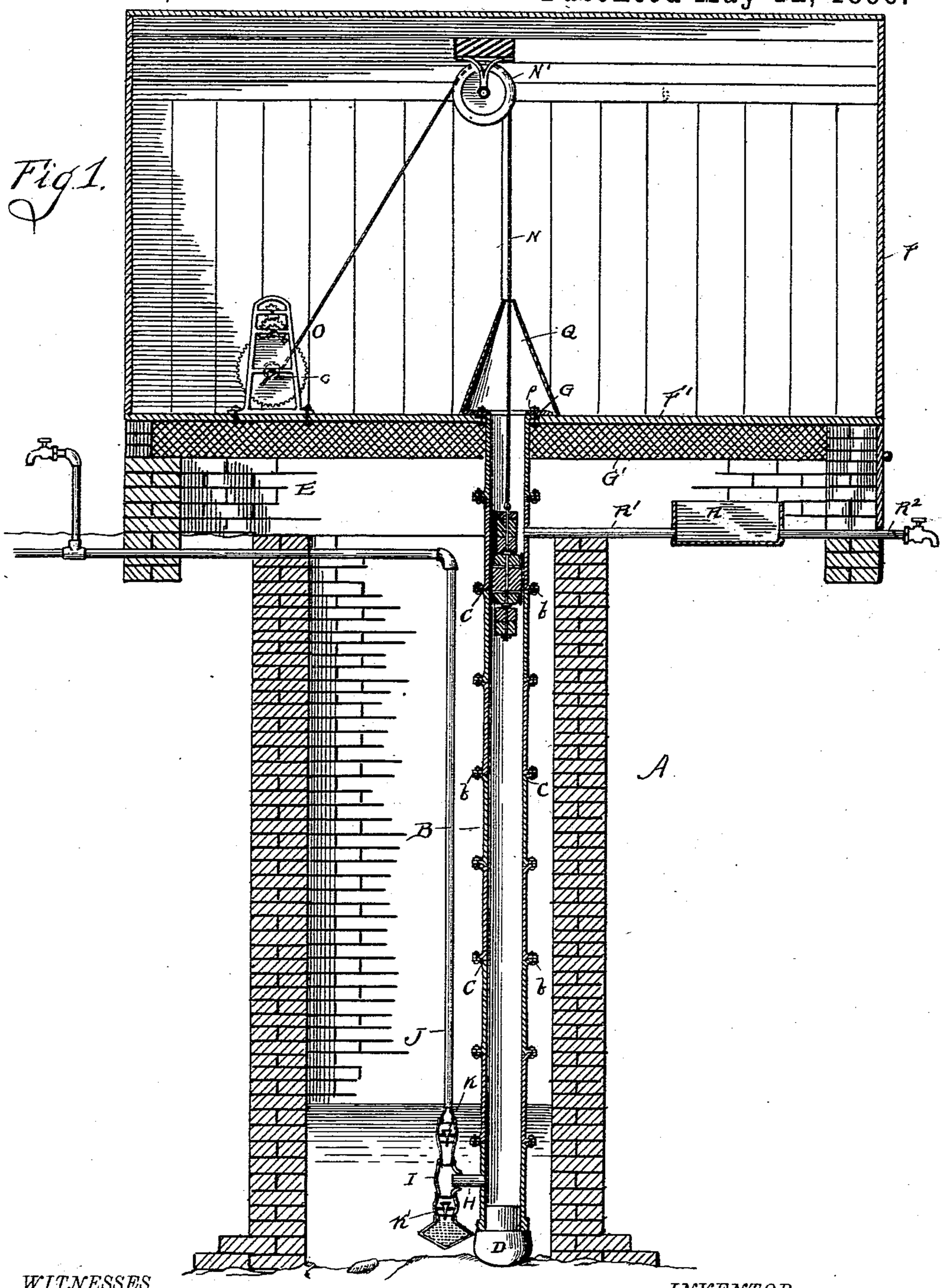
(No Model.) 2 Sheets—Sheet 1.

E. C. PLUMER.

WATER ELEVATOR.

No. 560,146. Patented May 12, 1896.

