

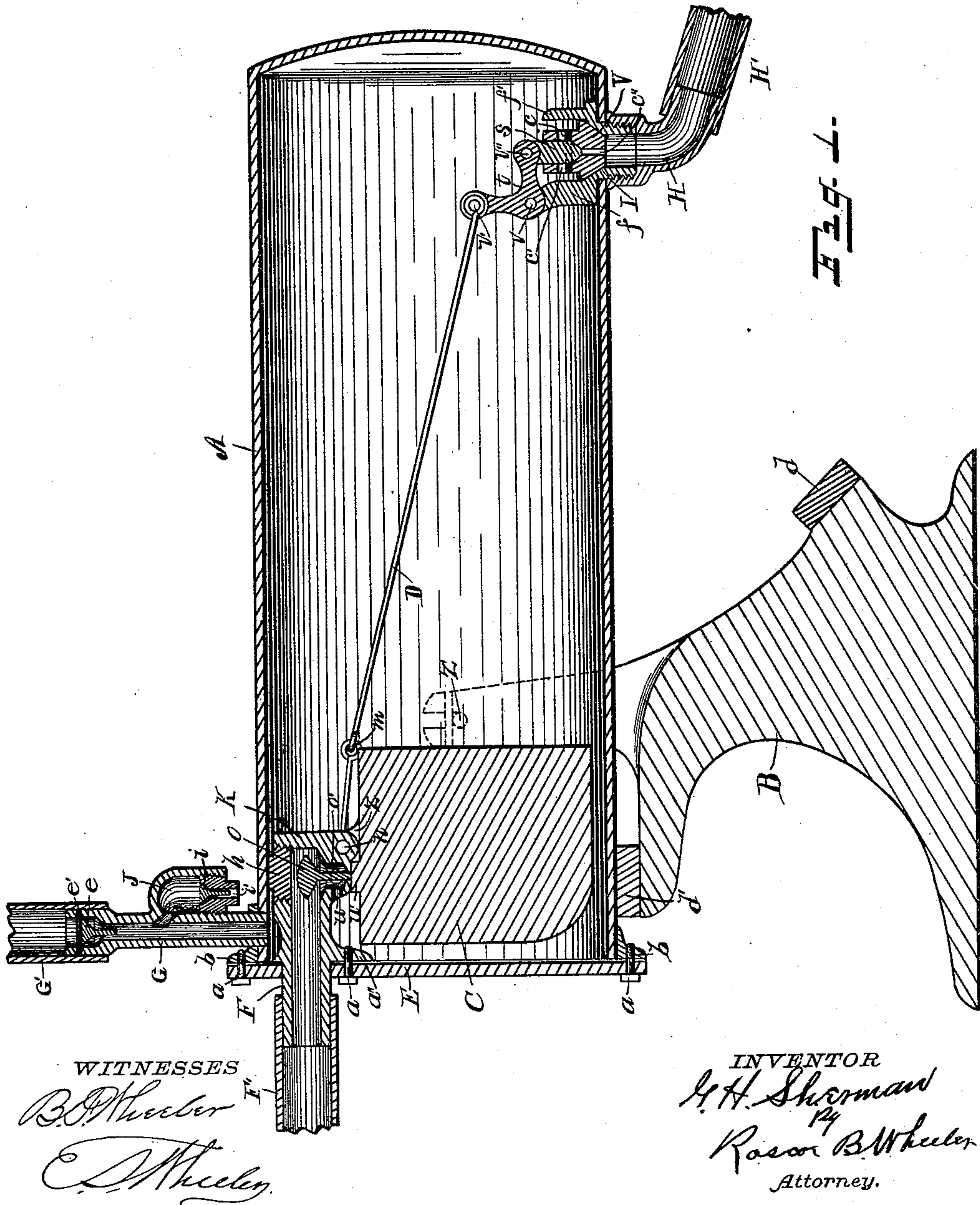
(No Model.)

2 Sheets—Sheet 1.

G. H. SHERMAN.
HYDRAULIC AIR COMPRESSOR.

No. 475,251.

Patented May 17, 1892.



