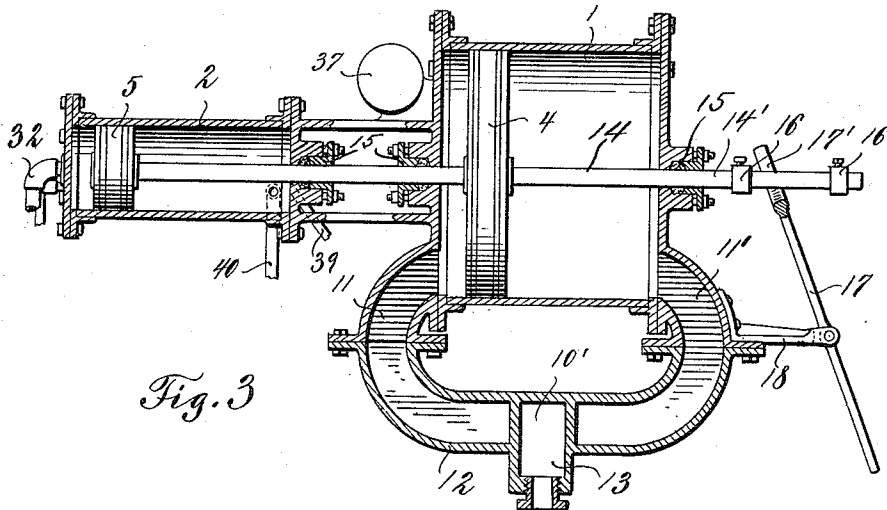
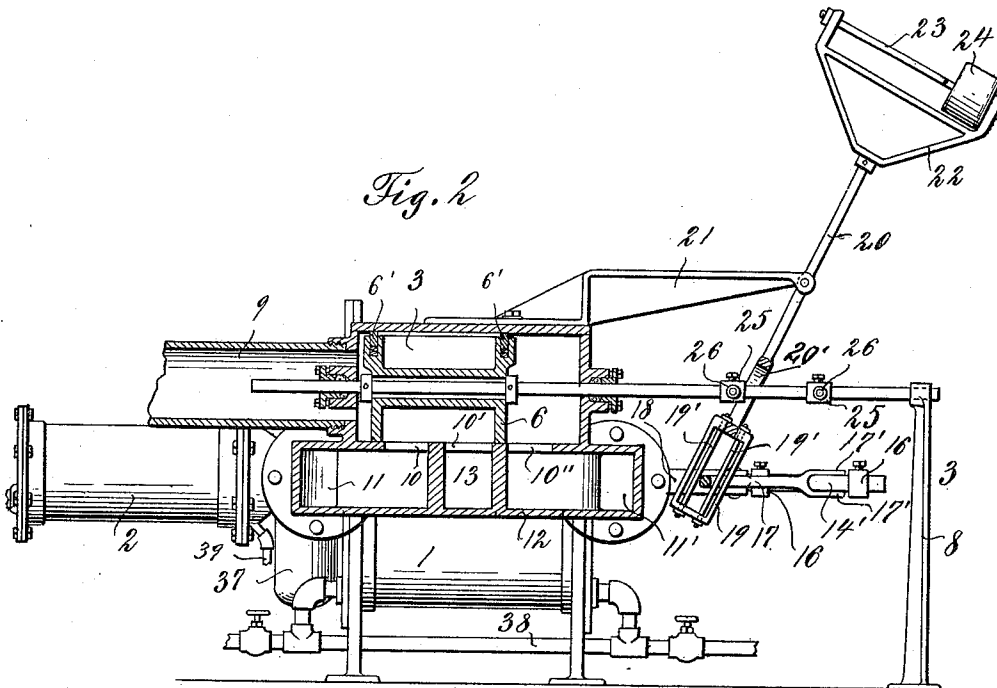


L. A. LAURSEN.
HYDRAULIC PUMP.
APPLICATION FILED DEC. 12, 1910.

995,263.

Patented June 13, 1911.

2 SHEETS—SHEET 2.



WITNESSES:

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HYDRAULIC PUMP.

