A. J. Reynolds,

Steam Pump.

No. 83,549. Patented Oct. 27, 1868.

Fig: 1.

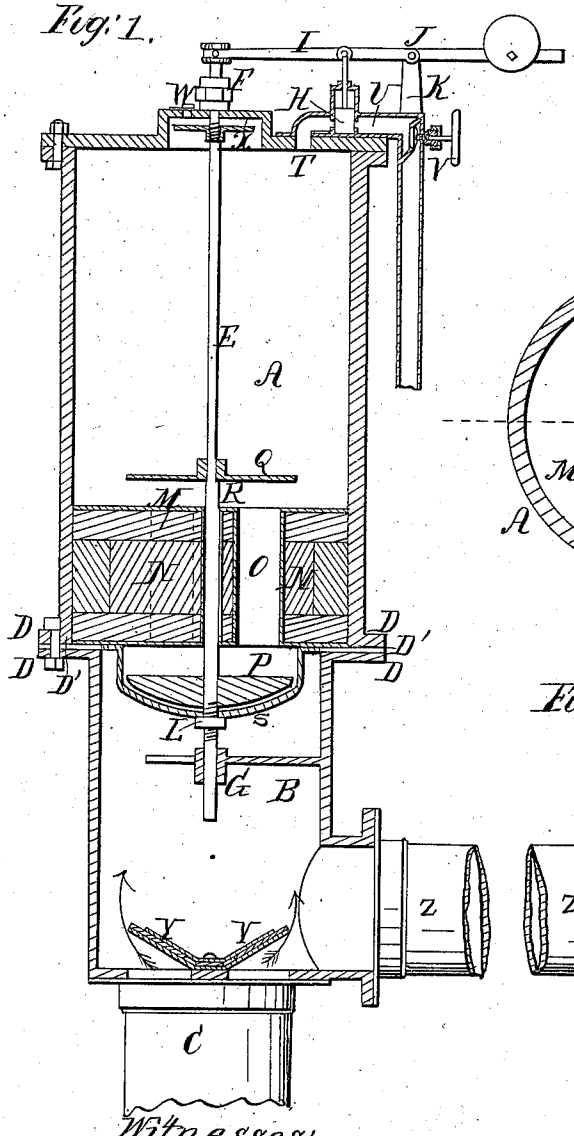


Fig: 3.

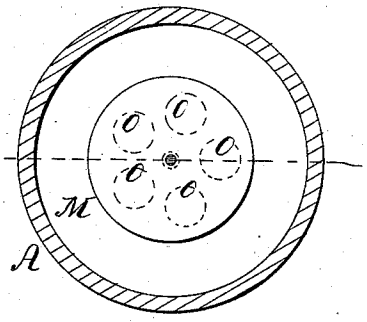
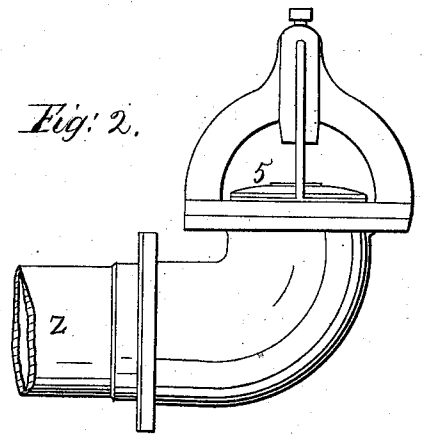


Fig: 2.



Witnesses,
H. F. Ewald
Charles A. Rice

Inventor,
Andrew J. Reynolds

United States Patent Office.

ANDREW J. REYNOLDS, OF CHICAGO, ILLINOIS.

Letters Patent No. 83,549, *dated October* 27, 1868.

IMPROVEMENT IN STEAM-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ANDREW J. REYNOLDS, of Chicago, in the county of Cook, and State of Illinois, have invented a new and useful Improvement in Condensing Water-Elevating Engines; and I do hereby declare the following to be a full and correct description of the same, sufficient to enable others skilled in the art to which my invention appertains, to fully understand and use the same, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 is a vertical central section of my improved condensing water-elevating engine;

Figure 2 is a side elevation of the discharge-pipe and valve; and

Figure 3 is a top view of the floating piston.

