(No Model.)

J. A. MARTIN & J. L. LATTA.

COMPRESSED AIR WATER ELEVATOR.

No. 569,294. Patented Oct. 13, 1896.

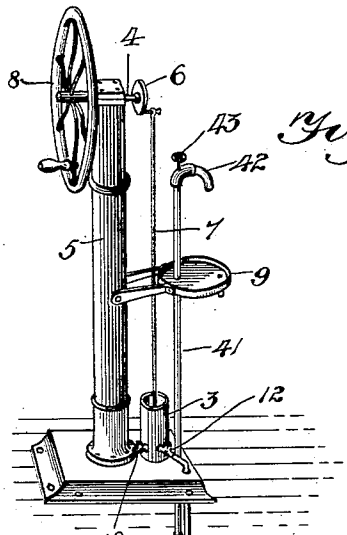

Fig. 1.

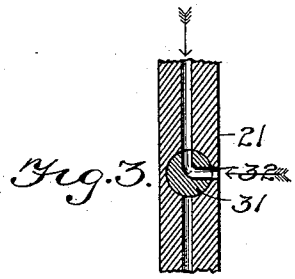

Fig. 3.

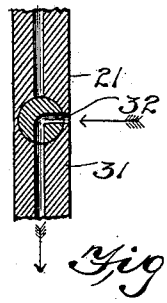

Fig. 4.

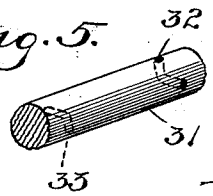

Fig. 5.

