(No Model.)

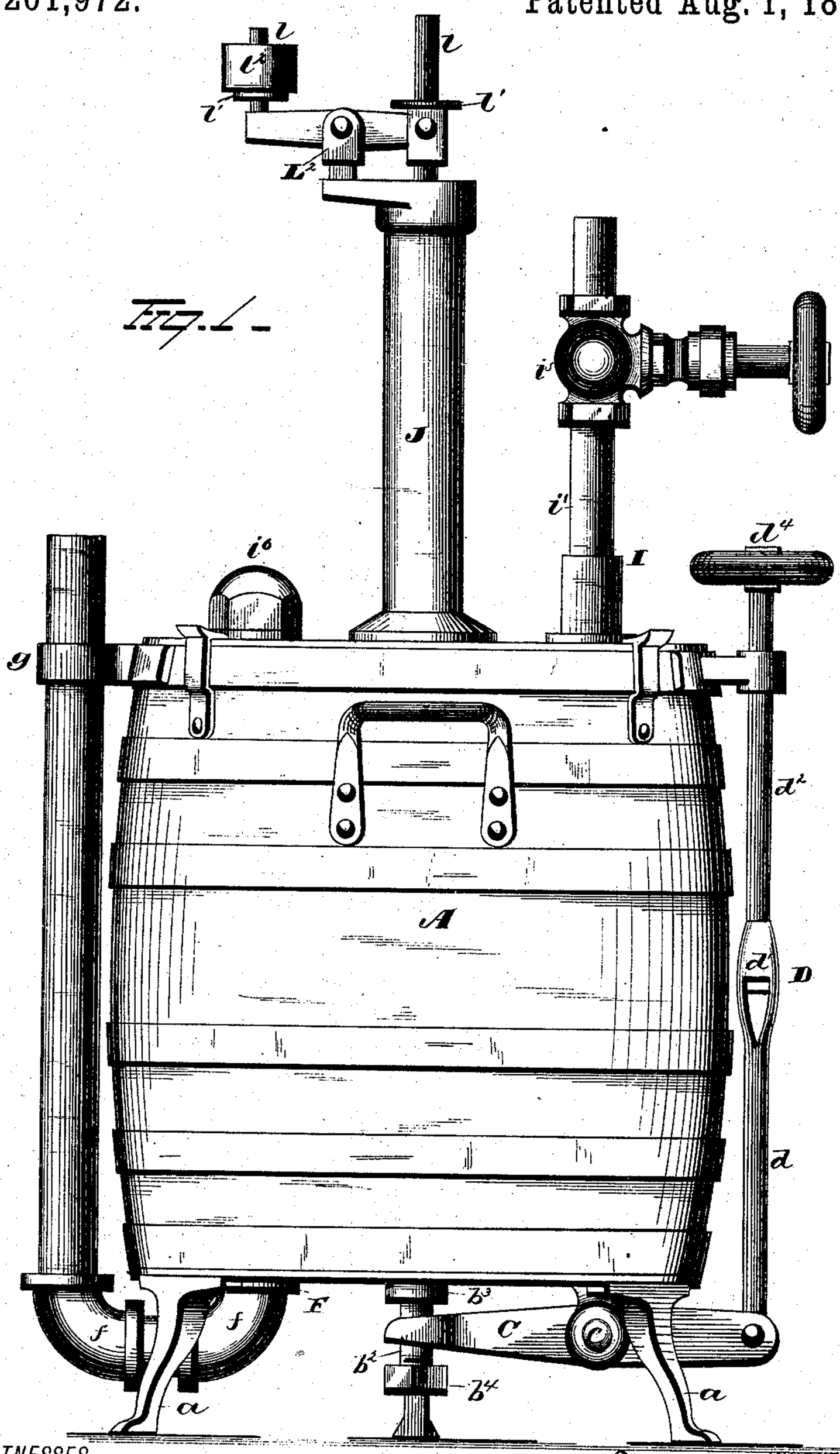
3 Sheets—Sheet 1.

J. S. WALLACE.

WATER ELEVATOR.

