

C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,529.

Patented Sep. 24, 1872.

Fig. 1,

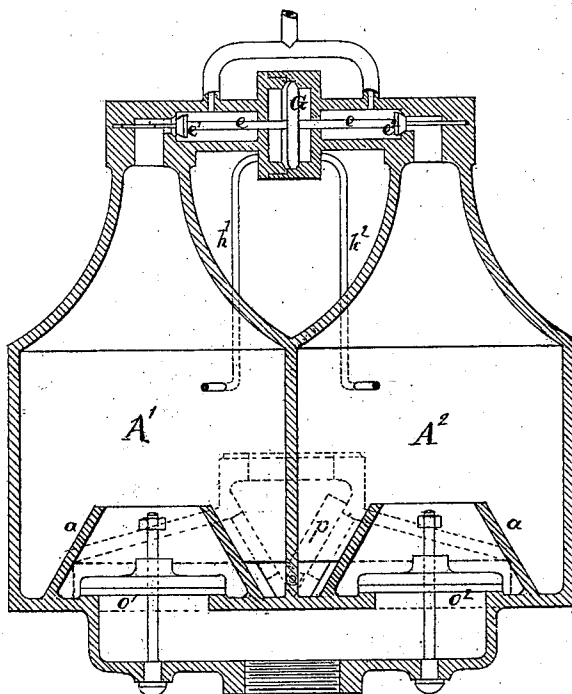
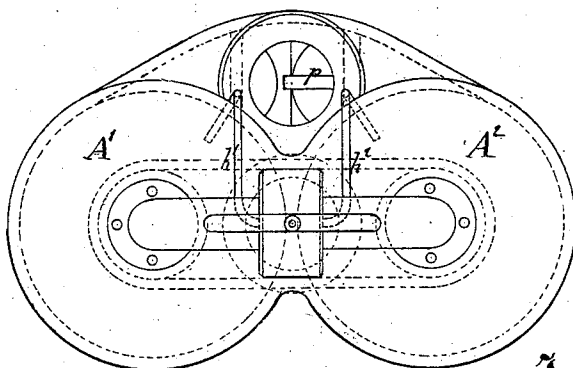


Fig. 2,



Witnesses,

Arnold Hornum.
W. C. Dey

Inventor,

C. H. Hall
by his attorney, J. S. Peterson

UNITED STATES PATENT OFFICE.

CHARLES H. HALL, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,529, dated September 24, 1872.

CASE O.

To all whom it may concern:

Be it known that I, CHARLES H. HALL, of New York city, in the State of New York, have invented a certain Improvement in Steam Pumping Apparatus, of which the following is a specification:

The invention relates to that class of pumping apparatus in which the steam is admitted into the same chamber or chambers with the water and presses upon the surface thereof. The working parts are small relatively to the capacity for pumping, and the apparatus constitutes an efficient pumping means, operating rapidly and reliably. I employ strong chambers, provided with valves for admitting water and holding it against its return, and also with valves for allowing it to be expelled through another pipe to be conducted to an elevated reservoir, or to such other point as may be desired; and the operations of being filled with water and being discharged succeed each other by reason of a change of position of the steam valve or valves, governing the admission of steam from a boiler or steam-generator, which may be situated at a distance. There are two equal chambers in each set of the apparatus, the two filling and emptying alternately. The chamber which is filling with water should complete its filling before its mate is emptied, and the change of the steam-valves is effected automatically on the completion of the emptying of the discharging-chamber.

The following is a full and exact description of what I consider the best means of carrying into effect one form of the invention. The accompanying drawing forms a part of this specification.

Figures 1 and 2 represent this form. In this the steam-valves are fixed on a stem, and the motion in the change of condition is aided by the differential pressure on the two sides of the piston attached. Fig. 1 is a vertical section, and Fig. 2 a plan view.

G is the piston fixed on the valve-stem e , and working tightly or nearly so in a short cylinder, H, which is connected by pipes $h^1 h^2$ to the chambers $A^1 A^2$, respectively. The arrangement represented allows the valves to work in a horizontal direction, so that gravity is of no effect. In the position represented

the valve e' is open, and the steam is admitted into the chamber A^1 , driving out the water and sinking the water-line. The chamber A^2 fills rapidly with water and rests in that condition. So soon as the water-level in the chamber A^1 is sunk below the upper edge of the discharge-orifice, and the surface is agitated and a portion of the steam discharged, the vacuum which obtains therein is instantly communicated through the pipe h^1 to the left-hand side of the piston G. This piston and its connections then move immediately to the left, in obedience to the difference in pressure acting on the piston G. The increased current of steam flowing past the valve e^1 also contributes to this result. From both causes the motion of the valve-stem e is very prompt, closing the steam-valve e^1 and opening the steam-valve e^2 . Immediately on this change of condition the same round of operations occurs in the chamber A^2 , the chamber A^1 filling with water and standing ready to exert a pressure on the piston G to move it in the opposite direction and again change the position of the valves the moment a partial vacuum obtains in the pressure-chamber A^2 . Each chamber receives the water past the valves $o^1 o^2$ and discharges it again past the valve p , as will be obvious. One object of the casing a around and partially over the water-induction orifice in the interior of the chambers is to compel the inflowing water to rise violently in and near the middle of the chamber, so as to be certain to agitate the surface and continue the condensation of the steam, even if the induction of the water is slow and if the steam-valves $e^1 e^2$ should leak slightly.

I have found by experiment that the loss of steam is slight when worked in this manner in uncoated vessels of metal; but I propose in ordinary practice to coat the interior of each chamber with japan varnish, or with red lead and oil, or with a solution of rubber or the like, to serve as a durable conductor of heat. I can make the chambers and the several connections of lead, to pump acids, or of glass or other material for any special uses requiring such.

What I claim as my invention is as follows:

The casing *a*, arranged, as shown, relatively to the water-induction valve *o*¹ and to the chamber *A*¹ and its connections, so as to cause the water inducted to be directed to the surface and constantly disturb the water-surface, and cause the continuous condensation of the steam during the admission of the water, as set forth.

In testimony whereof I have hereunto set my hand this 18th day of May, 1872, in the presence of two subscribing witnesses.

C. H. HALL.

Witnesses:

ARNOLD HÖRMANN,
W. C. DEY.