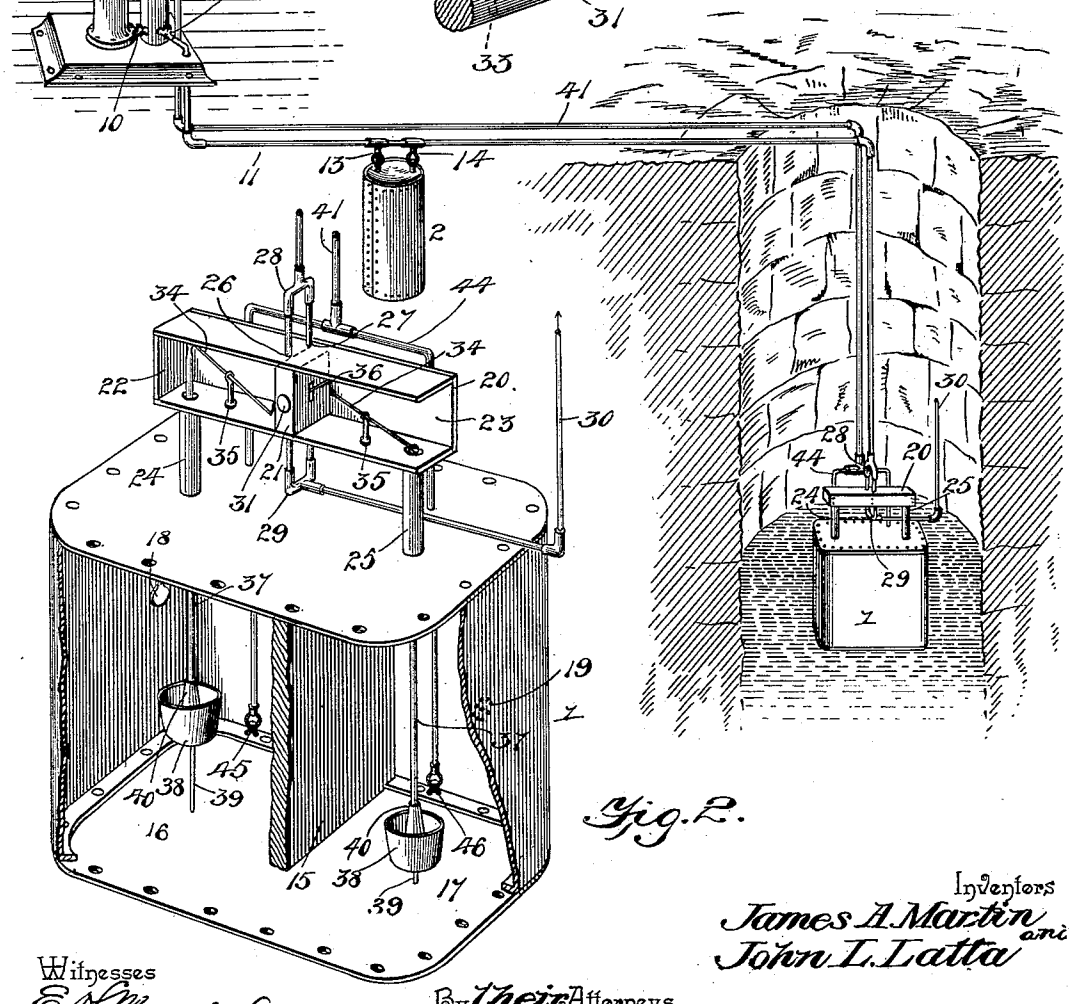

Fig. 2.

Witnesses
E. N. Monroe
V. B. Hilliard.

Inventors
James A. Martin and
John L. Latta

By their Attorneys,
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

JAMES ANDREW MARTIN AND JOHN LEE LATTA, OF HICKORY, NORTH CAROLINA.

COMPRESSED-AIR WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 569,294, dated October 13, 1896.

Application filed November 19, 1895. Serial No. 569,440. (No model.)

To all whom it may concern:

Be it known that we, JAMES ANDREW MARTIN and JOHN LEE LATTA, citizens of the United States, residing at Hickory, in the county of Catawba and State of North Carolina, have invented a new and useful Compressed-Air Water-Elevator, of which the following is a specification.

This invention relates to means for raising water from any depth by means of atmospheric pressure, thereby dispensing with pistons generally employed for this purpose.

One of the objects of the invention is to store power at such times when it is not required to raise water, thereby adapting the water-elevating apparatus to be used in connection with windmills, so that when the mill is in operation and it is not required to raise the water the energy or power can be stored for future use and for expenditure at such times when the wind is too light to effectively operate the mill.

The invention consists in certain details of construction, novel features, and peculiar combinations of the parts, which hereinafter will be more fully set forth, illustrated, and finally claimed.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages of the invention, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 shows the invention applied. Fig. 2 is a detail view of the water-chamber to be located at the bottom of the well, cistern, or reservoir from which it is required to elevate the water. Fig. 3 is a detail view showing the relative position of the air-valve when the air is passing into the right-hand compartment of the air-chest. Fig. 4 is a view similar to Fig. 3, showing the disposition of the air-valve when the air is exhausting from the right-hand compartment of the air-chest. Fig. 5 is a detail view of the rotary valve.

The same reference-numerals denote corresponding and like parts in all the figures of the drawings, and in the latter 1 indicates the water-chamber to be located at the bottom of the well, tank, or cistern, 2 the air-reservoir which is charged with air under pressure, and 3 an air-pump of ordinary construction for either charging the air-reservoir or for forcing the air directly to the water-chamber for raising the water.

It will be understood that the air-pump can be conveniently operated in any desired manner and by means of suitably-disposed mechanism, and, as shown, a shaft 4 is journaled transversely to the upper end of a post or standard 5 and is provided at one end with a crank 6, which has connection with the pump-rod 7, and has at its opposite end a balance-wheel 8 to be operated by hand or other power for actuating the air-pump when required. A shelf 9 is attached to the post 5 and supports the bucket or vessel for receiving the water. The lower end of the pump-cylinder is provided with an inwardly-opening check-valve 10, and the air-pipe 11, for conveying the air either to the air-reservoir or to the water-chamber, is supplied with an outwardly-opening check-valve 12, which closes when the piston of the pump rises and which opens when the piston descends to admit of the air passing into the said pipe 11.