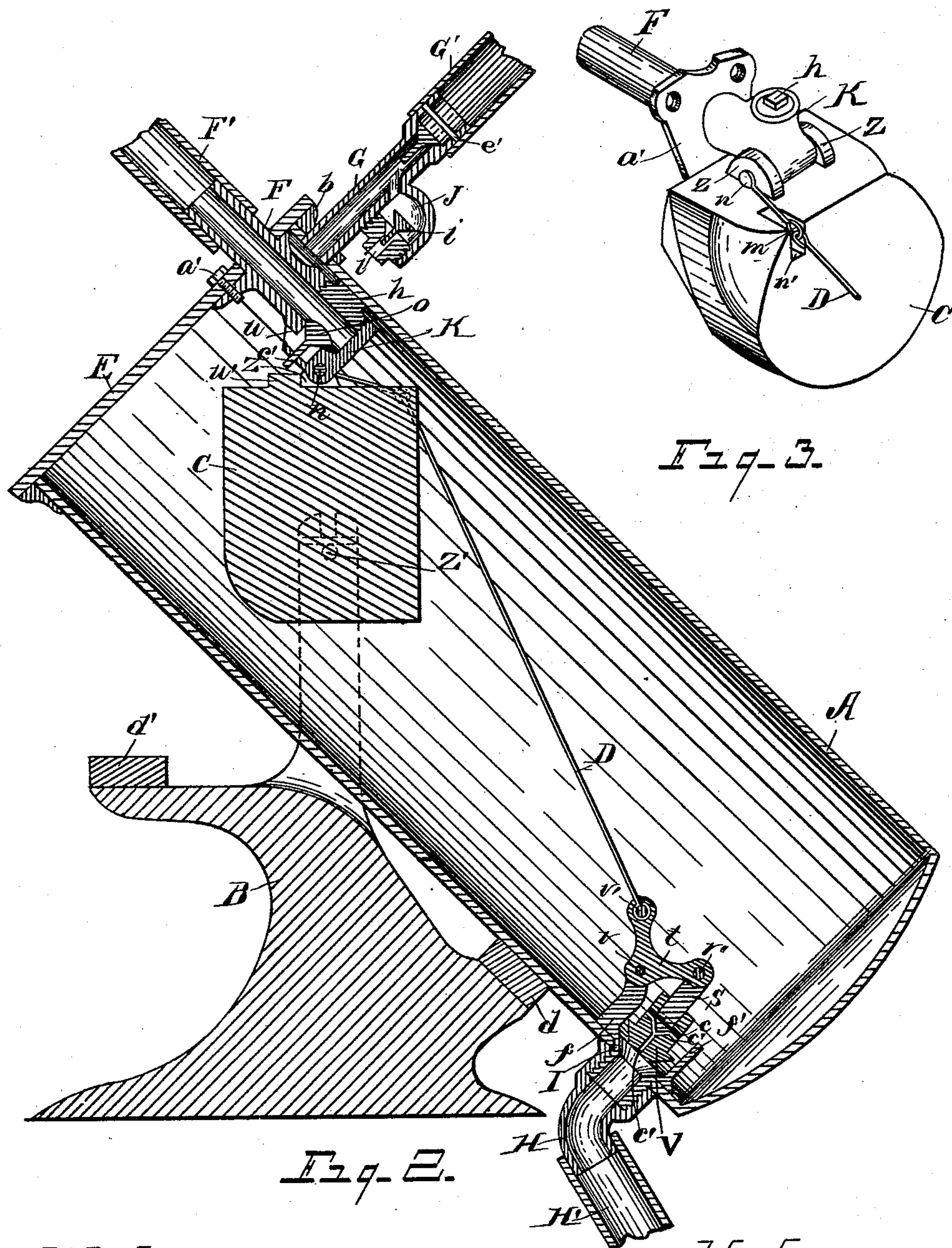
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WITNESSES.

E. Wheeler
B. A. Wheeler

INVENTOR-

G. W. Sherman
By Roscoe B. Wheeler atty.

UNITED STATES PATENT OFFICE.

GEORGE H. SHERMAN, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF
TO PAUL C. DULITZ, OF SAME PLACE.

HYDRAULIC AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 475,251, dated May 17, 1892.

