

C. H. HALL.  
Improvement in Steam Vacuum-Pumps.  
No. 131,538. Patented Sep. 24, 1872.

Fig:1.

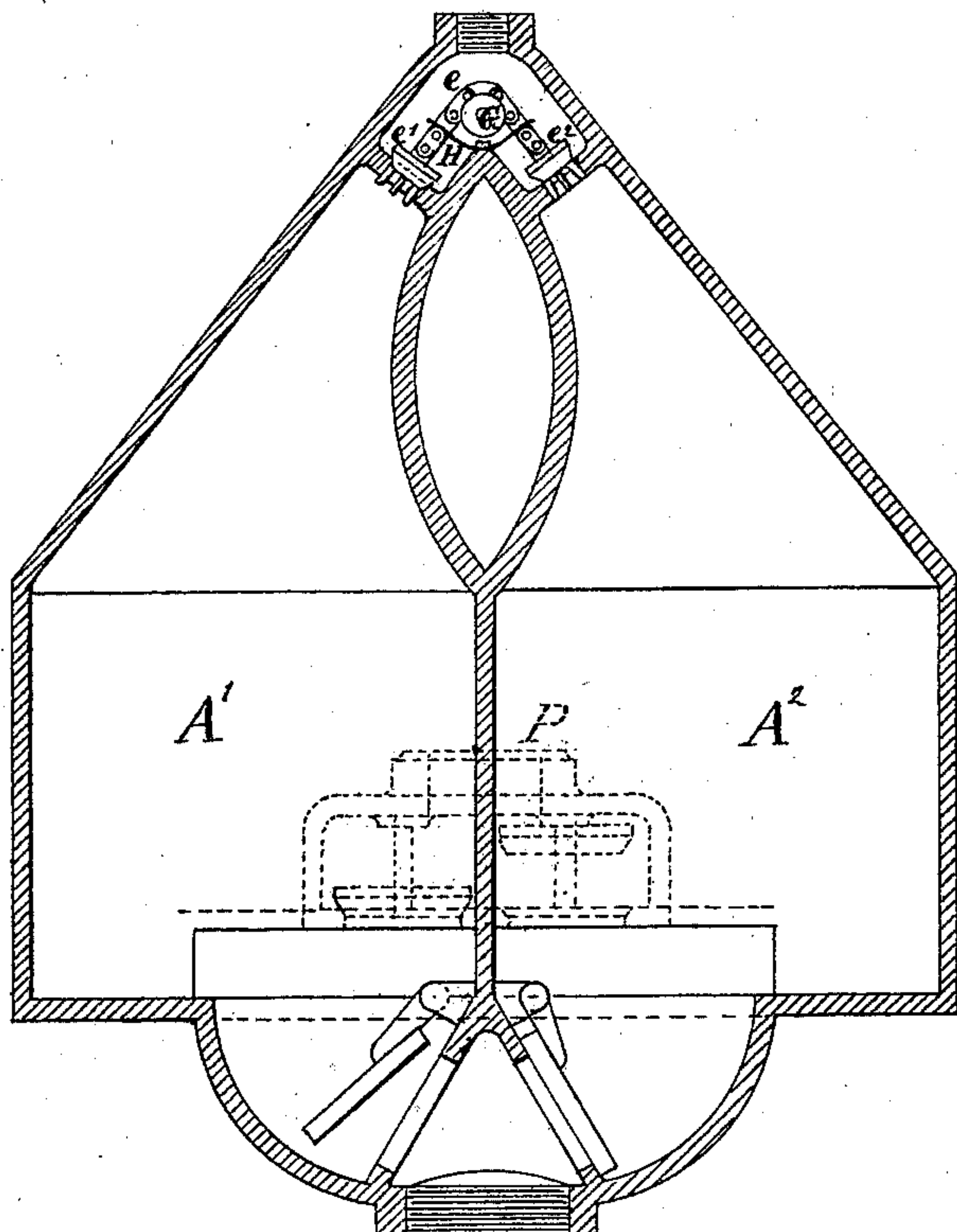
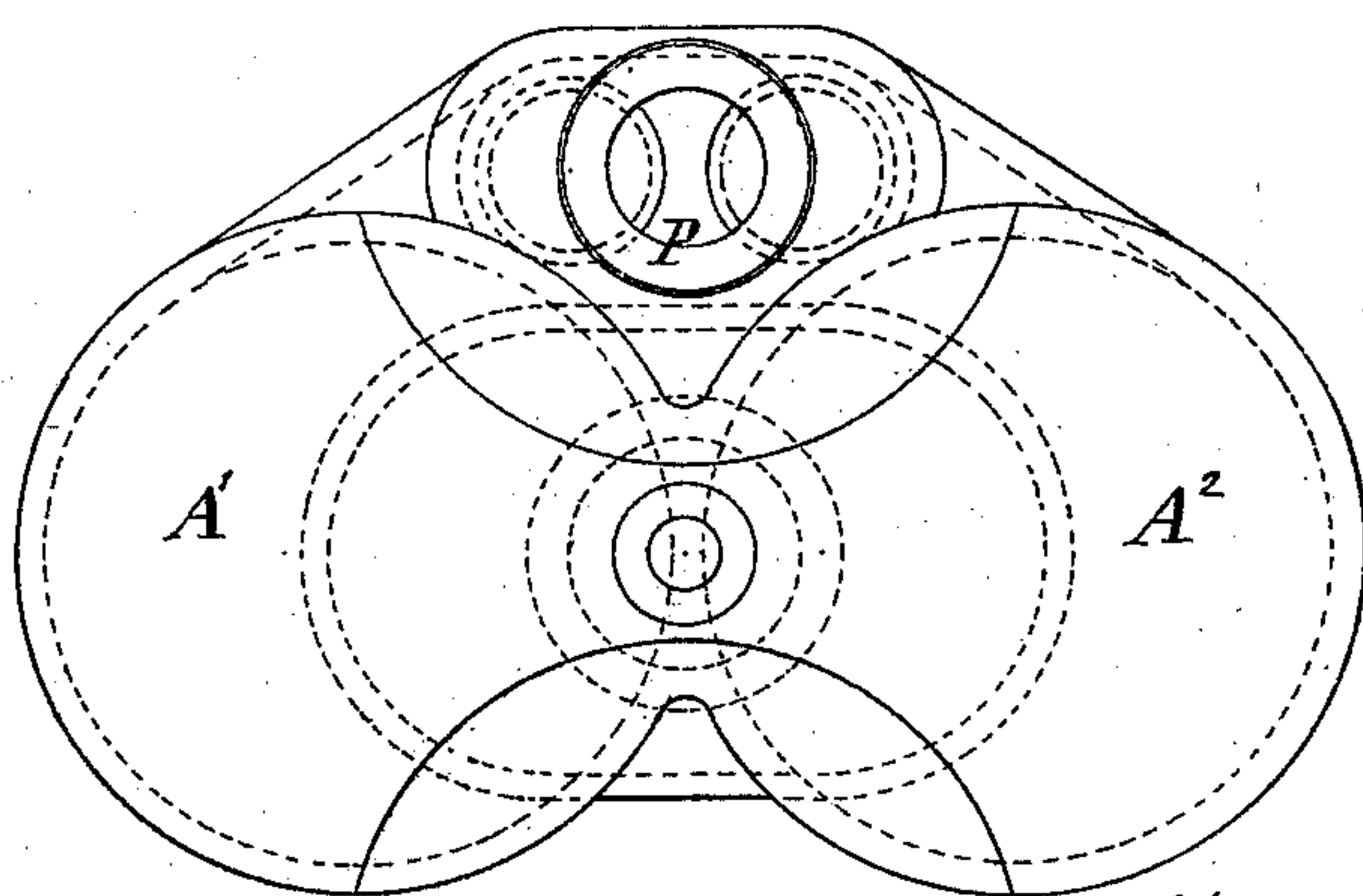


