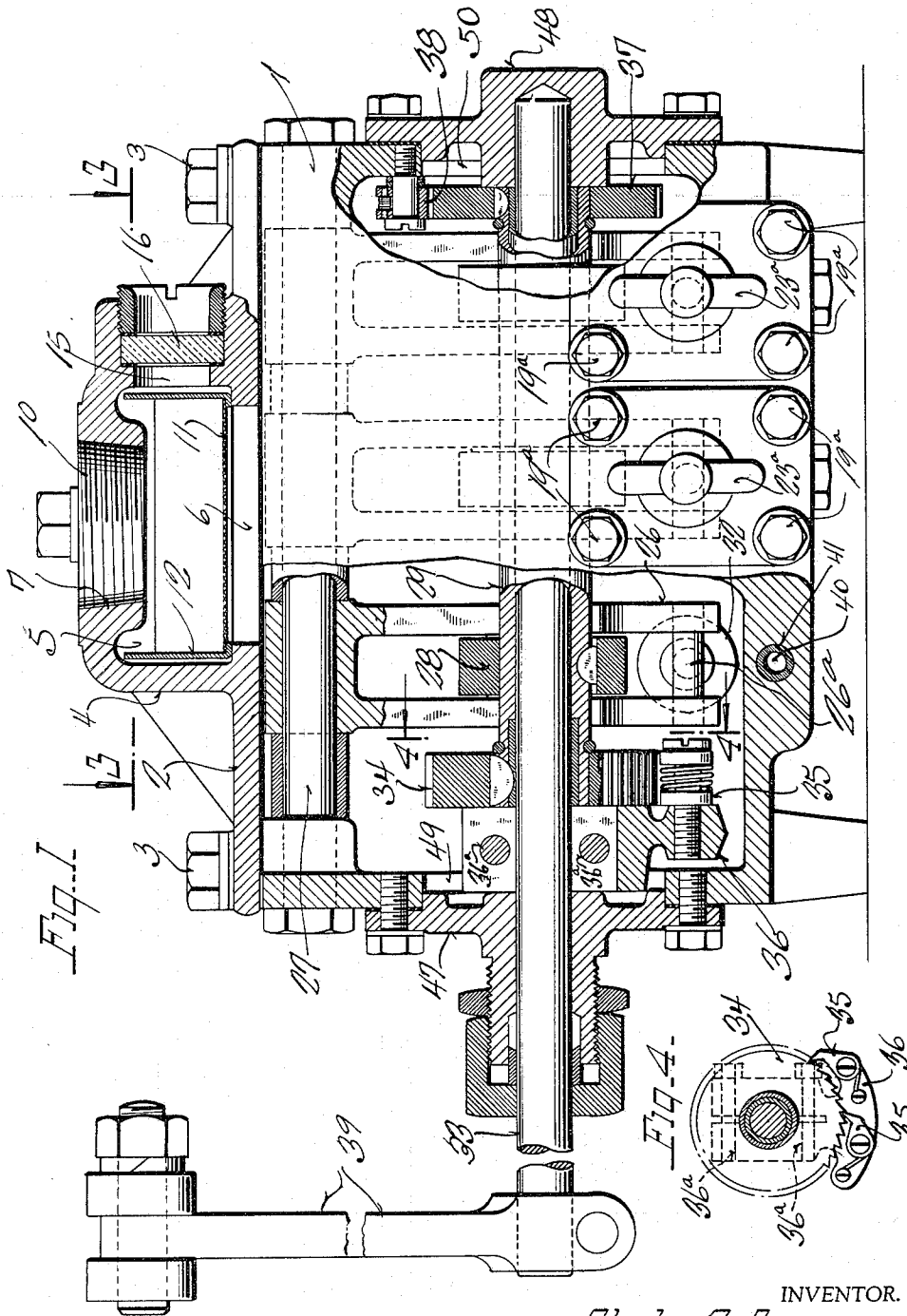
May 22, 1934.