Application filed January 24, 1890. Serial No. 338,040. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. SHERMAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Hydraulic Air - Compressors; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to hydraulic air-compressors in which an oscillating cylinder is alternately filled and exhausted of its air by a volume of water flowing into said cylinder under pressure, and that, having filled said cylinder, is then discharged therefrom, the air being forced from the cylinder as the water flows in and again filling the cylinder as the water is discharged. The operating mechanism is purely automatic and located entirely within the cylinder.

The object is to provide a simple, cheap, and effective air-compressor that will store compressed air in a receptacle or reservoir, from which it may be drawn for any purpose desired. This object is attained by the device illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section through the cylinder and base and the operating-valves and weight located within the cylinder, said cylinder being in a horizontal position, as when being filled with water or fluid. Fig. 2 is a view of Fig. 1, showing the position of the cylinder and valves when discharging the water therefrom. Fig. 3 is an enlarged detail of the weight that rights the cylinder after the water has been discharged and that operates the valves of the induct and educt ports of the cylinder.

Referring to the letters of reference, A indicates an air-tight cylinder pivotally mounted on a base B, as shown by dotted lines at Z', said cylinder being provided with the removable head E, secured thereto by bolts *a* passing through said head and into the flange *b* on the end of said cylinder, as shown in

Fig. 1. Located in the upper interior of the cylinder and near the head end E is an inlet-cock K, the stem F of which passes through the head E and which forms the induct-port, is secured in place by bolts *a'*, passing through said head and into the flange *a''* thereof. The weight C is pivotally depended from the inner end of the cock K by the pin *n*, passing through the ears *z z* of the weight and the under portion of said cock, as clearly shown in Fig. 3 and also in Figs. 1 and 2, the pin *n* also securing the upper end of the jointed rod D. The weight C is provided on its upper face with the lug *u'*, that is adapted to engage with the stem *o'* of the valve *o*, located in the cock K when the cylinder is in a horizontal position, as shown in Fig. 1, whereby the valve *o* is raised, permitting an inflow of water through the port *u* into the cylinder. The screw-plug *h*, located in the top of the cock K, is to permit of the valve *o* being placed in said cock and to afford access to said valve in case it should need repair.

Within the cylinder, near the end opposite from that in which the cock and weight are located, is a valve-case I, that projects through the under face of the cylinder and receives on its lower end the coupling H, that is screwed thereto. Said case forms a valve-seat for the valve V and is provided with an upwardly-extending arm *f*, to the upper end of which is pivoted at *v* the elbow-lever *t*, one end of said lever being pivotally coupled at *v'* to the lower end of the jointed rod D and its other end at *v''* to the plunger *s*, located within the valve V and secured therein by the pin *c*, passing through the lower end of the plunger *s*, the outer ends of which lie freely within the opening *c'*, passing transversely through the upper portion of the valve V, said transverse opening *c'* communicating with the vertical port *c''*, extending downward therefrom through the center of said valve, as clearly shown in Fig. 2. It is designed, when the cylinder has been filled with water sufficiently to overbalance the weight C and is tipping to the position shown in Fig. 2, that the action of said weight against the jointed rod D will operate the elbow-lever *t* to open the valve V and discharge the water therefrom. The employment of the plunger *s* and the transverse

and vertical openings $c'c''$ through the valve is to assist the weight in opening said valve to discharge the water from the cylinder. As the cylinder is tipping the first action of the rod D raises the plunger s from the mouth of the vertical opening c'' , as shown in Fig. 2, which permits a flow of water through the openings $c'c''$ in the valve V, thereby relieving the pressure of water on said valve from within the cylinder, when the force of the weight C will readily raise the valve V, as shown in Fig. 2, whereby the water is quickly discharged, the arm or guide f' preventing the valve from swinging out of place when in said position.

The tube G communicates with the interior of the cylinder through the upper face thereof and is provided in its upper end with the valve e , secured in place by the pin e' . The chamber J, communicating with the tube G, is provided with the valve i , closing the port i' therein, said port affording an air-vent for the cylinder A when the water is being discharged therefrom. It will be observed that the cylinder is pivoted at some distance from its longitudinal center and near the end in which the weight C is located, said weight being sufficient to overbalance the extended end of the cylinder and retain it in a horizontal position when empty.