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To all whom it may concern:

Be it known that I, LAURITS AKSEL LAURSEN, a citizen of the United States, residing at Holcombe, in the county of Chippewa and State of Wisconsin, have invented certain new and useful Improvements in Hydraulic Pumps, of which the following is a specification.

This invention relates to automatic pumping apparatus and consists of a machine adapted to be used in any suitable place where a sufficient head of water may be readily obtained to operate the pumping mechanism comprising the invention.

The invention resides particularly in the general arrangement of parts of the pumping mechanism, and the association therewith of a peculiar form of governor controlling the operation of a water supply valve which governs the passage of the water under pressure to opposite sides of a working piston, the latter being in turn connected with a pumping piston.

For a full understanding of the invention, reference is to be had to the following detail description and to the accompanying drawings, wherein—

Figure 1 is a perspective view of a hydraulic pump embodying the essential features of the invention; Fig. 2 is a vertical longitudinal sectional view and Fig. 3 is a horizontal sectional view.

Throughout the following detail description and on the several figures of the drawings, similar parts are referred to by like reference characters.

In the drawings, the numeral 1 denotes a working cylinder, the numeral 2 a pumping cylinder, and the numeral 3 a sliding valve chest. In the cylinder 1 operates a working piston 4. In the cylinder 2 operates a pumping piston 5 and a slide valve 6 is suitably mounted in the valve chest 3, and operable by a valve rod 7, passing through one end of the chest into cooperation with a guide standard 8, the other end of the chest 3 having a supply pipe 9 connected therewith, and to which the water under head is supplied. Inlet ports 10, 10' and 10'' in the bottom of the chest 3 permit the water to pass from the chest into the cylinder 1 on either of opposite sides of the piston 4, according to the position of the valve 6. Passages 11 and 11' are formed in a suitable casting 12 secured to the bottom of the chest 3, and said passages terminate in the exhaust port 13.

The piston rod 14 of the piston 4 passes at one end through stuffing boxes 15 into the cylinder 2 and is connected with a pumping piston 5. The other end of the piston rod 14 passes outwardly through an end of the cylinder 1 into a position substantially parallel with the valve rod, but in a lower horizontal plane. On said outward extension 14' of the piston rod 14 are carried spaced adjustable stops 16 arranged on opposite sides of the bifurcated end 17' of the horizontal lever 17 pivoted between its ends to a bracket 18 on one end portion of the casting 12. The opposite end of the lever 17 operates in a yoke 19 at the lower end of a vertical counterbalance lever 20 which is pivoted between its ends to a bracket 21 secured to the upper portion of the valve chest 3. At its upper end the lever 20 is formed with a somewhat triangular shaped frame 22, having a transverse weight guide 23, on which is adapted to slide a weight 24. In a manner similar to the arrangement on the extension 14' of the rod 14, the valve rod 7 is provided with spaced stops 25, having anti-friction rollers 26 mounted thereon, the stops being arranged on opposite sides of the slotted portion 20' of the lever 20, said slotted portion being located just above the yoke 19. Spaced from the sides of the yoke 19 and arranged on opposite sides of the adjacent free end of the lever 17, said yoke is provided with longitudinal cushion rods 19' which directly engage the lever 17 in the operation of the machine.

Certain pipe connections are employed as follows: A pipe 27 leads from the outer side of the valve chest 3 downwardly to a pipe 28 leading into the exhaust passages 11 near the point where said passages merge into the exhaust port 13. A valve 29 is arranged in the length of the pipe 27 and another pipe 30 leads from the two pipes 27 and 28 to a pipe 31, one end of which is connected to the branch pipe 32 connected with the outer end of the cylinder 2. A pipe 33 leads from the point of connection of the pipes 31 and 32 downwardly and laterally to a vertical pipe 34, and a pipe 35 extends downwardly from the pipe 33 intermediate its ends to a water delivery pipe 36, the latter being connected at one end with an air chamber 37. A pipe 38 is connected with opposite ends of the working cylinder 1 and a similar pipe 39 is connected with the opposite ends of the pumping cylinder 2 and suitable valve

means is provided for said pipes to permit of drawing off sand, sediment, or other foreign matter that may collect in the cylinders 1 and 2.

