J. COCHRANE.

Improvement in Apparatus for Condensing and Storing Air by the Pressure of Water.

Patented July 23, 1872.

No. 129,791.

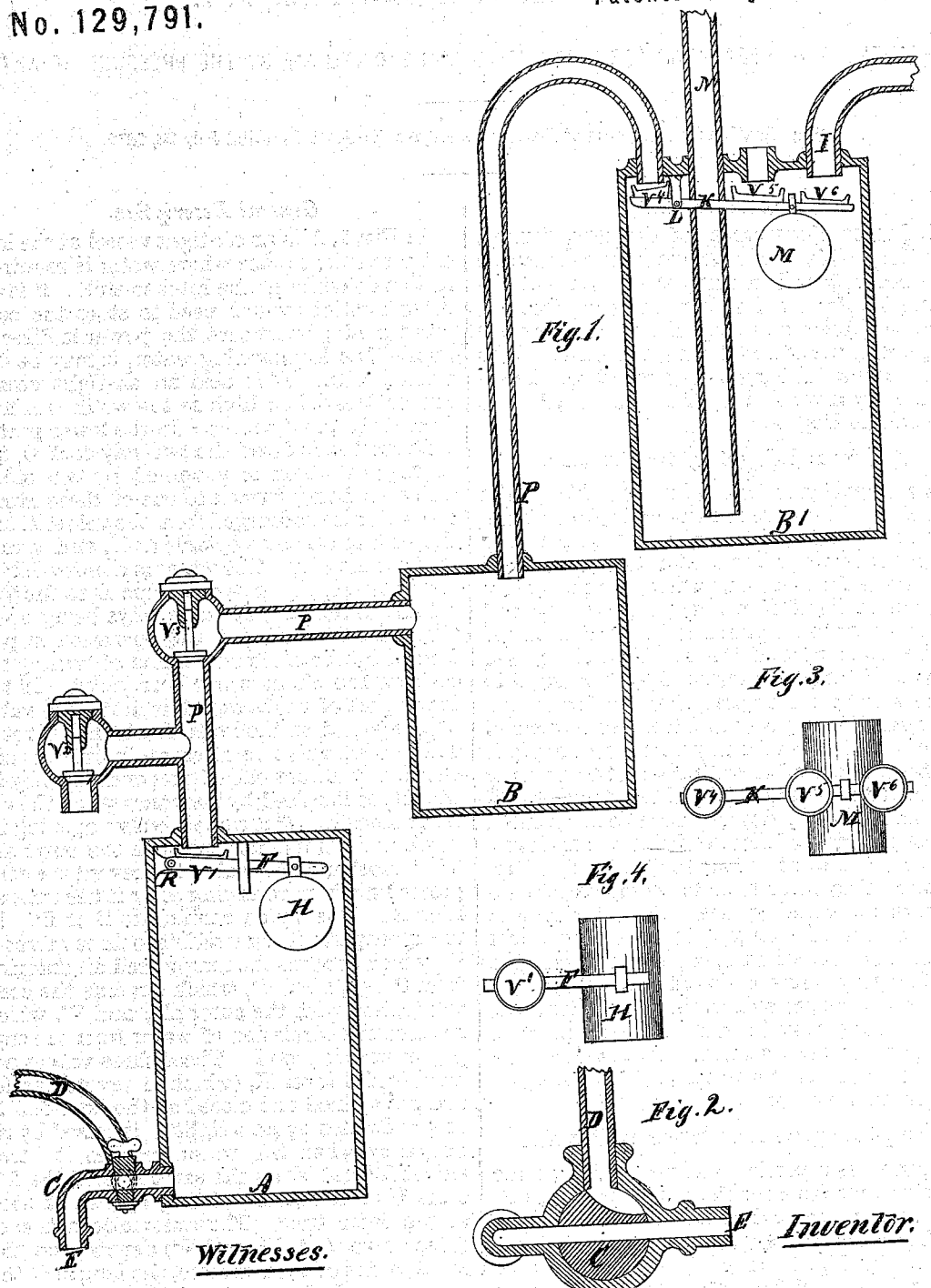

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

Witnesses.

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IMPROVEMENT IN APPARATUS FOR CONDENSING AND STORING AIR BY THE PRESSURE OF WATER.

Specification forming part of Letters Patent No. **129,791**, dated July 23, 1872.

SPECIFICATION.

I, JAMES COCHRANE, of the city, county, and State of New York, have invented devices for obtaining and utilizing the power of a column of water by allowing it to compress air, having relation more especially to that power at present wasted in towns and cities where water issues under head or pressure. I designate my invention by the title "Hydraulic Pneumatic Engine."

Nature and Objects of the Invention.

My invention is founded measurably on the principle of Heron's fountain and the Hungarian machine for draining mines. It proposes to obtain and store, in the form of compressed air, or use for elevating water, the power of a column or head of water. In dwelling and other houses large quantities of water are used in the lower part of the building, the power of which is at present wasted by allowing it to issue with an unnecessary head or force; and my invention purposes to obtain this power and store it to be used for any purpose, or apply it to the purpose of elevating water to parts of the house not supplied by the ordinary head.

