C. W. DARROW.

PUMP.

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998,472.

Patented July 18, 1911.

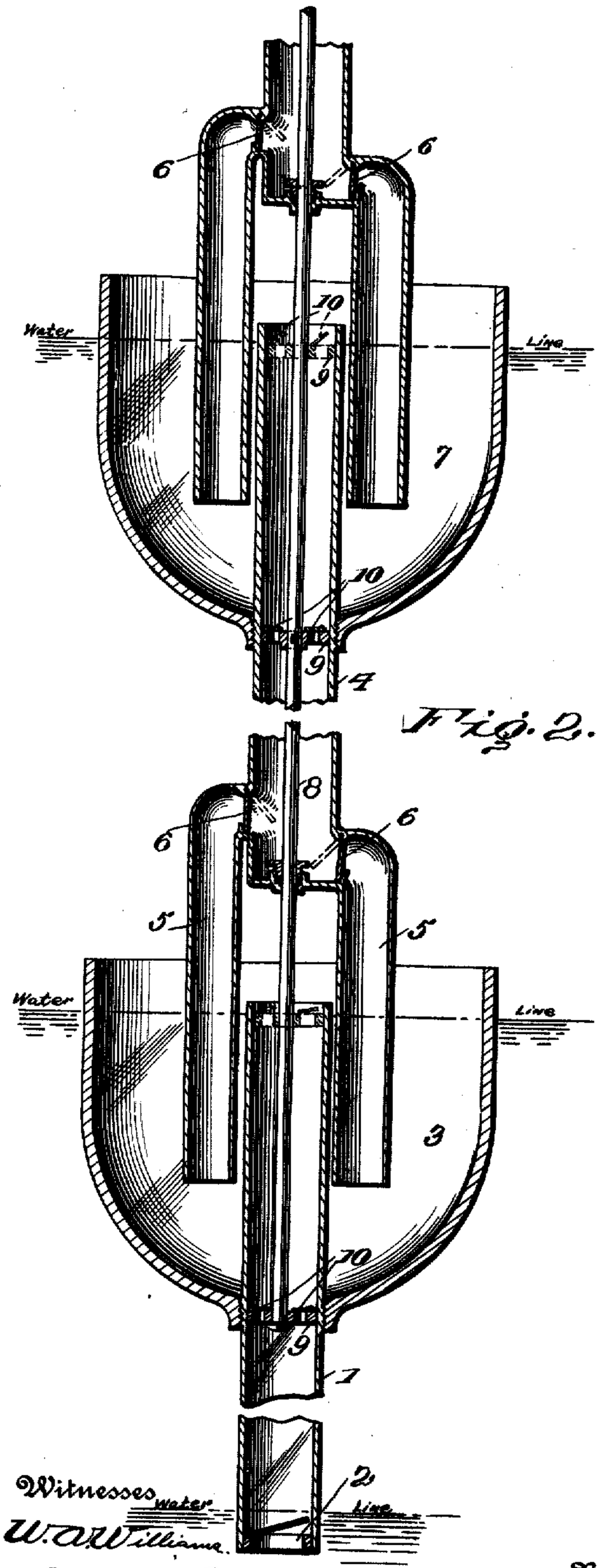

Fig. 2.

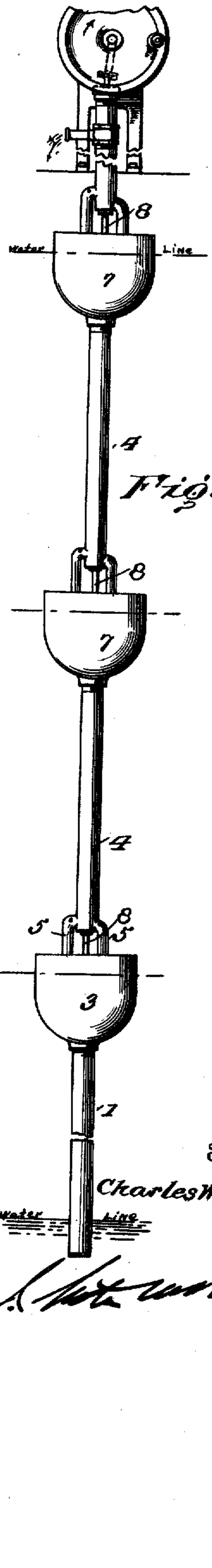

Fig. 1.