5 Suitable check valves are provided in the various pipes above referred to and in the operation of the invention, if the water is taken directly from the supply, by opening the valve 29, as the piston 5 travels out-
10 wardly or toward the member 20, the water entering the pipe 27 closes the check valve 28^a in the pipe 28, this causing the water to pass through the pipe 30 past the valve 45, through the pipe 32 into the outer end of
15 the cylinder 2. At the same time, water is being discharged from the opposite end of the cylinder 2 through the pipe 40, and closes the valve 41 in the pipe 31, opening and passing the valve 42 in the pipe 33 and
20 thence entering the pipes 35 and 36 discharging from the latter. The valve 44 closes due to the pressure of the water as it passes from the pipe 33 to the pipe 35. A full stroke of the machine has now been
25 completed, and the pistons 4 and 5 are reversed, whereupon the water which has previously entered the cylinder 2 through the pipe 32 is forced out through the pipe 32, closing the valve 45 in the pipe 37, said
30 water passing the valve 44, closing the valve 42 and being thence discharged through the pipes 35 and 36. At the same time, the water is entering the other end of the cylinder 2 through the pipes 30, 34 and 40, passing
35 the valve 41, the valve 42 being closed as above mentioned by the pressure of the discharge water passing from the pipes 33 and 35 to the discharge pipe 36. The valve 46 is provided in a pipe extension projecting
40 vertically from the pipe 37 and said valve 46 when opened slightly, permits the piston 5 to draw in a certain amount of air with the water, and which air will be discharged therefrom with the water, the air going to
45 the top of the air chamber 37 affording a cushion in the chamber 37, the advantages of which will be obvious. Of course when the valve 29 is opened, the pump wastes more water than when said valve is closed
50 because the water is taken direct from the supply. On the other hand, if the valve 29 is closed when the exhaust water is utilized, the same passes into the pipe 28 opening the valve 28^a, and thence entering the pipe 30
55 and passing to the cylinder 2 in the manner hereinbefore described.

Referring to Fig. 2 and describing more clearly the operation of the working piston 4, it will be understood that when said piston
60 is in the position illustrated in Fig. 3, it is at the end of the cylinder 1, opposite to that in which it will be arranged when the parts are in the various positions shown in Fig. 2. Referring to Fig. 3, however, the
65 water is being supplied to the left hand end

of the cylinder 1 from the valve chest 3 through the inlet port 10 and passage 11 adjacent to said port 10. This forces the piston 4 upwardly and the water in the right
hand end of the cylinder 1 passes therefrom 70 through the passage 11, port 10'', through the valve 3 and wastes through the ports 10' and 13, the latter being the exhaust. When the slide valve 3 is in the position shown in Fig. 2, the piston 4 not shown, being at its
75 outward limit of movement, the water passes from the pipe 9 into the slide valve box or chest 3. As the slide valve does not fill more than a small portion of the chest 3, the water passes by the sides of the valve 80 through the port 10'' and the adjacent passage 11, thereby forcing the piston 4 toward the left hand end of the cylinder 1. As the piston 4 moves toward the left hand end of
85 the cylinder 1, the water at the left hand side of the piston passes through the left passage 11, and out of the exhaust 13 through the port 10, the hollow portion of the slide valve 3 and the port 10', the latter
90 being just above the exhaust 13. When the slide valve 6 is reversed by the piston 4, said slide valve connects the ports 13 and 10'', and the water is again forced from the supply chest 3 through the port 10, forcing
95 the piston outwardly. Small yielding mounted plates 6' are arranged at the top of the valve 6 and are designed to relieve pressure of water on the valve so that should any water go to the top of the valve, it will
100 pass out through the port 13.

The ports 10, 10' and 10'' and 13 correspond to ports similarly employed in a steam engine valve mechanism excepting that, in the present machine, the valves have a very
105 quick action. The spaces between the rollers 26 are designed to permit the lever 20 to fall over the dead center to impart the quick movement to the rod 7 necessary in reversing the valve 6 and obtaining an effective operation of the machine. 110

It is to be understood that the pipe 39 is a sand pipe for the cylinder 2 and equivalent to the pipe 38 provided for the cylinder 1.