The air-reservoir 2 is located in the length of the air-pipe 11 at a convenient point, and has connection therewith by branch pipes 13 and 14, the branch pipe 13 having a downwardly-opening check-valve and the branch pipe 14 an upwardly-opening check-valve, so that when the apparatus is not in use for raising water the air will be forced into the reservoir 2 through the branch pipe 13, and when the pump is not in operation and it is required to raise the water the check-valve in the branch pipe 13 will close against its seat and the check-valve in the branch pipe 14 will open, thereby permitting the air to pass to the water-chamber 1, where it is utilized to raise the water in the manner presently to be described.

The water-chamber 1 may have any desired shape and be of a size according to the capacity or quantity of water to be raised in a given

time, and is closed on all sides, and is divided by a central partition 15 to form two vertical compartments 16 and 17. An inwardly-opening valve 18 closes an opening in the side of the compartment 16 near the top thereof, and a corresponding valve 19 is provided and closes an opening in the side of the compartment 17, and these valves open inwardly to admit of the water into which the water-chamber is placed passing into the compartments 16 and 17 to be forced therefrom by atmospheric pressure substantially in the manner to be described hereinafter. The air-chest 20 is placed above the water-chamber and is divided by a partition 21 to form compartments 22 and 23, which have communication with the compartments 16 and 17 of the water-chamber by means of pipes 24 and 25, which also serve to connect and support the air-chest. Air-passages 26 and 27 extend vertically through the partition 21 and communicate at their upper ends with the fork or branches 28 at the lower end of the air-pipe 11 and connect at their lower ends with the fork or branches 29 of the exhaust-pipe 30. A rotary valve 31 is properly seated in the partition 21 and intercepts the air-passages 26 and 27, and is formed with ducts 32 and 33, which correspond in position with the respective passages 26 and 27, and which are adapted to be alternately brought in register therewith. These ducts 32 and 33 are disposed in inverse order and enter and leave the rotary valve at points corresponding to one-fourth of its circumferential length, that is to say, the terminals of the respective ducts are located a distance apart corresponding to an angle of ninety degrees. Hence it is only necessary to make a fourth of a revolution of the valve to bring the ducts therein in proper relation.

The mechanism for operating the rotary valve is the same for each of the corresponding compartments, and a detailed description of one will suffice. A horizontal lever 34 is fulcrumed between its ends upon a suitable support 35, and its inner end has connection with a stem 36, extending outwardly from the rotary valve, and its opposite end is pivotally connected with the upper end of a rod 37, having a bucket 38 at its lower end, and which is guided in its vertical movements by means of a stem 39, operating in a tubular portion 40, centrally disposed with respect to the bucket 38 and to which the lower end of the rod 37 is connected. The horizontal levers 34 are located in the respective compartments of the air-chest, and the buckets 38 are disposed in corresponding compartments of the water-chamber, and the rods 37 operate through the pipes 24 and 25, as most clearly indicated in Fig. 2 of the drawings.

The water-pipe 41 is provided with a discharge-spout 42, located above the shelf 9, and has a valve 43 by means of which the discharge-spout 42 can be opened or closed, as required. The lower end of the water-pipe is formed with a fork or branches 44, which extend into the compartments 16 and 17 of the water-chamber, and which have check-valves 45 and 46 at their respective lower ends.