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PUMP.

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To all whom it may concern:

Be it known that I, CHARLES W. DARROW, of Glenwood Springs, in the county of Garfield and State of Colorado, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The primary object of this invention is to provide improved, simple and highly efficient means for elevating water to any desired distance within reasonable limits.

It is the purpose of my invention to utilize the atmospheric pressure on the water, first, in elevating the water through one of a series of pipes and discharging it into a reservoir, and then again utilizing the atmospheric pressure on the water in the reservoir for elevating it through a second pipe and then into a second reservoir, and repeating this operation through as many series of pipes and reservoirs as may be necessary to discharge the water at the desired height.

Briefly outlined, my invention contemplates the employment of a series of superposed pipes each having a tank or reservoir at its upper end into which the lower end of the next higher pipe opens, and in each pipe I arrange a plunger and a check valve, all of the plungers being operated by a common piston rod to which they are attached. The plungers are themselves provided with ports which are controlled by check valves, and each plunger is designed to operate through a short section of its respective pipe. The lower end of the lowermost pipe is submerged in the well or source of water supply, and in such end is located a check valve through which water is forced by atmospheric pressure acting on the water in the well or other source of supply, when the plunger is moved upwardly, such upward movement creating a partial vacuum in the pipe, allowing the water to enter the pipe through the check valve. When the first pipe is substantially full of water the plunger on its down stroke will allow water to pass through its ports, and on its next upward stroke will lift and discharge such water into the first reservoir. Similarly the water will enter and be discharged from each of the superposed pipes until discharged at the delivery end of the topmost pipe.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation showing a pump constructed in accordance with my invention. Fig. 2 is an enlarged vertical sectional view showing portions of three pipes.

Referring to the drawings, 1 designates a vertically disposed pipe the lower end of which is designed to be submerged in water in a well or other source of supply. This pipe is preferably about thirty feet in length, but the exact length is immaterial, although best results are obtained by having the pipe from twenty-five to thirty feet in length. In the lower end of pipe 1 is a check valve 2 the flap of which is designed to open upward to admit the water to the pipe from the well. At its upper end pipe 1 has a reservoir 3 which may be of any preferred form of construction, but that shown is believed to be best adapted for the purpose, being of bell-shape and extending at its upper edge to a point slightly above the discharge end of pipe 1. The next pipe 4 is of substantially the same length as pipe 1, and its lower end is designed to project into reservoir 3 of the first pipe to a point below the upper end of the latter pipe so as to be partly submerged in the water. I have shown the lower end of pipe 4 as having two deflected branch pipes 5 of smaller diameter. The receiving end of pipe 4 may, however, be differently formed, if desired, it being essential, however, that its lower end be extended into reservoir 3 some distance beneath the discharge end of pipe 1. At the upper ends of the smaller pipes 5 are located check valves, 6. The discharge end of pipe 4, like pipe 1, has a reservoir 7 at its upper end. The remaining pipe or pipes above pipe 4 are constructed similarly to the latter, and are likewise provided with check valves of the type of valve 6.

8 designates a piston or plunger rod which extends axially through the series of superposed pipes. On this rod 8 is mounted a series of pistons or plungers 9, each of similar construction, one being provided for each main pipe. These plungers have ports which are controlled by valves 10, which are designed to open upwardly when the plungers are forced downward. The piston rod may be reciprocated by any suitable means, either by manual power or by machinery.

