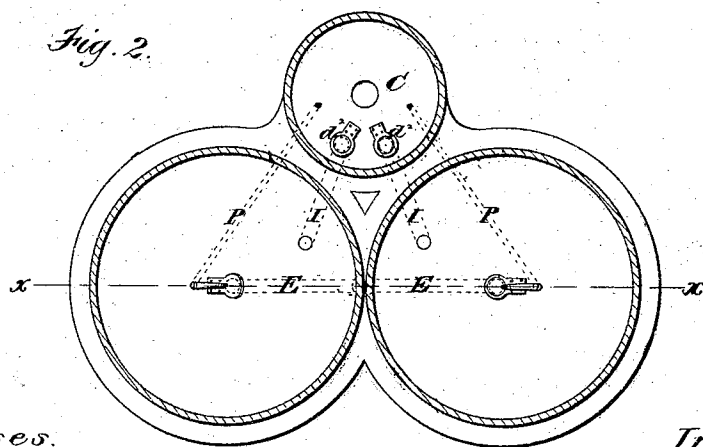
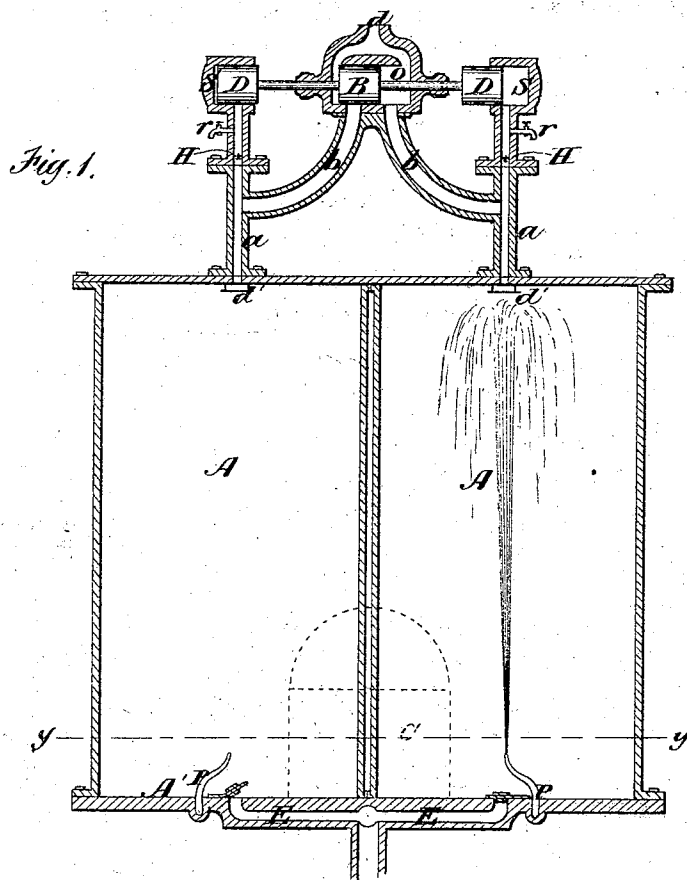


J. R. McPHERSON.
Steam Vacuum-Pumps.

No. 153,361.

Patented July 21, 1874.



Witnesses.
C. H. Brown.
M. Church.

Inventor
J.R.McPherson.
by his Attys.
Hill & Ballou.

UNITED STATES PATENT OFFICE.

JAMES R. MCPHERSON, OF BELOIT, WISCONSIN, ASSIGNOR OF TWO-THIRDS HIS RIGHT TO H. B. JOHNSON AND F. N. DAVIS, OF SAME PLACE.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **153,361**, dated July 21, 1874; application filed May 16, 1874.

To all whom it may concern:

Be it known that I, JAMES R. MCPHERSON, of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Steam Vacuum-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a vertical section through line *x x*, Fig. 2; and Fig. 2 is a horizontal section through line *y y*, Fig. 1.

Similar letters of reference in the accompanying drawings denote the same parts.

My invention relates to improvements in steam vacuum-pumps; and consists, first, in providing an automatic reciprocating movement of the valve which controls the admission of steam into the cylinders and the pistons connected therewith, by alternately exhausting the air in the cylinders in which the pistons operate. My invention further consists in the peculiar arrangement of the water-passages connecting the bases of the cylinders and the discharge-chamber, by means of which water from the latter is employed to condense the steam introduced into the former, as hereinafter more fully set forth.

