

C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,540.

Patented Sep. 24, 1872.

Fig. 1.

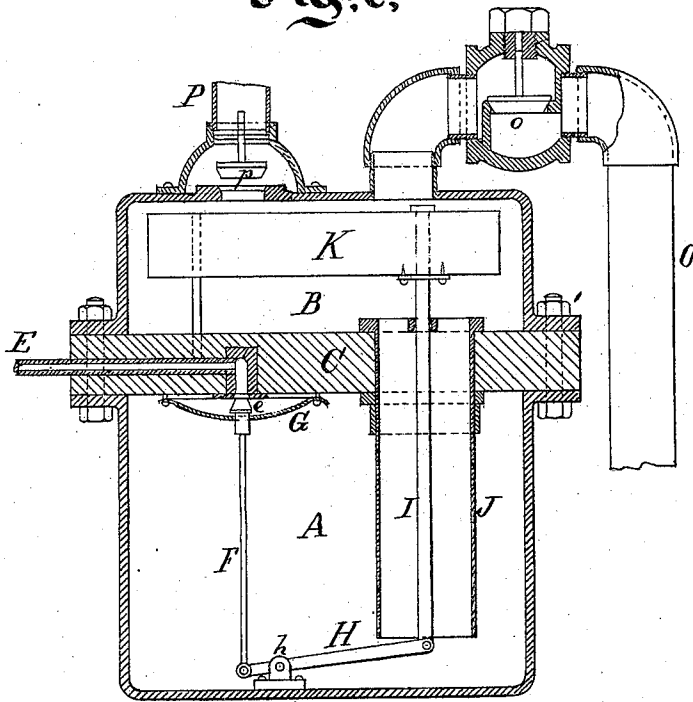
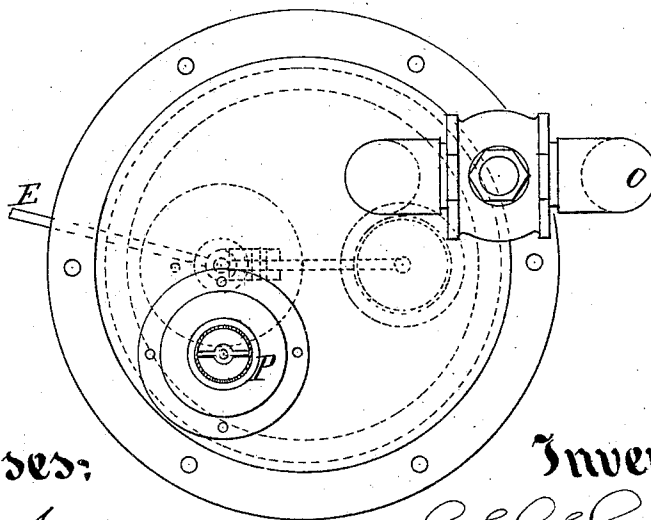


Fig. 2.



Witnesses:

Arnold Hornum.
W. C. Dey
" "

Inventor,

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

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACCUUM-PUMPS.

Specification forming part of Letters Patent No. 131,540, dated September 24, 1872.

CASE Z.

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:

To distinguish this from other inventions of my own, which are somewhat analogous, I will designate this particular invention by the letter Z.

The apparatus is single acting, or, instead of emptying two chambers to act alternately, there is but a single chamber provided with means for letting on and shutting off the steam by apparatus contained entirely within itself. The chamber is divided horizontally by a thick partition of wooden plank, with a large pipe leading therefrom to near the bottom of the lower vessel, and with a float serving also partially as a piston in the upper vessel. The division of the apparatus into an upper and lower chamber by these provisions is not, however, equivalent in effect to the division into two chambers in the double forms of the apparatus. The water is admitted at the top.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawing forms a part of this specification.

Figure 1 is a vertical section, and Fig. 2 a plan view.

Similar letters of reference indicate like parts in both figures.

I will use the letter A to designate the lower chamber or the lower portion of the apparatus, and the letter B to indicate the upper portion. C is the thick wooden partition. The steam-pipe E conducts the steam into the interior of the partition C, from whence it is discharged downward past the steam-valve *e*, which is mounted on a rod, F, playing through a spreader or deflector, G, which has the effect to distribute the steam gently over the surface and prevent its agitating the water below. The rigid rod F is pivoted to the short arm of the lever H, turning on the fixed pivot *h* below, and connected to the rod I, which ascends through a hanging tube, J, and carries a float, K, which is so extended horizontally as to nearly touch the vertical walls of the upper chamber B.

The hanging tube J is open at both ends, and forms the only communication between the upper and lower chambers. The water is discharged upward past the valve *p* into the delivery-pipe P. The water is drawn from the well or tank through the pipe O past the valve *o*, and flows into the top of the chamber B, directly above the floating piece K, which serves at certain times as a float, and at other times as a piston. The valve *e* is represented as open. In this condition the steam, coming in through the pipe E past the valve *e*, is spread horizontally, and made gentle in its action by means of the deflector or spreader G. It heats the upper surface of the water in the chamber A, and, passing downward thereon, forces the cold water below up through the capacious pipe J into the upper chamber B, and thence past the loosely-fitted piston or piece K out into pipe P. This state of things continues until the water-surface in the chamber A has descended to a little below the bottom of the pipe J. At this period a portion of the hot water lying on the surface, and also a certain proportion of the steam in the chamber A, are suddenly delivered upward into the pipe J. The sudden exposure of the cold water below, and also the escape and sudden condensation of a portion of the steam in the pipe J, (and it may sometimes reach the chamber B above,) causes such a vacuum in the chamber A, and, consequently, in the entire apparatus, that the delivery-valve *p* instantly closes, and the water-induction valve *o* rises and admits water from the pipe O. The current from the pipe O, acting on the piece K as a piston, forces it downward thus through the connections, promptly closing the steam-valve *e*. The steam-pipe E is of so small diameter that the rush of steam into the apparatus is small during the brief period while this change is taking place. The steam-valve *e* is held tightly closed by the current of water flowing inward past the valve *o* until the chamber A is filled; (the chamber B is supposed to be all the time filled with water;) but so soon as this current of water stops by reason of the chamber A being completely filled with water, the induction-valve *o* closes, the piece K commences to act as a float, and, rising gently

against the now slackened or entirely stopped downward current of water, opens the steam-valve *e*, and the steam is again admitted to force out the water as before.

I have in my experiments employed vulcanized rubber as a material for the hanging tube *J*. I esteem it well to employ some non-conductor for this purpose, but it is practicable to use a thick pipe of iron. Perhaps it is still better to use a double pipe, or even a triple pipe, of iron or similar material, in case a good non-conductor is not available.

I employ a guide-bar, extending across the pipe *J* at the top, with a hole in it, which receives the rod *I*.

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 a chamber, *A*, suitable water induction and eduction means, and provisions for receiving steam intermittently, I claim the partition *C*, orifices and hanging curtain *J*, with the float *K* in the chamber above, and the lever *H* in the chamber below, connected through the rod *I*, all arranged for joint operation, 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.