C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,526. Patented Sep. 24, 1872.

Fig:1.

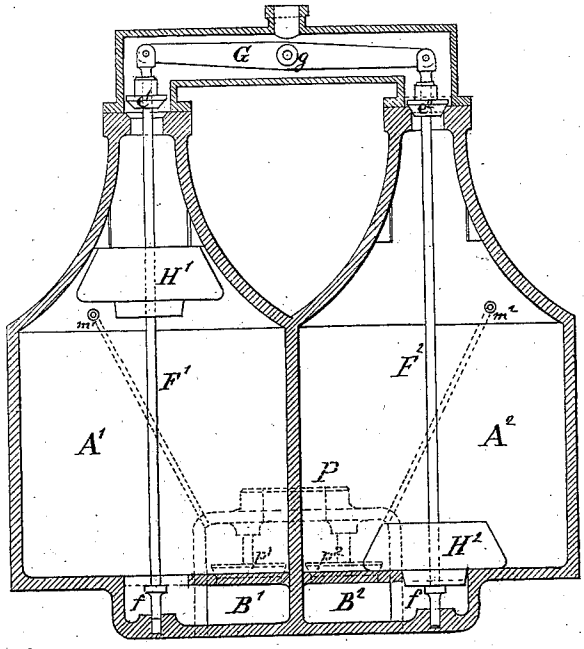
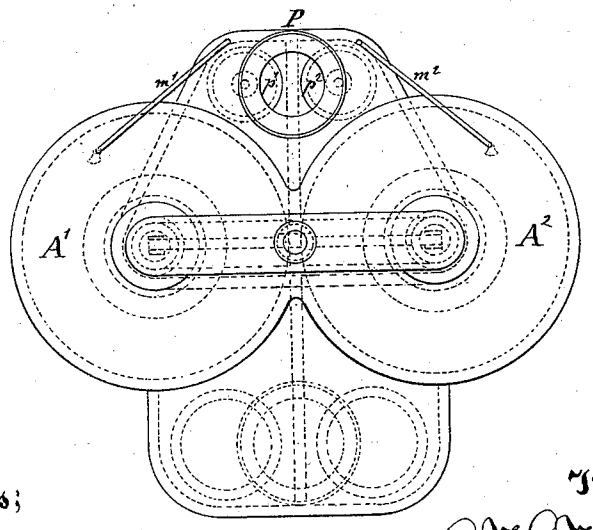


Fig:2.



Witnesses;

Arnold Hörnemann.

W. C. Dey

Inventor;

C. H. Hall

by his attorneys T. L. Stetson

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **131,526**, dated September 24, 1872.

CASE L.

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.

This invention is represented in Figures 1 and 2. Fig. 1 is a vertical section, and Fig. 2 is a plan view.

The steam-valves e^1 e^2 are fixed on rods which extend vertically down through the respective chambers, and also extend upward and connect to the opposite ends of the tilting-lever. G represents the lever tilting upon the center *g*, and F^1 F^2 are the vertical rods, each capable of a little vertical movement. Each rod carries a stop, *f*, firmly fixed. The floats H^1 H^2 play loosely on the rods, and rise and sink thereon according to the level of the water in the chambers. When the water in a chamber is nearly expelled the float strikes the stop *f*, and, pulling on the vertical rod, closes the steam-valve on that side and opens the steam-valve to admit steam to the opposite chamber. Suppose, for example, the steam-valve e^1 to be open. The steam is admitted past it to fill the chamber A^1 and expel the water. The water being driven downward through the passage through which it has been received, passes through this orifice into the sub-chamber B^1, from whence it rises past the discharge-valve p^1 into the discharge-pipe P, to be conveyed away. When this action has proceeded until the float H^1 has nearly reached the bottom, the float is drawn down very forcibly. It not only continues to sink by the lowering of the surface of the water, (which would give it only a gentle force, which might be insufficient for my purpose,) but I have provided means for causing it to be drawn downward forcibly and suddenly by the pressure of the steam. This is effected by providing the lower side of the float with an extension which reaches downward loosely into the discharge-orifice. When the sinking of the water has progressed so far that the float H^1 thus enters into the discharge-orifice it nearly stops the passage, and thereupon the float with the lower extension commences to act as a piston, receiving the whole direct pressure of the steam, and it is moved downward strongly and rapidly. In this movement it strikes the stop *f* and pulls down forcibly on the rod F^1. This movement closes the steam-valve e^1 and opens the steam-valve e^2. The same effect follows this change of the steam-valve as in all the other modifications. The steam commences to force out the water from the other chamber A^2, and the same round of operations occurs which has been described for this chamber A^1. Meanwhile the cold water flows up through the orifice in the bottom and fills the chamber A^1, carrying the float H^1 again to its highest position. The float H performs a useful function in addition to that above described. It is that of arresting or checking the rise of the water when the chamber is nearly filled. I have, in my experiments, experienced some difficulty when no precaution of this kind is adopted. The water is liable to rise with great violence, and when the steam-valves open in the direction here repre-

sented the water is liable to impinge against them and open them too early. I cannot too often repeat that the change of condition of the steam-valves should occur when the emptying-chamber is emptied, and not when the filling-chamber is filled. Ordinarily there may not be much difference in the time of these operations; but when there is any difference the filling-chamber must be filled first and wait a little until the emptying-chamber is emptied. I can employ the pipes m^1 m^2 to supply a small stream of water into the upper portion of each chamber to hasten the rapidity of the condensation.

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 non-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:

1. In combination with the chambers A^1 A^2, suitable induction and eduction means, and provisions for receiving steam to act intermittently in each, I claim the floats H^1 H^2, rising and sinking with the water in the chambers, and arranged relatively to the valve-rods F^1 F^2, and the tapering tops of the chambers, as shown, so as to operate the steam-valves e^1 e^2, and also to check the force of the water near the close of its induction movements, as specified.

2. Also, in combination as aforesaid, the arrangement of the valves e^1 e^2 so as to tend to close with the current of the steam, said force co-operating with the force of the water being expelled to induce a prompt change of the position of the steam-valves, as specified.

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.