No. 650,167. Patented May 22, 1900.

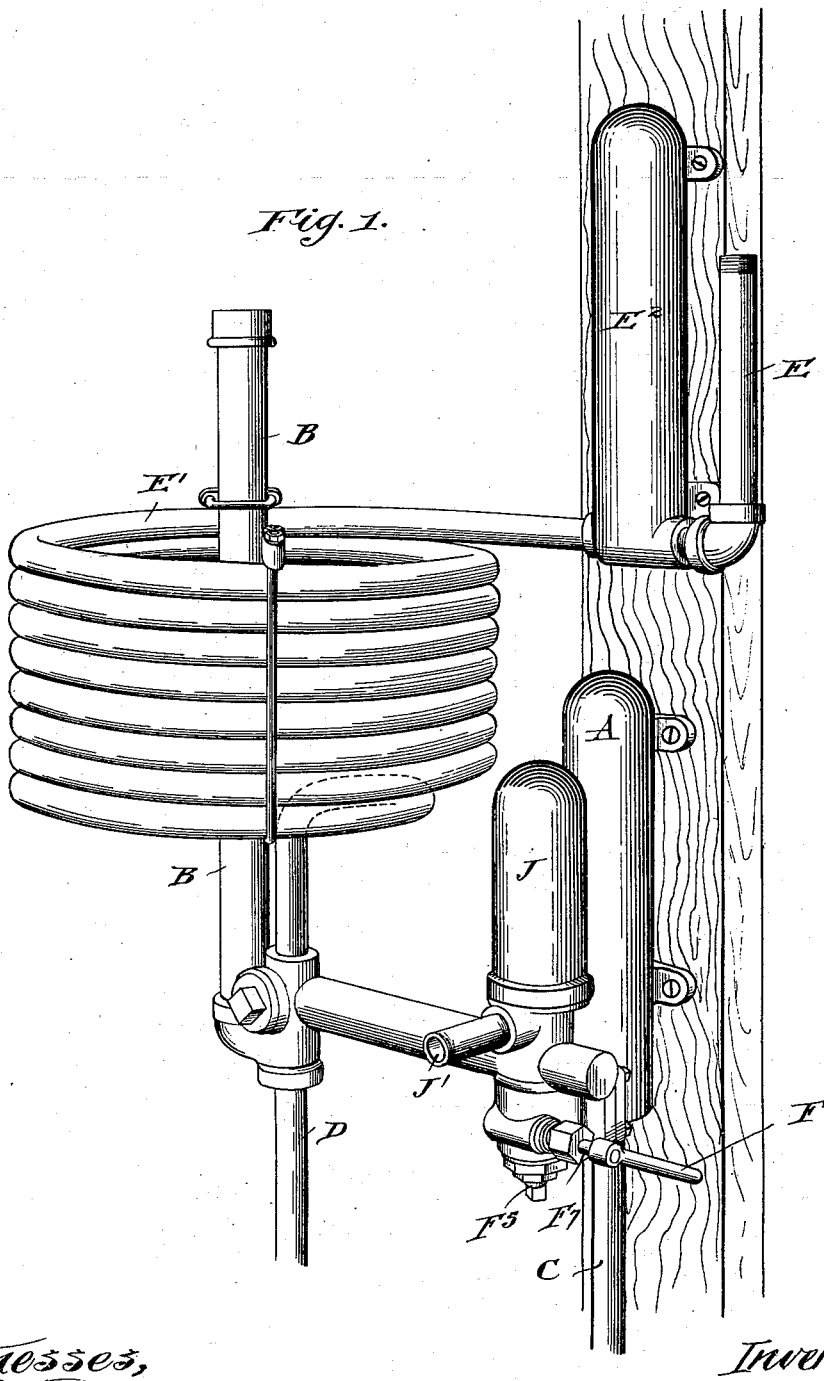
H. D. COLMAN.

WATER LIFT.

(Application filed Nov. 2, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Witnesses,
S. F. Mann
James Riley.

Inventor,
Howard D. Colman
By Luther L. Miller
Atty.

No. 650,167. Patented May 22, 1900.

H. D. COLMAN.

WATER LIFT.

(Application filed Nov. 2, 1898.)

