

C. H. HALL.
 Improvement in Steam Vacuum-Pumps.
 No. 131,528. *Fig. 1.* Patented Sep. 24, 1872.

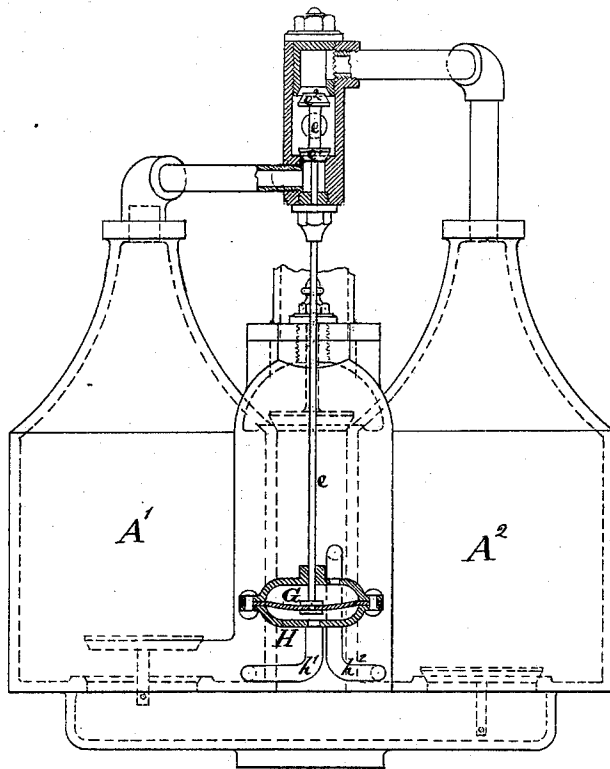
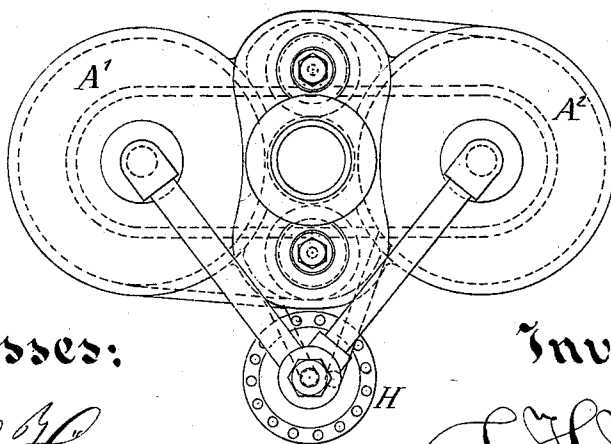


Fig. 2.



Witnesses:

Arnold Hornum.
W. C. Day
 " "

Inventor:

C. H. Hall
 by his attorney *J. L. Selmon*

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,528, dated September 24, 1872.

CASE N.

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.

The difference of pressure in the two chambers is made to give motion to a diaphragm which is connected to the steam-valves.

Figure 1 is a side elevation, partly in section; and Fig. 2 is a plan view.

The steam-valves e^1 e^2 are fixed upon a vertical rod, e , which extends out through a stuffing-box, and is connected to the diaphragm G below. This diaphragm is inclosed in a chamber, H , connected by pipes h^1 h^2 to the respective chambers, the space below the diaphragm G being connected by the pipe h^1 to the chamber A^1 , and the space above the diaphragm G being connected by the pipe h^2 to the chamber A^2 . The steam-valve e^2 is represented as open. The steam flowing upward past this valve, and through the connections

into the chamber A^2 , expels the water therein until it has sunk to the level of the discharge-orifice. The agitation occurring at this period and the discharge of a quantity of the steam induces a partial vacuum in the chamber A^2 , which has the effect to increase momentarily the flow of steam past the valve e^2 , and to tend to close it. But the change of conditions in the provisions for admitting steam to the chambers is not made to depend on this alone. The effect of the partial vacuum momentarily formed in the chamber A^2 is felt on the diaphragm G , by reason of the communication with the space above through the pipe h^2 . The diaphragm G rises on account of the difference of pressure in the chambers A^1 and A^2 , and contributes its great force to aid the valves in moving. The effect is to raise the valve-stem e , closing the valve e^2 , and opening the valve e^1 , after which the same round of operations is performed in the chamber A^1 as has been before described in the chamber A^2 . At the end of the expulsion of the water from A^1 the diaphragm G is drawn downward.

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:

In combination with the chambers A^1 A^2 , suitable water induction and eduction means, and the two oppositely-mounted poppet-valves e^1 e^2 fixed on the same rigid connection e , for receiving steam intermittently into each, I claim the double-acting diaphragm G , subject to the influence of the pressure in the vessels A^1 A^2 , respectively, and arranged to aid in operating the steam-valves e^1 e^2 by the motion thus induced, as herein 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. DEX.