L. A. LAURSEN.

PUMPING MECHANISM.

APPLICATION FILED NOV. 24, 1915.

1,304,330.

Patented May 20, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

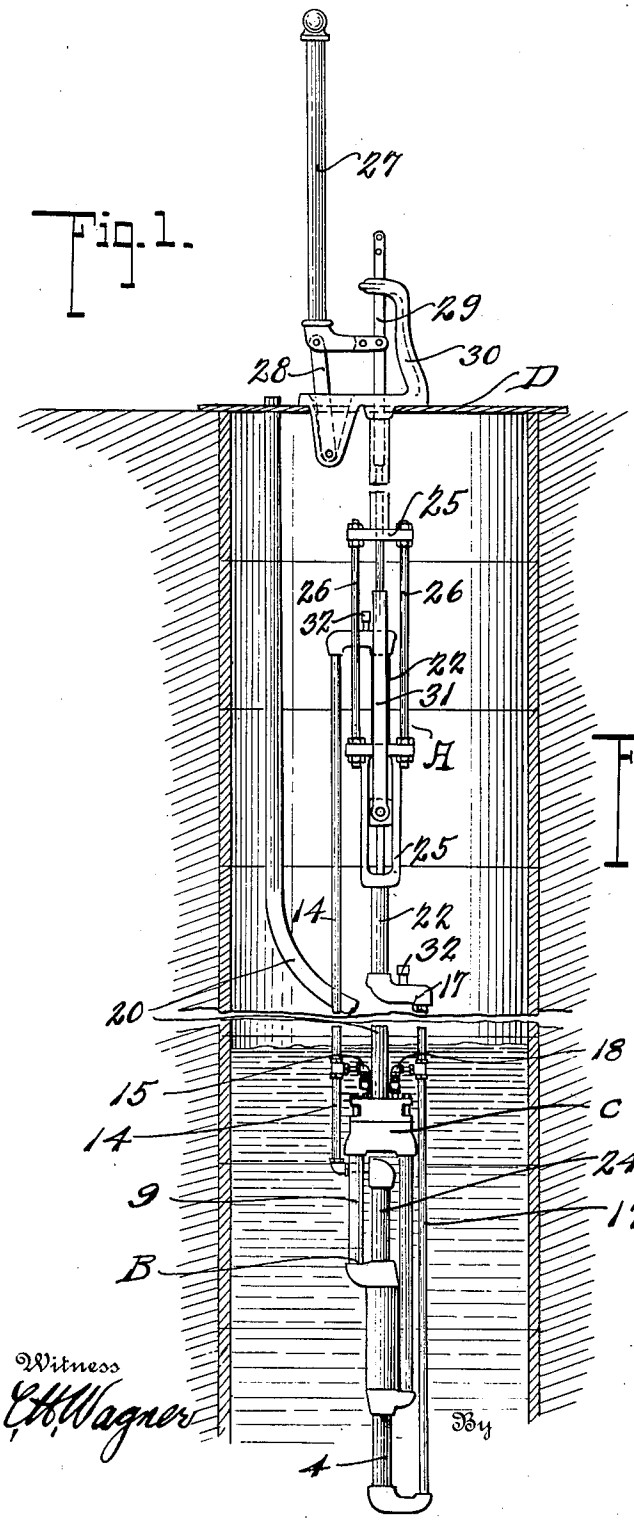
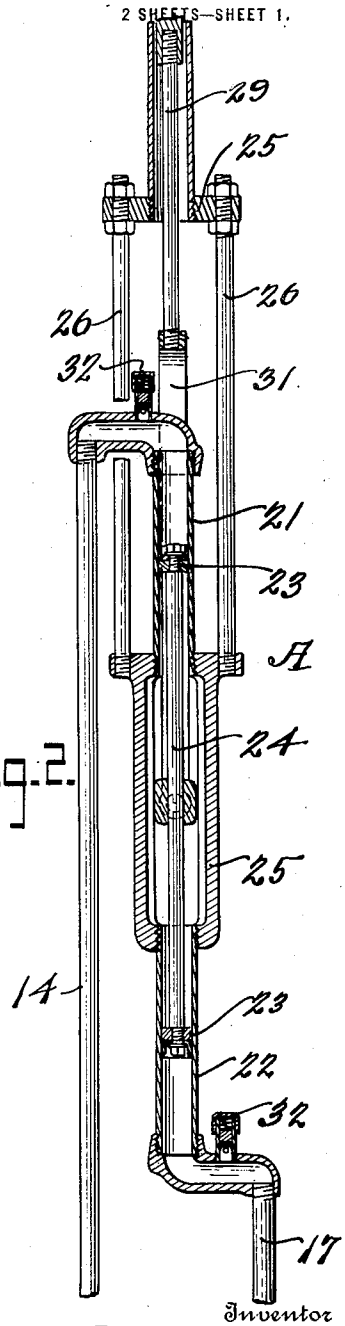


Fig. 2.