(No Model.) 4 Sheets—Sheet 2.

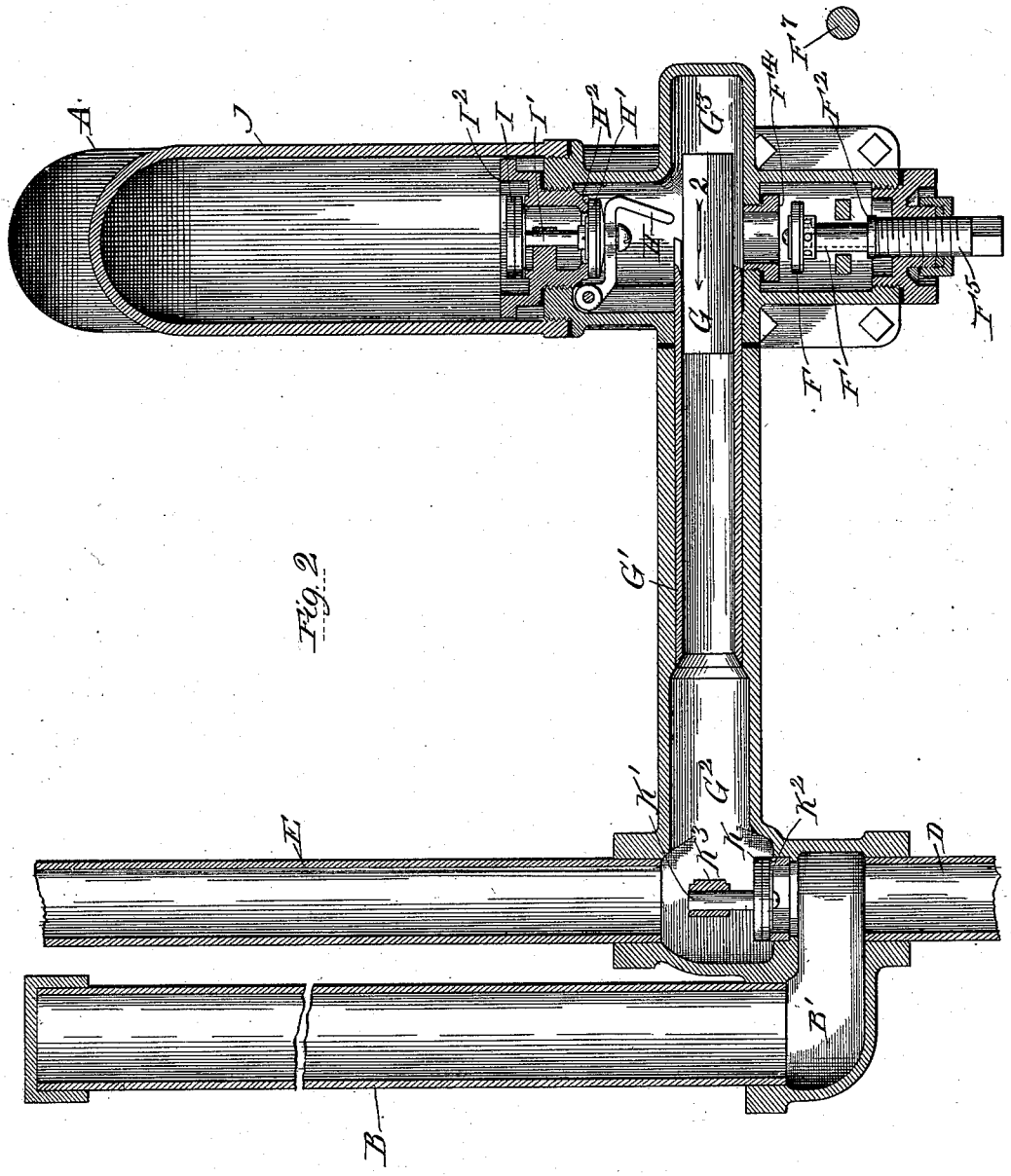


Fig. 2.

Witnesses:
W. B. Corlies
Lutr S. Allen

Inventor:
Howard D. Colman.
By Luther L. Miller
Atty

No. 650,167. Patented May 22, 1900.