Fig:2.



Witnesses:

Arnold Hornum.  
W. C. Day

Inventor:

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



# UNITED STATES PATENT OFFICE.

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

## IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,538, dated September 24, 1872.

### CASE X.

*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 as 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.

This form is shown in vertical section in Figure 1 and in plan view in Fig. 2. Here the steam-valves  $e^1 e^2$  are connected by a flexible chain,  $e$ , which runs over a pulley,  $G$ , turning upon a fixed center. When the valve  $e^1$  closes it opens the valve  $e^2$  by means of the chain  $e$ , and the same action occurs in the opposite chambers. This construction allows the action to be as strong as may be required, while its flexibility allows the valves to adapt themselves more perfectly to their seats than would be practicable with a rigid connection.  $H$  is a feather-spring, of thin brass, steel, or other suitable material, fixed firmly at the upper end, and acting between two links or stops on the chain so that at each extreme of the

motion the spring  $H$  exerts a gentle pressure, tending to bring the chain and its connections back again toward the central position. I propose to employ any ordinary means of adjustment to regulate both the position of this spring and its tension. It is important that it exerts a gentle force at each end of the motion, and that the force be not so great as to prevent the apparatus from operating. An important effect is induced by this spring and its connections when properly adjusted. It holds the valves a little time in or near their middle position—that is to say, during the interval after the chamber  $A^2$  has been filled with water and before the water has been all expelled from the chamber  $A^1$ . The valve  $e^1$  remains open to continue the admission of steam; but the steam-valve  $e^2$  is also open to a slight extent. Thus the steam is admitted to the chamber  $A^2$  and the surface of the water heated, and the water commences to be expelled before the water ceases to be expelled from the chamber  $A^1$ , and the complete change of condition of the steam admission ensues. The effect is to induce a continuous current in the discharge-pipe  $P$ .

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 provisions for receiving steam intermittently into each, I claim the flexible connections  $e$  between the steam-valves  $e^1 e^2$ , adapted to allow the accommodation of each to its seat while compelling both to move together and mutually act on each other, as 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.