In the accompanying drawings, *A A* are the pump-cylinders, of convenient size, preferably lined with wood, and having flanges on their lower ends, by means of which they are bolted to the base-plate *A'*, the latter being provided with water-passages *E E*, the upper ends of which have suitable valves opening upward. The water-passages *E E* are united together between the cylinders, forming a single tube, which extends down into the well or the reservoir containing the water to be elevated. *I I* are water-passages made in the base-plate *A'*, and opening into the cylinders *A A*, and leading thence into the discharge-chamber *C*, preferably made of a dome shape, and having a pipe inserted in its upper end, for the discharge of the water raised. *d² d²* are valves, opening upward, at the junction of the water-passages *I I* with the discharge-chamber *C*. *P P* are water-passages in the base-plate *A'*, also

connecting the discharge-chamber *C* with the cylinders *A A*, and projecting up into the latter, as seen in the drawings. The water-passages *E E*, *I I*, and *P P* are, preferably, cast in the base-plate *A'*. To the upper ends or heads of the cylinders *A* are attached, by any suitable means, the tubes *a a*, the openings in the upper ends of which lead into the cylinders *S S*, in which the pistons *D D* are made to operate. *b b* are side channels, connecting the tubes *a a* with the chamber *o*, in which the balanced valve *B* is made to reciprocate by the steam passing into the chamber *o* through the pipe *d*. *H H* are suitable valves in the pipes *a a*, opening downward. *r r* are cocks placed in the tubes *a a*, and left constantly open for the introduction, at all times, of air into the tubes; so a stratum of air is always made to intervene between the steam and water, to prevent the too rapid condensation of the former, air being a poor conductor. *d¹ d¹* are steam-deflectors, attached to the lower faces of the heads of the cylinders *A A*, for the purpose of distributing the steam in the latter, and bringing it in contact with the entire surface of the water in the cylinder.

The operation of my steam vacuum-pump is as follows: Steam is introduced into the valve-chamber *o* through the pipe *d*, connected with the boiler, (the valve *B* being in the position shown in the drawing,) and thence passes through one of the steam-passages *b* and pipe *a* into one of the cylinders *A*, the steam being deflected and distributed by the steam-deflector *d¹*. The steam thus introduced forces the air and water, if any is in the cylinder *A*, into the discharge-chamber *C* through the passages *I I*, the pump, prior to the commencement of its operation, having been primed by the introduction of water into the discharge-chamber *C*. The pressure of steam empties the chamber *A*, and the steam escaping into the chamber *C* is rapidly condensed, causing a partial vacuum in *A*, checking the outflow of water, closing the check-valve in pipe *I*, and allowing the pressure in the chamber *C* to inject water through the pipe *P*, which completes the vacuum. The air in the piston-cylinder *S* and channel *a* will then pass into

the cylinder A, to fill up the vacuum formed therein, when the atmospheric pressure on the outer face of the piston D will move it to the outer end of the cylinder S, thus moving the valve B over the port or channel *b* and closing it, the opposite port being open for the introduction of steam into the opposite cylinder, where the same operation is repeated.

The vacuum created alternately in the cylinders A A will cause the water in the well or reservoir to be raised through the pipes E E.

The cylinders S S are made to project beyond the steam-pipes, so as to form air-cushions for the pistons in their reciprocating movements, and prevent the jar or blow of the pistons against the ends of their cylinders.

I claim as my invention—

1. In a steam vacuum-pump, a valve, attached to pistons working in cylinders which

opens and closes the steam-ports alternately, by atmospheric pressure on the outer faces of the pistons, substantially as described.

2. The cylinders A A, provided with steam-pipes *a a*, having valves H H and side channels *b b*, in combination with the valve-chamber *c*, valve B, pistons D D, and cylinders S S, substantially as described.

3. The cylinders A A, steam-passages *a b*, cylinders S S, pistons D D, and valve-chamber and valve B, in combination with the discharge-chamber C and water-passages I I, E E, and P P, the whole arranged, constructed, and operated in the manner and for the purpose set forth.

JAMES R. McPHERSON.

Witnesses:

W. READ,

NATHAN K. ELLSWORTH.