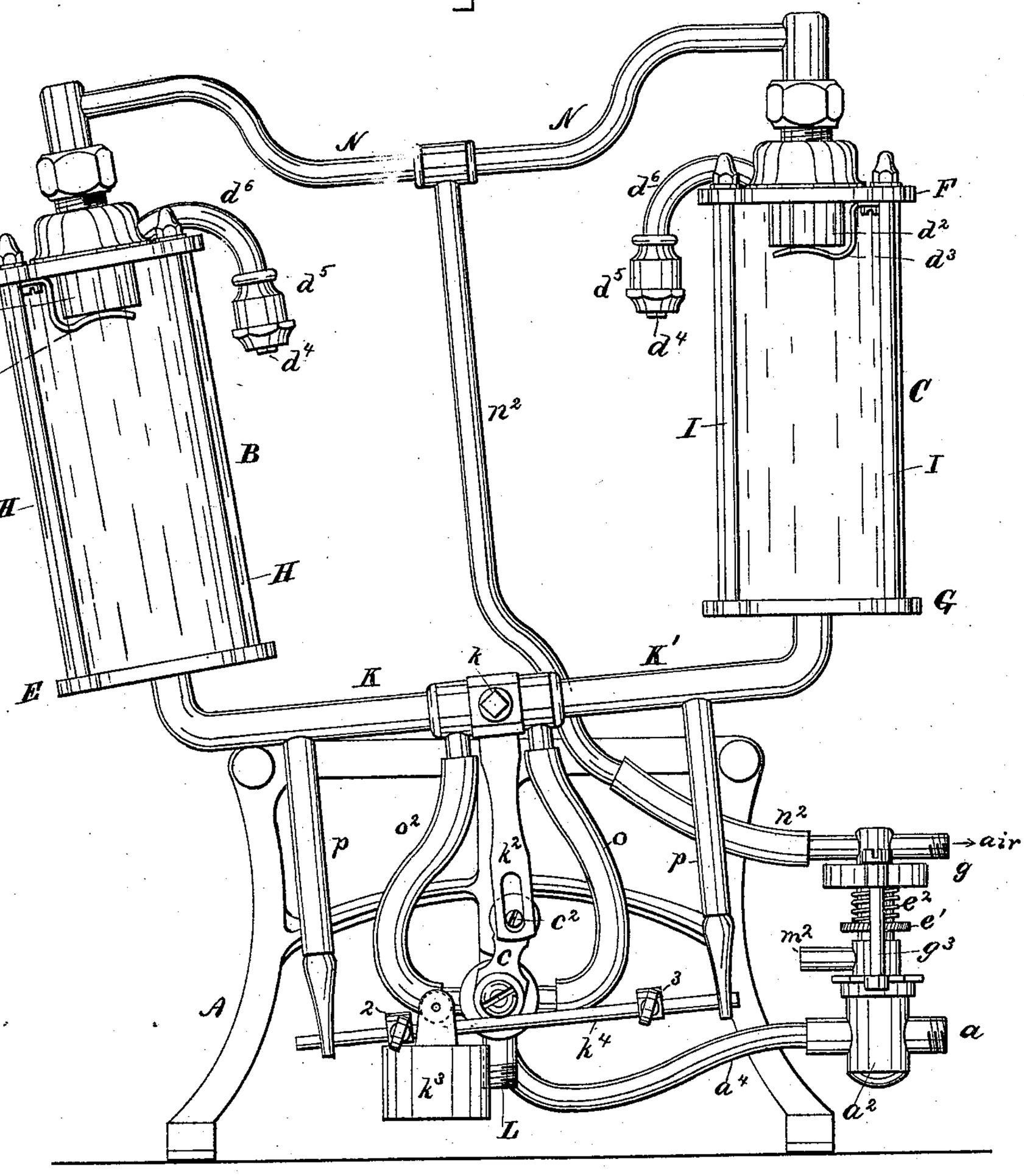
(No Model.) 2 Sheets—Sheet 1.

