

J. R. McPHERSON.  
 STEAM AND VACUUM PUMP.

No. 184,646.

Patented Nov. 21, 1876.

Fig. 1.

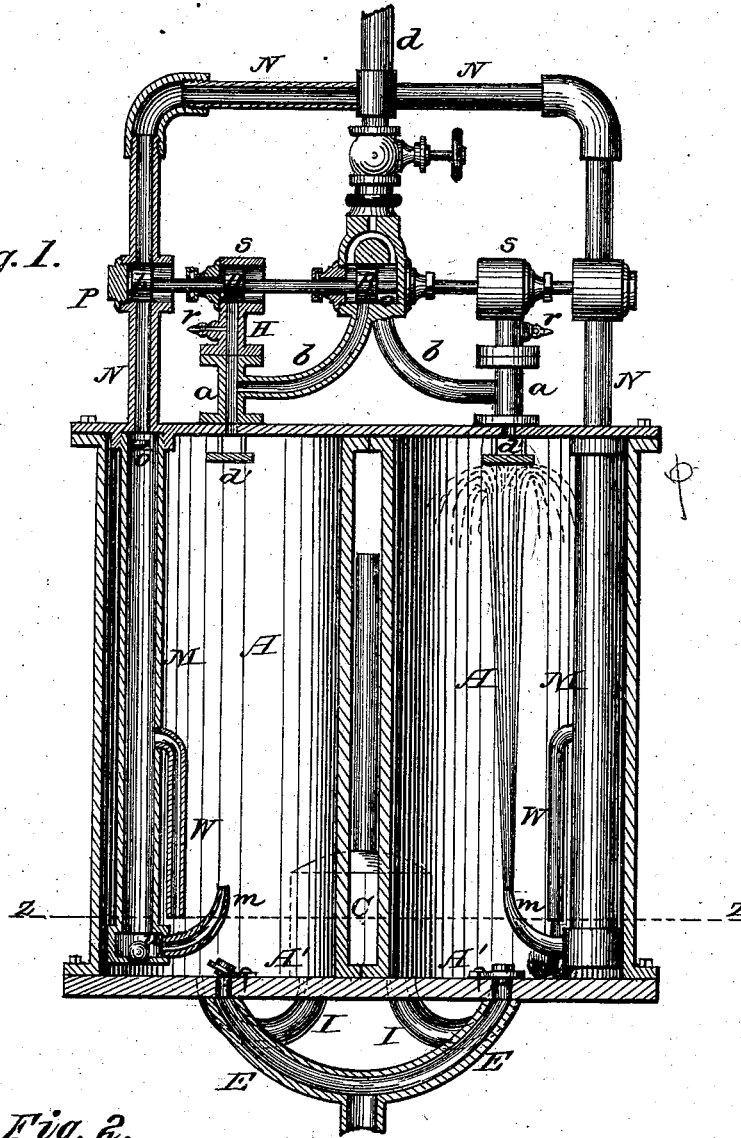
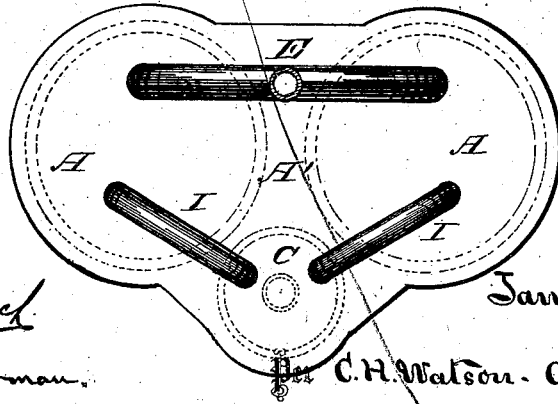


Fig. 2.



Witnesses:

*P. C. Dietrich*  
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Inventor:

*James R. McPherson*

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# UNITED STATES PATENT OFFICE

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

## IMPROVEMENT IN STEAM AND VACUUM PUMPS.

Specification forming part of Letters Patent No. 184,616, dated November 21, 1876; application filed November 22, 1875.