No. 261,972. Patented Aug. 1, 1882.

Fig. 1.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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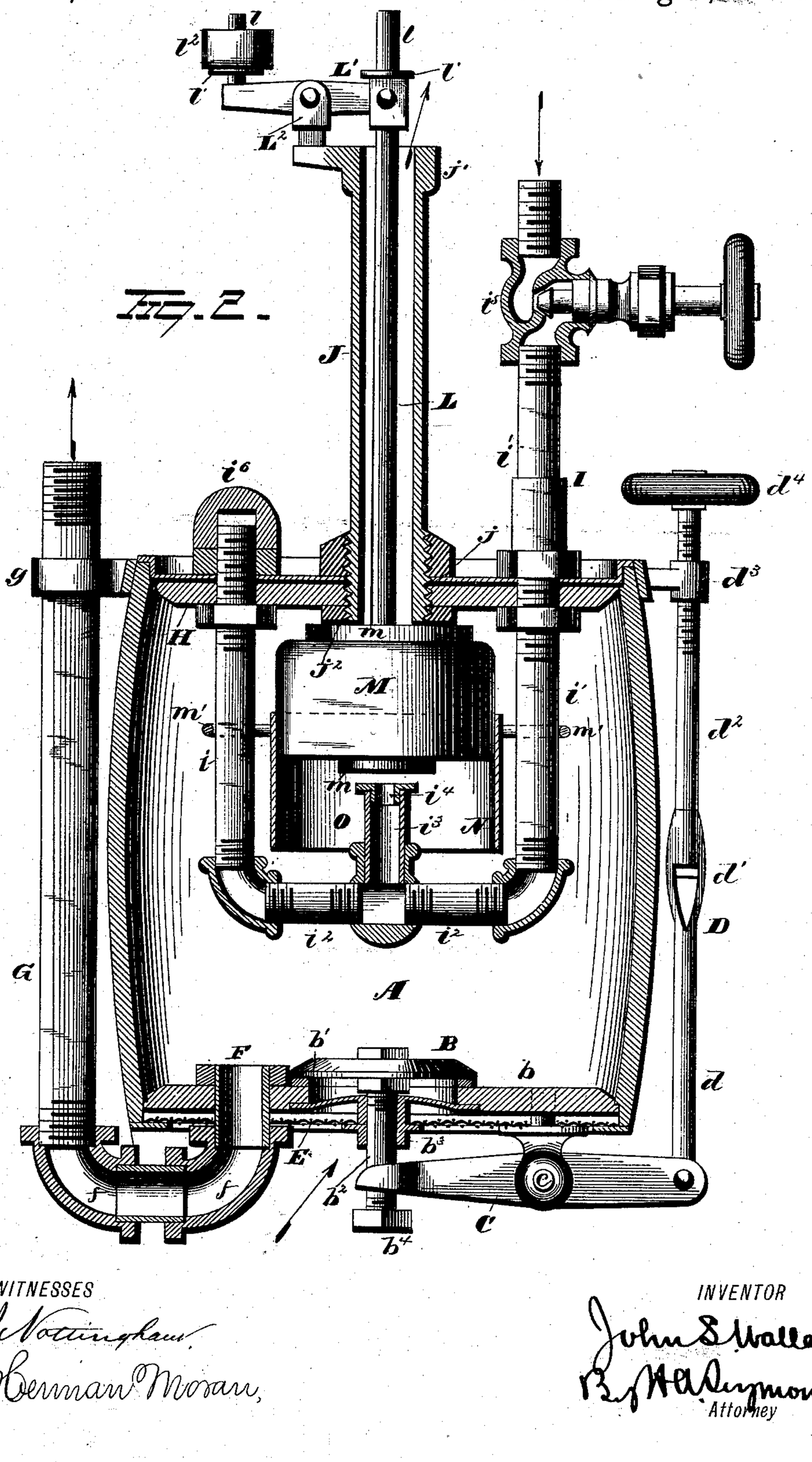
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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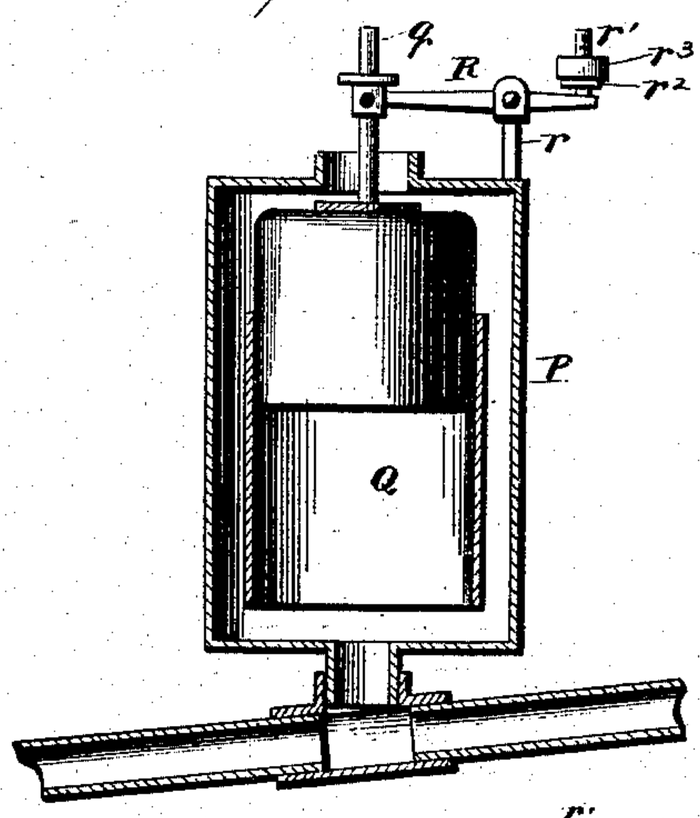
Fig. 3.