H. D. COLMAN.

WATER LIFT.

(Application filed Nov. 2, 1898.)

(No Model.) 4 Sheets—Sheet 3.

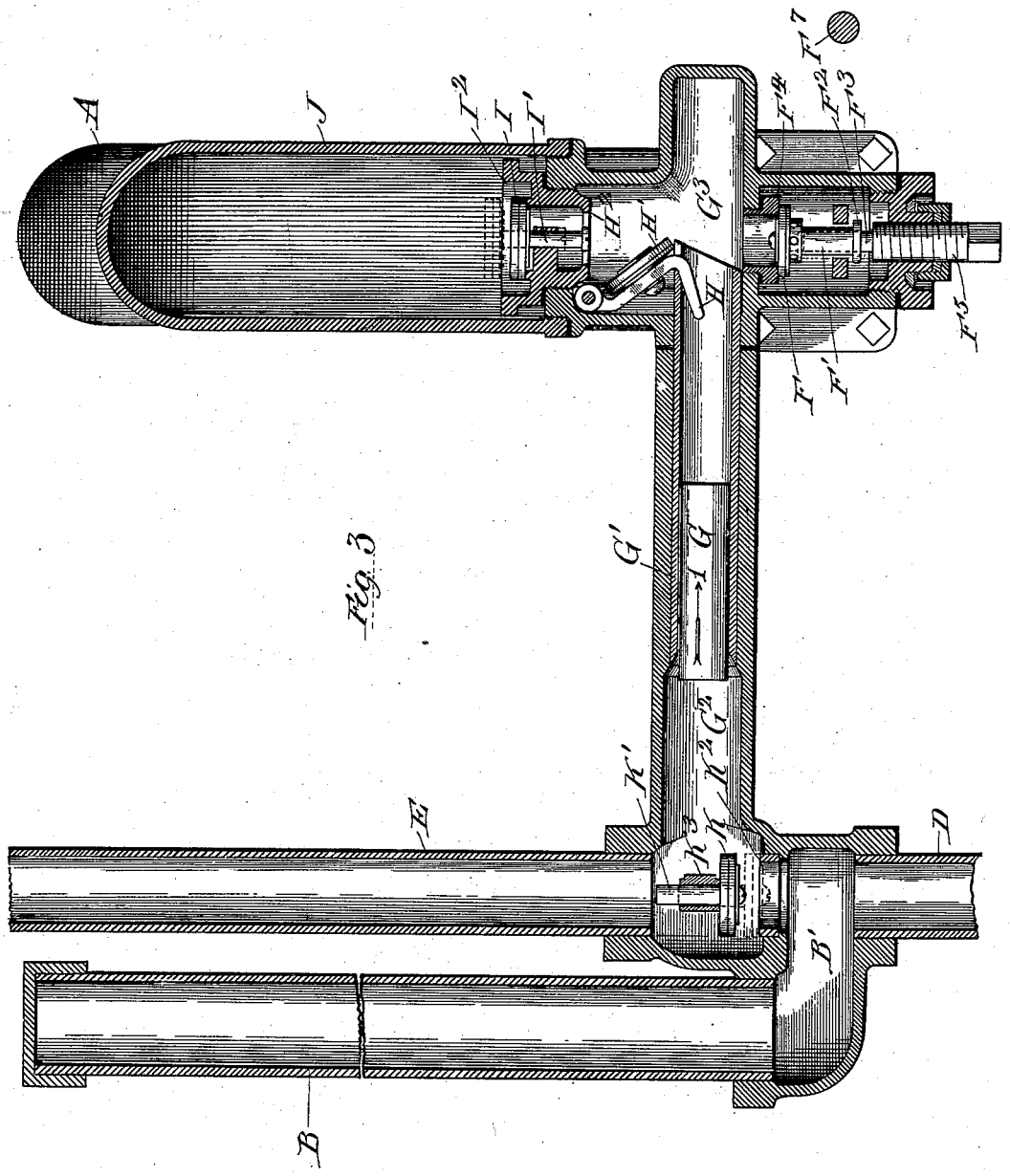


Fig. 3

Witnesses:
W. C. Coulter
Luther L. Miller
Atty

Inventor:
Howard D. Colman.
By Luther L. Miller
Atty

No. 650,167. Patented May 22, 1900.