The operation of the apparatus is as follows: The water-pipe 41 being open, so that the water will flow therethrough and out through the spout 42, the air from the pipe 11, either from the air-reservoir 2 or from the air-pump, will pass into the air-chest and from thence into one or the other of the compartments 16 and 17. Suppose the rotary valve is set so that the air will pass into the right-hand compartment 23, and from thence into the compartment 17, the pressure exerted thereby upon the water in the compartment 17 will close the valve 19 and force the water into the right-hand branch of the fork 44 and into the water-pipe 41, and when the level of the water in the compartment 17 reaches and falls below a predetermined point the bucket 38 in the said compartment 17 will descend and reverse the position of the valve 31, through the instrumentalities herein described, thereby causing the air to enter the left-hand compartment 22, from whence it will pass into the compartment 16 and exert a pressure on the water contained therein and compel it to pass to the water-pipe 41, through the left-hand branch of the fork 44. While the water is discharging from the left-hand compartment 16 the right-hand compartment 17 is filling through the opening closed by the valve 19, the air being exhausted from the right-hand compartment 17 through the duct in the rotary valve 31, previously utilized for conveying the air under pressure to the said compartment. It must be understood that the partition 21 will be provided upon opposite sides with suitably-disposed openings to register with the ducts 32 and 33; also that the buckets 38 act as weights to automatically shift the position of the rotary valve, so as to alternately charge and exhaust the compartments 16 and 17 of the water-chamber, whereby the successful operation of the apparatus is attained. It is clear that when the buckets 38 are submerged they are lighter than when the water recedes therefrom. Hence it is that the weight of one bucket is superior to the weight of the other bucket in the effective operation of the apparatus. When both buckets are submerged, they mutually counterbalance one another, but as soon as the water recedes from one its weight is augmented, as will be readily understood, thereby causing the said bucket to descend and reverse the position of the valve.

Having thus described the invention, what is claimed as new is—

1. In an apparatus for elevating water, the combination of a water-chamber divided into two compartments, each having a valve-controlled inlet-opening, a water-pipe having communication with the said compartments and provided with suitably-arranged check-

valves, an air-chest arranged above the water-chamber and divided by a partition into two compartments, pipes supporting the air-chest and connecting its compartments with corresponding compartments of the water-chamber, passages extending through the partition of the air-chest and communicating at their opposite ends with an air-supplying and an air-exhaust pipe, a valve seated in the said partition and intercepting the passages therein and provided with ducts to alternately register with the air-supplying and the air-exhausting pipes, rods operating through the aforesaid connecting-pipes and having connection with the valve, and buckets attached to the rods and controlled by the variation of the water-level in the compartments of the water-chamber, substantially as set forth for the purpose described.

2. In a water-elevating apparatus, the combination of a water-chamber subdivided into two compartments having valve-controlled inlet-openings, a water-pipe communicating with the said compartments and having check-valves, an air-chest divided by a partition into two compartments which are in communication with corresponding compartments of the water-chamber, said partition having inlet and exhaust passages, a valve seated in the said partition and provided with ducts disposed to alternately register with the said air inlet and exhaust passages, horizontally-disposed levers arranged in the compartments of the air-chest and operatively connected with the said valve, and buckets located in the compartments of the water-chamber and directed in their vertical movements and operatively connected with the said horizontal levers, and operated by the change in water-level in the compartments of the water-chamber to reverse the position of the valve in the air-chest, substantially in the manner set forth for the purpose described.

3. A water-elevating apparatus comprising in its organization an air-pump, an air-reservoir, a water-chamber subdivided into two compartments having valve-controlled inlet-openings, an air-chest, a partition dividing the air-chest into two compartments, which latter are in communication with corresponding compartments of the water-chamber, and which partition is formed with air-passages, pipes supporting the air-chest and connecting its compartments with the water-chamber compartments, a rotary valve seated in the said partition and intercepting the air-passages therein, and formed with inversely-disposed ducts, horizontally-disposed levers located in the compartments of the air-chest and operatively connected with the rotary valve, rods operating through the connecting-pipes and having attachment with the said levers, buckets arranged in the compartments of the water-chamber and connected with the said rods and controlled in their movements by the change in water-level to reverse the position of the rotary valve, a water-pipe having a fork the branches of which communicate with the compartments of the water-chamber and have check-valves, said water-pipe having a discharge-spout and provided with a controlling-valve, an exhaust-pipe having a fork in communication with the air-passages in the partition of the air-chest, and an air-pipe having a fork in communication with the opposite ends of the air-passages in the said partition and connecting with the air-reservoir and the air-pump, substantially in the manner set forth for the purpose described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JAMES ANDREW MARTIN.
JOHN LEE LATTA.

Witnesses:
Z. C. MARTIN,
N. W. CLARK.