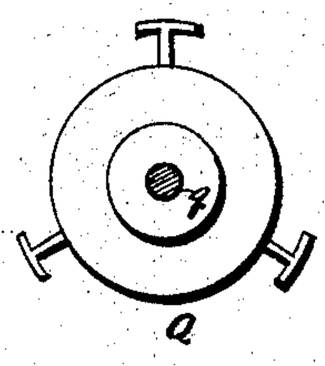


Fig. 4.

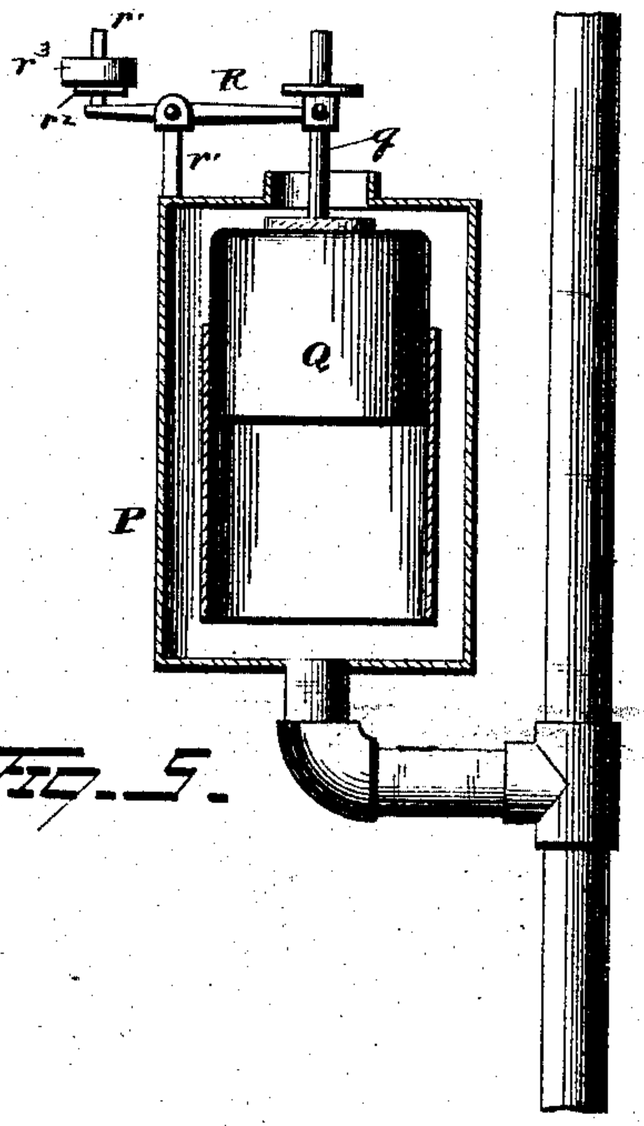


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN S. WALLACE, OF NELSONVILLE, OHIO.

WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 261,972, dated August 1, 1882.

Application filed April 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. WALLACE, of Nelsonville, in the county of Athens and State of Ohio, have invented certain new and useful Improvements in Water-Elevators; 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 pertains to make and use the same.

My invention relates to an improvement in water-elevators adapted for use in mines. Ordinarily the water in mines is pumped from the mine shafts or slopes by steam-pumps of different forms. These pumps are objectionable primarily because of their expensive construction and the complication of their operation. They are also objectionable for the reason that they are not adapted for the use in the "rooms" of a mine from which the water must be drawn either by ditching, to avoid hauling the water, or by water-boxes and horse-power. A further objection to the use of steam-pumps is that said pumps, being constructed of metal, are very susceptible to the destructive influences of the acids contained to a greater or less degree in all water in mines.

The object of my invention is to obviate the difficulties above noted by dispensing with the use of steam-pumps and rendering water-hauling and ditching in mines unnecessary, and to provide a portable water-elevator of simple and inexpensive construction, which will be automatic and reliable in its operation, capable of resisting the deteriorating effects of the acid contained in the water of the mines, so constructed that it may be readily moved from place to place in the mine, and having the parts of durable construction, but at the same time of inexpensive form and material, so that any needed repairs or renewals of parts may be easily made at small cost.

