J. H. PATTEE.

Improvement in Steam Vacuum Pumps.

No. 130,309. Patented Aug. 6, 1872.

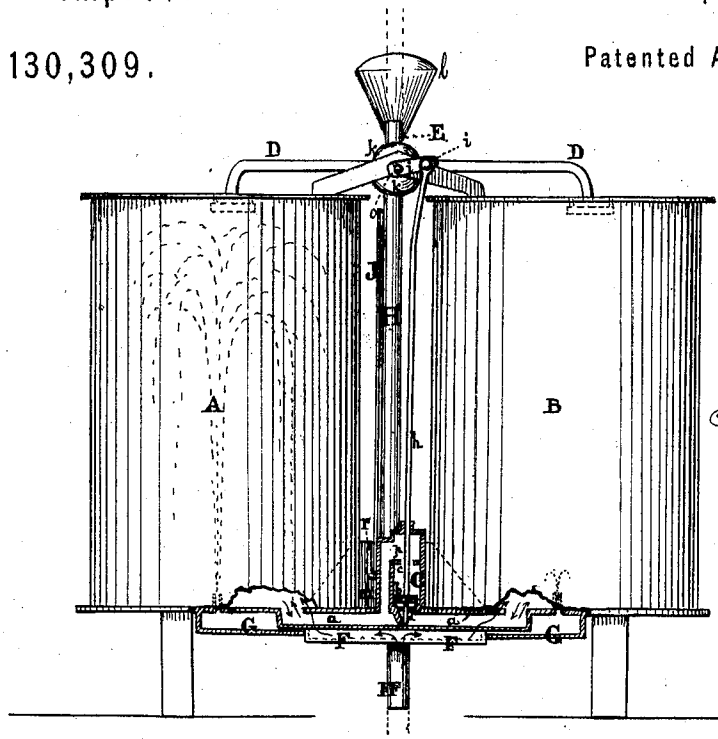
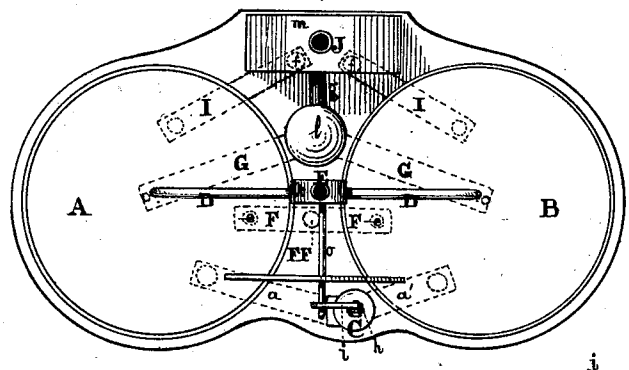
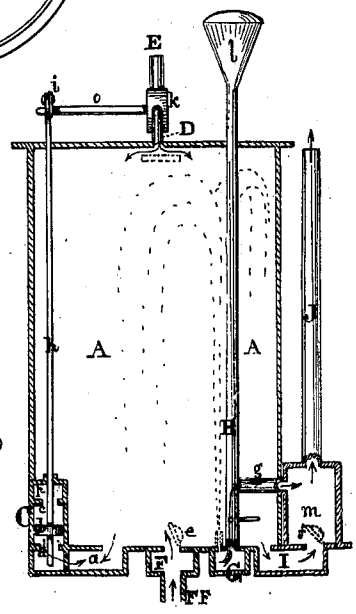


Fig. 1.



Scale - 1/2 inch to 1 foot



Witnesses
L. A. Lapham
Jas. M. Morse.

James H. Pattee
Inventor
by Edmund Thurlow
his Attys in fact

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

JAMES H. PATTEE, OF MONMOUTH, ILLINOIS.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **130,309**, dated August 6, 1872.

To all whom it may concern:

Be it known that I, JAMES H. PATTEE, of the town of Monmouth, in the county of Warren and in the State of Illinois, have invented an Improvement in Double-Action and Steam Vacuum-Pumps for drawing water; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making a part of this specification, in which like letters of reference refer to like parts, and in which—

Figure 1 represents an elevation of the pump, partly sectional below, to show the section of the piston-cylinder C of the cut-off, and also the lower water-passages; Fig. 2, plan, the dotted lines indicating the lower water-passages; Fig. 3, a section of one pump-cylinder across the lower water-passages, or from cylinder C to box *m*, in such a meandering line as will best illustrate the connections made by the water-passages.

This invention is an improvement in double-action steam vacuum-pumps for drawing water, and relates more particularly to a device for working them automatically; and consists in placing between the two pump-cylinders a smaller cylinder, the upper part of which communicates by passages with one of the pump-chambers on one side, and by a similar passage from the lower end of said cylinder with the other pump chamber or cylinder on the other side. Said cylinder has a valve-seat above and below, at the entrance of said passages, and between said seats a loose piston plays at each change in the direction of the current of the water as either pump is emptied, which piston is connected by a rod and crank and small shaft. With a three-way cock situated in the steam-supply pipe of the pump, the emptying of one of the pumps through the discharge-pipe causes a flow of water toward it along the pipes or passages in the small cylinder which contains the piston, which current carries with it the piston, which, being connected with the three-way cock for supplying steam to the pump, automatically works the latter and reverses the action of the pump.

