

X. CAVERNO.
PUMPING APPARATUS.
APPLICATION FILED MAR. 18, 1907.

1,021,861.

Patented Apr. 2, 1912.

2 SHEETS—SHEET 1.

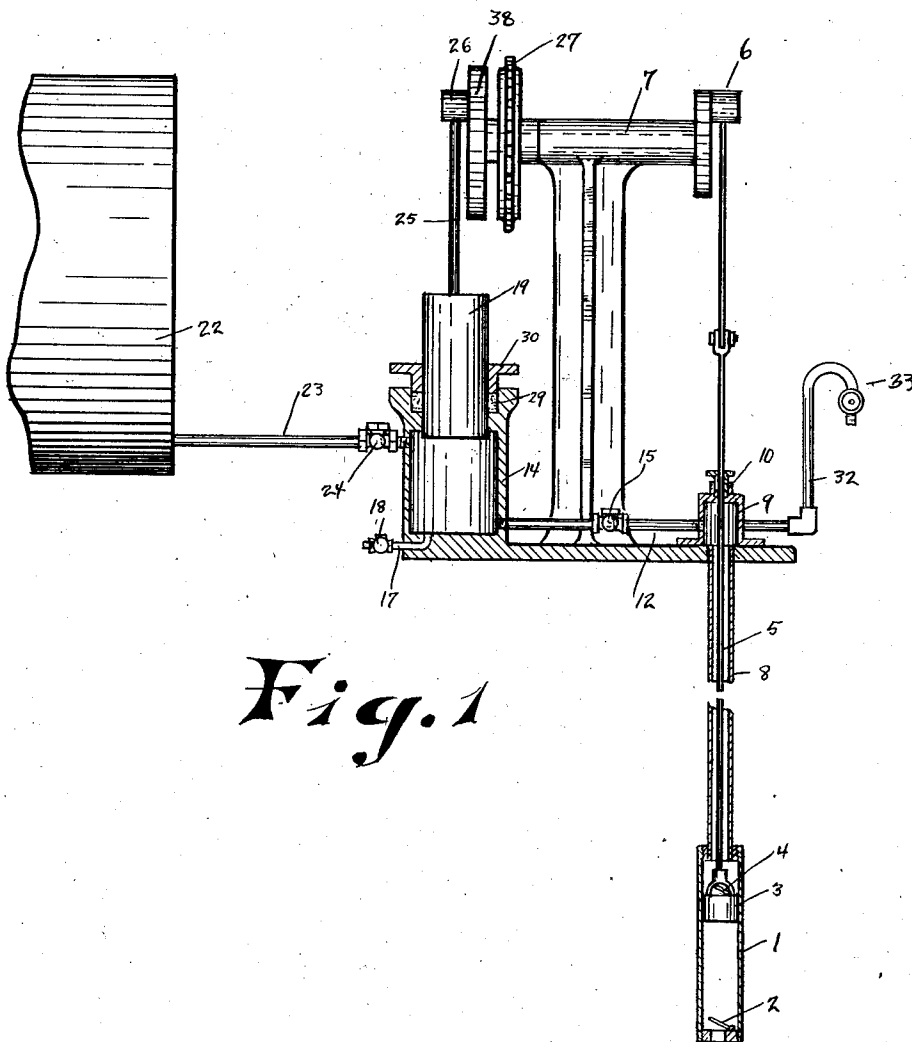


Fig. 1

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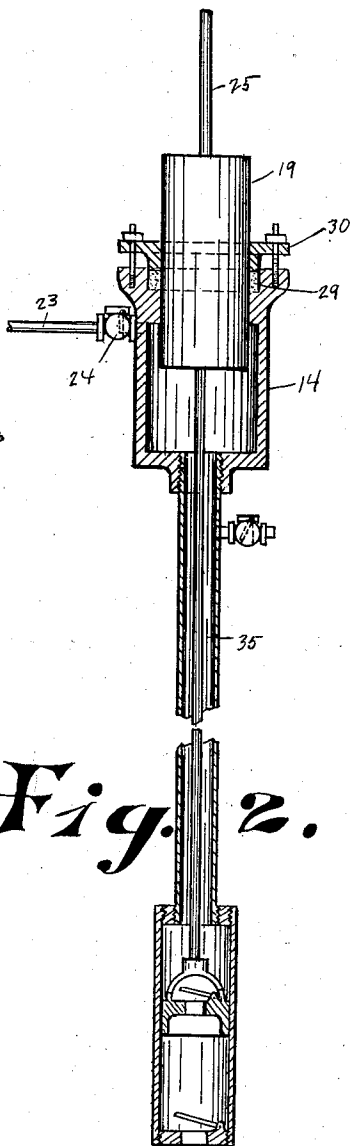


Fig. 2.