J. H. QUINN.
Air Compressor.

No. 236,455. **Patented Jan. 11, 1881.**

Fig: 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

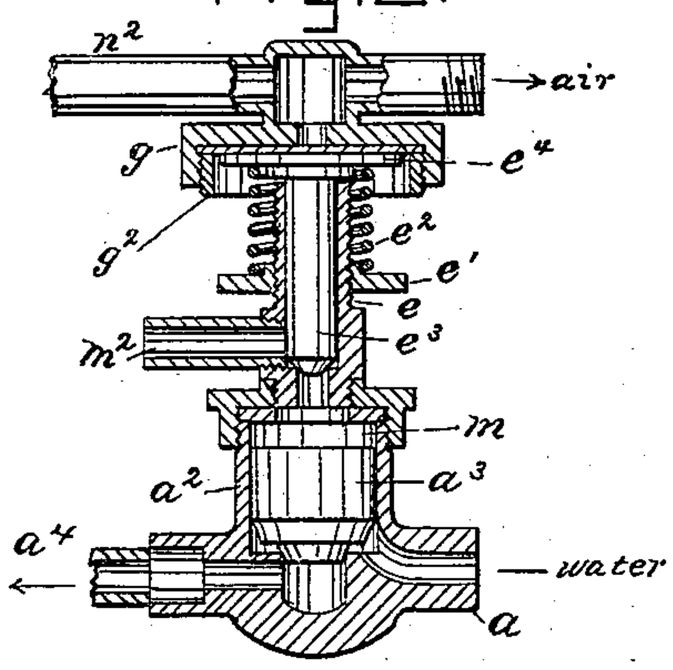


Fig: 4.

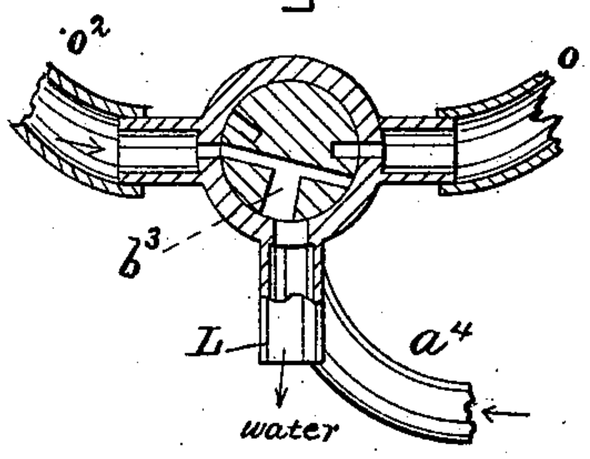


Fig: 3.

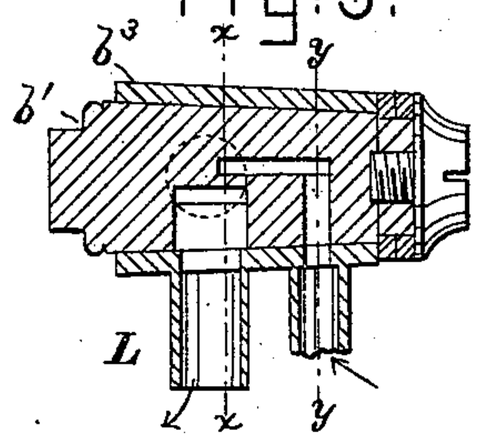


Fig: 5.