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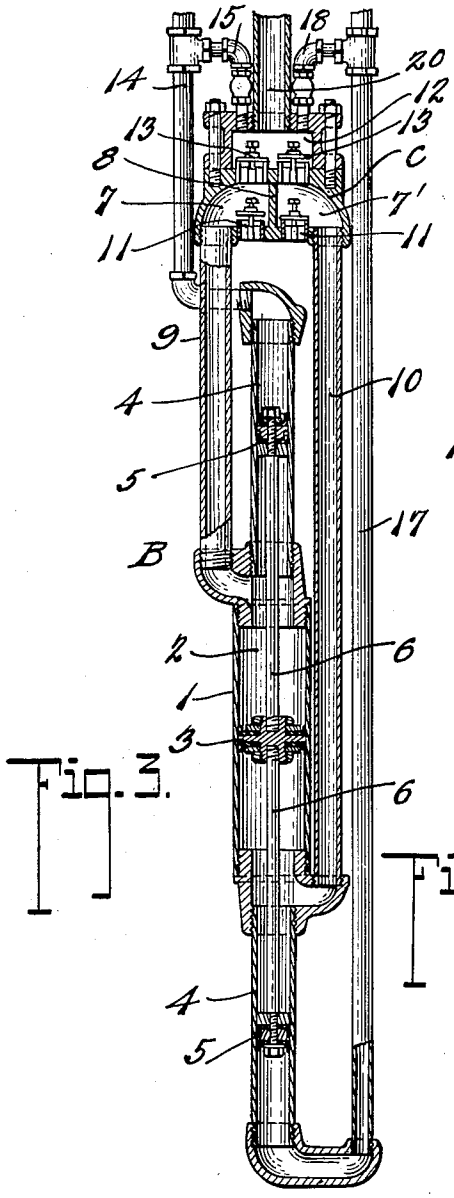


Fig. 3.

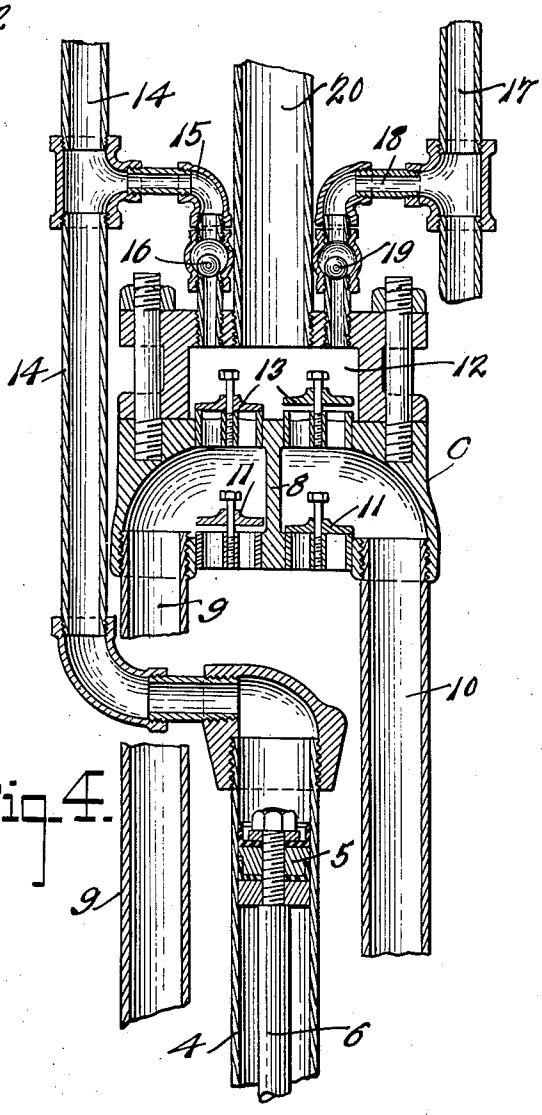


Fig. 4.

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UNITED STATES PATENT OFFICE.

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PUMPING MECHANISM.

1,304,330. Specification of Letters Patent. Patented May 20, 1919.

Application filed November 24, 1915. Serial No. 63,264.

To all whom it may concern:

Be it known that I, LAURITS A. LAURSEN, a citizen of the United States, residing at Eau Claire, in the county of Eau Claire and State of Wisconsin, have invented certain new and useful Improvements in Pumping Mechanism, of which the following is a specification.

The present invention relates broadly to improvements in pumps, and in particular to double acting force pumps for elevating water from deep wells to a suitable point above the surface for utilization, the object of my device being to dispense with the usual rigid pump rod or member employed in the usual form of pump mechanisms, the use of which has its limitations and is accompanied with numerous disadvantages.

