

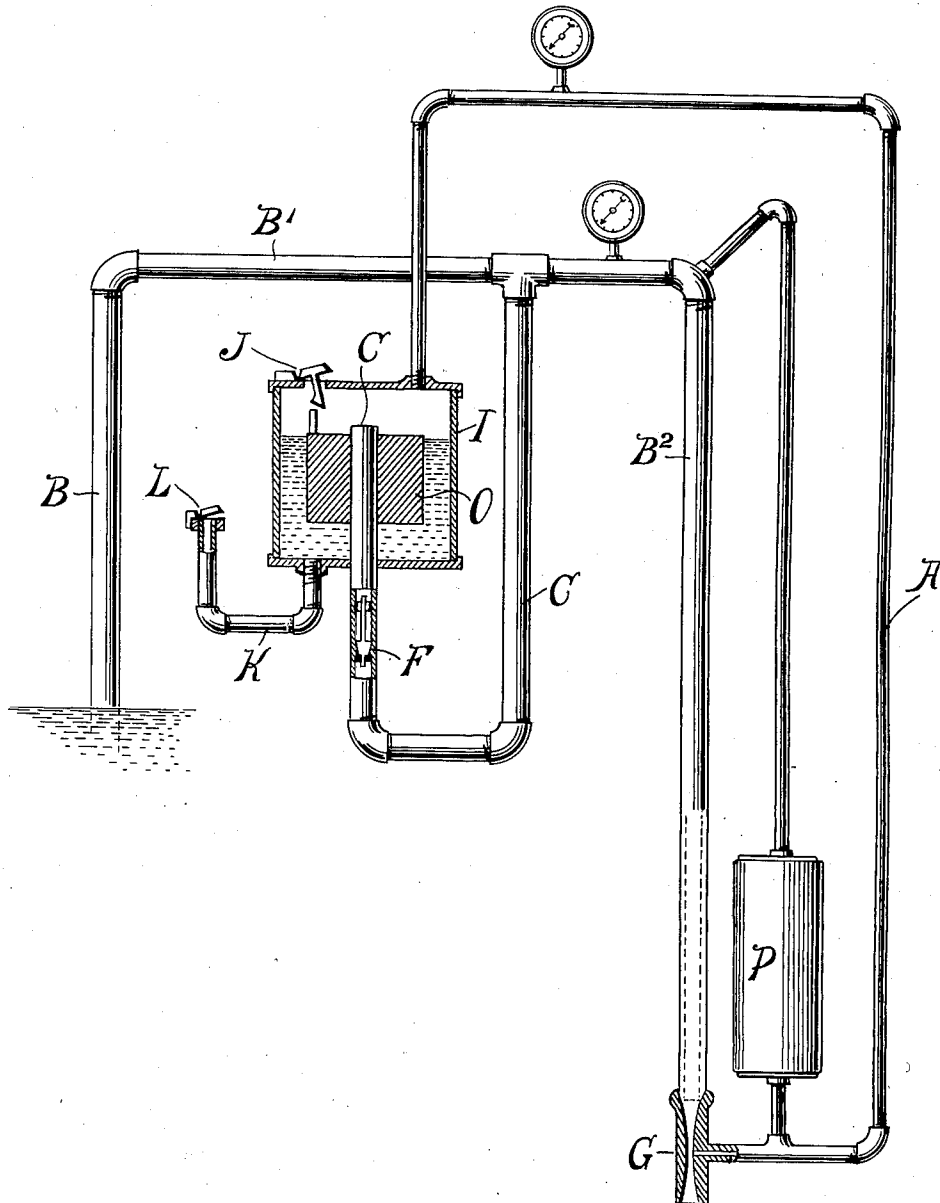
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SIPHON WATER ELEVATOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, JAMES NELSON WOOD, ERNEST AUGUST HOEN, and ANDREW CHARLES MEAGHER, citizens of the United States, residing at Richmond, county of Henrico, and State of Virginia, have invented certain new and useful Improvements in Siphon Water-Elevators, of which the following is a specification.

The drawing is a side elevation of our improved elevator.

Our invention consists in a system in which a siphon B, B', and B² is used, in which the inlet-leg B and B' and the outlet-leg B² may be of the same area or the outlet-leg B² may be reduced in area at a convenient point. On the outlet-leg B² is placed a pump G, based, preferably, on the principles of the Giffard injector. At any high point of the siphon we drop a tube C of appropriate length. At a point below the highest point of the siphon we inclose the end of the tube or intermediate column C in a water-trap I. This water-trap has on its top a small air-inlet valve J. This trap is also provided at a low point with an outlet to the air by a tube K, on which is a check-valve L, that can be lifted only by pressure from beneath it. At any convenient point in the intermediate column C a check-valve F is placed, the purpose of which is to prevent the return of water from the water-trap through the intermediate column C when atmospheric pressure is admitted to the water-trap. A vacuum-pipe A leads from the pump G on the outlet-leg to the top of the water-trap. There is also placed in the water-trap a float O, made of any suitable material, that as it is lifted by the influx of water through the column C reaches a point where it will finally upset the air-inlet valve at the top. When the siphon is filled with water in the usual way—that is, by closing the inlet and outlet pipes and filling it with water, either from a hose or any other way that may be convenient—the inlet and outlet pipes are opened and the siphon flows in the usual way. The intermediate column C obviously has been filled with water when the siphon is filled with water, because the column is in free communication with the siphon. As soon as the siphon starts to work the head of water passing through the pump G induces a powerful vacuum in the vacuum-pipe A, which is in-

stantly communicated to the water trap or traps. This causes the check-valve F in the intermediate column to rise, and the water flows from the intermediate column into the water-trap I until it is partially filled. As the water enters the float O rises until it reaches and opens the inlet-valve J, causing atmospheric pressure to enter the trap I. The column of water in the trap subjected to this atmospheric pressure closes the valve F in the intermediate column, acts on the outlet-pipe K of the trap, and lifts the check-valve L, thereby causing the trap to empty itself, or partially empty itself, of the water contained in it. As soon as the trap is empty, or nearly so, an equilibrium is established, the air-inlet valve J resumes its seat, the check-valve L on the outlet-pipe K resumes its seat, and the air that is contained in the trap begins to be drawn out by the continuous action of the vacuum-pump G on the outlet-leg of the siphon. As soon as the condition of vacuum has been restored inside the trap the former operation is repeated.

