A. J. WALKER.

Water-Elevating Machine.

No. 219,787. Patented Sept. 16, 1879.

Fig. 1.

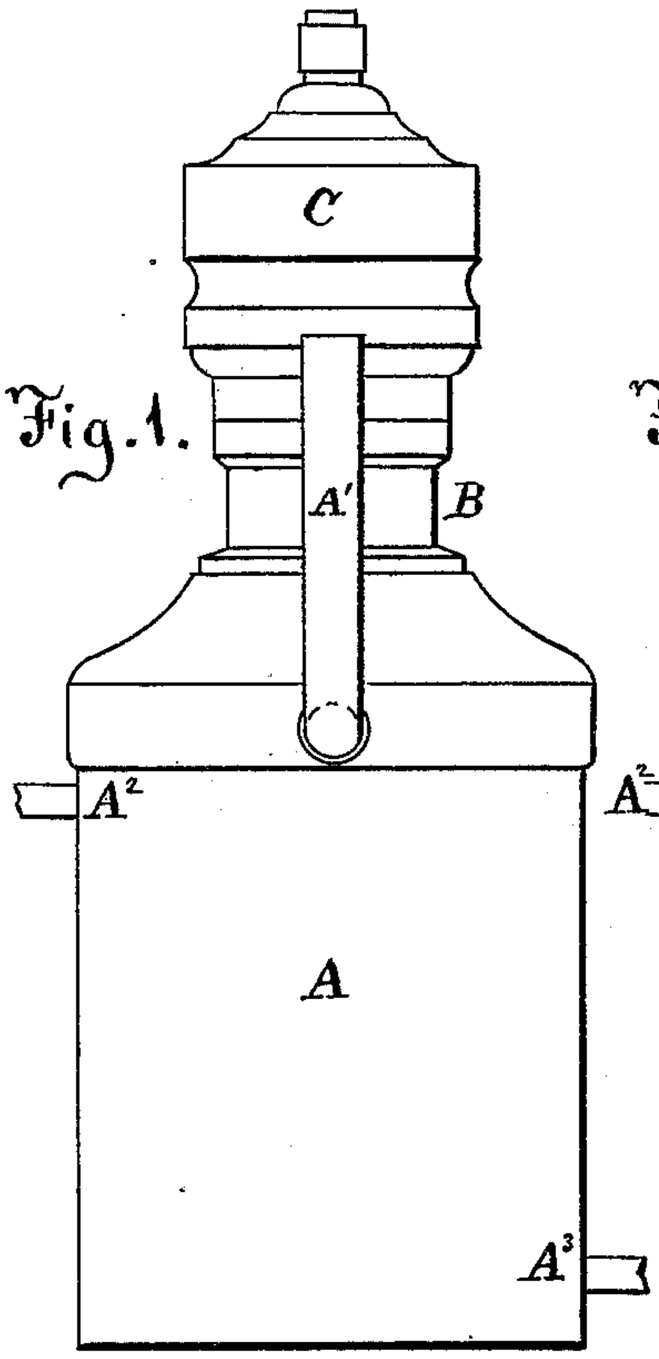


Fig. 2.