The essence of the invention lies in the combination with a working cylinder of special construction disposed in the water to be elevated, of operating means located at a convenient place adjacent to the surface, for actuating the piston of the cylinder aforesaid through the instrumentality of a column of water, provision being made for the automatic maintenance of the necessary quantity of water in said column for performing its proper function.

These and such other objects as may hereinafter appear are attained by the novel construction, combination and arrangement of parts to be hereinafter specifically described and claimed. Reference will now be had to the accompanying drawings forming a part of this specification, wherein:—

Figure 1 is a side elevation of an apparatus constructed in accordance with my invention, disposed in a well in operative position.

Fig. 2 is a vertical sectional view of the operating mechanism for the pumping apparatus.

Fig. 3 is a similar section showing the working or pumping cylinder and valve instrumentalities coacting therewith.

Fig. 4 is an enlarged sectional view showing more clearly the details of construction of the valve means.

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

Referring to the drawings, A designates the operating mechanism of this device and B the pumping mechanism, each of which will be separately described in detail.

In respect to the pumping mechanism, the numeral 1 designates a working cylinder, in the water chamber 2 of which, the pumping piston 3 is operable. It will be noted that the cylinder 1 is provided at each end, that is above and below the same according to the construction illustrated, with a reduced portion 4 in each of which is disposed a plunger 5, said plungers being of relatively smaller cross sectional area than the piston 3 and operably connected thereto by means of the connecting rods 6. This plunger is provided above and below the working piston, so that, as will be more apparent as this description proceeds, the operation of the device will be double acting in the usual sense applied to apparatus of this character.

The pumping mechanism B is adapted to be immersed in the water, say for instance in a deep well, as shown clearly in Fig. 1, and said mechanism includes as a constituent element thereof, valve means C for controlling the elevation of the water from the well, as will be described in detail hereinafter. The valve mechanism C consists of the inlet or intake compartments 7, 7′ separated by a partition 8, the compartment 7 communicating through the passage 9 with the working cylinder 1 above the pumping piston 3, while the compartment 7′ is placed in communication with said cylinder below the pumping piston 3 by the passage 10. In each of said compartments 7, 7′ is an inlet valve 11.

The valve means, furthermore, is provided with a discharge compartment 12 just above the intake compartments 7, 7′, and placed in communication with the respective intake compartments by the outlet valves 13.

From the upper reduced portion 4 of the working cylinder 1, a fluid passage 14 leads upwardly to the operating mechanism A disposed in the well also a short distance below the surface, or approximately below the frost line, as shown in Fig. 1 of the drawing. This passage 14 is provided with a by-pass 15 leading therefrom to the discharge compartment 12 of the valve mechanism C, said by-pass having a ball valve 16 therein, the function of which will be later explained.

The lower reduced end 4 of the working cylinder 1 has a fluid passage 17 leading upwardly therefrom also to the operating

mechanism A. In like manner this passage 17 is provided with a by-pass 18 and valve 19 establishing communication with the discharge compartment 12 of the valve means C.

From the discharge compartment 12 of the valve means C a discharge passage or conduit 20 leads upwardly and out of the well to convenient points of delivery of the water therefrom. At this point, it may be mentioned that it is immaterial whether the discharge conduit has additional pumping mechanisms connected therewith in order to deliver the water to distant places or whether the apparatus as herein disclosed is relied upon, so far as the scope of the invention is concerned.

Passing now to the operating mechanism A, it will be observed by reference to Fig. 2 that the fluid passage 14 communicated with an upper cylinder 21 while the fluid passage 17 communicates with a diametrically opposed or lower cylinder 22. These cylinders contain pistons 23 connected together by means of the connecting rod 24. The cylinders 21 and 22 are supported from the platform D by the castings 25 connected by suitable tie rods 26. Upon said platform is arranged a pumping handle 27 pivotally connected upon an oscillating link 28 and to a short pump rod 29 guided by the arm 30 and in turn connected to the connecting rod 24 of the pistons 23 by the stirrup 31. In the passages 14 and 17 at any desired point are located safety valves 32 which are designed to relieve the passages from overpressure when the conduit 20 is cut off or when utilizing other operating means than the manual means 27 in the actuation of the operating mechanism A.

The foregoing description discloses the preferred embodiment of the apparatus but it is to be understood that details of the construction may readily be changed or rearranged within the spirit of the invention and within the scope of the claims hereto annexed.