Fig 1.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

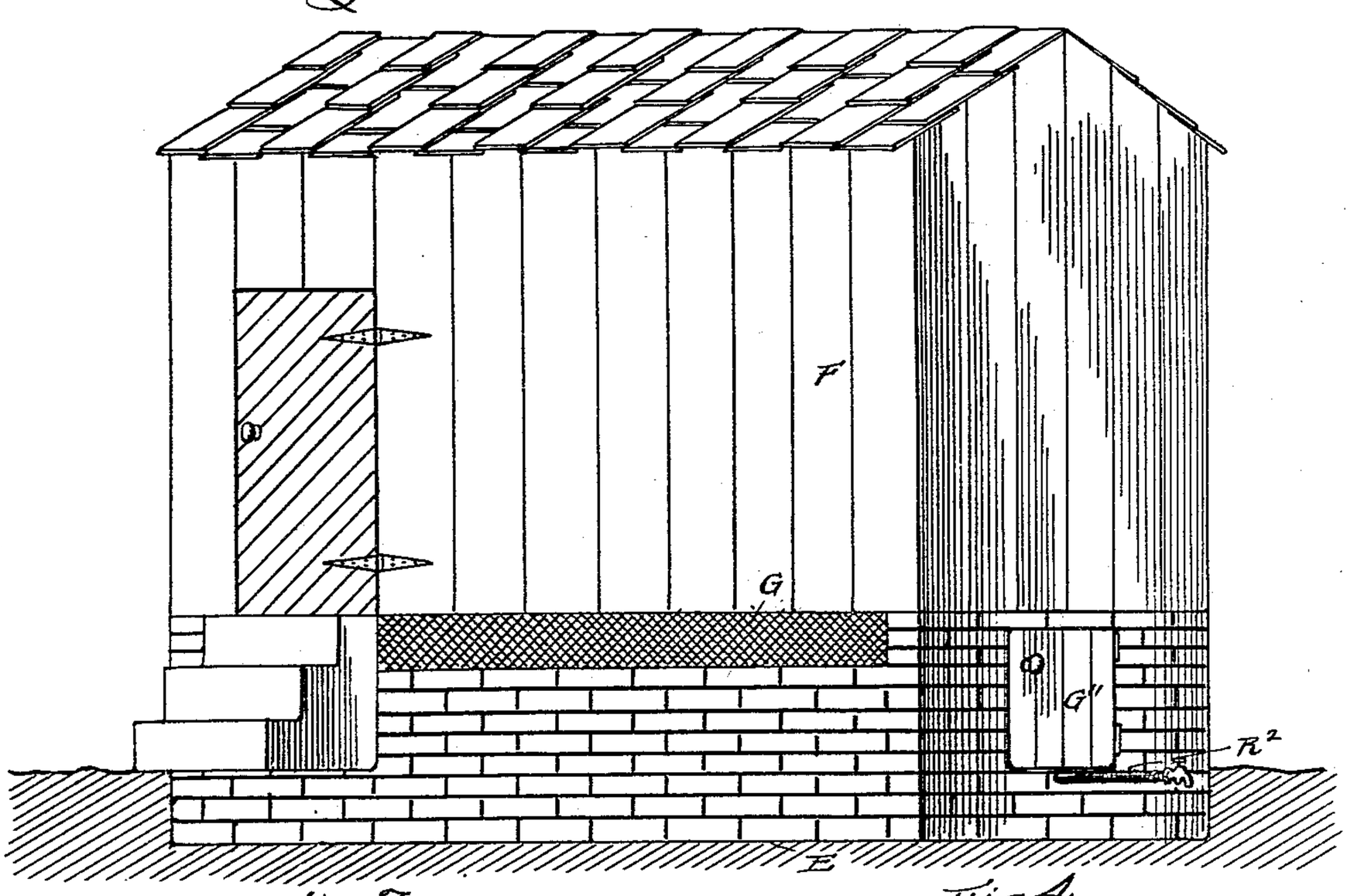


Fig. 3.