The invention consists in the combinations of parts and the details of construction, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a portable water-elevator constructed in accordance with my invention. Fig. 2 is a vertical central section of the same. Fig. 3 is a view of a water-discharge pipe for use in slopes or inclines provided with an exhaust-valve constructed in accordance with my invention. Fig. 4 is a plan view of the valve illustrated in Fig. 3 removed from its chamber. Fig. 5 represents a similar valve in connection with a vertical discharge-pipe used for shafts.

A represents a barrel or cylinder adapted to be placed in a water-hole in the mine, and provided with legs or supports *a*, to allow the water to pass under the bottom or lower head, *b*, of the barrel, and into the latter through an opening, *b'*, closed by a valve, B, the stem b^2 of which is supported by a bracket or guide, b^3, secured to the under side of the head *b*. The barrel is also provided with handles to adapt it to be readily moved.

C represents a lever fulcrumed in a pivotal bearing, *c*, depending from the bottom of the cylinder. The inner end, *c'*, of the lever C is bifurcated to embrace the valve-stem b^2 and bear on the head b^4 of the latter, when desired. The outer end of the lever is pivoted to a two-part operating-rod, D. The lower part, *d*, of the latter is connected by a swivel-joint, *d'*, to the upper part, d^2, which latter is screw-threaded at its upper end and passes through an interiorly-threaded eye, d^3, projecting from the adjacent side of the cylinder. The upper end of the rod D is provided with a hand-wheel, d^4, by means of which the upper part, d^2, of said rod is turned to operate the lever C, to regulate the valve B.

E represents a screen or strainer, of wire-gauze or other suitable material, secured to the lower projecting end of the cylinder below the valve B, to prevent the ingress to the cylinder of coal-dust or other matter.

F represents the water-discharge opening formed in the bottom of the cylinder at one side of the valve B. Within this opening F is secured by suitable couplings, *f*, one end of a discharge-pipe, G, which latter is preferably extended upward through a loop-guide, *g*, at the top of the cylinder, and thence to any desired point of discharge.

