

C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,521.

Fig. 1.

Patented Sep. 24, 1872.

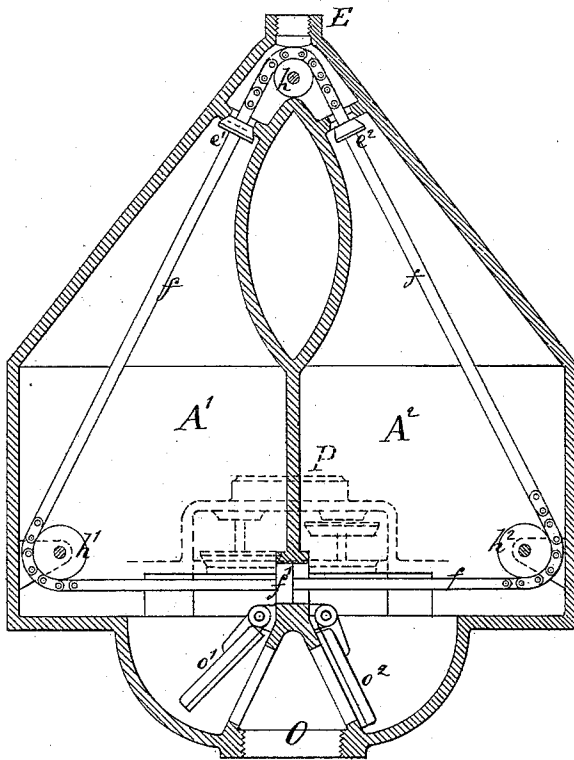
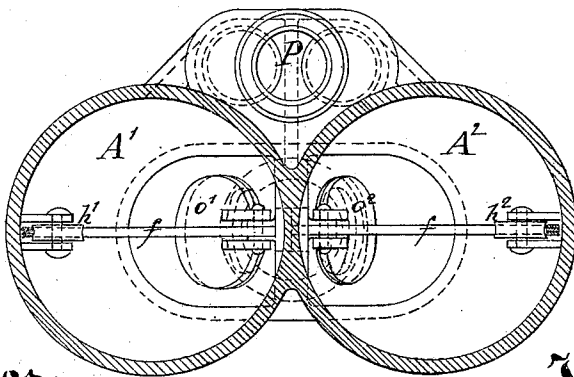


Fig. 2.



Witnesses:

Arnold Horvath.
W. C. Gray

Inventor:

C. H. Hall
By his attorney, J. S. Weston

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,521, dated September 24, 1872.

CASE G.

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 G.

The apparatus belongs to that class of steam-pumps in which the solid working parts are small, relatively, to the capacity of the apparatus, and the steam is caused to act by direct pressure upon the water. There is a marked gain by the reduction of rubbing-surfaces and the great efficiency and small cost of the apparatus.

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 is a horizontal section.

Similar letters of reference indicate like parts in all the figures.

A¹ A² are vessels of equal size, formed of cast-iron, in one piece, and adapted to resist a strong internal pressure, as also to resist the external pressure of the atmosphere when a vacuum is formed therein. E is a steam-pipe, which communicates with a boiler, not represented. The steam-pipe E is of small internal diameter, or there must be at some point in the steam connection a narrow passage through which the steam cannot flow readily except in a very contracted current. O is a pipe of sufficient size, communicating with the tank or well from which the water is to be taken; and P is a delivery-pipe, adapted to convey away the water under pressure and discharge it at a higher point, or wherever it is desired to force the water.

The chambers A¹ and A² are filled alternately with steam and water. The action is self-controlling. When the steam is excluded from a chamber the water is received from the pipe O and fills it. Meantime the opposite chamber is being emptied of its water by the steam entering at its top and pressing downward on

the surface with such force as to discharge the water outward through the discharge-pipe. When the water is thus expelled the reception of steam is cut off and the chamber is soon again filled with water. While one chamber is being filled with water the other is expelling its water.

The admission of the steam to the chambers alternately is controlled by the two valves e¹ e², which are fixed on rods forming part of the continuous chain f, and extending around pulleys, as represented. The uppermost pulley is marked h and the other two pulleys, respectively, h¹ h². The chain compels the valves e¹ e² to move together. The closing of one causes the opening of the other, and vice versa. The chain extends through the partition between the two chambers A¹ A², and is there enlarged to form a piston, f', which fits easily within a corresponding cylinder formed in the partition, of suitable length to allow the piston to move a little ways horizontally, carrying the chain with it. On the formation of a vacuum in either chamber the piston f' is drawn strongly in that direction and, yielding to the force, moves rapidly. The movement, being transmitted through the chain f to the valves e¹ e², closes one valve and opens the other. This provision insures that the steam shall be excluded from the chamber A¹ by the closing of the valve e¹ so soon as a vacuum commences to be formed in it, and the same for the other chamber A². The provisions for initiating the vacuum in either chamber are not fully represented, but may be briefly described as follows: When the steam is admitted to either chamber it presses upon the water, forming a stratum of hot water on the immediate surface, but leaving the mass of water cold below. The cold water is forced out through suitable valves, which may be self-acting, into a pipe leading upward to an elevated or to any other desired point of discharge. So soon as the chamber is nearly empty and the water-surface has sunk nearly to the bottom of the vessel the discharge-passage commences to be uncovered and the steam itself commences to be discharged through such passage. This disturbs the water-level and exposes the cold particles below. This movement induces a rapid con-

densation of the steam, and as the pipe and passages for the induction of steam are of limited area it induces a partial vacuum, with the effects as above explained. The valves for the induction of water through the pipe O into either chamber A¹ or A² may be self acting, and arranged as indicated by o¹ o². The piston f' may be packed in any ordinary or suitable manner; or, instead of a piston working in a cylinder, a long cylindrical part may play through a packed hole in the partition—in other words, the packing may be carried in the piston and work against a smooth surface exterior thereto; or the packing may be in the exterior surface and be adjusted against a smooth object, analogous to the plunger of a pump, moving within it. I believe that the apparatus will work successfully without any packing.

I claim as my invention—

1. The valves e¹ e², connected by the flexible

connection f running over the pulleys h h¹ h² or their equivalents, as herein specified.

2. The piston f', arranged and operating, as represented, relatively to the chambers A¹ A² and to connecting means f leading to the valves e¹ e², as specified.

3. A piston or movable piece, f'', mounted in and forming part of the partition between the two steam and water chambers A¹ A² as a medium for receiving and communicating to the steam-induction valves e¹ e² a strong operating force from the difference of pressure in the chambers, 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.