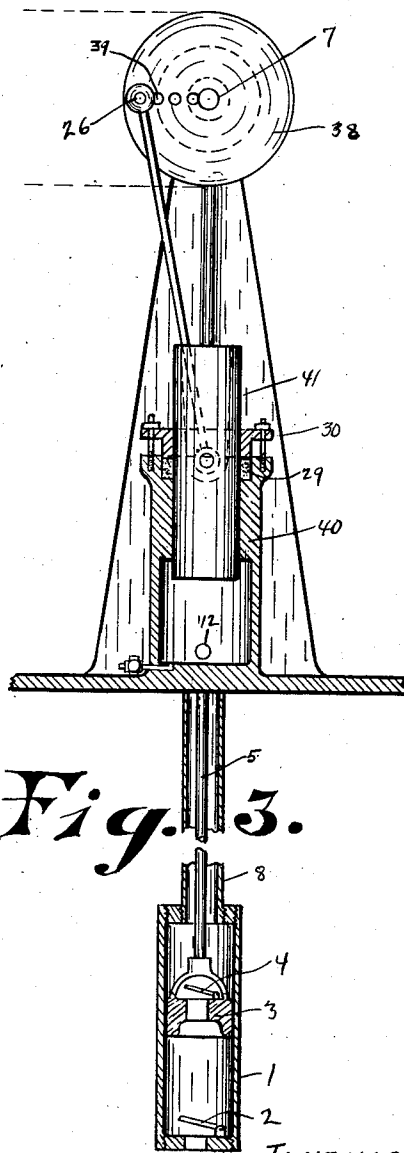


Fig. 3.

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UNITED STATES PATENT OFFICE.

XENOPHON CAVERNO, OF KEWANEE, ILLINOIS.

PUMPING APPARATUS.

1,021,861.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed March 18, 1907. Serial No. 362,884.

To all whom it may concern:

Be it known that I, XENOPHON CAVERNO, a citizen of the United States, residing at Kewanee, county of Henry, and State of Illinois, have invented new and useful Improvements in Pumping Apparatus, of which the following is a specification.

My invention relates to improvements in pumping apparatus wherein two cylinders of unequal capacity are employed in connection with a single water column or set of supply pipes to pump both air and water into a tank, this application being in part shown and described, but not specifically claimed, in United States Letters Patent numbered 955,580, issued to me for improvements in pumping apparatus and dated April 19th, 1910, the application for said patent having been filed concurrently herewith.

The object of this invention is to provide means whereby the delivery stroke of one pump will alternate with that of the other, thus distributing the work over both strokes, and also permitting one of the pumps to be used independently, if desired, or for the delivery of water alone.

A further object is to provide means whereby the length of stroke of one of the pump pistons may be relatively varied.

In the following description reference is had to the accompanying drawings, in which,

Figure 1 is a view of a set of pumps embodying my invention, the pumps and a portion of the water pipes being shown in section, and one of the pumps being laterally offset from the other. Fig. 2 is a similar view, showing both pumps in lineal series. Fig. 3 is a view similar to Fig. 1 drawn at a right angle thereto, showing two pumps of equal capacity for a given length of stroke, but having an unequal stroke, whereby the total capacity of one is greater than that of the other. This view also illustrates means for varying the length of stroke of the upper pump piston.

1 is the lower pump cylinder, provided with an inlet valve 2 at its lower end of any ordinary construction and also having a bucket piston 3 provided with a check valve

4 and connected by a piston rod 5 with a crank 6 carried by a driving shaft 7. The piston rod 5 extends upwardly through the water supply pipe 8 and through a chamber 9 at the upper end of said pipe where the rod 5 passes through a stuffing box 10. From the chamber 9, a pipe 12 leads laterally to a pump cylinder 14 of larger diameter than the cylinder 1. A check valve 15 is preferably employed in the pipe 12 to prevent the return of water delivered to the cylinder 14 in case of a possible leakage through valve 2.

The cylinder 14 is provided with an air inlet duct 17 having an inwardly opening check valve 18 to prevent a return flow of air or water from the cylinder 14. A plunger piston 19 operates in the cylinder 14 to force air and water therefrom into a tank 22 through the pipe 23, this pipe being also provided with a check valve 24 adapted to prevent a return flow of water from the tank. The plunger 19 is connected by a rod 25 with the crank 26, also operated from the shaft 7. 27 is a sprocket wheel by means of which the shaft 7 may be driven from any suitable source of power. Packing 29 is employed where the plunger 19 passes through the upper head of the cylinder 14 and 30 is a nut used for compressing the packing.

It will be observed that the bucket piston 3 lifts water from the cylinder 1 during the up-stroke, while water is expelled from the cylinder 14 during the downstroke of the plunger piston 19, thus distributing the work.

If desired, a direct pipe connection may be made with the chamber 9 and provided with a valve at 33, by opening which a supply of water could be drawn directly from chamber 9. The plunger 19 could in such case be disconnected from the crank.