A B represent the two pump-cylinders of a steam vacuum-pump. Each may be lined with wood, and with proper steam-deflectors over each orifice of the steam-induction pipe, to prevent the steam from striking and heating the water. Each cylinder communicates with the other by pipes *a a* F G I I at or under the bottom of same. The water-induction pipe F F branches outward from the pipe F, and the discharge-pipe J passes downward from the valve-chamber *m* at the junction of the pipe J with the pipes I I. The valves in this chamber open upward from the orifices of the latter pipes *f*, dotted in the drawing. G G, condensing-pipes for throwing a jet of water into either pump-chamber and, at their junction having an upright pipe, H, which terminates above in the usual air-chamber *l*, and having above the said junction a valve, *r*. A short distance above this valve a pipe, *g*, branches from the pipe H to the valve-chamber *m*. The pipes G G terminate within their respective pump-cylinders in a nozzle for throwing a small stream of water to the top of the cylinder to condense the steam. Two valves, *e e*, are seated, one at the orifice of each induction-water pipe F in the pump-cylinder. The latter are connected at the top by steam-induction pipes D D, which are supplied by the steam-pipe E, at the junction of which pipe is placed a three-way cock, *k*. C represents a cylinder, communicating by passage *a* out of its upper end with the bottom of the pump-cylinder A, and by another pipe, *a'*, (or passage,) from the bottom of said cylinder C with the other pump-cylinder B, or vice versa. A piston, *b*, attached to the rod or stem *h*, moves loosely within the cylinder C between the valve-seats or flanged passages *c d*. The upper seat *c* opens into a small chamber, *p*, at the upper part of said cylinder, and from which chamber the pipe *a* departs. The rod *h* of piston *b* is connected with a crank, *i*, and an axle, *o*, which terminates in a three-way cock, *k*, at the junction of the steam-supply pipes E D D for alternate filling of pump-cylinders A B with steam. Pet-cocks may be inserted in either cylinder A B to admit air to prevent the inrush of water from entirely occupying the whole cylinder and to leave space for the operation of the steam.

The operation of this pump is as follows: Having produced a vacuum in both chambers A B, and a consequent filling of said chambers with water through the inlet-pipe F F

and branch pipe F and valves *e e*, steam is admitted through the three-way cock *k* into the cylinder A, which will expel water through the pipe I into the valve-chamber *m* and up the discharge-pipe J, at the same time forcing water up condensing-pipe G into the upright condensing-pipe H, compressing the air in the air-chamber *l*, the cock *r* having been left open when water was let into the pump-cylinder from the air-chamber *l* to produce the first vacuum. Water having been thus expelled from A, and steam coming in contact with the bottom of its chamber, and a small portion exhausting through the discharge-pipe I, slightly relieves the pressure in cylinder A, when a jet of water will be expelled from the nozzle of pipe G into said chamber by pressure from the air-chamber *l* on the water in H. The steam thus forming a partial vacuum, the water, by its gravity, begins to flow from cylinder B to cylinder A, carrying the piston *b* to the top of the cylinder C, and with the piston the rod *k*, moving the crank *i* and axle *o* and the three-way cock *k*, thus cutting off steam from cylinder A, at the same time admitting steam to cylinder B simultaneously with the closing by the piston *b* of the upper valve-seat *c* of cylinder C, preventing further passage of water from B to A. Steam now passing into cylinder B, the water is forced through pipe I, box *m*, and discharge-pipe J. At the same time water is expelled through condensing-pipe G into cylinder A by a jet, simultaneously with a discharge from the chamber *m*, through pipe *g*, down pipe H, into pipe G and cylinder A, completing the vacuum in the latter, which now is filled with water, while cylinder B is emptying by discharge through pipes I and J. When B is depleted the water, partly by its gravity, its level being above that of the piston-chamber C, produces a reflex or contrary flow of water through the pipes *a a* and cylinder C, which forces the piston *b* downward to its lower seat *d*, cutting off further flow of water from A to B, depressing rod *h*, and cutting off steam from cylinder B, and admitting steam to cylinder A, thus continuing the process of alternately emptying and filling the pump-cylinders.

What I claim as my invention is—

1. In a steam vacuum-pump, the cylinder C, when placed in such a position, and so connected by passages *a a'* to the pump-cylinders A B, that a current of water will pass alternately from one pump-cylinder to the other at each alternate emptying of said cylinders A B, and carry with it the piston *b* to operate the steam-valve *k*, substantially as and for the purposes set forth.

2. The valve-seats *c d* and piston *b*, when the latter acts as a valve to close the passage at the end of each stroke of the piston *b*, as and for the purposes described.

3. The combination of the condense-pipes G G H and the cross-pipe *g*, (connecting the pipe H with the valve-box *m*,) the valve-box *m*, and the discharge-pipe J, constructed and arranged substantially as and for the purposes described.

In testimony that I claim the foregoing improvement in steam vacuum-pumps I have hereunto set my hand this 21st day of May, A. D. 1871.

JAMES H. PATTEE.

Witnesses:
HENRY W. WELLS,
JAMES M. MORSE.