C. A. PARSONS
FORCE FEED LUBRICATOR

1,960,064

Filed July 16, 1932

2 Sheets-Sheet 1



INVENTOR.
Clyde A. Parsons.
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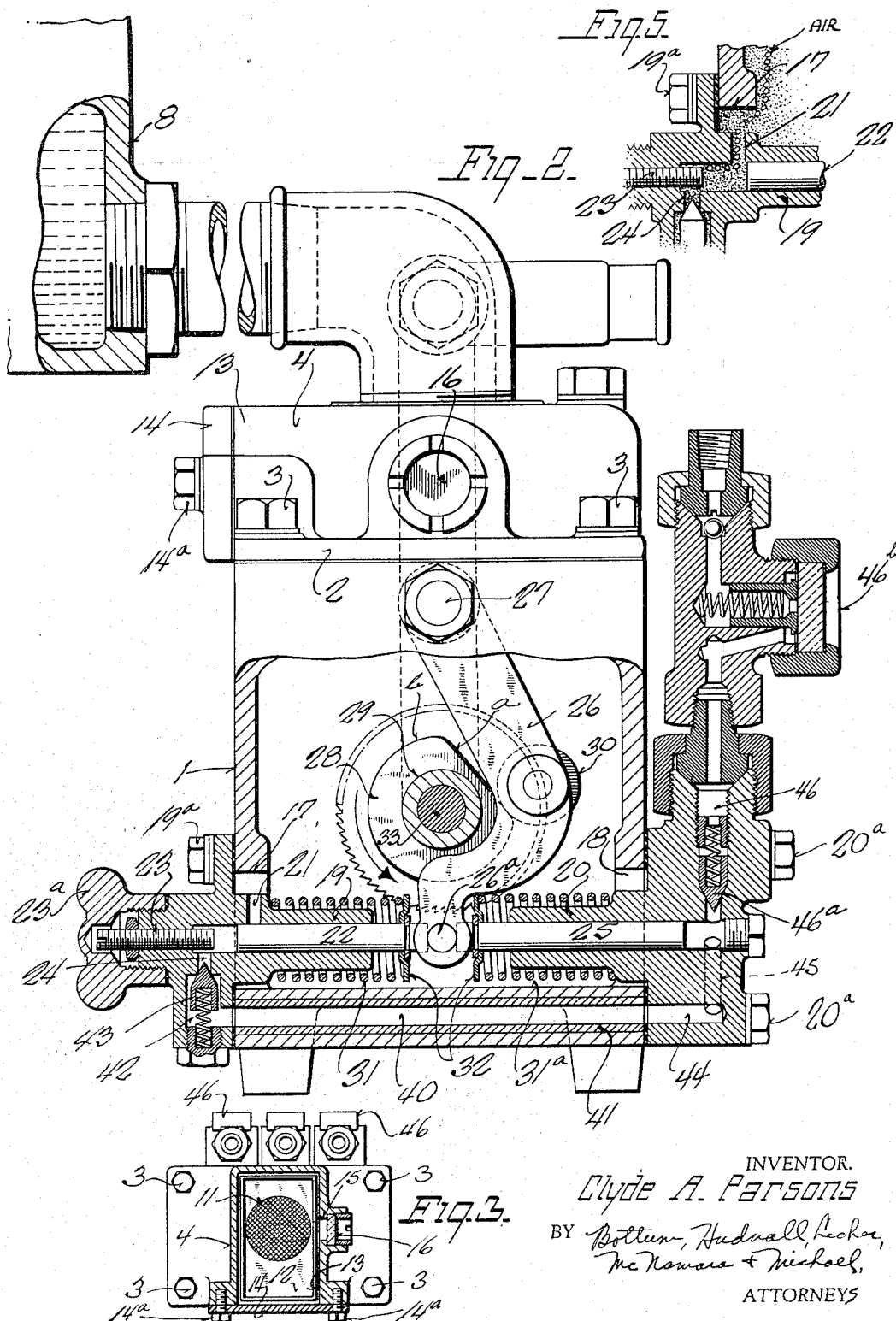
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UNITED STATES PATENT OFFICE

1,960,064

FORCE FEED LUBRICATOR

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Application July 16, 1932, Serial No. 622,914

2 Claims. (Cl. 184—27)

This invention relates to force feed lubricators.