H represents the upper end or head of the cylinder, from which is suspended the air-inlet pipe I. The latter consists of two parallel vertical portions, *i i'*, and the horizontal connecting portion i^2, and the short central pipe, i^3, provided with a contracted opening, i^4, for the admission of air within the cylinder, said contracted opening serving to increase the force

of the air-current. The pipes *i i'* project through the head H of the barrel or cylinder. The pipe *i* projects above the pipe *i'*, to adapt it to be connected with any suitable source of supply of compressed air, and is provided with a suitable throttle-valve, i^5, to regulate the admission of air. The upper end of the pipe *i'* is provided with a removable cap or plug, i^6. When it is not convenient to make the connection for the compressed air from that side of the barrel nearest the pipe *i'* said connection may be readily made with the pipe *i* by removing the cap of the latter and closing the end of the pipe *i'*. The short pipe i^3 is preferably arranged centrally between the pipes *i* and *i'*, and is provided with a contracted opening, i^4, as above described.

J represents an exhaust-pipe, having its lower end secured in a central opening, *j*, of the head H of the cylinder, and preferably formed with a flaring discharge-end, *j'*. Within the exhaust-pipe J is arranged a valve-rod, L. The upper end of the latter is connected to one end of a lever, L', said lever being pivoted at about its center to an angle-arm or bracket, L^2, projecting at one side of the exhaust-pipe J, near the upper end of the latter. At each end of the lever L' is an upwardly-projecting stud or arm, *l*, provided with a collar, *l'*. Upon these arms *l* are adapted to be secured perforated weights l^2, for a purpose hereinafter explained.

To the lower end of the rod L is secured a valve, M, preferably made of wood, and provided on both its upper and lower surfaces with an elastic cushion, *m*, the upper cushion being adapted to bear against the lower inner end, j^2, of the exhaust-pipe J, while the lower cushion is adapted to bear against the upper end of the pipe i^3, to close its opening i^4. On each side of the valve M is secured a loop-guide, *m'*. The pipes *i* and *i'* pass through these guides, and the latter are adapted to slide thereon, as will be further explained. The lower end of the valve M is provided with an annular flange, N, which forms an air-chamber, O, to render the valve buoyant, as will also be explained hereinafter.

Having described the construction of my improvement, I will now describe its operation.

The pump or elevator is adapted to be submerged by placing it in a water-hole in the mine. The pump may be weighted or braced to overcome its buoyancy or inclination to rise before filling. The valve B is then opened, when the water will run in through the opening *b'* and expel the air in the keg through the exhaust-pipe J, the valve M of the latter resting normally upon the pipe i^3, thus keeping the air-inlet i^4 closed. When the water reaches the valve M and enters the chamber O the valve will be at once raised by its buoyancy, thus opening the air-inlet i^4 to admit the compressed air, which drives the water out through the discharge-pipe G to any suitable trough or receptacle. After the water has been thus discharged the pressure of air within the cylinder becomes reduced, as the air is relieved of the pressure of the water, and the pressure upon the valve M being reduced, the latter will fall by its own gravity, again closing the air-inlet and opening the exhaust, which allows the remaining air in the barrel or cylinder to be driven out by the inflow of water to the latter. This operation is continued until all of the water in the hole has been pumped out or there is not sufficient water left to raise the valve M, when the discharge will cease until sufficient water collects to raise said valve, when the pumping will be resumed.

It will be observed that when the device is not discharging it automatically closes the air-opening, and thus prevents any waste of air.

The valve M must be regulated to the pressure of the air within the cylinder. For this purpose are provided the weights l^2, which may be changed from one end to the other of the lever L, to increase or diminish the weight upon the valve. In discharging water long distances there would be left a considerable pressure of air in the barrel or cylinder, which would prevent the valve M from falling at the proper time. To overcome this difficulty I arrange upon the discharge-pipe any desirable number of exhaust-chambers P. Within each of these chambers P is suspended an exhaust-valve, Q, by a valve-rod, *q*, the upper end of the latter being secured to one end of a lever, R. This lever R is pivoted to an upright or stud, *r*, of the valve-chamber P, and is provided at each end with an upwardly-projecting arm, *r'*, on each of which latter is arranged a collar, r^2, adapted to receive weights r^3. The valve Q is provided with any desired number of laterally-projecting pins, which serve to guide the valve within its chamber.