H. D. COLMAN.

WATER LIFT.

(Application filed Nov. 2, 1898.)

(No Model.) 4 Sheets—Sheet 4.

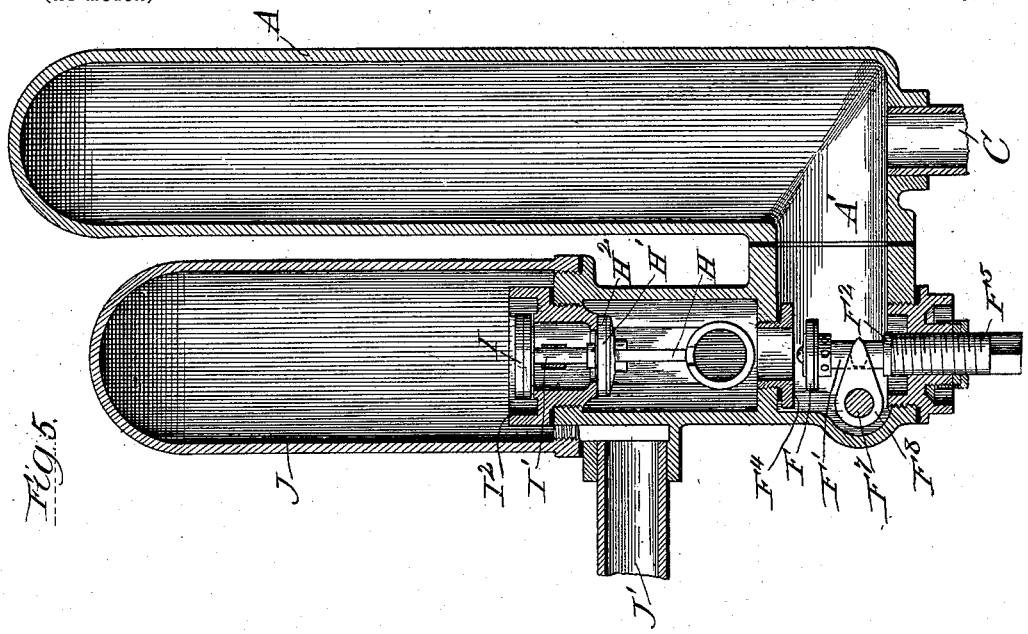


Fig. 5.

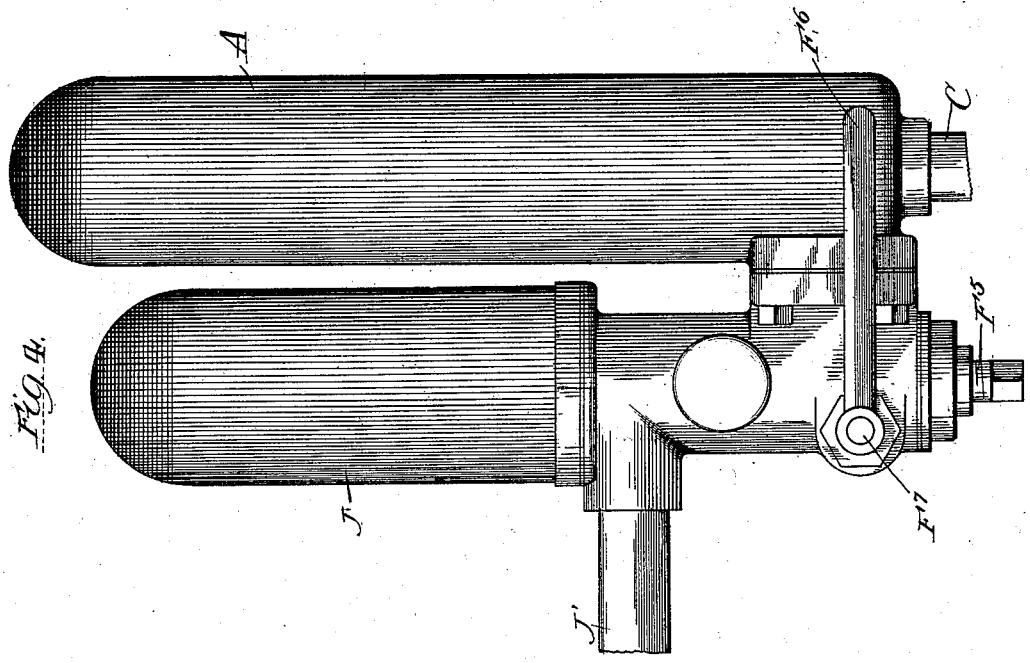


Fig. 4.