The main object of my invention is to provide a lubricator which is sturdy and strong in construction and thus adaptable for use with heavy duty machinery, such as slush pumps, drilling machinery, locomotives and other outdoor and field equipment, subjected to rough usage and more or less severe service conditions.

Another object of my invention is to provide an improved form of pumping mechanism for such lubricators, such pumping mechanism comprising one or more units, each of which serves a particular part of the machinery with which the lubricator is used.

Another object of my invention is to so construct and mount the pumping units in the reservoir that the units may be separately inserted in and removed from the reservoir when assembling and disassembling.

A further object of my invention is to have the priming and delivery pumps of each pump unit in the form of separate and distinct assemblies, thereby permitting the pumps to be mounted on and inserted into the reservoir through opposed walls thereof, as for example, the upright front and rear walls, and thus afford a sturdy and rigid support for the pump units.

A further object of my invention is to so arrange and dispose the inlet port of the priming pump of each unit that the lubricator cannot become air-bound should it be operated when the oil supply is lower than said port.

A further object of my invention is to dispose the inlet port at a high point on the cylinder of the priming pump so that the port permits free venting of the pump should air enter the same during the operation of the device.

A further object of my invention is to provide a relatively long bearing between the cylinder and the piston element of the delivery pump so that a high pressure may be developed by the delivery pump as required for forcing oil to the place of use. In this way, the priming pump need develop only a relatively small pressure, that is, sufficient to supply oil to the delivery pump and thus its seal may be relatively small.

A further object of my invention is to so construct the priming and delivery pumps that they will pump oil only, thereby insuring a uniform delivery of oil and yet not become air bound, necessitating the priming of the pumping units should it be operated with the oil below the intake port.

A further object of my invention is to provide an oil intake for the reservoir in the top or

upper wall thereof of such a design and arrangement that a supply pipe or conduit leading from an oil supply above the lubricator may be directly connected therewith for a gravity feed as may be required with outdoor or field equipment.

A further object of my invention is to provide a novel form of sight feed for the intake opening at the top of the reservoir whereby the attendant of the machine may be advised by means of such intake opening when the oil supply from the outside source needs replacement.

Other and further objects of my invention will appear from the following specification taken in connection with the accompanying drawings, in which:—

Fig. 1 is a front view of my improved lubricator, parts being broken away and in section, respectively, for the purpose of illustration;

Fig. 2 is an end view of the device similarly shown;

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1 on a reduced scale;

Fig. 4 is a vertical sectional view, also on a reduced scale, taken on line 4—4 of Fig. 1; and

Fig. 5 illustrates the air venting action of the intake port of the priming pump.

The reservoir of the lubricator, as shown in the drawings, is in the form of a box-like casing 1 in which is located the pumping units of the device. Said units are horizontally disposed adjacent the bottom of the reservoir to be submerged in the oil contained therein and are arranged in side by side relation along the length of the reservoir. The latter is furnished with its oil supply through its top wall or cover 2 which is removably fastened in place by a number of screws 3, 3 as shown.

Cover 2 is provided with an upstanding dome-like boss 4 which extends across the top of the cover and is provided with a chamber 5 connecting with the interior of the reservoir through an opening 6 in the cover as shown. An inlet opening 7 is provided for the chamber in the top of the boss, whereby oil may be supplied to the reservoir through the cover. When the lubricator is used with heavy duty machinery, such as slush pumps and other operative equipment usually operated out of doors or in the field, a barrel or drum 8 of oil is racked about the lubricator to serve as the source of oil supply therefor. A pipe 9 screwed into the opening 7 connects the oil supply with the lubricator and provides a gravity flow thereto until the oil supply in the container 8 is exhausted. In this way any

amount of oil can be used without repeatedly filling the lubricator reservoir. The opening 7 may be used as a hand filler opening when it is desired to use the lubricator without connecting it to a separate or individual oil supply. When the lubricator is so used, the opening 7 is normally closed by a screw plug 10, as shown.