The advantages of this system lie in its simplicity, in the protection of the siphon itself from air, in the use of an intermediate column to protect the siphon from the influx of the air that enters the trap. This intermediate column is also a factor of safety in the event of any temporary derangement of parts in the water-trap itself. In addition to the points given it is not necessary to confine the water that passes through the siphon to acting on one pump. Any number of pumps may be used that can be conveniently operated by the given stream of water. Although in the experiment so far carried out a pump such as shown in the annexed drawing has been used, any pump of general type shown or on the principles of the aspirator would be equally useful.

On a large siphon or on a system of siphons it would be of the utmost importance that the siphon should be further protected from the accumulation of air at the high point or points or at the joints in the siphon such as is due to the presence of air or particles of air in the water that enters the inlet. This air that comes in with the water in minute parts gradually accumulates at any defective joints or high places and unless measures are taken to protect the siphon against it will finally destroy the siphon's action, and it will

have to be started over again. To overcome this, we provide a tank P, in which a low vacuum will be maintained by means of a small pump using only a part of the water from the outlet-leg. The action of this vacuum will be only placed in communication with the weak points of the siphon—that is to say, joints, or high points, elbows—but constantly removing any incoming or accumulating air, thus making the action of the siphon continuous under all circumstances. We claim that in any siphon there is at the high point a state of tension in the water that corresponds to a vacuum; but by means of the vacuum-pump we obtain a surplus of power that enables us to overcome the natural suction or natural vacuum of the siphon and draw water from it at this high point. Water can be raised to any height on this principle in successive steps—that is to say, the water liberated from the water-trap can be taken and lifted again by means of a siphon similar to that described, and so on indefinitely. On the additional lifts an increased ratio of efficiency will result from the additional head of water that passes through the vacuum-pump, and while it would probably never be possible to exceed twenty-eight inches of mercury in actual vacuum the capacity of the pump, considered as to its power and volume, would be immensely increased.

Having described the invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination with a siphon, of a low-vacuum tank and means connecting said tank with the points of the siphon where air accumulates, for the purpose of withdrawing the said air.
2. The combination with a siphon, of a means connected to the siphon to effect the withdrawal of water from the siphon, and connection between the siphon and said means to operate the means.
3. The combination with a siphon, of a column connected to the siphon, a trap connected to the column, a discharge from the trap, and connection between the siphon and the trap for operating the trap.
4. The combination with a siphon, of a vacuum-pump on the long leg of the siphon, and a vacuum-pipe connecting the high point of the siphon and said pump.
5. The combination with a siphon, of a vacuum-pump connected to the long leg of the siphon and operated by the head of water therein to exhaust the air from the siphon.
6. The combination with a siphon, of a main water-discharge intermediate the legs of the siphon, and means controlling the discharge and operated by the siphon.
7. The combination with a siphon, of a main water-discharge intermediate the legs of the siphon, and a pump operated by the siphon and controlling the discharge.

8. The combination with a siphon, of a main water-discharge intermediate the legs of the siphon, and a vacuum-pump operated by the siphon and controlling said discharge.

9. The combination with a siphon, of a main water-discharge, and a vacuum-pump operated by the siphon and controlling said discharge.

10. A water-elevator system comprising a siphon, a main water-discharge intermediate the legs of the siphon, a vacuum-pump connected with the long leg of the siphon and a low-vacuum tank connected with the joints and high points of the siphon.

11. In a water-elevator, the combination with a siphon, of a column connected thereto, a trap into which said column leads, a valve in said trap, a float in said trap to operate said valve, a discharge-pipe leading from said trap, a valve on said pipe, and a vacuum-pump connected with said trap.

12. In a water-elevator, the combination with a siphon, of a column connected thereto, a trap into which said column leads, a main water-discharge from said trap, and a vacuum-pipe controlled by the siphon and leading into said trap.

13. In a water-elevator, the combination with a siphon, of a column connected thereto, a trap into which said column leads, a valved air-inlet for said trap and a main water-discharge for said trap, a vacuum-pump connected to the lower end of the long leg of the siphon to be operated by the siphon, and a vacuum-tube connecting said pump and said trap.

14. In a water-elevator the combination with a siphon, of a column connected thereto, a trap into which said column leads, a vacuum-pump connected to the lower end of the long leg of the siphon and a vacuum-pipe connecting said pump and said trap.

15. In a water-elevator the combination with a siphon, of a column connected thereto, a trap into which said column leads, a vacuum-pump connected to the lower end of the long leg of the siphon, a vacuum-pipe connecting said trap and said pump, and a low-vacuum tank connected to the joints and high points of the siphon.

16. In a water elevator, the combination with a siphon, of a column connected thereto, a valve on said column, a trap into which said column leads, a valve in said trap, a float in said trap to operate said valve, a discharge-pipe leading from said trap, a valve on said pipe, and a vacuum-pump connected with said siphon.

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In presence of—

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