Witnesses:
W. C. Codlé
Lute S. Miller

Inventor:
Howard D. Colman,
By Luther L. Miller
Atty.

UNITED STATES PATENT OFFICE.

HOWARD D. COLMAN, OF ROCKFORD, ILLINOIS.

WATER-LIFT.

SPECIFICATION forming part of Letters Patent No. 650,167, dated May 22, 1900.

Application filed November 2, 1898. Serial No. 695,257. (No model.)

To all whom it may concern:

Be it known that I, HOWARD D. COLMAN, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Water-Lifts, of which the following is a specification.

The object of this invention is the production of an apparatus for elevating one kind or quality of liquid with another under pressure—as, for instance, the elevation of rain-water from a cistern to an attic-tank by means of the water from the mains of a city's water-supply.

In the accompanying drawings, Figure 1 is a perspective view of the apparatus. Fig. 2 is a vertical central section of the same. Fig. 3 is a view similar to Fig. 2, but showing the moving parts in different operative positions. Fig. 4 is an end elevation of the apparatus. Fig. 5 is a vertical central section through the chambers shown in the preceding figure.

Like letters of reference indicate corresponding parts throughout the several views.

For convenience I will describe the apparatus in its application to the elevation of cistern-water, employing the water under pressure from the mains of a city's water-supply for the drive-water.

A is an air-chamber. A′ is a chamber in direct communication therewith.

B is a vacuum-chamber. B′ is a chamber having communication therewith.

C is the pressure-water-supply pipe, connected with the city water-mains.

D is the intake-pipe, having connection with the cistern.

E is the discharge-pipe, leading to the attic-tank.

E′ is a coil of pipe communicating with and forming a part of the discharge-pipe E, and E^2 is an air-chamber near the upper end of said coil. This pipe and air-chamber are added to the discharge-pipe E in order that the apparatus may be operative in cases where there is no considerable rise in the discharge-pipe, and the falling column and its effect are thus obtained in positions where it is inconvenient to have a vertical discharge-pipe.

F is a pulse-valve; F′, the tubular stem therefor, having the annular flange F^2 at the lower end thereof, and F^3 a bearing-stud within the tubular stem F′, upon which stud the valve has a vertical movement.

F^4 is the valve-seat.

F^5 is a screw integral with the bearing F^3, forming an adjustable limit to the opening of the valve F.

F^6 is a hand-lever, F^7 its supporting-shaft, and F^8 a yoke fixed on said shaft and being in a position to engage the valve-stem F′ when desirable to do so, though not interfering with the action of the valve when the latter is in operation.

G is a floating piston free to move backward and forward in the tube G′ with the changing flow of the water therein. This floating piston is an air-tight metallic cylinder arranged to have about the same specific gravity as water in order that it may be carried by the water with the least possible resistance. The tube G′ has an enlarged chamber G^2 at one end thereof to receive the floating piston and permit the passage of water around it to fill the pipe E upon starting the apparatus, and G^3 is a chamber at the opposite end of the tube G′.

H is a pivoted valve-arm crooked at its free end to be engaged by the floating piston G. H′ is a valve pivotally mounted on said arm, and H^2 is the seat for said valve.

I is a check-valve mounted on the valve-stem I′ above the pivoted valve H. The length of the stem is such that when the valve H′ rests upon its seat H^2 the valve I will be slightly open, the object of which is to prevent the formation of a partial vacuum in the space between the two valves, and thus interfere with the ready opening of the valve H′.

I^2 is a cup surrounding the valve I for retaining a small quantity of water about said valve and preventing the ingress of air to the chamber G^3 when the partial vacuum occurs in that chamber.

