J. JONSON.

HYDRAULIC APPARATUS FOR COMPRESSING AIR FOR RAISING WATER, &c.

No. 172,125. Patented Jan. 11, 1876.

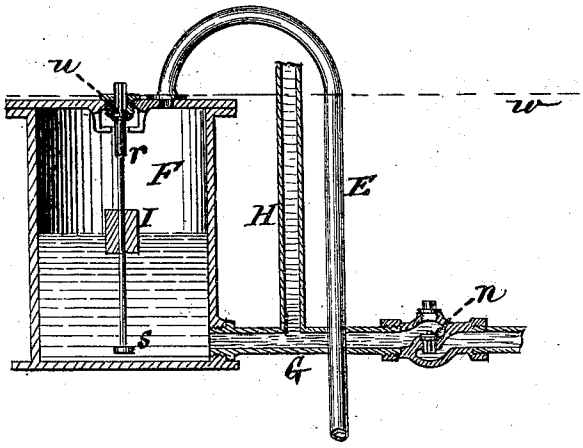


Fig. 1.

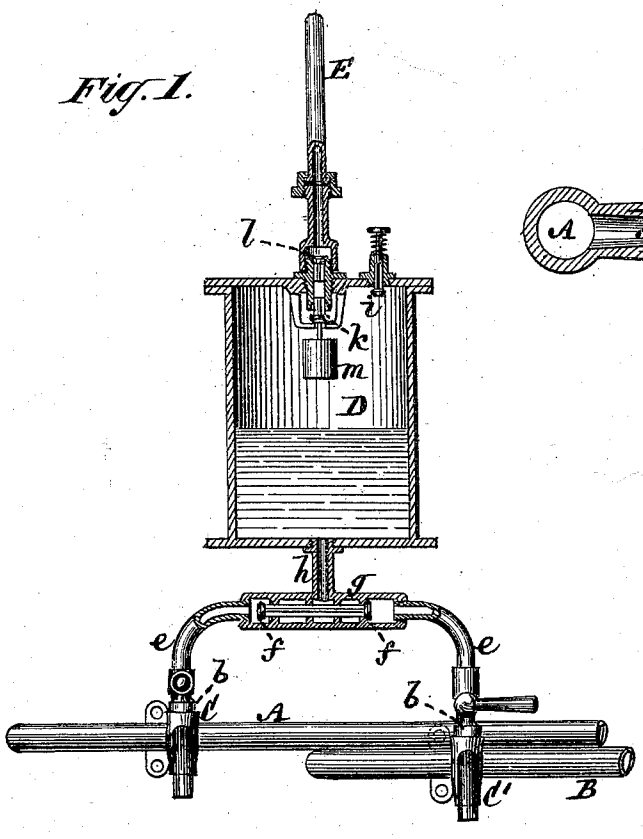
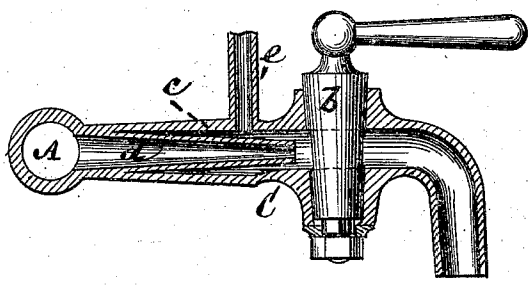


Fig. 2.



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UNITED STATES PATENT OFFICE.

JULIUS JONSON, OF NEW YORK, N. Y.

IMPROVEMENT IN HYDRAULIC APPARATUS FOR COMPRESSING AIR FOR RAISING WATER, &c.

Specification forming part of Letters Patent No. **172,125**, dated January 11, 1876; application filed November 18, 1875.

To all whom it may concern:

Be it known that I, JULIUS JONSON, of the city, county, and State of New York, have invented certain new and useful Improvements in Hydraulic Apparatus for Compressing Air for Raising Water and other purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to apparatus for utilizing the power of a column or head of water by applying it to compress air, somewhat upon the principle of Hero's fountain and the Hungarian machine for draining mines. It is applicable to compressing air for different purposes, but is more particularly designed to be used in cities and other districts having a water-supply under head or pressure, for the purpose of raising the water to a higher level than it would otherwise attain under the natural head—as, for instance, to the upper stories or roofs of buildings, to which the pressure of the water in the main is incapable of directly raising it. The invention will, accordingly, here be described more especially with reference to this last-named use of it, and as controlled in its operation by the simple act of opening and closing a draw-off cock or cocks in the lower story of a building.

The invention consists in various novel combinations of devices for compressing air and elevating water by means of a column or head of said fluid, the same including a draw-off cock having an inner discharge-tube, which operates as a draft or suction tube when the key of the cock is open, to lower the water in a hydraulic air-compressor, and, when the cock is closed, to supply water to said compressor, for the purpose of condensing the air therein.

The invention also consists in a combination of an automatic double-acting valve with a hydraulic air-compressing chamber and two or more cocks, provided with inner suction-tubes, as above described, and connected with separate service or supply pipes.

The invention furthermore consists in a certain combination of a float and stops controlling the air-valve of the compressed-air receiver, the water-supply pipe, the water-discharge pipe, and the compressed-air pipe, whereby the efficiency of the apparatus is materially promoted.

Figure 1 represents a sectional elevation of an apparatus constructed in accordance with my invention; and Fig. 2, a longitudinal section of the draw-off cock, by which the operation of the apparatus is controlled.