A screen 11 is located in the chamber 5 over the opening 6 to prevent any dirt or other foreign matter entering the reservoir to injure the operative parts therein or to clog the passages thereof. The screen is carried by a holder 12 preferably in the form of a tray, with the screen forming its bottom wall. The tray forms a collector for any dirt or other foreign matter removed from the oil by the screen, and is removable from the chamber through a passage 13 which connects with the chamber and opens through one end of the boss 4 where the passage is normally closed by a cover plate 14. The latter is secured in place by screws 14a, 14a as shown in Figs. 2 and 3. Chamber 5 is provided at one side with a sight opening 15 covered by a glass or other transparent cover 16 as shown in Fig. 1. Thus the attendant of the machine may see the oil in the chamber 5 and be advised that the oil supply needs replacement when the level in the chamber lowers sufficiently to expose the tray 12 to make it visible through the sight opening. The tray is usually painted white or some other discernible color to increase its visibility when uncovered by the oil.

The pumping units each comprise separately constructed and mounted priming and delivery pumps which in the assembling of the lubricator are inserted into the reservoir 1 through openings 17, 18 in the upright front and rear walls thereof, as shown in Fig. 2. The priming pumps are inserted through one wall, while the delivery pumps extend through the opposite wall. The pumps of each unit are arranged in axial alignment and have a space between their opposed inner ends to receive the actuating member therefor to be presently described. The cylinder elements, 19, 20 of the respective pumps are in the form of castings which extend into the reservoir through the openings referred to and are shaped at their outer ends to provide closures for said openings when the pumps are secured to the walls of the reservoir by screws or fastening members 19a, 20a, respectively, as shown in the drawings.

The cylinder 19 of the priming pump is provided on its upper side with an intake port 21 which has direct connection with the interior of the reservoir. Said port is opened and closed by the movement of the piston element 22 in said cylinder. The out-flow of oil from the cylinder may be regulated by an adjusting screw 23 threaded into the front end of the cylinder and extending over the discharge port 24 thereof as shown. The outer end of the screw is normally covered and protected by a cap 23a. The piston element for the delivery pump is marked 25.

To reciprocate the piston elements 22 and 25 in their respective cylinders, a power operated mechanism is provided. This mechanism is located within the reservoir and comprises for each pumping unit a rocker 26 in the form of a lever fulcrumed in the reservoir adjacent its upper end on a shaft 27. The lower end of the rocker extends into the space between and is engageable with the opposed inner ends of the piston elements 22, 25 as shown. Power is furnished to the rocker by a cam 28 fixed to a cam

shaft 29 supported in the reservoir and common to all of the cams of the several pumping units. Each rocker moves each piston element in one direction, the elements being moved in the opposite directions by coiled springs 31, 31a which respectively surround the associated cylinder elements 19, 20 and bear against abutments or spring retainers 32, 32 at the inner ends of the pistons. The opposite ends of the springs bear against fixed parts of the respective cylinders as shown.

Power is furnished to the cam shaft 29 through a drive shaft 33. This as shown in Fig. 1 extends through the reservoir 1 from end to end and provides a support for the cam shaft which is made hollow to fit about it. The cams for the various pumping units are keyed or otherwise fixed to the hollow cam shaft to rotate therewith. A ratchet-wheel 34 is fixed or keyed to the cam shaft 29 preferably at one end of the same as shown in Fig. 1 so that an intermittent rotation may be given to the cam shaft through pawls 35, 35 carried by an arm 36 clamped or otherwise fastened to the drive shaft 33 as shown. A ratchet-wheel 37 is fastened to the other end of the cam shaft as shown in Fig. 1 and is engaged by pawl 38 mounted on the end wall of the reservoir and arranged to hold the cam shaft from reverse rotation. Oscillatory movement is imparted to the drive shaft 33 by an arm 39 fixed to said shaft exterior of the reservoir and which arm by suitable linkage is connected with the moving parts of the machine with which the lubricator is used to furnish the power for the pump units.