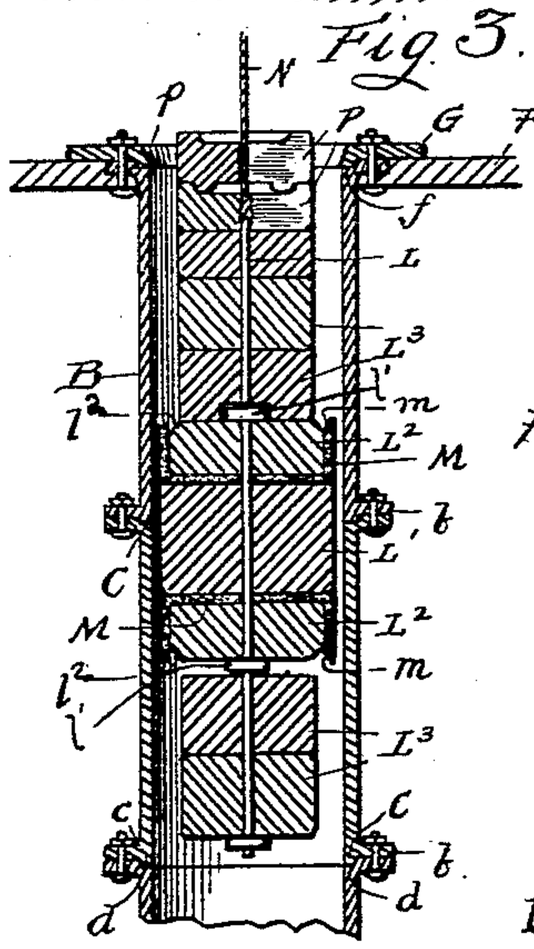


Fig. 5.

Fig. 5a.

Fig. 6.

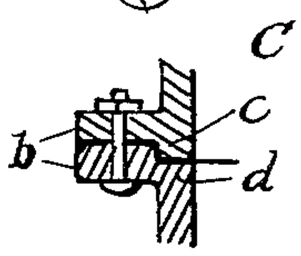
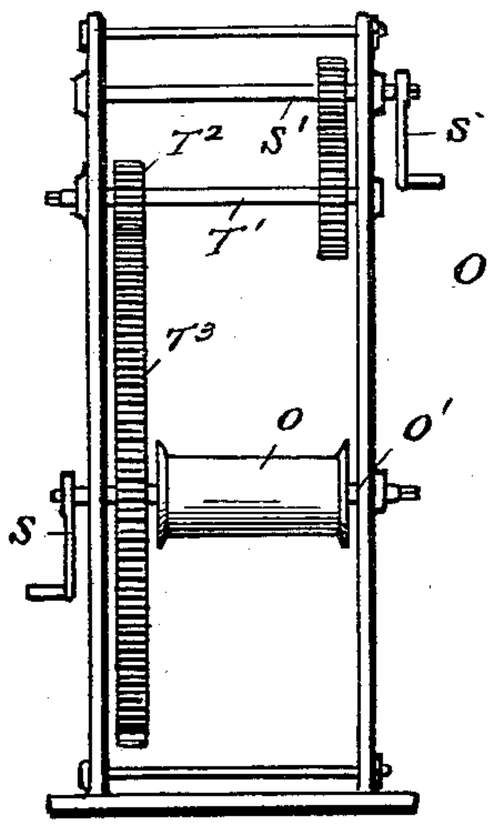


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

EUGENE C. PLUMER, OF COLUMBIA, SOUTH CAROLINA.

WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 560,146, dated May 12, 1896.

Application filed July 8, 1895. Serial No. 555,314. (No model.)

To all whom it may concern:

Be it known that I, EUGENE C. PLUMER, a citizen of the United States, and a resident of Columbia, in the county of Richland and State of South Carolina, have invented certain new and useful Improvements in Water-Elevators; 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 letters of reference marked thereon, which form a part of this specification.

Figure 1 is a vertical sectional view illustrating the invention. Fig. 2 is a perspective view of the well-house. Fig. 3 is a sectional view of the weighted piston and a portion of the cylinder. Fig. 4 is a front view of the windlass. Figs. 5 and 5ª are detail views of the removable piston-weight. Fig. 6 is a sectional detail view of one of the cylinder-joints.

This invention relates to water-elevators of the class shown and described in my Patent No. 214,444, dated April 15, 1879; and it consists in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims.