Describing the operation of the device, and to start the pump, the fluid passages 14 and 17 are filled with water by pouring the same into the conduit 20. Owing to the fact that the outlet valves 13 are closed the water will pass through the by-passes 15 and 18 into the respective fluid passages 14 and 17, thus providing a solid column of water in each of these passages between the pumping mechanism B and the operating mechanism A. Upon movement of the pumping handle 27 toward the right, the lower cylinder 22 of the operating mechanism is emptied by its piston 23, the pressure of which is transmitted through the fluid in the passage 17 to the lower plunger 5 of the pumping mechanism B. This raises the piston 3 in the working cylinder forcing the water thereabove, assuming that in the operation of the apparatus water has entered into the water chamber 2, at this side, through the passage 9 to the valve means C where it is discharged through an outlet valve 13 into the conduit 20. Simultaneous with the upward movement of the pumping piston 3 water has been drawn into the intake compartment 7′ through the inlet valve 11 into the passage 10 filling the water chamber 2 beneath the piston 3. The reverse movement of the handle 27 will obviously reverse the operation just described causing the water to pass upwardly through the passage 10, the valve means C and into the conduit 20.

In the operation of this apparatus as just mentioned it will be apparent that forcing of the water through the valve means C is accompanied by a tendency to force water through the by-passes 15 and 18 into the fluid passages 14 and 17 whenever there has been a leakage of fluid from these passages. When not working, the weight of the column of water in the conduit 20 is always sufficient to maintain the full supply of water in the fluid passages 14 and 17 so that the automatic replenishment of these water columns is insured and the proper operation of the apparatus obtained. With this character of mechanism, the working mechanism A may be positioned at any point inasmuch as the operation of the working cylinder is accomplished through columns of water and this is particularly advantageous in deep wells where the use of the usual pump rods is accompanied by many disadvantages. A powerful pump is obtained and a steady stream of water secured by this apparatus.

Having thus described the invention, what is claimed is:

1. A double acting pumping apparatus of the class described comprising a working cylinder having a main piston and a separate pressure piston at either side thereof arranged in spaced relation to the main piston, relatively smaller cylinders for said pressure pistons, a passage leading from the working cylinder at each side of the main piston and including an inlet and a discharge port, a discharge conduit common to said passages, a fluid pressure passage for each pressure piston whereby to actuate said pistons, to discharge the contents of the cylinder from between the pressure and main pistons through the discharge passage, and means affording communication from the discharge passage to the fluid pressure passage preventing escape of the fluid from the fluid pressure passages to the discharge passage.

2. A double acting pumping apparatus of the class described comprising a working cylinder having a main piston and a pressure piston at each side of the main piston

and connected with said main piston, operating means for said mechanism including separate fluid pressure columns each communicating with an end of the working cylinder for actuating the respective pressure pistons, a discharge passage communicating with the working cylinder, passages placing the fluid pressure columns in communication with the discharge passage, and a separate valve for each passage whereby fluid from the discharge passage as it is discharged will be forced into that fluid column which is not under pressure to thereby replenish any depletion of supply in said column.

3. In combination, pumping mechanism adapted to be disposed in water or similar fluid, operating mechanism therefor, fluid passages arranged between said mechanisms, valve means for controlling the discharge of fluid from the pumping mechanism, bypasses placing said fluid passages in communication with the valve means, and a discharge conduit leading from the valve means, said valve means comprising a valve chamber, inlet valves disposed therein, and discharge valves also arranged in said chamber, said bypasses being maintained in communication with the discharge conduit aforesaid.

4. A pumping apparatus of the class described comprising a working cylinder, a piston mounted therein, valve means for controlling the discharge of the working cylinder, passages leading from the valve means to the working cylinder at both sides thereof, said valve means comprising separate intake compartments, intake valves arranged therein, a discharge compartment arranged above said intake compartments, discharge valves establishing communication between the respective discharge and intake compartments, means for operating said working piston including fluid passages leading to the working cylinder, and valved by-passes intermediate the discharge compartment of the valve means and the fluid passages aforesaid.

5. In a pumping device, the combination of three separate units adapted to be detachably assembled by means of pipe connections in different spaced relations, one of said units comprising a double chambered pump mechanism, another unit comprising a casing with inlet and outlet valves arranged for simultaneously filling one chamber of the pump mechanism and exhausting the other, and the other unit comprising an auxiliary pump for applying an alternating fluid pressure to the pump mechanism to simultaneously enlarge one pump chamber and diminish the other and thereby admit and discharge fluid through the valve casing.

6. In a device of the class described the combination of a well, an auxiliary pump suspended in the well and having operating means therefor at the top of the well, a double chambered pump mechanism suspended from the auxiliary pump and connected therewith so that an alternating fluid pressure is communicated from the auxiliary pump to the pump mechanism to simultaneously enlarge one pump chamber while the other is diminished thereby, a valve casing having inlet and outlet chambers and valves therefor to simultaneously admit fluid to one pump chamber and discharge from the other.

In testimony whereof I affix my signature.

LAURITS A. LAURSEN.