The cylinder elements of the priming and delivery pumps of each unit are connected by a passage 40 in the bottom wall of the reservoir as shown in Fig. 2. This passage is lined with a brass or other bushing to prevent leakage of the oil from the passage through the more or less porous metal of the reservoir which is usually in cast form. The casting which forms the cylinder element 19 of the priming pump is provided exterior of the reservoir with a chamber 42 which connects at its upper end with the discharge port 24 of the cylinder and at its lower end with the passage 40, there being a suitable non-return spring-pressed check valve 43 in the chamber at the discharge port. Passage 40 connects with a passage 44 formed in the portion of the cylinder element 20 of the delivery pump exterior of the reservoir. Passage 40 connects with cylinder 20 through a passage 45 in which is a non-return check not shown. A passage 46 in which is a check valve 46a, leads from cylinder 20 and is connected through a flasher 46b with the pipe line which connects the lubricator with the part of the machine being served.

The drive shaft 33 is journaled at its ends in bearing fixtures 47, 48, which as shown in Fig. 1 are in plate form to not only support the shaft but also to cover the openings 49, 50 in the end walls of the reservoir through which the shaft extends. With the supports for the shaft in this form, a sturdy and strong construction is possible, and in addition allows the lubricator to be made either a right or left hand drive by simply reversing the positions of supports 47 and 48 and moving shaft 33 which is held in endwise position by clamping pawl arm 36 held by clamping screws 36a—36a.

The lubricator operates as follows: As the drive shaft 33 is oscillated, the cams 28 are intermittently rotated in the same direction through

the pawl and ratchet mechanism heretofore described. Each cam has a flat side *a* which is joined with the peripheral portion *b* which is concentric to the axis of the cam. With the cam in the position shown in Fig. 2 and rotating in the direction of the arrow, the roller 30 on the rocker 26 is passing from the flat side of the cam to the peripheral surface *b*. In this movement the rocker is moved toward the right. This imparts a positive force in that direction to the piston 25 of the delivery pump and forces the oil out of the cylinder of the pump past the check valve 46*a*. In this movement the spring 31*a* of the delivery pump is being compressed. The spring 31 of the priming pump is expanding due to the rocker being moved away from the piston 22. The spring in expanding causes the piston 22 to follow the rocker and thus opens the inlet port 21. When the roller 30 rides off of the flat side of the cam, the pistons in the respective pumps have reached the limits of their pumping and intake strokes, and the oil in the reservoir flows by gravity into the cylinder of the priming pump through the open port 21. When the flat side of the cam again reaches the roller 30, the rocker is free to move inward toward the axis of the cam, that is, toward the left as shown in Fig. 2, and the spring 31*a* of the delivery pump is permitted to expand, thus forcing the lower end of the rocker against the inner end of the piston 22 and forcing said piston outward on its pressure stroke to first close the inlet port 21 and thereafter force the oil collected in the cylinder 19 into the passage 40 past the check valve 43 and the one in the passage 45. The spring for the delivery pump in expanding at this time moves the piston 25 of that pump on its outward or intake stroke and thus conditions the cylinder 20 to receive the oil forced out of the priming pump. Spring 31 is merely strong enough to overcome friction and put the piston 22 against actuating pin 26*a*. At the end of this cycle, piston 22 of the priming pump has reached the limit of its power stroke while the piston 25 of the delivery pump has reached the limit of its intake stroke. As the cam continues to be rotated, the rocker 25 is swung to the right, thereby conveying a positive force to the piston 25 of the delivery pump and forcing the oil accumulated therein into the supply line past the check valve 46*a*. Each of the several units of the lubricator operate in this way, each being served by its operating cam and rocker 26. The rocker may be in fork form as shown in Fig. 1 to increase its strength and also to straddle the associated cam. The free ends of the fork are connected by the pin 26*a* which serves as an abutment between the rocker and the piston elements of the pumps.

