(No Model.)

E. H. WEATHERHEAD.

PUMP.

No. 484,383. Patented Oct. 11, 1892.

Fig. 1.

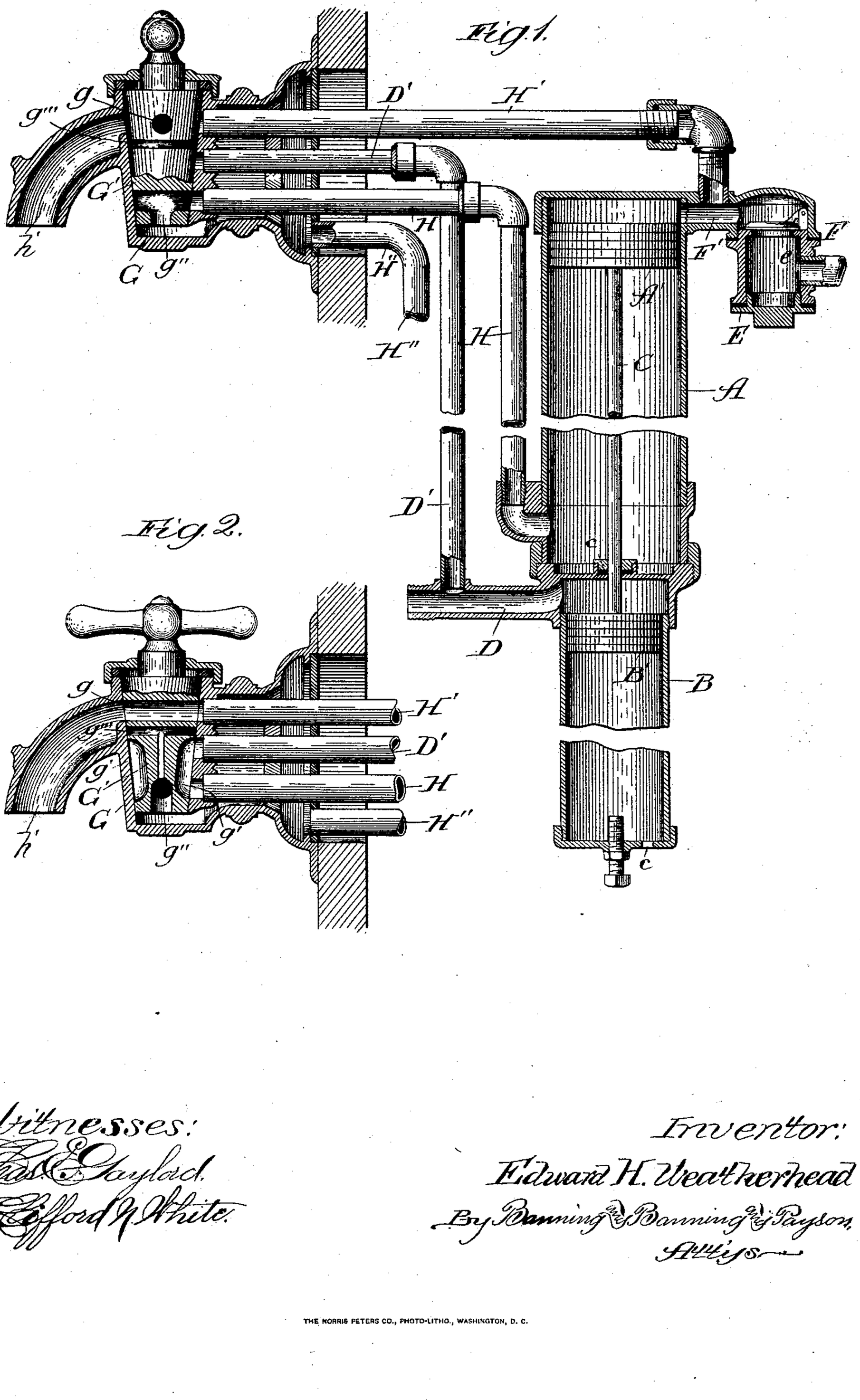

Fig. 2.

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PUMP.

SPECIFICATION forming part of Letters Patent No. 484,383, dated October 11, 1892.

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To all whom it may concern:

Be it known that I, EDWARD H. WEATHERHEAD, a citizen of the United States, residing at Cleveland, Cuyahoga county, State of Ohio, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

Where a liquid is pumped from a cask by means of air forced against the surface of the liquid, it is liable to deteriorate in quality and become stale.

It is the object of my invention to avoid this and to provide for pumping liquids by water-power, first, by raising the liquid by means of suction from the cask into a suitable receptacle, and then by forcing it out of such receptacle by water-power into the vessel in which it is to be received; and my invention consists in the method and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a vertical central section through my improved apparatus; and Fig. 2, a similar section through the cock, with the parts in reverse position.