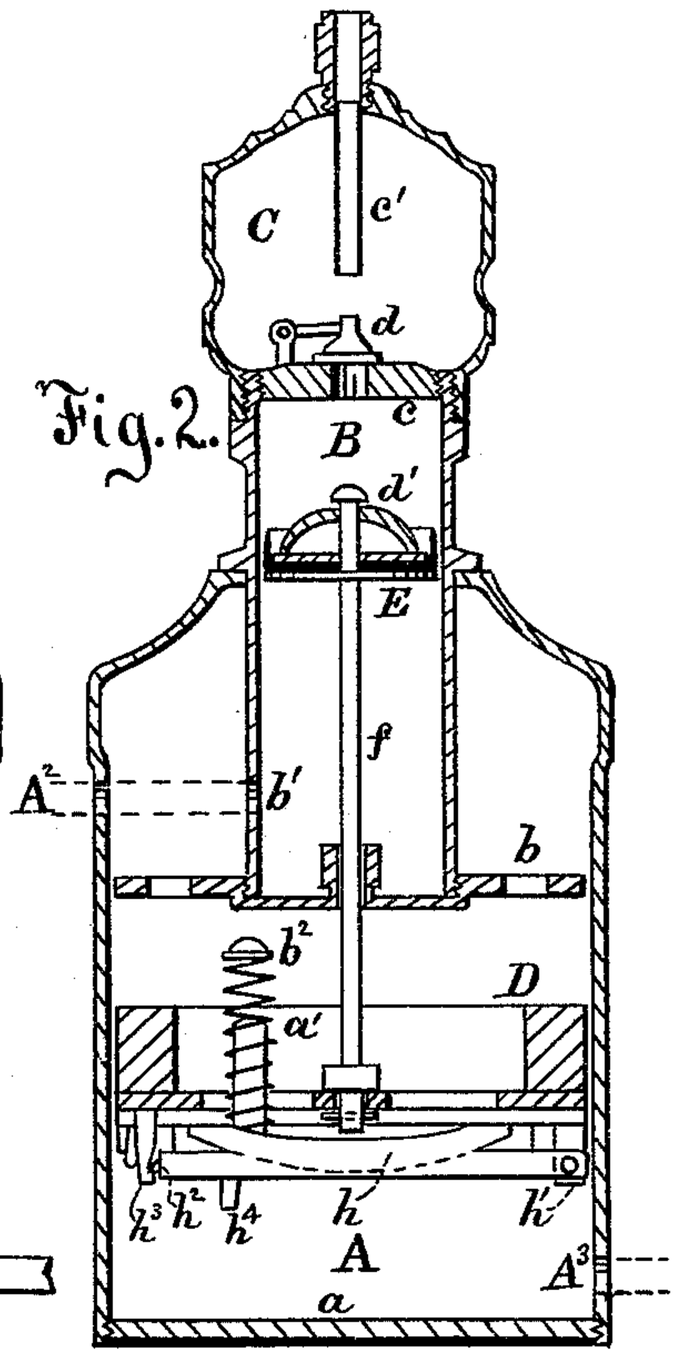
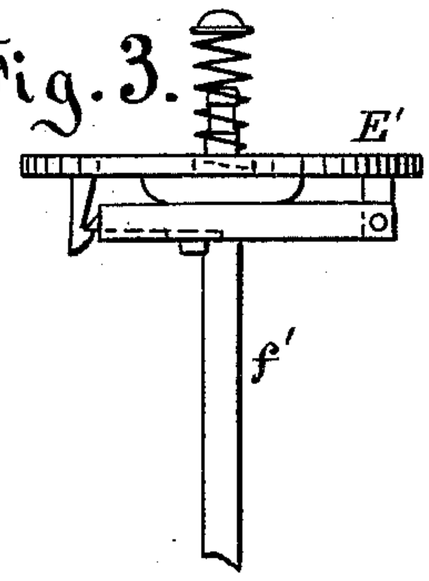


Fig. 3.



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UNITED STATES PATENT OFFICE.

ADONIRAM J. WALKER, OF WILLIAMSVILLE, VERMONT.

IMPROVEMENT IN WATER-ELEVATING MACHINES.

Specification forming part of Letters Patent No. **219,787**, dated September 16, 1879; application filed November 9, 1878.

To all whom it may concern:

Be it known that I, ADONIRAM J. WALKER, of Williamsville, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Water-Elevators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention consists of a water-elevating machine having one or more cylinders and pistons, with the necessary plates, valves, and receiving and discharging openings, operated by water from a fall let into the machine under a piston, as hereinafter described.

The drawings represent such a machine, having two cylinders, an air-chamber, and two pistons, in which drawings—

Figure 1 is a side view of the machine, and Fig. 2 is a vertical section of the same. Fig. 3 is a side view of a piston and connecting-rod and let-off valve used when the water is let into the upper cylinder.

A represents the lower cylinder, provided with a bottom plate, *a*, and the openings A^1, A^2, and A^3, for receiving and discharging the water. B is the middle cylinder, the lower end of which is screwed into a recess in the middle plate, *b*, which plate is made to fit neatly in the cylinder A, and is provided with openings outside of the cylinder B, to admit water from the cylinder A to the chamber above the plate. The cylinder B is provided also with an opening, at b^1, to admit water into the cylinder under the upper piston. The upper end of cylinder B is provided with a plate, *c*, having a valve, *d*, opening upward.