I am aware that devices have been invented on the principle of Heron's fountain for elevating water; but, according to the history of hydraulics, they have been too complex and expensive for common use. Now, I claim to have in the following invention a practical water-elevator, which is especially applicable for elevating water in dwelling-houses.

It is obvious, as seen in the description, that the machine may be made either partly or wholly automatic; and, further, that it can be made to measure the water used by the addition of an indicator.

Description of the Accompanying Drawing.

Figure 1 is a vertical middle section of the combined machine for the purposes of elevating water or storing the compressed air. Fig. 2 is a horizontal middle section of the two-way cock C in Fig. 1. Fig. 3 is a top view of valves, lever, and float-ball fitted in the upper part of the vessel B′ in Fig. 1. Fig. 4 is a top view of the valve, lever, and float-ball fitted in the upper part of the vessel A in Fig. 1.

General Description.

In Fig. 1, A is an air-tight vessel at the lowest convenient place where water is required, as in a dwelling at the kitchen-sink. B is another air-tight vessel used to store the compressed air; but where the power is directly applied, as in elevating water, it may be dispensed with. B′ is also an air-tight vessel, and is located as high as the water will flow from its original source. In the lower part of the vessel A is fitted the two-way cock C, the turning of which is governed by two stops. The cock being turned to one of these stops, the water is discharged from the vessel A into the sink or other receptacle at E, and turned to the other stop. The water is admitted from the water-supply or service pipe D to the vessel A. Either one of these ways being open, the other is shut, and the operation is performed by the common method of turning the cock on and off, as water is required. In the upper part of the vessel A is fitted the valve V^1, supported on the lever F, which is pivoted at R. This valve is alternately opened and closed as the float-ball H preponderates by its weight, or is raised by buoyancy when the water reaches it. V^2 is a check-valve opening inward, and communicating with the outer air. V^3 is another check-valve to prevent the compressed air from returning after it has entered B or B′. P is a pipe running to B or B′. In the upper part of the vessel B′ are three valves—V^4, which governs the compressed air entering from the pipe P; V^5, which governs the communication with the outer air; and V^6, which governs the admission of water from the supply or service pipe I. These three valves are fixed to the lever K, (which is pivoted at L,) and are opened and closed as the float-ball M preponderates by its weight or is raised by its buoyancy when the water reaches it. The valves V^5 and V^6 on the same side of the fulcrum L work together, being opened or shut at the same time. The automatic action of these valves (V^4, V^5, and V^6) depends on the relative size of their orifices, the length of the lever K, and the weight of the float-ball M, and requires that these be adjusted in the proper proportion. N is a pipe running from the bottom of B′ to an open reservoir above,

located at the required height to elevate the water; and in a case where the water is required to go higher than the perpendicular distance from the vessel A to the original source added to its flowing point, then another vessel similar to B′ will be required, and the operation performed in B′ is repeated in this vessel. The vessels used in the construction of this engine I prefer to have cylindrical; but they may be of any shape.

Mode of Operating.

The handle of the two-way cock C being turned, as described above, the water enters the vessel A and compresses the previously-contained air, forcing it through the valve V^1, which remains open by the preponderance of the float-ball H until the water reaches and raises this float, shutting the valve, and thus preventing the water from entering the air-chambers. When it is required to draw water the cock C is turned to the other stop, (on,) when the water from A is pushed out by the compressed air remaining in the upper part of the vessel, the water lowers the float, the valve V^1 opens, and V^2, also opening, serves as an air-vent to empty A. The valve V^3 prevents the compressed air from returning after it has passed into B or B′. In the vessel B′, the valves V^5 and V^6 being open, the water enters from I, while V^5 serves as an air-vent. When the water reaches the float-ball M it lifts it, thus closing V^5 and V^6 and opening V^4. The compressed air from P now enters, forcing the water out of B′ through the pipe N to the reservoir above. The valves V^5 and V^6 are held shut after the water ceases to buoy the float by the pressure of air from within the vessel B′, and remain so until all the water has been expelled, when, the vessel B′ having communication with the outer air through N, the pressure is suddenly exhausted from B′. The valves V^5 and V^6, being now relieved from pressure, are opened by preponderance of the float-ball M, (and the other weights on the lever,) and at the same time V^4 is closed. The valves are now in the same position as at the commencement of the operation, and it is repeated.

Claims.

I claim—

1. The combination and arrangement of vessel A with its appurtenances—namely, the two-way cock C, float-valve V^1, and check-valves V^2 V^3—substantially as described, and for the purpose, as set forth, of generating automatically the power of water under pressure in the form of compressed air.

2. I claim the combination and arrangement of vessel B′, with its induction and eduction pipes, and float-valves V^4 V^5 V^6, arranged on the lever K, substantially as and for the purposes as set forth and described in the accompanying specification.

JAMES COCHRANE.

Witnesses:

JONES COCHRANE,

JOSEPH H. STINER.