In constructing my improved apparatus I first make of any suitable material a cylinder A of any desired dimensions—say, for instance, of a size to hold a quart. To the bottom of this cylinder I attach another cylinder B, the diameter of which must be less than the diameter of the cylinder A. The cylinder A is provided with a piston A′ and the cylinder B with a piston B′, each of these pistons being suitably packed to tightly fit the cylinder in which it is placed. These pistons are connected, preferably, by means of a rod C, passing through a stuffing-box *c* in the partition separating the two cylinders. The lower cylinder is provided with an opening *c′* for the admission and escape of air, to prevent the formation of a vacuum beneath the piston B′. The cylinder B is connected by means of a pipe D with any suitable source of water-supply—as, for instance, the city-main. I next construct a valve-chamber E, in which is a flap-valve *e*, opening upward only. This valve-chamber is connected by means of a pipe F with the cask containing the liquid which it is desired to pump and which may be located in the cellar or any other place desired and by a pipe F′ with the cylinder A. The cock G is shown in the drawings as attached to the outside of a refrigerator, while the cylinders are placed inside thereof for the purpose of cooling the liquid which is being pumped. The chamber in which the plug G′ is located connects with the pipe D by means of a pipe D′, with the cylinder A by means of a pipe H, and with the pipe F′ by means of a pipe H′, and the cock G, which is closed, as shown, at its rearward end, is provided with a waste-pipe H″, preferably at its lower side. The plug G′ is provided with several passages or ports, as shown, the port *g* extending through the plug in line with the pipe H′ and the spout *h′*, the ports *g′*, of which there is one at each side of the plug, connecting the pipes D′ and H, and the port *g″*, running from the pipe H to the bottom of the plug, connecting such pipe with the exhaust-pipe H″ through the cock-chamber, as shown. There is also an annular passage *g‴*, connecting, as shown, with the exhaust-port, the object of this being to collect any water that may seep upward along the side of the plug and return it to the exhaust.

The parts being constructed and put together in the manner described and being in the position shown in Fig. 1 operate as follows: Water is admitted through the pipe D into the cylinder B. It cannot pass up through the pipe D′, since the plug G′ is turned to close the upper end of this pipe. The water acting upon the upper surface of the piston B′ forces it downward, carrying along the piston A′, which, as above stated, is connected with the piston B′. As the pipe H′ is closed by the plug, air cannot enter the upper end of the cylinder A, and as the piston A′ moves downward in such cylinder it tends to create a vacuum therein. This raises the valve *e* and draws up the liquid to be pumped through the pipes F F′ into the cylinder A until such cylinder is filled or the plug turned, as hereinafter set forth. The length of the two cylinders is preferably so proportioned that when the cylinder A is full the piston B′ shall reach the bottom of the cylinder B, so as to be unable to move farther. The cylinder A now being filled, when it is desired to force the liquid out through the cock the plug is turned into the position shown in Fig. 2.

The water entering through the pipe D now passes upward through the pipe D′, the port *g*′, and by means of the pipe H enters the cylinder A beneath the piston. The area of this piston being larger than the area of the piston B′, the water-pressure thereon counterbalances the water-pressure upon the piston B′ and forces both pistons upward. The contents of the cylinder A is forced out through the pipe F, and since it cannot pass the valve E it passes through the pipe H′ and the port *g* out through the spout *h*′. Meanwhile the water in the cylinder B is gradually forced out by the rising of the piston B′, passes up the pipe D′ through the port *g*′, and by way of the pipe H into the cylinder A, where it assists in raising such cylinder. When the plug is turned back into the position shown in Fig. 1, shutting off the flow of liquid and closing the pipe H′ and the connection between the pipes D′ and H, the process already described takes place again, the piston B′ being forced downward and drawing along the piston A′ to suck in more liquid through the pipes F F′. As the piston A′ falls, the water in the cylinder A is forced out through the pipe H and passing through the port *g*″ escapes through the waste-pipe H″. This escaping water circulating among the pipes H, H′, and D tends to cool them and prevent the heating of the liquid as it passes out. It will thus be seen that with this apparatus a considerable part of the water is used twice, being first introduced into the cylinder B to force down the piston B′, and then passing from such cylinder into the cylinder A to raise the piston A′. It will further be seen that at no time is the liquid being pumped under pressure in the cask. As the piston A′ moves downward the liquid is raised by means of suction into the cylinder A, and as such piston moves upward, the valve *e* being closed, no pressure can be exerted through the pipe F. In other words, the liquid is first raised by suction into the cylinder A and afterward expelled by direct pressure.

