

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,533, dated September 24, 1872.

CASE S.

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 which the change of condition in the steam-valves is induced or aided by changes in the position of hollow vessels which become alternately filled with water and emptied again as the water-level in the chambers A^1 A^2 rises and sinks. Fig. 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 rod, e , which extends out through a stuffing-box at each end of the valve-chest, and is connected at each end to a lever. The apparatus is the same at each end. The lever F , turning upon

the pivot f' , is connected by a link, Y^1 , to the bell-crank lever G^1 , which turns on a pivot, g' , and carries a hollow vessel, H^1 , of considerable capacity. The bottom of the vessel H^1 is connected by a flexible pipe, m^1 , to the bottom of the chamber A^1 , and the top of the vessel H^1 is connected by a corresponding pipe, n^1 , to a higher point in the chamber A^1 . The steam-valve e^1 is represented as open, admitting steam to the chamber A^1 , which expels the water, driving it up past the valve p' and sinking the water-level. When the water has got below the connection of the pipe n^1 the steam passes up rapidly through the latter and allows the vessel H^1 to empty itself, the water therein falling by gravity, through the pipe m^1 , into the vessel A^1 . So soon as the vessel H^1 is lightened by this emptying action it allows the force of the superior weight of the opposite vessel H^2 , which has been previously filled from the filled chamber A^2 , to be felt through the several connections, and the rod e is moved promptly to the left, thereby closing the steam-valve e^1 and opening the steam-valve e^2 .

Now, the same round of operations occurs in the chamber A^2 and its connections as has been heretofore described in the chamber A^1 , while the steam in the chamber A^1 , becoming rapidly condensed, induces a vacuum and the cold water flows up from the pipe O past the induction-valve o' , filling the chamber A^1 , and also, by the condensation in the vessel H^1 , filling that promptly with water. This vessel H^1 has been previously elevated by the motion of the rod e to the left, as will be evident from the connections represented, and the gravity of the now loaded vessel H^1 is ready to exert its effect in restoring the parts to their primitive condition so soon as the opposite vessel H^2 is lightened by the rise of steam through the pipe n^2 , when the chamber A^2 is nearly emptied. The chambers thus promptly alternate, the one filling not only itself, but also its connected vessel, before the water is quite expelled from the other chamber, and the change in the conditions for the admission of the steam occurring promptly so soon as the emptying-chamber becomes sufficiently emptied.

I have found by experiment that the loss of steam is slight when worked in this manner in uncoated vessels; 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

provisions for admitting steam intermittently into each, I claim the movable vessels $H^1 H^2$, suspending means $G^1 G^2$, flexible connections $n^1 m^1 n^2 m^2$, and means $Y^1 F^1 Y^2 F^2$ of communicating motion to the steam valve or valves $e^1 e^2$, all arranged for joint operation, substantially 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. DEY.