*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 drawing, forming part of this specification, in which—

Figure 1 is a vertical section, and Fig. 2 is a bottom view.

Similar letters of reference indicate the same parts in this and my former patent.

The object of my invention is to improve the steam vacuum-pump patented by me July 21, 1874, No. 153,361, so as to render said pump quicker and more efficient in operation; and to this end it consists, first, in the employment of an independent injector connected directly to the steam-pipe, so as to apply the pressure of the steam directly to the surface of the water to be injected; secondly, in the use of a waste-pipe to allow the hot water of condensation to escape from the injector; thirdly, in the construction of the injector; fourthly, in the combination of a cut-off with the steam-pipe leading to the injector, all substantially as I will proceed to describe.

In the drawings, A A are the pump-cylinders, provided with water-passages E E and I I. C is the discharge chamber. A' is the base-plate. B is the balanced valve, operating in the chamber O, and connected with the pipes *d b b a a*, and the cylinders S and piston D. *r r* are the air-cocks. *d' d'* are the deflectors, all constructed and operating substantially as set forth in my former patent above referred to, and therefore requiring no further description herein.

The improvements which I now apply to my said pump are substantially as follows: Instead of using the jet-pipes P P, as set forth in said patent, I now employ with each pump-cylinder, either inside or out, an independent vessel, M, connected with the live steam pipe *d* by means of a suitable pipe, N N, having a steam-deflector, *o*, at its lower end, and provided with a cut-off valve, *p*, attached to and

operated by the stem of the balanced valve B and pistons D D, such stem being prolonged through the outer end of the cylinders S S into the cut-off chambers P, as shown in drawing. The independent vessels M, which are employed as injectors in my new form of pump, extend down beneath the low-water line *z z*, where they each terminate in a bent nozzle or tube, *m*, the end of which is slightly above said low-water line. The lower end of the vessel M is also provided with a valve, *u*, opening upward or inward, to admit water into said vessel. A small waste-pipe, W, is attached to each vessel M, for the purpose of discharging the hot water formed by the condensation of the steam.

The operation of my improved pump is as follows: Upon priming the cylinders, the water passes through the valve *u*, and rises in the vessel M to the same level that it maintains in the cylinder A. Now, if the steam is turned on, it will pass through the pipes *d b a*, and also N, forcing the water in cylinder A down to low-water line *z*, through a large and free discharge, many times the size of the steam-pipe *a b*, and reducing the pressure to the weight of the discharging column of water. Meanwhile the steam in M is kept at nearly the same pressure as in the boiler, in consequence of the very small discharging-orifices at *m* and W, when compared with those from A. Consequently a sufficient quantity of water is retained in M to force a jet into A the moment the mouth of jet-pipe is uncovered. The vacuum is thus directly formed without the loss of steam through the discharge-passages, as in my former and other steam vacuum-pumps, thus saving time and waste of steam, with the effect of moving the valve B and reversing the action of the pump, as described in my former patent. The action of the pump thus constructed and arranged is very rapid, filling promptly, and condensing the steam in the injector, causing it to refill through valve *u*, and delivering the water continuously in large quantities, and forcing it to any required distance or height, according to the steam-pressure employed.

I claim as my invention—

1. The injector-vessel M, connected with the steam-pipe, and provided with a jet-pipe, *m*, and valve *u*, constructed so as to produce a jet by the direct application of steam to water, and by inducing an unequal pressure in the vessels M and A, substantially as and for the purpose set forth.

2. The waste-pipe W, combined with the injector M and valve *u*, and the cylinder *a*, substantially as and for the purpose specified.

3. The cut-off *p*, combined with the injector M and steam-pipe N, and with the balance-valve B, substantially as and for the purpose set forth.

4. The double-acting pump, having cylinders A A, chamber C, balance-valve B, cylinders S S, and valves and passages described, in combination with independent injectors M, supplied with steam directly from the steam-pipe *d*, and having suitable cut-offs, substantially as and for the purpose set forth.

JAMES R. McPHERSON.

Witnesses:

C. H. BICKNELL,  
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