It is evident that various modifications of this device may be made, the principle of raising by suction and expelling by pressure only upon the liquid so raised remaining the same. For instance, in place of the cylinder B and piston B′ a weight might be attached to that end of the piston-rod C which extends out of the cylinder A. When so constructed, the parts being in the position shown in Fig. 1, the piston A′ would be drawn down by means of the weight, sucking up the liquid to be pumped, and when the plug was turned into the position shown in Fig. 2 water would pass through the pipe D′ and the port *g*′ into the lower end of the cylinder A and raise the piston to expel the liquid, as already described. When the piston A′ was drawn down again, the water beneath it would escape through the pipes H H″. The only difference then would be that the cylinder B and pipe D would be omitted and a weight substituted for the piston B′. Again, the pipes D, D′, H, and H″ might be omitted and a double valve connected with the cylinders A and B, so constructed as to first admit the water above the piston B′ and exhaust it from beneath the piston A′ and then, the valve being reversed, to exhaust from above the piston B′ and admit beneath the piston A′, the pistons being moved in each direction by the direct pressure of the water and the water in such case, as well as in the modification first described, being used but once.

Aside from the advantages of keeping all pressure off of the surface of the liquid to be pumped until it has been received into the cylinder A, there are other advantages attendant upon the use of my apparatus. The apparatus being placed in a refrigerator, the liquid is kept cool. Again, by graduating the size of the cylinder A the apparatus may be useful for bottling. For example, if the cylinder be made to hold exactly a quart, when all of the liquid therein has been pumped into a bottle it will be known that said bottle contains exactly a quart, and similarly if a cylinder be made to hold a greater or less quantity of liquid. All of the liquid in the cylinder A can be drawn off or any such portion of it as may be desired, and whenever the cock is turned into the position shown in Fig. 1, shutting off the flow through the pipe H′, the cylinder will immediately and speedily refill itself.

The device is simple, automatic, and easily constructed and operated, and the method which is carried out by means of this apparatus is a great improvement on those formerly in use.

It should of course be understood that it is not essential for the various pipes, valves, &c., to be arranged in precisely the relative position shown in the drawings, nor is it essential that they should be of the precise dimensions shown, since the form, size, and relative location of the various parts of the apparatus may be varied as desired and as rendered necessary by the circumstances of the case.

My invention is especially applicable to the pumping of liquids commonly used as beverages from casks or vessels contained in cellars or remote places, and so it will be understood that I use the word "liquid" in a general sense and in contradistinction to water by which power is produced.

For convenience of designation I have termed the chamber into which the water is first introduced as the "primary water-chamber," the chamber into which the liquid is introduced as the "liquid-chamber," and the chamber into which the water is finally introduced to expel the liquid as the "secondary water-chamber."

I claim--

1. In an apparatus for pumping liquids by water-power, the combination of a liquid-chamber connected in use with a cask or

liquid-supply and provided with a movable piston-head for one of its ends, a water-chamber connected in use with a water-supply under pressure and having the said movable piston-head for one of its ends, said chambers being arranged on an axial line and of equal diameter, and means for moving the piston-head in that direction that increases the size of the liquid-chamber to cause the liquid to flow into it, substantially as described.

2. In an apparatus for pumping liquids by water-power, the combination of a primary water-chamber connected in use with a water-supply under pressure, a liquid-chamber connected in use with a cask or liquid-supply, and a secondary water-chamber connected in use with a water-supply under pressure, said chambers being arranged on an axial line, substantially as described.

3. In an apparatus for pumping liquids by water-power, the combination of a primary water-chamber connected in use with a water-supply under pressure, a liquid-chamber connected in use with a cask or liquid-supply and provided with a movable piston-head for one of its ends, and a secondary water-chamber connected in use with a water-supply under pressure and provided with said last-mentioned movable piston-head for one of its ends, said chambers being arranged on an axial line, substantially as described.

4. In an apparatus for pumping liquids by water-power, the combination of a primary water-chamber connected in use with a water-supply under pressure and provided with a movable piston-head for one of its ends, a liquid-chamber connected in use with a cask or liquid-supply and provided with a movable piston-head for one of its ends, and a secondary water-chamber connected in use with a water-supply under pressure and provided with said last-mentioned movable piston-head for one of its ends, said movable piston-heads being connected together and moving in unison and said chambers being arranged on an axial line, substantially as described.

5. In an apparatus for pumping liquids, the combination of a cylinder A, connected by means of pipes F F′ with the vessel containing the liquid, a one-way valve *e*, a piston A′, a cock G, connected with the cylinder A by pipes H, H′, and F′, a cylinder B beneath the cylinder A, connected with the water-supply by a pipe D and with the cock by pipes D and D′, and a piston B, connected with and smaller than the piston A′, and a waste-pipe H″, all operating substantially as described.

6. An apparatus for pumping liquids by water-power, comprising two cylinders A and B, pistons in such cylinders connected together, the piston in the cylinder A separating the liquid to be drawn from the water used as a motive power, the cylinder A having a liquid inlet and outlet and a water inlet and outlet and the cylinder B having a water inlet and outlet, substantially as described.

7. The combination of the liquid-pipe H′, provided with a valve E, water-pipes H and D, water-pipe H″, and the cock G, the plug G′ of such cock having a port *g* to connect the liquid-pipe with the spout, a port *g′* to connect the water-pipes, and a port *g″* to connect the pipe H and the waste-pipe, substantially as described.

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