The object of the invention is principally to provide means of improved character for maintaining at any desired place a head or pressure of water without the use of a tank or equivalent device.

A further object is to provide means for automatically equalizing the pressure throughout the movement of the weighted piston which is employed to create the head or pressure; also to provide an improved construction of the cylinder in which the said piston operates and of the piston itself. Other minor objects will hereinafter appear.

Referring to the accompanying drawings, the letter A designates a well to which I have shown the invention as applied. Supported vertically within this well and extending nearly or quite the full depth thereof is a hollow cylinder B, which is composed of a series of superposed short sections united by male and female joints C. To form these joints, the ends of the sections are formed with the surrounding horizontal flanges *b*, one end of each section having a vertical flange or extension *c* below the flange *b*, which forms the male portion of the joint, while at the opposite end is an annular rabbeted seat *d*. In setting the sections the flange *c* of one section is dropped into the rabbet of the contiguous section and the flanges *b* are bolted together. The male and female parts being accurately fitted, a perfect joint is formed without the necessity for grinding the meeting faces of the sections and without the use of gaskets. I also secure without difficulty a perfect alinement of the sections, which is a matter of great importance, as will be apparent when the working of the piston within the cylinder is considered. I prefer that the sections should not exceed five feet in length, and they should be cast of varying lengths within this limit in order to suit any well without the necessity for cutting a section. The lower end of the lower section is closed by a suitable plug D.

Around the mouth of the well I set a foundation E for a well-house F and extend the cylinder to the floor F′ of such house.

G is a floor-plate which is bolted or otherwise secured to the floor F′, and which has a flange *f*, which fits the rabbeted seat in the upper end of the top section of the cylinder.

The foundation E of the well-house is ventilated upon two or more sides by means of wire gratings G′ and is provided at one end with a door G″. The ventilators not only admit air to the well, but by permitting a circulation underneath the well-house the floor F′ is prevented from rotting, as would otherwise soon occur.

The lower section of the cylinder is tapped near the bottom of the well to receive a short horizontal pipe-section H, which constitutes both the induct and the educt of the cylinder. Connected to said pipe is a vertical shell or casting I, the lower portion of which is perforated to form a strainer, and to the upper portion of which is connected the delivery or service pipe J, which extends to the top of the well and from thence to any desired point or points. Within the case or shell I are two downwardly-seating valves K K′, one above and one below the pipe-section H, the former constituting the educt and the latter the induct valve. Within the cylinder is a weighted piston that travels from one end to the other.

Said piston consists of a central vertical rod L, a central guide-section L′, end sections L^2, and friction-weights L^3 above and below. The sections L′ L^2 are supported on the rod L by means of a collar *l* and are held together by a nut *l*′. The end sections are tapered at their pressure ends, as at l^2, and are packed and jacketed with leather cups M, said sections with the jackets removed being of somewhat less diameter than the central or guide section L′. Said jackets are preferably skived off, as indicated at *m*, to correspond with the taper of the end sections, in order that the pressure of the water may act to better advantage to press the cups against the walls of the cylinder. The stationary weights L^3 above and below the piston proper are of smaller diameter, being out of contact with the walls of the cylinder and are intended to counterbalance the actual friction of the piston. The piston-rod L is connected by a wire cable or rope N, running over a pulley N′, secured to a beam of the well-house, to the drum *o* of a windlass O.

Above the weights L^3 are a series of removable weights P, which are of male and female character and slotted from side to center for easy adjustment. By means of these weights the pressure is regulated as desired.

Q is a conical cap which fits over the mouth of the cylinder and through a small opening in the apex of which the rope or cable N passes. This cap is intended to protect the cylinder from dirt and dust. Upon the contact of the piston-weights therewith upon the upstroke the cap is lifted, but drops back into place again as the piston descends. To facilitate the entrance of the piston into the cylinder, the mouth of the floor-plate is made somewhat conical or flaring, as indicated at *p*.

R designates a tank which is supported underneath the well-house and which is comparatively shallow in comparison with its area. Running from the lower portion of this tank to the upper portion of the cylinder is a pipe R′. The said tank also has a drainage-pipe R^2.