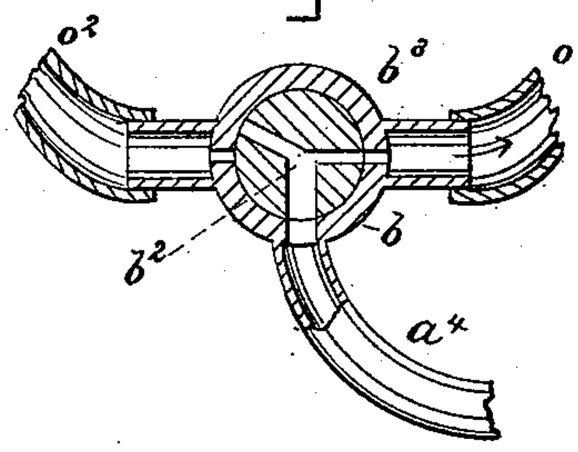
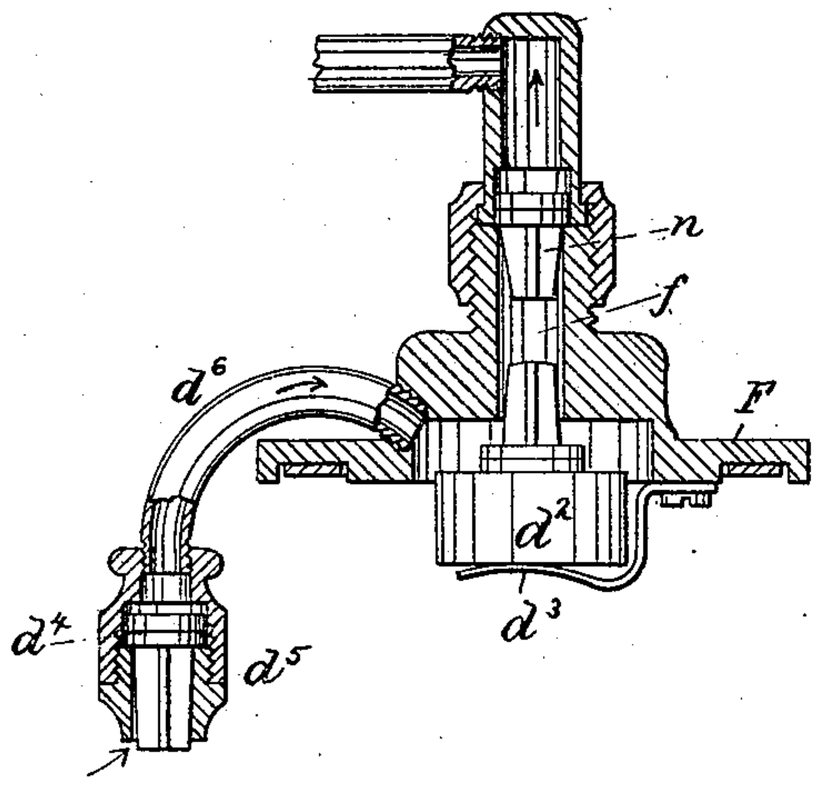


Fig: 6.



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UNITED STATES PATENT OFFICE.

JOHN H. QUINN, OF BOSTON, MASSACHUSETTS.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 236,455, dated January 11, 1881.

Application filed November 8, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. QUINN, of Boston, county of Suffolk, State of Massachusetts, have invented a new and useful Improvement in Air-Compressors, of which the following description, in connection with the accompanying drawings, is a specification.

This invention in air-compressors has for its object the production of a compressor suitable for maintaining a proper degree of air-pressure in kegs or barrels from which a fluid is being drawn and for blowing organs and such other work where a pressure of air is required.

My compressor derives its movement from water or other fluid which is permitted to flow through it; and my invention is herein shown embodied in an apparatus having a lever provided at each side of its fulcrum with a fluid-chamber, one of which chambers receives while the other discharges fluid, the inlet and outlet to permit the fluid to pass into and from the said chambers alternately being preferably formed in one cock, it having six ports or water-ways, and being turned to open and close the said ports by an arm projected from the lever upon which the said chambers are mounted. These fluid-chambers, at their upper ends, are connected with different branches of an air-pipe, which is led to the place where the air-pressure is to be exerted, and the air forced from these chambers alternately by the rising fluid (preferably water) is forced into one or the other of these branches, thus keeping up a steady flow of air.

The particular features and construction of parts constituting my invention will be hereinafter fully set forth at the end of this specification.

Figure 1 represents, in front elevation, an air-compressor embodying my invention, the left-hand chamber being fully depressed. Fig. 2 is a vertical section taken through the regulating-valve between the water-supply and the cock which diverts the water into and from the chambers. Fig. 3 is a longitudinal section taken through the six-way cock; Fig. 4, a cross-section thereof on the line *x x*, Fig. 3; Fig. 5, a cross-section on the line *y y*, Fig. 3; and Fig. 6 is a vertical central section taken through the air-pipe and air-controlling valves at the upper end of one of the fluid-chambers.