Having thus described the invention, 115 what is claimed as new is:

1. In an automatic hydraulic pump, the combination of a working cylinder, a valve chest connected with said cylinder, a pump-
120 ing cylinder associated with the working cylinder at one end of the same, working and pumping pistons in the respective working and pumping cylinders, a piston rod connecting said pistons, and having one
125 end thereof extending from an end of the working cylinder, a valve operating in the valve chest, a valve rod extending from said valve to a point exterior to the valve chest, spaced stops on the valve rod and spaced stops on the outwardly extended portion of 130

the piston rod, a horizontal lever having an end thereof received between the spaced stops of the piston rod extension, a vertical lever pivoted between its ends, weight means carried by one end of the vertical lever, the other end of the lever operating between the spaced stops on the valve rod and being in engagement with the other end of the horizontal lever as set forth.

2. In an automatic hydraulic pump, the combination of a working cylinder, a valve chest connected with said cylinder, a pumping cylinder associated with the working cylinder at one end of the same, working and pumping pistons in the respective working and pumping cylinders, a piston rod connecting said pistons, and having one end thereof extending from an end of the working cylinder, a valve operating in the valve chest, a valve rod extending from said valve to a point exterior to the valve chest, spaced stops on the valve rod and spaced stops on the outwardly extended portion of the piston rod, a horizontal lever having an end thereof received between the spaced stops of the piston rod extension, a vertical lever pivoted between its ends, weight means on the upper end of said lever, a yoke at the lower end of said vertical lever and receiving between its sides the other end of the horizontal lever, said lower end of the vertical lever having a slot through which the valve rod passes, the spaced stops on the valve rod being on opposite sides of the slotted portion of the vertical lever.

3. In an automatic hydraulic pump, the combination of a working cylinder, a valve chest connected with said cylinder, a pumping cylinder associated with the working cylinder at one end of the same, working and pumping pistons in the respective working and pumping cylinders, a piston rod connecting said pistons, and having one end thereof extending from an end of the working cylinder, a valve operating in the valve chest, a valve rod extending from said valve to a point exterior to the valve chest, spaced stops on the valve rod and spaced stops on the outwardly extended portion of the piston rod, a horizontal lever having an end thereof received between the spaced stops of the piston rod extension, a vertical lever pivoted between its ends, weight means on the upper end of said lever, a yoke at the lower end of said vertical lever and receiving between its sides the other end of the horizontal lever, said lower end of the

vertical lever having a slot through which the valve rod passes, the spaced stops on the valve rod being on opposite sides of the slotted portion of the vertical lever, the working cylinder having exhaust passages leading therefrom and merging into an exhaust port, pipe connections leading from the exhaust passages aforesaid and connected with one end of the pumping cylinder, an air chamber connected with the pumping cylinder, and a water delivery pipe leading from said air chamber.

4. In an automatic hydraulic pump, the combination of a working cylinder, a valve chest connected with said cylinder, a pumping cylinder associated with the working cylinder at one end of the same, working and pumping pistons in the respective working and pumping cylinders, a piston rod connecting said pistons, and having one end thereof extending from an end of the working cylinder, a valve operating in the valve chest, a valve rod extending from said valve to a point exterior to the valve chest, spaced stops on the valve rod and spaced stops on the outwardly extended portion of the piston rod, a horizontal lever having an end thereof received between the spaced stops of the piston rod extension, a vertical lever pivoted between its ends, weight means on the upper end of said lever, a yoke at the lower end of said vertical lever and receiving between its sides the other end of the horizontal lever, said lower end of the vertical lever having a slot through which the valve rod passes, the spaced stops on the valve rod being on opposite sides of the slotted portion of the vertical lever, the working cylinder having exhaust passages leading therefrom and merging into an exhaust port, pipe connections leading from the exhaust passages aforesaid and connected with one end of the pumping cylinder, an air chamber connected with the pipe connection leading to the pumping cylinder, a water delivery pipe extending from the air chamber, and a valve pipe connection leading from the valve chest to the pipe connection extending from the exhaust passages to the pumping cylinder.

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

LAURITS AKSEL LAURSEN.

Witnesses:

M. WHITE,
G. KIMBALL.