Like letters indicate like parts in the several figures.

The nature of my invention consists—

First, in the construction of a condensing water-elevating engine with a double, that is to say, an upper and a lower, cylinder, the latter of which is, properly speaking, the condensing-cylinder.

Second, in the devices for condensing the steam which is let into the upper cylinder, to destroy the vacuum, and allow the water to fall to the level of the discharge-valve, by the momentum of the falling water, which enables it to pass, through the floating piston, into the water in the condensing-cylinder.

Third, in the means for discharging the surplus steam, air, or gases, through a valve in the head of the upper cylinder, by means of the momentum or concussion of the water forced up by atmospheric pressure, and exerted on the piston, the upper cylinder being several feet less in height than the atmosphere would raise the water.

Fourth, in the arrangement of the valves on the main operating-rod within the cylinder, by means of which the above effects are produced.

A, in the drawings, represents a cylinder, open at the bottom, and provided with a flange, D, which fits on a similar flange on a smaller cylinder, B, open at the top, a non-conducting packing, D′, of any suitable material, non-conductor of heat, being placed between the two flanges, which latter may be secured to each other by bolts, or in any suitable manner.

The cylinder B ends, at its lower end, in a water-supply pipe, C, which is opened or closed by inwardly-swinging valves, Y, and its lower side extends into a discharge-pipe, Z, which, bending upwardly, is provided, at its mouth, with a valve, 5.

The central part of the head of cylinder A is raised, so as to form a circular chamber, which is provided with a valve-opening, W.

Through the centre of this chamber and head, and suspended by a nut, F, passes a rod, E, provided with a shoulder, R, and extending downward, through cylinder A, into cylinder B, where it is guided by means of a suitable bearing, G.

Clutched or otherwise secured to the upper end of rod E is the forked lever I, pivoted, at J, to a standard, K, and provided, at its free end, with a balancing-weight.

Between the pivot J and rod E, on the lever I, is pivoted the rod of valve H, which opens or closes the steam-pipe U, connecting with cylinder A through hole T in the cylinder-head.

Secured on rod E, in the chamber formed in head of cylinder A, is a ring-valve, X, provided with a downward shoulder, at such a distance from the top of the chamber that, when rod E moves upward, and lifts the valve H, thus opening steam-pipe U, it closes the opening W.

Moving freely on rod E, and resting on its shoulder R, when at its lowest position, is a ring-valve, Q, provided with an upward shoulder, of such dimension as to cover and close openings O in the floating piston M.

This floating piston fits snugly in cylinder A, moving on rod E, and may be constructed of wood, or any other suitable material, and be provided with chambers N, to contain air or cork, so as to make it float readily.

To the under side of this piston M is a bail, S, through which the rod E passes, and under which a nut, L, is screwed on the rod.

Between the bail S and the bottom of piston M, and moving freely on rod E, is a floating valve, P.

The operation of my improved steam-condensing water-elevating engine is as follows;

The valve 5, at the mouth of the discharge, is screwed down first, and the engine then filled with water to the top. The rod E is then lifted by any suitable means, and steam admitted into cylinder A, at the same time releasing the valve 5. The water in cylinder A, being higher by four or five feet than the mouth of the discharge-pipe, and aided by the pressure of the steam, now rushes down through cylinder B and discharge-pipe Z, until the water in cylinder B is even with the mouth of discharge-pipe. In reaching this point, however, it creates a vacuum between the floating piston M and the top of the water in cylinder B, which draws the steam from cylinder A (the valve H having been meanwhile closed, and the steam shut off, by the dropping of rod E) into the cylinder B, through the openings O in the piston M, where, mingling with the water, it is condensed very rapidly. A vacuum is created in cylinder A, (the atmospheric pressure keeping the valve W down,) for, as the water from cylinder A passes below the piston M, it acts like a solid piston on the water in cylinder B, which forced out on the water in cylinder B, which is forced out through the discharge-pipe Z, the valves Y being closed, and, rushing from cylinder A in great force, it necessitates the steam to follow, thus leaving a vacuum in cylinder A.