C is an upper cylinder or air-chamber, constructed to fit over and screwed onto the top of cylinder B. This air-chamber is provided with a tube or pipe, *c'*, extending downward nearly to the bottom of the chamber, and arranged for attaching the discharge-pipe for the ascending water.

D is the lower piston, provided with a let-off valve, *h*, which is hinged to the bottom of the piston at h^1, and is provided with a spring-bolt, h^2, adjusted to catch in a notch in a post, h^3, at the side of the piston opposite to the hinge. The upper side of the valve is provided with a post, *a'*, upon which is adjusted the spiral spring b^2, extending above the post, and both extending, when the valve is closed, through an opening in the piston some distance above it, as shown in Fig. 2 of the drawings. This post *a'* is connected with the spring-bolt, so that pressure upon the top of the post will throw back the bolt to let the valve drop; and the spring is extended above the post for the purpose of throwing the valve lower and sooner than it would fall of its own weight at first opening to prevent the liability of the valve being closed by the pressure of the water as the piston descends.

The under side of the let-off valve is provided with a stop-pin, h^4, near the outer end of the spring-bolt, which pin strikes the bottom plate as the piston descends, raising the spring-catch into the notch in the post h^3, thus closing and fastening the valve.

E is the upper piston, provided with a valve, *d'*, adjusted to lift and let the water pass through the piston as it descends. These pistons D and E are connected by a rod, *f*, extending through the plate *b*.

In Fig. 3 of the drawings, E' represents a piston, having a let-off valve constructed and operated like the let-off valve on piston D. This piston E' is provided with a connecting-rod, *f'*, the lower end of which, when in use, connects with a common piston having a valve adjusted to open upward. This piston E' and the common piston attached to the lower end of rod *f'* are designed to be used in the cylinders A and B in the place of the pistons D and E when the water is let into cylinder B, as hereinafter described.

This machine is used and operated in several different ways.

To raise a part of the water which runs the machine to a greater height than the fall, the water is let into the cylinder A at the opening A^3 under the piston D, which raises that piston till the top of the post *a'* strikes the plate *b*, throwing back the spring-catch h^2, allowing the valve *h* to drop, the spring b^2 forcing the valve sooner than it would fall by its own weight, and preventing it from being

closed by the pressure of the water, and thus allowing the water to pass through the piston, which, by its own weight, descends till the stop-pin h^4 strikes the bottom plate, and the valve is closed and fastened, when the pistons again rise. As the piston E descends with the piston D the clapper-valve d' lifts, allowing the water to pass through the piston into the upper port of the cylinder B; and as the pistons rise again the water in cylinder A is forced through the openings in the plate *b*, and into the cylinder B through the opening b^1 in the side of the cylinder, and the water in cylinder B above the piston E is forced by this piston into the air-chamber, and through the tube c' into the pipe for the ascending water.

By this adjustment and operation of the machine water may be raised as many times the height of the fall as the upper piston is less than the lower piston, less the effects of the weight of the pistons and the friction of the machine; and it is evident that the relative sizes of the machines may be varied, so as to raise one half, one-fourth, one-eighth, one-twelfth, or more or less, respectively, two, four, eight, or twelve times the height of the fall; and the size of the inlet may be enlarged to quicken the stroke and increase the quantity of the water entering the machine.

In this operation of the machine, the water which cannot enter cylinder B, and remains in cylinder A after the descent of the pistons, is forced up by the next ascent of the piston D, and escapes through pipe A^1; and this pipe may be carried up for raising the water to a limited height for use, the height to which the water is thus carried depending upon the height of the fall and the size of the cylinders.

In the above-named operation of the machine the opening A^2 in cylinder A is closed by a screw-cap.

The upper cylinder and piston may be used as an ordinary suction-pump, for drawing water from below out of a fountain, stream, pond, or well. In this operation the pipe A^2 is extended downward into the water to be drawn up, and is provided with a valve at the lower end to retain the water so that the supply will be kept up to the piston E. The water being let into A under piston D, raises it and piston E, which, by suction, draws up water through pipe A^2 into the cylinder B, and by the repeated automatic action of the pistons, as previously described, the water thus drawn up is discharged at the top of the air-chamber, or as far above as the pressure of the water under piston D will force it.