The operation of the elevator is as follows: As the piston is hoisted by the operation of the windlass the water follows in vacuum to the height of thirty-two feet, or thereabout. When the winding ceases and the windlass-crank is released, the weighted piston rests upon the water-column, and if a cock is opened on a service or delivery pipe water will be discharged therefrom. Upon closing the cock the water ceases to flow and the piston ceases to move until water is drawn again. In this manner water may be drawn until the cylinder is exhausted, when the winding is repeated.

The purpose of the tank R is as follows: It is obvious that when the piston is at the top of the cylinder there is a maximum head or pressure in the service-pipe, and that as the piston descends this head or pressure decreases in a corresponding ratio. In order, therefore, to provide a constant head or pressure, it is necessary to constantly increase the weight on the piston. To provide this constant increase of pressure is the office of the tank, which is filled, or practically filled, with water. As the piston descends water flows from this tank into the cylinder above the piston, forming a column of constantly-increasing height and weight, which causes a uniform head or pressure to be maintained at the service-pipe during the entire downstroke of the piston. As the piston is raised the water flows back into the tank, so that as the lift becomes greater the weight is diminished, and a uniform expenditure of power is required during the whole operation of winding. This, it will be seen, is a great advantage over the use of metallic weights entirely, since with the latter not only is the cost greater, but there is no uniformity of pressure.

It will be observed that the piston has a broad bearing in the cylinder, the friction of which is counterbalanced by the stationary weights, so that there is no liability of water being forced up by the piston. The weight column of water above the piston also forms a seal.

Inasmuch as the cylinder is necessarily air-tight, it follows that the water delivered by the service-pipe is perfectly fresh, having lost none of its gases by contact with the air; also that as the temperature within the well a few feet below ground is nearly constant the water in the cylinder will be kept cool. The service-pipe can be extended throughout a dwelling-house or other building, to the barn or other outbuilding, and to the lawn. Sufficient head or pressure can be obtained to maintain hot and cold water service throughout the building.

The invention is also useful in cities when the water-pressure fails to reach the upper stories, as the cylinder and its adjuncts can be attached directly to the city service-pipe.

It will be observed that the shaft *o*′ of the winding-drum *o* of the windlass is squared at both ends to receive cranks S. These cranks will be employed only in case of fire, when time is to be gained, or at such other times as may be desirable. Ordinarily the winding is accomplished by placing one of the cranks upon the square shaft T′ of a pinion T^2, which is geared to a large wheel T^3 on the shaft *o*′, or upon a second shaft S′, which is geared to the shaft T′. The latter arrangement is especially adapted for women and children when time is not so much the object as comparative ease in winding.

No pawl and ratchet are required for the windlass, as the resistance of the water upon the piston when the service-cocks are closed performs this function.

By removing the floor-plate G the entire cylinder can be readily moved from the well.

It will be observed that the pipe R′, which connects the tank R with the cylinder, com-

municates with the latter some distance below its upper end, whereby said cylinder has an extension beyond the top of the tank. When the piston is raised entirely out of the cylinder for repair or the adjustment of its weights, it will be noted that the cylinder remains full of water, and were it not for this extension there would be an overflow at the top when the piston was removed. Said extension also forms a guide for the piston the full length of its stroke.

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

1. The herein-described water-elevator, comprising the vertical sectional cylinder, the plug closing the lower end of and supporting said cylinder upon the bottom of the well or reservoir, the induct and educt pipe H communicating with the lower portion of said cylinder, the perforated valve-casing connected to the said pipe, the service or delivery pipe connected to said casing, the parallel valves therein, the sectionally-weighted piston arranged to reciprocate the full length of said cylinder, the water-tank arranged to discharge into said cylinder below its upper end, and below the limit of the upward movement of said piston, and windlass mechanism for raising said piston, substantially as specified.

2. In a water-elevator, the piston consisting of the rod, the central guide-sections, the end sections, having the tapered portions, the cup-leather jackets for said end sections skived or thinned opposite to the taper of the end sections, the friction-weights above and below the central and end sections, and the slotted weights above the upper friction-weights, substantially as specified.

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

EUGENE C. PLUMER.

Witnesses:
GEO. H. PARMELEE,
GEO. M. ANDERSON.