The vacuum being formed, as soon as the momentum of the water and the exertion of pressure by the steam, which has now been condensed, has ceased, the piston moves upward on rod E, the floating valve P closing the openings O, so that no water can pass into cylinder A. At the instant the vacuum is formed, the dis-

charge-valve 5 is closed, and the valves Y opened, through which latter the water rushes up, and follows piston M into cylinder A. As the piston moves upward, it carries with it the ring-valve Q, and any surplus uncondensed steam, air, or gases are forced out through the valve W in the head of cylinder A, until the shoulder on ring-valve Q comes into contact with the shoulder on any ring-valve X, which is rigidly secured to rod E. The latter is elevated, bearing ring-valve X against the head of cylinder A, and closing the valve W, at the same time elevating the rod I, and opening valve H, through which steam is admitted, thus destroying the vacuum in cylinder A, and above piston M.

The moment the vacuum is destroyed, the water begins to fall by its own gravity, the piston following, but the steam, exerting its force, whatever little force it has, on the piston, (the openings O of which are closed by ring-valve Q, which descends with the piston,) accelerates the momentum of the water, and the more, the deeper the water sinks in the cylinder. The moment the water begins to fall, the valves Y close, and valve 5 opens, and allows the water to escape through pipe Z. As the piston descends, the ring-valve Q strikes against the shoulder R on rod E, and opens the openings O in piston M, allowing the steam from cylinder A to follow the momentum of the water, by passing, through the openings O, into cylinder B, the water in that cylinder, B, acting like a solid piston, which, moving down in cylinder B, would create a vacuum, and force the steam to follow it, where, mingling with the water, it is rapidly condensed. At the same time, a moment after ring-valve Q has struck shoulder R, the bail S strikes against nut L on rod E, and carries it downward with it, until piston M strikes at the bottom of cylinder A, thereby removing ring-valve X from valve W, and closing valve H, thus shutting off the steam from cylinder A. A vacuum is again formed in cylinder A, and the operation continues, as hereinbefore described.

The condensation of the steam, and consequent forming of a vacuum, are very rapid, so rapid, in fact, that I have been enabled to make fifteen strokes a minute, with a pressure of from ten to fifteen pounds of steam, raising the water a height of twenty-five feet. The engine would operate were but little steam used, but not as rapidly, for the momentum of the water is accelerated by the pressure of the steam, though a greater amount of steam has to be condensed to create the vacuum, which is accomplished by the large surface of the condensing-cylinder, this cylinder being kept in a continuous cool temperature, (the non-conducting packing between it and the upper cylinder preventing the latter from heating the former,) and being almost continuously kept filled with water.

By forcing out the surplus steam, air, or gases, through valve W in the head of the cylinder A, by means of the momentum or concussion of the water, I do away with air-pumps, siphons, and similar contrivances, and thus simplify the construction and operation of my steam-condensing water-elevating engine.

The rod E is balanced in such a manner, by means of the weight on the free end of lever I, that the least amount of power is only required to operate it.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. A water-elevating engine, having two cylinders, arranged one upon the other, the upper one for receiving the steam, which aids in expelling the water therefrom, and which, by means of its condensation, causes a vacuum to be created therein, and another, into which the steam from the latter is caused to flow by the discharge of the water from the former, and in which the steam from the upper cylinder is condensed, substantially as described.

2. The combination of cylinders A and B and float or piston M, with its apertures or passages O, substantially as described.

3. The combination of the float or piston M and valve P, substantially as set forth.

4. The combination of the rod E, float M, valves P, Q, and X, substantially as described.

5. The combination and arrangement of valves Q and X on rod E, and valve W in the head of cylinder A, substantially as set forth.

6. The arrangement of valve H in relation and with reference to valves X and W, substantially as set forth.

ANDREW J. REYNOLDS.

Witnesses:

D. OURAND,

M. F. KLAUCKE, Jr.