The frame-work A of the machine will be of suitable shape to support the working parts.

The fluid or water chambers B C are made as cylinders, and preferably of glass, to enable the water in the chambers to be readily seen, which is desirable to facilitate adjustment of parts and insure a prompt change in the position of the chambers when one is fully filled. These cylinders are closed at bottom and top by reason of metallic plates or heads D E F G, held in place at the ends of the cylinders by bolts H I, a suitable packing being employed between the ends of the cylinders and heads. The chambers constituted by these cylinders and heads are mounted upon the ends of a lever, K K′, pivoted to the frame-work at *k*, the said lever being made as a hollow pipe. The open ends of the lever or pivoted pipe enter the heads E G, and each end alternately discharges water into and takes water from one of the said chambers.

The water to operate the compressor is supposed to be received from a proper water-supply into the inlet *a* of the valve-casing a^2, when it lifts the plunger a^3, permitting the water to pass through the pipe a^4 into the case *b* of the six-way cock, it having a plug, *b′*, provided with a three-way inlet-port, b^2, (see Fig. 5,) for the passage of water from the pipe a^4 into that one of the chambers B or C which is uppermost and is then to be filled, and with a three-way outlet-port, b^3, (see Fig. 4,) to permit the escape of water from that one of the chambers B or C which may be lowest and the discharge of the said water out through the main outlet L, connected with the sewer or a well.

The lever *c* of the plug of the cock has upon it a stud or pin, c^2, which is made to enter a slot in the arm k^2 of the water-conducting and chamber-carrying lever K K′, so that as the lever is turned by reason of the weight of water in one cylinder overcoming the force of the lever-holder (herein shown as a sliding counter-balance, k^3, carried by the rod or race k^4, suspended from the said lever K K′) the said arm k^2 will turn the plug of the cock and cause it to occupy one or the other of the two positions shown in Figs. 5 or 4, to permit first one and then the other chamber to be filled and then discharged. The rod or race k^4 has placed

upon it stops 2 and 3, made adjustable to stop the counter-balance or weight at such a distance from the ends of the race as will permit the lever K K′ to be turned when one of its chambers is just filled with water.

Instead of the sliding counter-weight or "variable holder" for the lever, as it may be termed, I may employ other devices which shall be controlled by springs and permit the chamber to descend or fall when they have received a certain weight of water.

At the upper end of each chamber the heads D E F (see Fig. 6) are each provided with a hub having a passage, *f*, in communication with the air-pipe N, there being near each head D F a check-valve, *n*, to prevent the passage of air from the said pipe N into either cylinder, the said check-valve, however, rising freely and readily to permit air in that chamber being filled with water to be forced out of the said chamber into the said air-pipe, a central branch, n^2, thereof conducting the compressed air into the space or chamber where the air-pressure is to be utilized, whether it be in a cask or other thing. Each chamber has at its upper end a float, d^2, preferably of cork, which is lifted by the water and forced upward into a proper seat to prevent the flow of water into the air-pipe, the said float being prevented from falling out of guided position when the water falls by reason of a wing or stop, d^3. As the water is being discharged from a chamber it is necessary to permit the air to enter the chamber above the water. This is provided for by the loose valve d^4 in the case d^5 at the lower end of the pipe d^6, there being one such valve and pipe connected with each head D F. When the air-pressure arrives at the desired maximum the flow of water into the apparatus must be automatically stopped, which is provided for in the following manner:

The upper end of the valve-case a^2 has an extension, *e*, upon which is placed and held a ring, *e′*, made adjustable on the said extension, preferably by a screw-thread. This ring serves as a seat for a spiral spring, e^2, the force of which is regulated by the said ring to exert more or less force, which must be overcome by the air-pressure, and consequently the effective strength of this spring determines the maximum pressure of the air and the time when the water will be cut off or permitted to enter the case a^2.