When my improved form of exhaust-valve is to be used on a vertical discharge-pipe for shafts it is connected to said pipe by an angle-arm connection, as shown in Fig. 5. The valves Q are cushioned with rubber, as shown. These valves, thus arranged on the discharge-pipe, will prevent any accumulation of air within the cylinder to prevent the falling of the valve M as the air will, instead of rushing back to the cylinder after the discharge of the water, pass off at each of the valves P and be successively exhausted, the last exhaust being at the exhaust-pipe J.

The water-elevating device, as thus described, is of simple and economical construction, and may be made at or near the mines, as but little mechanical skill is required. I have found that ordinary beer kegs or barrels may be utilized for the cylinder of the elevator, as such kegs or barrels will withstand great pressure and are comparatively unsusceptible to the action of the acids contained in the water.

It will be apparent that by the use of my improved device all ditching and channeling in the mines, as well as water hauling by horse-power, will be avoided.

Many slight changes in the details of con-

struction may be resorted to without departing from the spirit of my invention. Hence I do not limit myself to the exact construction shown and described, but consider myself at liberty to make such alterations as may properly fall within the scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a portable water-elevator, the combination, with a cylinder or barrel, of a water-inlet at the bottom of said cylinder and a valve arranged in said inlet and provided with devices for regulating said valve, a water-discharge-pipe, an air-inlet pipe arranged to project through the upper end or head of the cylinder and provided with a contracted opening for the admission of compressed air within the cylinder, an exhaust-pipe adapted to exhaust the air within the cylinder and provided with a valve-rod and a buoyant valve, the latter being adapted to rest upon the contracted opening of the air-inlet when exhausting the air in the cylinder, substantially as set forth.

2. In a portable water-elevator, the combination, with the cylinder or barrel having a water-inlet, of a valve arranged within the latter and adapted to be opened by its buoyancy, and provided with a lever and an operating-rod whereby said valve may be closed either partially or entirely, as desired, substantially as set forth.

3. In a portable water-elevator, the combination, with the cylinder or barrel provided at its bottom with a water-inlet, of a valve arranged within the latter and connected to a lever, which latter is connected to a two-part operating-rod, the parts of the latter being swiveled together, the upper part of said rod being screw-threaded and arranged within a screw-threaded bracket or eye to regulate the valve, substantially as set forth.

4. In a portable water-elevator, the combination, with the upper end or head of the cylinder or barrel, of an air pipe consisting of two parallel vertical portions projecting through said head and adapted to be connected with an air-pump, and a horizontal portion provided with an upward projection and a contracted outlet, an air-exhaust pipe projecting through said head and provided with a valve-rod and valve, the latter being provided on both its upper and lower sides with elastic cushions and adapted to be guided between the vertical portions of said compressed-air pipe, substantially as set forth.

5. In a portable water-elevator, the combination, with the air inlet and exhaust pipes, of a valve-rod and a buoyant valve, the latter being provided with rings through which said inlet-pipes pass, whereby said valve is guided when raised by the water, substantially as set forth.

6. The combination, with a portable elevator, of a discharge-pipe provided with a valve-chamber, (one or more,) of a valve-rod supported by a lever adapted to receive weights, and a cushioned valve, substantially as set forth.

7. The combination, with a portable water-elevator, of a discharge-pipe and a cylindrical valve-chamber suitably connected to said pipe, a valve-rod supported by a lever fulcrumed on an arm or bracket of said chamber and provided with a stud or arm at each end to receive weights, and a valve connected to said rod and supported within its chamber by laterally-projecting pins or guards, substantially as set forth.

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

JOHN SHAW WALLACE.

Witnesses:
C. F. GILLIAM,
L. D. FROST.