In arranging the pumping units in the bottom of the reservoir they are obviously located at the lowest possible point therein and thus will be normally submerged in the oil contained in the reservoir. Moreover, with the intake port 21 of each unit disposed on the upper side of the unit, the port is at the highest point on the unit, in so far as the cylinder is concerned, and will freely vent the cylinder to the reservoir. Thus the lubricator cannot become air-bound should its units be operated when the oil level is below the inlet ports. As soon as the reservoir is filled with oil, any air in the priming pump will on the opening of the inlet port immediately escape from the pump, being displaced from the pump cylinder by the incoming oil. Manifestly, the

pump will prime immediately the oil supply rises above its inlet port and the lubricator in a few strokes will begin to deliver oil as indicated in Fig. 5. Thus the lubricator pumps only oil and not oil and air to give a spasmodic or irregular amount of oil at the point for lubrication. With my improved lubricator, air cannot be trapped in the device by reason of the free vent provided at the intake of the priming pump and thus a full supply of oil is supplied to the point of lubrication.

It will be observed from an inspection of Fig. 2 that the extent of movement of the piston element 22 of the priming pump beyond the intake port 21 on the pressure stroke of the pump is relatively small. Thus a small seal is provided between the portion of the cylinder beyond the piston and the intake port, this being determined solely by the amount of metal between these parts. As this area is relatively small, the seal could be disrupted or broken should the pump be required to deliver at a high pressure. Thirty five pound pressure is sufficient to open the check valve 43 and the one in passage 45, and deliver oil to the delivery pump which is not sufficiently high to cause wire drawing or cutting at the seal between inlet port 21 and end of piston 22. It is essential that a relatively high pressure be delivered by the delivery pump, with a minimum amount of slippage and wire drawing. This is accomplished by providing a long bearing for the piston element in the delivery cylinder as shown in Fig. 2. With this arrangement a high pressure can be developed by the delivery pump for the purpose of forcing the oil at the pressure desired to the place of use.

With the pumps for each unit in alinement as shown in the drawings it is possible to use a single rocker or operating element for each unit. Moreover, the arrangement permits the disposition of the rocker between the pumps which being independent of each other, allows them to be separately installed in and removed from the reservoir without removing the rocker or its associated parts. This has an advantage when removing the pumps for cleaning or repair.

The details of construction and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of my invention, except as pointed out in the appended claims.

I claim as my invention:

1. In a force feed lubricator, a reservoir adapted to contain a supply of oil and having opposed walls, a pumping mechanism for pumping oil from the reservoir, comprising priming and delivery pumps extending into the reservoir through said opposed walls, said pumps each having intake and discharge ports, the intake port of the priming pump opening into the reservoir, a conduit independent of the pumps for connecting the discharge port of the priming pump with the intake port of the delivery pump, and means in the reservoir for use in operating the pumps, said pumps being separately formed and mounted and having releasable connection with the conduit and said means whereby the pumps may be individually removed from and inserted into the reservoir through said walls without interference by or disturbing said means or said conduit.

2. In a force feed lubricator, a reservoir adapted to contain a supply of oil and having opposed upright walls, a pumping mechanism for pumping oil from the reservoir, comprising priming and delivery pumps extending into the reservoir in

axial alinement through said opposed walls, said pumps each having intake and discharge ports and a piston element cooperating therewith, the priming pump being arranged with its intake port opening into the reservoir at the highest point of the pump and being uncovered by the piston element of said pump at the end of its suction stroke, a conduit independent of the pumps for connecting the discharge port of the priming pump with the intake port of the delivery pump, means in the reservoir for use in operating the pumps and having an operable member between them, and yielding means carried by the pumps for holding the exposed ends of the piston elements at the inner ends of the pumps in contact with said member in all positions thereof, said pumps being separately formed and mounted and having releasable connection with the conduit and said member whereby the pumps may be individually removed from and inserted into the reservoir through said walls without interference by or disturbing said means or said conduit.

CLYDE A. PARSONS.

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