The extension *e* receives within it a plug, e^3, having its lower end tapered to fit a seat in the extension, as shown in Fig. 2, and at its upper end this plug has a head, e^4, which receives upon it a piece of india-rubber or other suitable elastic material, to serve as a diaphragm against the upper side of which the compressed air in the pipe N n^2 may bear. This diaphragm is held at its edges between the flanged head *g*, with which the air-pipe n^2 is joined, and a ring, g^2, screwed therein. The head g^2 is bolted by bolts g^3 with the head of the casing a^2.

When the air-pressure is sufficient to overcome the spring e^2, the plug e^3 is forced down to its seat, trapping the water in the small space *m* above the plunger a^3, preventing the water below the said plunger from acting to lift the plunger and opening the way to the pipe a^4. The area of water-pressure above the plunger a^3 when the plug e^3 is held down by the air-pressure keeps the plunger a^3 to its seat and cuts off the flow of water into the apparatus. When the plug e^3 is again permitted to rise the small amount of water above the plunger, or which gets above the plunger in its operation, it being fitted loosely in the case a^2, is permitted to escape through the pipe m^2 into a sewer or other place.

The rod or race k^4 is sustained by arms *p*, connected with the lever K K′.

Referring to Fig. 1, it will be supposed that chamber C is empty and is to be filled with water. In such position of the parts the inlet-ports of the six-way cock will be as in Fig. 5 and the outlet-ports as in Fig. 4. The water will then pass along pipe a^4 through the cock, as shown in Fig. 5, and thence along pipe *o* into that branch K′ of the lever-pipe and into the chamber C, forcing the air therein out through the pipe N n^2. At this same time the water in the chamber B will flow from it through the part K of the lever-pipe along the pipe d^2 into the three-way outlet, as in Fig. 4, and thence out into the sewer. The pipe K K′ is plugged at its pivoted center.

It is obvious, instead of making the lever K K′ hollow to serve as a water-conductor, that it might be solid and carry suitable pipes of rubber or otherwise connected with and so as to supply the chambers with water and receive water from them, as set forth; but the plan herein shown is preferred for durability and cheapness.

I claim—

1. In an air-compressor, two water-receiving chambers connected at their upper ends with air-pipes, and having valves to permit air to enter therein as the water descends in the said chambers, a lever upon which the said chambers are mounted, and an arm, k^2, carried by the said lever, combined with a cock operated by the said lever, and having suitable water ways or ports, as described, to permit the passage of water into one chamber and its discharge from the other chamber at the same time, and suitable water ways or channels for the passage of water into and from the said chambers, to operate as and for the purpose set forth.

2. In an air-compressor, a hollow water-conducting lever and water-chambers provided with valves d^4 and air-pipe N, and carried by the said lever, combined with pipes *o* o^2, the cock connected with the said pipes and having water-ways, as described, and means to move the said cock, the said chamber alternately receiving water from and discharging water into the said hollow lever, according to the position of the said cock, substantially as described.

3. In an air-compressor, the chambers B C, carried by a pivoted lever and adapted to alternately receive water to compress and discharge air and to discharge water, combined with a lever-holder, substantially such as described, to hold the lever and chambers in position until the chamber then receiving water is filled to the desired point, when the force of the lever-holder is overcome and the lever is permitted to change its position, the chamber then being filled descending, substantially as described.

4. In an air-compressor, the following instrumentalities, viz: two water-chambers, each provided with an air-inlet and valve to control it, an air-receiving pipe leading from each chamber and connected into one pipe, a lever to carry the two cylinders, a single cock having inlet and outlet passages for the simultaneous admission of water into one chamber and its discharge from the other chamber, pipes to connect the said cock with each of the said chambers, means to automatically operate the said cock, a plunger to control the admission of water to the said cock, and means to control the operation of the said plunger and permit the flow of water into the compressor beyond the plunger when the air-pressure has arrived at its maximum, substantially as described.

5. In an air-compressor, a spring-supported plug operated by the pressure of air, combined with a plunger and casing in which it moves, the pressure of the air actuating the plug to control the times of rest and of movement of the plunger to permit or stop the flow of water into the compressing apparatus, substantially as described.

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

JOHN H. QUINN.

Witnesses:
JOS. P. LIVERMORE,
G. W. GREGORY.