J is an air-chamber for receiving the overflow or waste water, and J′ is the delivery-pipe therefrom.

K is a check-valve, K′ the valve-stem, and K^2 the valve-seat. The valve K has a vertical movement in its bearing K^3.

Assuming the parts to occupy the positions which they are represented as occupying in Fig. 2 and the intake-pipe D and the chamber B′ to be filled with water, the operation

of the apparatus is as follows: Water from the city water-mains is admitted through the inlet-pipe C, the pulse-valve F being held from its seat F^4 by the hand-lever F^6 until the discharge-pipe E is filled. The pulse-valve F is then released to the action of the drive-water, the rush of which will immediately close it sharply. The column of water in E, however, by reason of its momentum will continue to rise, creating a partial vacuum in the tube G′ and the chambers G^2 and G^3, and to relieve this vacuum water flows in from the chamber B′, opening and passing by the check-valve K. This partial vacuum in the chamber G^3 also causes the waste-water valve H′ to open. As soon as the upward momentum of the rising column of water in the pipe E is exhausted the check-valve K closes of its own weight, the column of water in the pipe E commences to descend, raising the valve I and discharging into the chamber J the waste water in the tube G′. The floating piston G is carried by the movement of the water in the direction of the arrow 1, Fig. 3, striking against the valve-arm H of the valve H′, raising the latter until the current of escaping waste water catches and closes it. The valve H′ is held closed by the pressure in the chamber G^3 until the partial vacuum occurs therein. The escape of the water being suddenly checked by the closing of the valve H′, the momentum of the descending column increases the pressure in the chamber G^3 above that of the city water, forcing open the pulse-valve F against the pressure of the city water, and flows downward past the pulse-valve into the chamber A′. As soon as the momentum of the descending column of water is spent the pressure-water reverses its flow, again driving upward the column of water in the pipe E at an increasing velocity until the rush of water is sufficient to close the pulse-valve F, as before, the floating piston G being carried by the water in the direction of the arrow 2, Fig. 2. By this action a partial vacuum is again created within the tube G′ and the chambers G^2 and G^3, and the momentum of the ascending water column in the pipe E again draws water from the chamber B′.

To start the apparatus in action, the hand-lever F^6 is depressed to open the pulse-valve F and immediately returned to the horizontal position it is shown to occupy in the drawings. The pulse-valve F being open and the pressure-water introduced, the operation of the apparatus will continue indefinitely. To stop the operation of the apparatus, the hand-lever F^6 is raised, holding the pulse-valve F against its seat.

In starting the apparatus when there is no water in the intake-pipe D the pulse-valve F is actuated by the hand-lever F^6 until the air in the pipe D and the chamber B′ is exhausted and discharged upward through the pipe E, the air in the vacuum-chamber B sufficiently rarified, and the ingress-pipe D filled with water from the cistern.

The air and vacuum chambers A, B, E^2, and J perform the usual functions of such chambers when applied to hydraulic machinery.

In cases where it is desirable to discharge water in a continuous stream under pressure at a point near the apparatus the effect of the rising discharge-pipe E is had in the coil B′ and the air-chamber B^2, which give the reversals of the flow of water necessary to cause the operation of the apparatus.

I claim as my invention—

1. In a water-lift, in combination, an intake-pipe, a discharge-pipe, and means for reducing the pressure in or adjacent to the intake-pipe, which means comprises a pressure-water-supply pipe, a pulse-valve, a check-valve in the intake-pipe, an escape-valve and an oscillating column of water.

2. In a water-lift, in combination, an intake-pipe, a vacuum-chamber having communication with the intake-pipe, a discharge-pipe, and means for reducing the pressure in or adjacent to the intake-pipe, which means comprises a pressure-water-supply pipe, an air-chamber having communication with said pressure-water-supply pipe, a pulse-valve, a check-valve for the intake-pipe, an escape-valve and an oscillating column of water.