In practice, the piston rod is operated

back and forth, and each piston is caused to travel a distance of two or three feet in the upper end of its respective pipe. In the first upward movement of the piston of pipe 1 a vacuum is created in the latter, and water from the source of supply under atmospheric pressure, will enter pipe 1 through check valve 2. When the water reaches the piston of pipe 1, on the next downward stroke of this piston, it will pass through the ports of the latter, and on the next upward stroke of this piston such water will be lifted by the latter and discharged into reservoir 3, and from the latter, under atmospheric pressure, through continued manipulation of the piston in pipe 4, water will enter the latter pipe through the smaller pipes and their check valves 6, and, as in the case of pipe 1, will be discharged into reservoir 7. This operation is continued throughout each of the superposed pipes until finally the water is discharged at the upper end of the pump.

From what has been said it will be seen that I utilize the advantage of atmospheric pressure over and over again through a series of superposed pipes by means of a single piston rod common to a series of pistons operated simultaneously in all the main pipes of the series. By means of my invention water may be readily and conveniently elevated to a height of sixty feet or more solely through the atmospheric pressure except through the short distance of each pipe through which water is lifted or elevated in the upward travel of the pistons to effect its discharge either into the reservoir tanks or from the topmost pipe.

While I have shown and described a preferred form of carrying out my invention, it will be understood that changes may be made in the construction and arrangement of the parts without departing from the spirit of the invention as defined by the claims.

I claim as my invention:—

1. A pump comprising a plurality of axially alined superposed pipes occupying fixed relations relatively to one another, the lower end of each pipe being designed to be submerged in water and each pipe having at its upper end a reservoir open to the atmosphere and into which the lower end of the next higher pipe is designed to extend, check valves at or near the lower ends of the pipes, and a series of pistons, one for each pipe, all designed to operate in unison, said pistons having valve-controlled ports therethrough.

2. A pump comprising a plurality of axially alined superposed pipes occupying fixed relations relatively to one another, the lower end of each pipe being designed to be submerged in water and each pipe having at its upper end a bell-shaped reservoir open to the atmosphere and into which the lower end of the next higher pipe is designed to extend, check valves at or near the lower ends of the pipes, and a series of pistons, one for each pipe, all designed to operate in unison, said pistons having valve-controlled ports therethrough.

3. A pump comprising a plurality of axially alined superposed pipes, the lower end of each pipe being designed to be submerged in water and each pipe having at its upper end a reservoir open to the atmosphere and into which the next higher pipe is designed to extend, the lower ends of the superposed pipes having deflected branch pipes which open into said reservoirs, a series of valves, one in each deflected pipe, a check valve at the lowest end of the lowermost pipe, a series of pistons, one for each pipe, all designed to operate in unison, said pistons having valve-controlled ports therethrough.

4. The herein described pump comprising a pipe designed to be submerged at its lower end in a well or source of supply, and having at its upper end a water receiving reservoir open to the atmosphere, a second pipe arranged in axial alinement with the first mentioned pipe and having at its lower end deflected branch pipes extending into said reservoir to a point beneath the discharge end of the first mentioned pipe, check valves located in said deflected pipes and at the lower end of the first mentioned pipe, pistons fitted in the upper ends of said pipes and designed to travel a limited distance therein, said pistons having ports and upwardly opening valves, a rod common to all pistons, and means for reciprocating such rod.

5. A pump comprising a plurality of axially alined superposed pipes, the lower end of the lowermost pipe being designed to be submerged in water and each pipe having at its upper end a reservoir open to the atmosphere, each superposed pipe having deflected branch pipes at its lower end extending into the reservoir of the next lower pipe, a series of check valves, one in each branch pipe and one at the lower end of the lowermost pipe, and a series of plungers, one for each pipe, all designed to operate in unison, said plungers having valve-controlled ports therethrough.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

CHARLES W. DARROW.

Witnesses:
SADIE KORN,
LAURA SANTY.