

C. H. HALL.

Improvement in Steam Vacuum-Pumps.

No. 131,541.

Fig:1,

Patented Sep. 24, 1872.

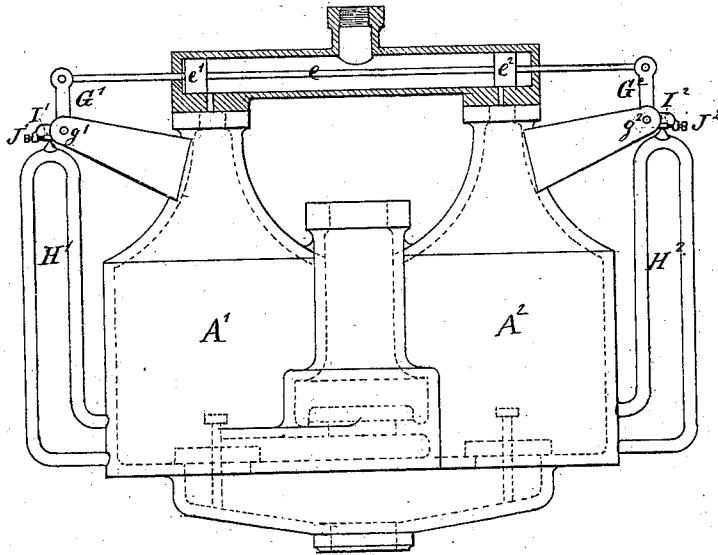
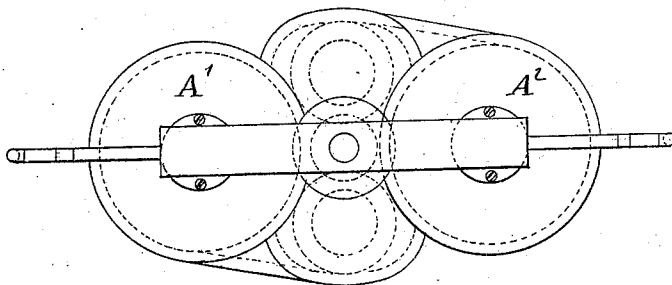


Fig:2,



Witnesses:

Arnold Hornum.
W. C. Day
" "

Inventor,

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

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 131,541, dated September 24, 1872.

CASE A¹.

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. Fig. 1 is a side elevation, partly in section, showing distinctly the parts in which the novelty lies; and Fig. 2 is a plan view.

The valve-rod *e* carrying the two steam-valves is operated by two levers, $G^1 G^2$, turning on fixed centers $g^1 g^2$, and the motive force therefor is derived from the expansion and contraction of tubes. Two tubes are employed, one at each end of the apparatus, and each is doubled, so that the steam and water can ascend from near the base of each side of the apparatus to a point near the top, and re-

turn again. One end of each tube communicates with its adjacent chamber at a higher point than the other. So soon as the water-line in a chamber has sunk below the level of the highest connection the steam darts up through the short leg of the tube, and the water descends through the long leg, so that the entire tube is instantly filled with steam, and, becoming rapidly heated, expands and forces up the horizontal arm of the connected lever. The two sides of the apparatus act alternately. When the vacuum obtains in a chamber the steam is nearly all drawn out of the tube, and, on the admission of cold water, it condenses what remains and fills the tube, the water flowing up through both branches of the tube and rapidly cooling it. The tubes are represented, respectively, by $H^1 H^2$. Each bears, by knife-edges, an adjustable piece, I^1 , adjusted by means of the screw J^1 on the adjacent lever. By turning the screw J^1 , and thus setting the point of connection further from or nearer to the pivot g^1 , the range of motion of the lever, and consequently of the rod *e*, and of the connected steam-valves, may be increased or diminished with a given expansion and contraction of the tubes.

There may be many modifications in the form of this device. The figure represents one which it is easy to delineate. The tube may be, as here, highly expansible, and work upon a lever, the fulcrum of which is fixed or is mounted on a part less subject to expansion; or the conditions may be reversed, and the fulcrum may be carried on a rod immersed in the steam—for example, a copper rod mounted within an iron tube, so that the difference of expansion will be available.

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:
1. 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 U-shaped expanding-tubes $H^1 H^2$, arranged to receive steam and water, as shown, and to operate the steam-controlling means by connections $G^1 G^2 e$, as herein specified.

2. I also claim the adjusting piece I' and controlling means J' , arranged so as to change

the relative motion of the tube H^1 and valve or valves $e e^1 e^2$, substantially 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.