3. In a water-lift, in combination, an intake-pipe, a discharge-pipe, a pressure-water-supply pipe, an air-chamber having communication with said supply-pipe, a pulse-valve, an escape-valve, and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

4. In a water-lift, in combination, an intake-pipe, a vacuum-chamber having communication with the intake-pipe, a discharge-pipe, a pressure-water-supply pipe, an air-chamber having communication with said supply-pipe, a pulse-valve, an escape-valve, a floating piston for the escape-valve, a tube, and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

5. In a water-lift, in combination, an intake-pipe, a discharge-pipe, a pressure-water-supply pipe, a pulse-valve, an escape-valve, a check-valve for the waste water, means for preventing the closing of the check-valve when the escape-valve is closed, and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

6. In a water-lift, in combination, an intake-pipe, a discharge-pipe, a pressure-water-supply pipe, a pulse-valve, an escape-valve, a check-valve for the waste water, a stem for the said check-valve which stem is so located as to prevent the closing of the check-valve when the escape-valve is closed and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

7. In a water-lift, in combination, an intake-pipe, a discharge-pipe, a pressure-water-

supply pipe, a pulse-valve, an escape-valve, a swinging supporting-arm therefor, a floating piston for moving the arm, a check-valve for the waste water, a stem for said check-valve, which stem is of such length as to prevent the closing of the check-valve when the escape-valve is closed, and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

8. In a water-lift, in combination, an intake-pipe, a discharge-pipe, a pressure-water-supply pipe, an escape-valve, a swinging supporting-arm therefor, a floating piston for moving the arm, a check-valve for the waste water, means for preventing the closing of the check-valve when the escape-valve is closed, a pulse-valve, a tubular stem therefor, a supporting-stud for said stem and means for opening the pulse-valve against the pressure-water by the momentum of a column of water.

9. In a water-lift, in combination, a pressure-water-supply pipe, a pulse-valve, a waste-water pipe, an intake-pipe, a delivery-pipe, and a column of water which by its momentum reduces the pressure in or adjacent to the intake-pipe.

10. In a water-lift, in combination, a pressure-water-supply pipe, an air-chamber, a pulse-valve, an intake-pipe, a check-valve for the intake-pipe, a delivery-pipe, a waste-water valve, a floating piston for operating said last-mentioned valve and means for preventing the return of the waste water.

11. In a water-lift, in combination, a pressure-water-supply pipe, an air-chamber communicating therewith, a pulse-valve, an intake-pipe, a discharge-pipe, a vacuum-chamber having a communication with the intake-pipe, a check-valve for the intake-pipe, a waste-water valve, a floating piston for moving said valve, and means for preventing the return of the waste water.

12. In a water-lift, in combination, a pressure-water-supply pipe, an air-chamber communicating therewith, a pulse-valve, an intake-pipe, a vacuum-chamber having communication with the intake-pipe, a discharge-pipe, a check-valve for the intake-pipe, a valve for the waste water, a floating piston for moving said last-mentioned valve, and a valve for preventing the return of the waste water.

13. In a water-lift, in combination, a pressure-water-supply pipe, an air-chamber communicating therewith, a pulse-valve having a tubular stem, a supporting-stud for said stem, an intake-pipe, a vacuum-chamber having communication with the intake-pipe, a check-valve for the intake-pipe, a discharge-pipe, a tube, a floating piston in the tube, a valve for the waste water, a swinging arm for said valve, which arm is arranged to be moved by the said floating piston to such a point as to carry the valve adjacent to its seat, and a check-valve to prevent the return of the waste water.

14. In a water-lift, in combination, a pressure-water-supply pipe, an air-chamber communicating therewith, a pulse-valve, a tubular stem therefor having an integral, annular flange at its lower end, a supporting-stud for said stem, a screw for adjusting the position of the valve relative to its seat, a hand-lever for moving the valve, an intake-pipe, a vacuum-chamber having communication with the intake-pipe, a check-valve for the intake-pipe, a discharge-pipe, a tube, a floating piston in the tube, a check-valve for the waste water, a swinging arm for supporting said valve, which arm is arranged to be moved by said floating piston so that said valve is carried to a point near its seat, a waste-water chamber, an escape-pipe leading therefrom, and a valve in the last-mentioned chamber for preventing the return of the waste water.

HOWARD D. COLMAN.

Witnesses:
JEANETTE M. EVANS,
J. B. WHITEHEAD.