In this operation the entrance b^1 from A to B being closed by the pipe A^2 extended into cylinder B, it is evident that no water can enter this cylinder except the water drawn up through pipe A^2. The water which enters cylinder A and runs the machine passes through the openings in the plate *b*, and escapes through the pipe A^1; but when the machine is run by aqueduct water it is stopped back with a faucet till the pipe is full, so as to create a head equal to the fall from the spring to the fountain, and the water is saved in a cistern, it having only passed through the cylinder A, raised piston D, and drawn up some cold water from below, which is kept separate from the water running the machine.

To draw up from below and raise to a height less than the fall more water than runs the machine the pistons D and E are removed, and the piston E′ and a common piston of the proper size, attached to the lower end of the connecting-rod f', are adjusted in the cylinders; and the pipe A^2 is turned upward and connected with a fall of a great height; and the pipe A^3 is removed, and a pipe sufficiently large to admit all the water that the machine will raise is adjusted in the place and extended downward to a cistern or well, and the lower end of this pipe is provided with a valve to keep the water up to the lower piston. Now, the water being let on, it is conducted through pipe A^2 into cylinder B under piston E′, raising it, and, by means of the connecting-rod f', raising the lower piston, which draws water through the pipe at A^3 from the cistern or well into the cylinders A and B. As these pistons rise the spring and post connected with the let-off valve on piston E′ strike the plate *c*, releasing the spring-bolt and throwing down the valve, and the pistons descend, the valve in the lower piston opening upward, allowing the water drawn up to pass through into the cylinder above the piston; and the stop-pin on the let-off valve of the piston E′ descending strikes the plate *b*, closing and fastening the valve, and the operation is repeated. As the pistons again rise the water in cylinder B is forced by the piston E′ into the air-chamber, and is discharged at the top through a suitable spout or elbow into a cistern, and the overflow may be conducted to a barn below for use, and the water in cylinder A is discharged through a pipe at A^1 for use.

In this operation it is readily seen that the well-water drawn up by the machine is kept separate from the water which runs the machine, and the well-water being thus raised a sufficient height is conducted to families below for use—for example, a spring eighty feet above my house is used to run the top piston. All of this spring-water entering the machine escapes as waste water through the top of the machine and runs into a cistern, and the overflow runs on to my barn, none the less nor worse for having passed through the machine; but in passing through the machine this spring-water draws up from a well three times as much water as runs the machine, and raises the water thus drawn up high enough to run to and supply three families below, thus supplying four families where only one could be supplied by the spring-water.

I do not limit myself to the particular construction of the machine described and shown; but as the mode of operation may be varied, as above described, so the construction of the

machine may be varied in all of these modifications of construction and operation, retaining the same principle of the invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. The water-elevating machine consisting of the cylinders and air-chamber having the plates and valves, and provided with the water-escapes, in combination with the connected valved pistons, all constructed and adapted to be operated automatically by water from a fall let into the machine under one of the pistons, substantially as and for the purposes described.

2. The water-elevator having the cylinders A and B, the air-chamber C, the plates *a b c*, and the valve *d*, in combination with the pistons D and E, provided with the valves *d'* and *h*, substantially as and for the purposes described.

3. The let-off valve *h*, hinged to the piston and provided with the post and spring *a' b²*, the stop-pin h^4, and spring-catch h^2, in combination with the notched post h^3, substantially as and for the purposes described.

4. The water-elevator having the cylinders A and B, air-chamber C, the plates *a b c*, and the valve *d*, in combination with the pistons D and E, provided with the valves *d'* and *h*, adjusted to be operated by water from a fall let into the cylinder A under the piston D, for raising a part of the water higher than the fall, substantially as described.

5. The water-elevator having the cylinders A and B, the air-chamber C, the plates *a b c*, and valve *d*, in combination with the pistons D and E, provided with the valves *d'* and *h*, adjusted to be operated by water from a fall let into the cylinder A under the piston D, and to draw up water through a pipe at A^2 into the cylinder B, and to discharge for use the water which runs the machine and the water drawn up by the machine, substantially as described.

6. The water-elevator having cylinders A and B, the air-chamber C, the plates *a b c*, and valve *d*, in combination with the piston E', provided with a let-off valve and connected by a rod, *f'*, with a piston in the lower cylinder, adjusted to be operated by water from a fall let into the cylinder B under the piston E', to draw up and discharge at a less height than the fall more water than is required to run the machine, substantially as described.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

ADONIRAM JUDSON WALKER.

Witnesses:

LUCINDA W. WALKER,

L. E. WALKER.