A is a lower service-pipe, for conveying water from the main to a kitchen-sink or elsewhere; and B, another pipe, at or near the same level, for conveying hot water—as, for instance, from a heater or water-back of a range. Either of these pipes, however, may be the cold-water-supply pipe, and the other of said pipes the hot-water one; or only one of said pipes may be used. C C′ are the draw-off cocks to the pipes A B. These cocks are each fitted with a one-way plug or key, *b*, in rear of which, and between it and the pipe A or B, within the after part of the cock, is a tube, *d*, preferably made conical, so as to contract in an outward direction, and through which the water passes from the pipe A or B. Said tube *d* does not fill the cock, but leaves a clear space, *c*, more or less around it, from which space, in rear of the outlet end of the tube *d*, a pipe, *e*, is led, to connect with a hydraulic air-compressing chamber, D. When two cocks, C C′, are used for drawing either hot or cold water from the two pipes A and B, then a double-acting valve, *f f*, is interposed between the pipes *e e* of the two cocks and the base of the chamber D, which latter connects with the valve-box *g* by a branch, *h*. The hydraulic air-compressing chamber D may also be arranged in the kitchen or lower story of the building, and is provided with an upper air-inlet valve, *i*, for supplying air to said chamber, except when closed by a superior pressure of compressed air from within. The chamber D is likewise provided with upper independent reverse valves *k l*, the one, *k*, of which opens inward, and the other, *l*, of which opens outward. The lower valve *k* has attached to it a float, *m*, the weight of which serves to keep said valve open, but the buoyancy of which, when water rises to a fixed altitude within the chamber D, closes such valve. E is a pipe for conveying the compressed air from the vessel or chamber D, subject to control by the valves *k* and *l* at the foot of said pipe.

F is a compressed-air receiver in one of the upper stories of the building, and which may stand at any altitude but little below the level to which the water from the main, under a mean head or pressure, is capable of rising, the dotted line *w* in the drawing representing the highest water-level under a mean head or pressure. G is a supply-pipe for supplying water from the main to the receiver F, subject to the control of a check-valve, *n*, which prevents return of water to the main. The compressed-air pipe E connects with the upper part of the compressed-air receiver F, and connected with said receiver below, or with the supply-pipe G, between said receiver and the check-valve *n*, is a stand-pipe, H, for conveying water to a cistern or other receptacle on a still higher story, or on the roof of the building, or elsewhere above the level to which the head or pressure in the main is capable of directly raising the water. Within this compressed-air receiver F is a float, I, arranged to slide up and down between stops *r s*, and which, when unsupported by the water, strikes on the stop *s* to open an air-inlet valve, *u*, but which, when fully raised by water rising within the receiver F, strikes on the stop *r* to close said valve.

The operation of the apparatus, when applied as represented in the drawing, is as follows: Supposing the double-acting valve *f f* to be open at either of its ends, and the cocks C C′ to be closed, the water, passing through the inner nozzle or tube *d* to the space *c* of the cock on the same side as that on which the double-acting valve *f f* is open, will pass up the pipe *e* of said cock, through the valve-box *g* and branch *h*, to the air-compressing chamber D, and, rising within said chamber, will compress the air therein, causing the air-inlet valve *i* to be closed, and the compressed air within said chamber to pass through the valve *l*, and up the pipe E into the upper part of the receiver F. The compressed air thus entering the receiver F will force the water therein, previously supplied by the pipe G, up the pipe H to the desired altitude over and above that due to the pressure of the water in the main. During this action the float I will descend till, striking the stop *s*, it opens the valve *u* to the atmosphere, when the receiver F will be filled again with water by the pipe G, and the valve *u* closed by the float I, to provide for a repetition in due course of the discharge of water up the pipe H. In the meantime, or previously, the water is rising within the chamber D to compress the air, as hereinbefore described, acts upon the float *m* to close the valve *k*, and the latter will be kept closed till the pressure of the air in said chamber has been sufficiently reduced by drawing off the water therefrom, and the float *m* preponderates to open said valve. The valve *u* of the receiver F is also kept closed by the pressure of the compressed air therein till the float I acts upon the lower stop *s*. The valve *l* acts as a check-valve to prevent the return of compressed air to the chamber D when drawing off water therefrom. Now, supposing either of the cocks C C′ to be opened—say, the cock C—then the water flowing from the pipe A through the inner nozzle on tube *d*, and out through the key *b*, will create a suction in the space *c* and pipe *e* of said cock, and cause the double-acting valve *f f* to remain open or be thrown open on the same side of said cock, so that the water will also be drawn off or lowered in the chamber D, opening the air-inlet *i* and the valve *k*, thus putting said chamber in condition again, when the cock is closed, for a fresh supply of water to it, and compression of the air, as before. The inner tubes *d* of the cocks may, accordingly, be called draft or suction tubes.

When only one cock, C or C′, is used, then the interposed and automatic double-acting valve *f f* may, as hereinbefore observed, be dispensed with. Furthermore, the air compressed in the chamber D may be used for any other purpose besides elevating water.

I claim—

1. The draw-off cock C or C′, provided with an inner draft or suction tube, *d*, in rear of its plug or key *b*, in combination with a hydraulic air-compressing chamber, D, connected with said cock back of the key, and outside of the draft-tube, substantially as specified.

2. The combination of the double-acting valve *f f* with the hydraulic air-compressing chamber D and duplicate cocks C C′, having draft or suctions *d*, and connected with separate service or supply pipes, essentially as described.

3. The combination of the float I and stops *r s*, controlling the air-valve *u* of the compressed-air receiver D, the water-supply pipe G, the water-discharge pipe H, and the compressed-air pipe E, substantially as specified.

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Witnesses:

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