C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,523. Patented Sep. 24, 1872.

Fig: 1.

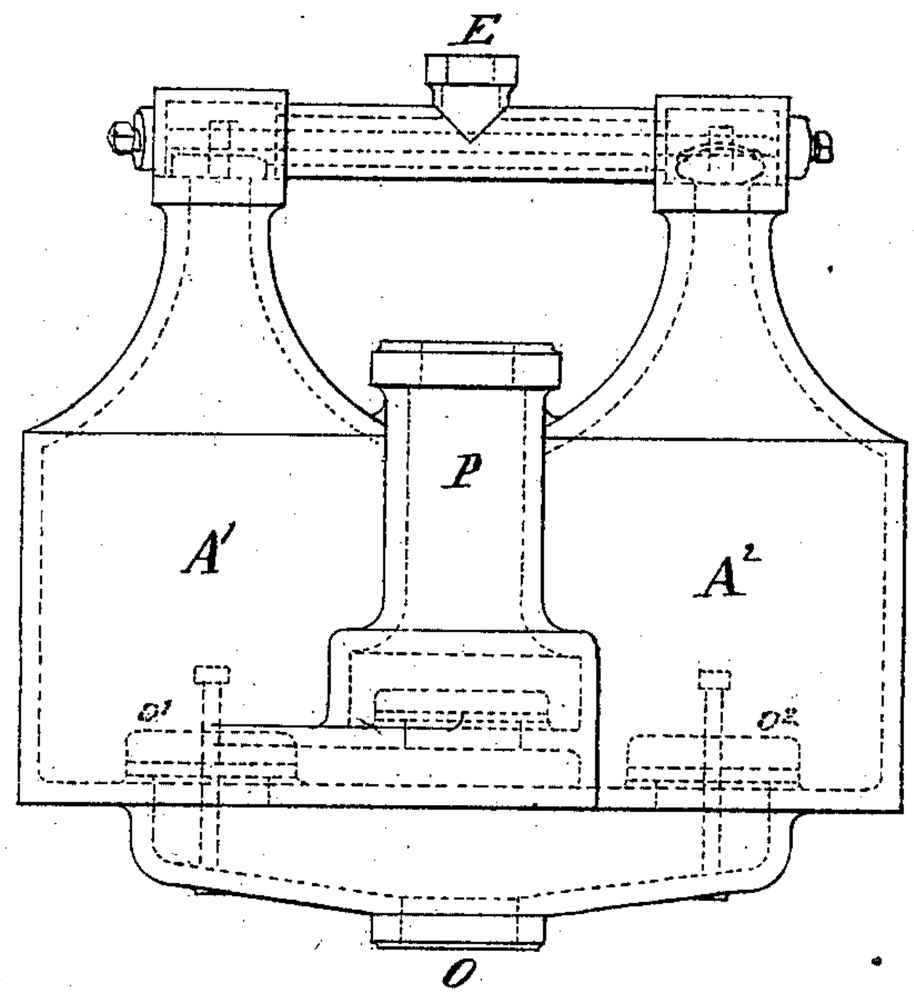
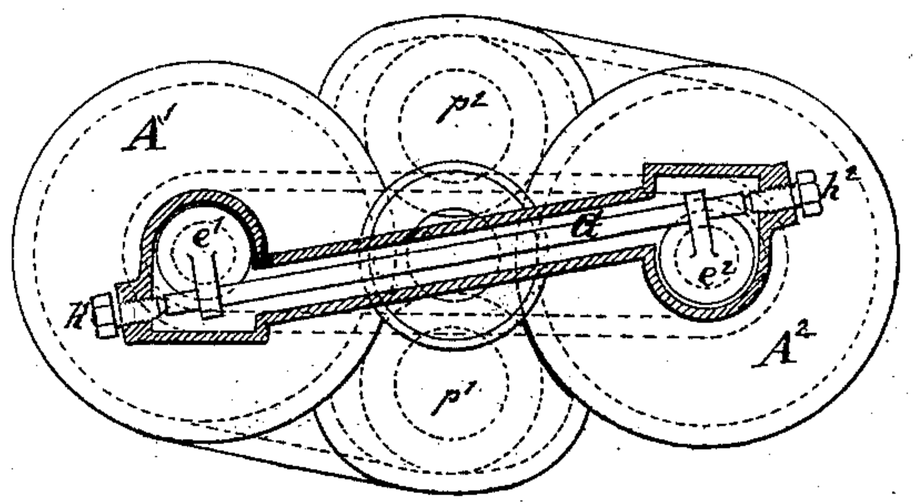


Fig: 2.



Witnesses:

Arnold Hornaman.

W. C. Dey

Inventor:

C. H. Hall

by his attorney D. L. Shelton

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **131,523**, dated September 24, 1872.

CASE I.

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 I.

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

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

A^1 A^2 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 A^1 A^2 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.

I have, in my experiments, tried many forms of connection and many forms of valves. The construction and connection of the steam-valves here represented are peculiar, and I believe possess advantages over any other known to me.

The steam-valves are marked e^1 e^2. They are flat-faced valves, and act on corresponding flat seats. The faces of the valves, or of the seats, may be provided with a soft metal or India-rubber surface, if preferred. I can use, in this respect, any ordinary or suitable material. The valves are mounted on a rock-shaft, G, which rocks upon bearings h^1 h^2. When one valve closes the other opens. The water-induction valves o^1 o^2, which admit the water alternately from the suction-pipe O into each chamber, are self-acting valves of any ordinary or suitable construction. So of the delivery-valves p^1 p^2. The novelty in this apparatus lies entirely in the provisions for the induction of the steam and for its control.

When the steam has been admitted to the chamber A^2, and has driven out the water therefrom down to a certain level, the steam commences to be discharged therefrom, flowing out toward the delivery-valve p^2. The construction is such that this movement induces an extended agitation of the water-surface, and this so removes the thin stratum of hot water previously on the surface, and so exposes the cold water below, that the steam is rapidly condensed in the chamber A^2 and a partial vacuum is formed. This accelerates the current of steam past the steam-valve e^2, and, by its extra pressure thereon, induces the shaft G to rock so that the valve e^2 closes and the valve e^1 opens. The opening of the valve e^1 gives the steam access to the chamber A^1, which is full of water, and which water commences now to be delivered by virtue of the pressure of the steam on its upper surface. When the water has been nearly all forced out of the

chamber A^1 the same round of operations which has been before described for the chambers A^2 is repeated in the chamber A^1. In either case, so soon as the steam is excluded a rapid influx of cold water from the suction-pipe O, past the water-induction valve, induces a complete condensation of the steam in that chamber, and the complete filling of the chamber with water, to be afterward expelled by the admission of steam to the upper part of the chamber to act upon its surface, as before described. The construction of the bearings for the rocking-shaft G in the form of screws allows great convenience of adjustment from the outside, but I do not esteem this feature essential. Any ordinary form of bearings for a rocking-shaft may be employed in my apparatus. It may rock on knife-edges, in a manner analogous to that employed in the rocking levers of scales, if preferred.

I claim as my invention—

In combination with chambers A^1 A^2, provided with suitable connections for alternately filling with water and steam, the steam-controlling valves e^1 e^2 mounted on a rocking piece, G, and adapted to operate each other by a tilting action, 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.