The operation of the device is as follows: As the cylinder returns to a horizontal position, the lug u' of the weight C engages the stem o' of the valve o and raises or opens said valve, causing a flow of water through the port u into the cylinder. As the inflowing water fills the cylinder, the air is forced therefrom, which passes out through the tube G, the valve e in said tube rising to permit of the passage of the air, as shown in Fig. 1. The water having filled the cylinder, its weight in the extended end thereof will overbalance the weight C, when said end of the cylinder will drop to the position shown in Fig. 2. This action of the cylinder carries the stem o' of the valve o away from the lug u' on the weight C, when said valve will close, cutting off the inflow of water. It also carries the jointed rod D against said weight, the action of which upon said rod actuates the elbow-lever t and operates the valve V, whereby the water is discharged from the cylinder through the educt-port. As the water passes from the cylinder, the valve e in the tube G will close, preventing the return of the compressed air through said tube, and the valve i in the chamber J is raised by the air passing in through the port i' , thus giving the cylinder vent as the water is flowing therefrom, and whereby said cylinder is refilled with air. When the water has been discharged from the cylinder, the weight C will return it to a horizontal position, closing the valve V and opening the valve o , the inflowing water forcing the air therefrom, and the operation is continued, as before described.

The purpose of forming a joint in the rod

D at m and in providing the weight C with the groove or slot n' in the corner thereof, (see Fig. 3,) in which the rod is adapted to lie, is to afford some lost motion, so that the extended end of the cylinder may swing downward some distance before the contact of the rod and weight will act upon the valve V. The cylinder having gained considerable headway, the action on the rod will be quick and positive, insuring a perfect operation of said valve. The tubes F' , G' , and H' , connected, respectively, to the tubes F , G , H , are flexible and do not therefore interfere with the free oscillation of said cylinder. The tube F' is to lead to a source of water-supply, the tube G' to an air-storage chamber or reservoir, and the tube H' forms the water-discharge. The base B is provided with the rubber buffers d and d' . The buffer d arrests the motion of the cylinder when swinging to the inclined position shown in Fig. 2, and the buffer d' arrests the motion of the cylinder when returning to the horizontal position of Fig. 1.

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

1. In a device for the purpose specified, the combination, with the oscillating vessel, of a water-induct cock projecting into said vessel, a valve in said cock, and a weight pivotally suspended within the vessel and adapted to actuate said valve, said vessel being provided with a valve-controlled air-discharge water-educt and an air-vent.

2. In combination with the base, the vessel pivotally mounted thereon, the removable head of said vessel, the water-induct cock projecting through said head, having a valve and discharge port at the inner end, the weight pivotally coupled to said cock and having a lug projecting from its upper face, said lug adapted to engage with the valve of the cock, and the air-discharge tube passing through the upper wall of the vessel, said vessel having the water-educt port and air-vent, substantially as specified.

3. In combination with the vessel pivotally supported at one side of its longitudinal center, the water-induct cock projecting through one of the ends of the cylinder and just below the upper wall thereof, a valve and discharge-port at the inner end of the cock, the weight suspended on said cock and adapted to engage with the valve thereof when the cylinder is in a horizontal position, the water-discharge port in the bottom of said cylinder and near the end of the cylinder farthest from the weight, a valve in said discharge-port, and means coupling said valve with the weight in said cylinder, said valves and their operating parts being located within the cylinder, and the air-tube passing through the upper wall of the cylinder being located outside thereof, substantially as and for the purposes specified.

4. In combination with the cylinder pivot-

ally supported at one side of its longitudinal center upon the base B, having the buffers d and d' , the water-induct cock located in the end of the cylinder, the valve and port in said cock, the weight coupled to the cock, the valve-case and valve located in the lower wall of the cylinder, the water-port in said valve, the plunger closing said port, the elbow-lever t , coupled to the plunger and valve-case, the jointed rod coupled to the elbow-lever and to the pivotal support of the weight, said valves and their operating parts being located en-

tirely within the cylinder, the air-tube passing through the upper wall of the cylinder being outside of the cylinder, said tube having a valve in its upper end and air-chamber at one side, and a valve in said chamber, as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE H. SHERMAN.

Witnesses:

E. S. WHEELER,
R. B. WHEELER.