It will of course be understood that it is not material to this invention whether the air valve 18 is located in the specific position shown or whether it is connected with the side of the cylinder 14 or with the pipe 12 since this valve is only open during the suction stroke of the plunger piston 19.

Referring to Fig. 2, it will be observed that the construction is the same except that

the two pumps are arranged in a lineal series, and a single piston rod connected to the plunger piston 19 is used for operating both pistons, the two pistons being connected by a rod 35 corresponding with the rod 5 in Fig. 1. The reference characters otherwise are the same for like parts shown in Fig. 1.

Referring to Fig. 3 it will be observed that the shaft 7 is provided with a crank wheel 38 having a series of holes 39 to any one of which the crank pin 26 may be adjusted. By adjusting the pin 26 at a different radius from the axis of shaft 7, the length of stroke of the piston 41 may be varied with reference to the stroke of piston 3. Where this is done it is not necessary that the cylinders should be of different sizes or that the cylinder 1 should be of less diameter than the piston of the upper cylinder, since the capacity of the upper pump is determined by the length of the stroke as well as by the diameter of the plunger. In this view, the lower cylinder is the same as shown in Fig. 1 but an upper cylinder 40 is employed in connection with the plunger 41 which is of the same diameter as the piston 3, *i. e.* the interior diameter of the cylinder 1. It will also be observed that so far as this feature of my invention is concerned, it is not material what form of piston is used in either cylinder.

I believe that I am the first to divide the work of the actuating mechanism between the up and down stroke in a two cylinder pump wherein the upper cylinder has a greater capacity than the lower cylinder. In all other two cylinder pumps, so far as I am aware, the piston of the lower cylinder works against the full pressure of the tank added to the lift. By providing a double pump in which the displacement of the upper plunger or water forcing member is greater than the lower one, and by causing said members to work in alternation for the elevation of water above the cylinders, I am able to divide the work in such a manner that the plunger or water forcing member of the lower cylinder has no other duty than that of lifting the water to the upper cylinder, even though the pistons be working in alternation. Further, it is obvious that with this construction, whatever suction is exerted during the up stroke of the plunger 19, will assist the piston of the lower cylinder in lifting the water and that notwithstanding the fact that the plunger and piston are working in alternation to force water beyond or above the respective cylinders, yet the piston of the lower cylinder does not exert its force against the tank pressure.

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

1. In apparatus of the described class, the combination of a pump provided with inlet and outlet ports, and an air admission port provided with an inwardly opening valve, arranged to preclude the formation of a vacuum during the suction stroke of the pump, and another pump of less capacity having its outlet connected with the inlet port of the first mentioned pump, one of said pumps having a water forcing member adapted to elevate liquid above the pump with a downward and the other having a water forcing member of different character adapted to elevate liquid above the pump with an upward working stroke.

2. In apparatus of the described class, the combination of a pump cylinder provided with a solid plunger piston extending through the cylinder head, another pump cylinder of less capacity provided with a bucket piston reciprocating in the cylinder and adapted to permit water to pass above it on the down stroke, said last mentioned cylinder having its outlet connected with the inlet of the first mentioned pump, an air inlet arranged to admit air below said plunger during substantially the entire working stroke thereof, an inwardly opening valve for said air inlet, and means for simultaneously actuating said pistons in the same direction.

3. In apparatus of the described class, a water supply connection provided with two pumps of different capacity arranged in sequence, an air inlet duct for the pump of largest capacity, provided with an inwardly opening valve,—one of said pumps being provided with a plunger piston and the other with a bucket piston, whereby they may be actuated simultaneously in the same direction, with an alternate delivery,—one of said pumps being offset laterally from the other and provided with an independent piston rod, together with means for varying the stroke of one of the pistons.

4. In apparatus of the described class, the combination of a water supply connection provided with two pumps arranged in sequence with one receiving water from the other, an air inlet duct provided with an inwardly opening valve and arranged to admit air to the cylinder of the receiving pump during its suction stroke,—the stroke of said pump being of greater length than the other.

5. In apparatus of the described class, the combination of a water supply connection provided with two pumps arranged in sequence with one receiving water from the other, an air inlet duct provided with an inwardly opening valve and arranged to admit air to the cylinder of the receiving pump during its suction stroke,—the stroke of said pump being of greater length than the other and said inlet valve being operative for the

admission of air during substantially the entire stroke.

6. In a pump of the character described, intercommunicating cylinders, one having a water inlet, the other a water discharge, and the latter an air inlet, a piston and its rod for each cylinder, the piston in the cylinder having the air supply and water discharge

having a greater stroke than the other piston, and means to so actuate said pistons.

In testimony whereof I affix my signature in the presence of two witnesses.

XENOPHON CAVERNO.

Witnesses:

A. W. ERRETT, Jr.,

F. A. DICKINSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."