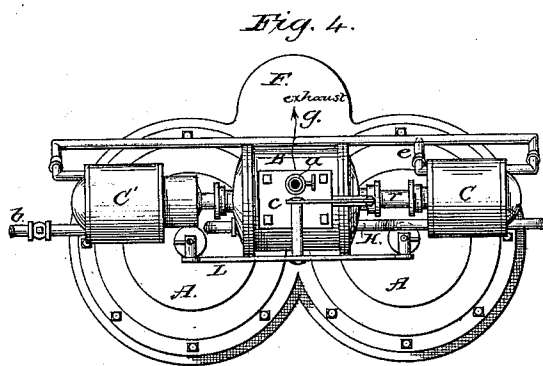
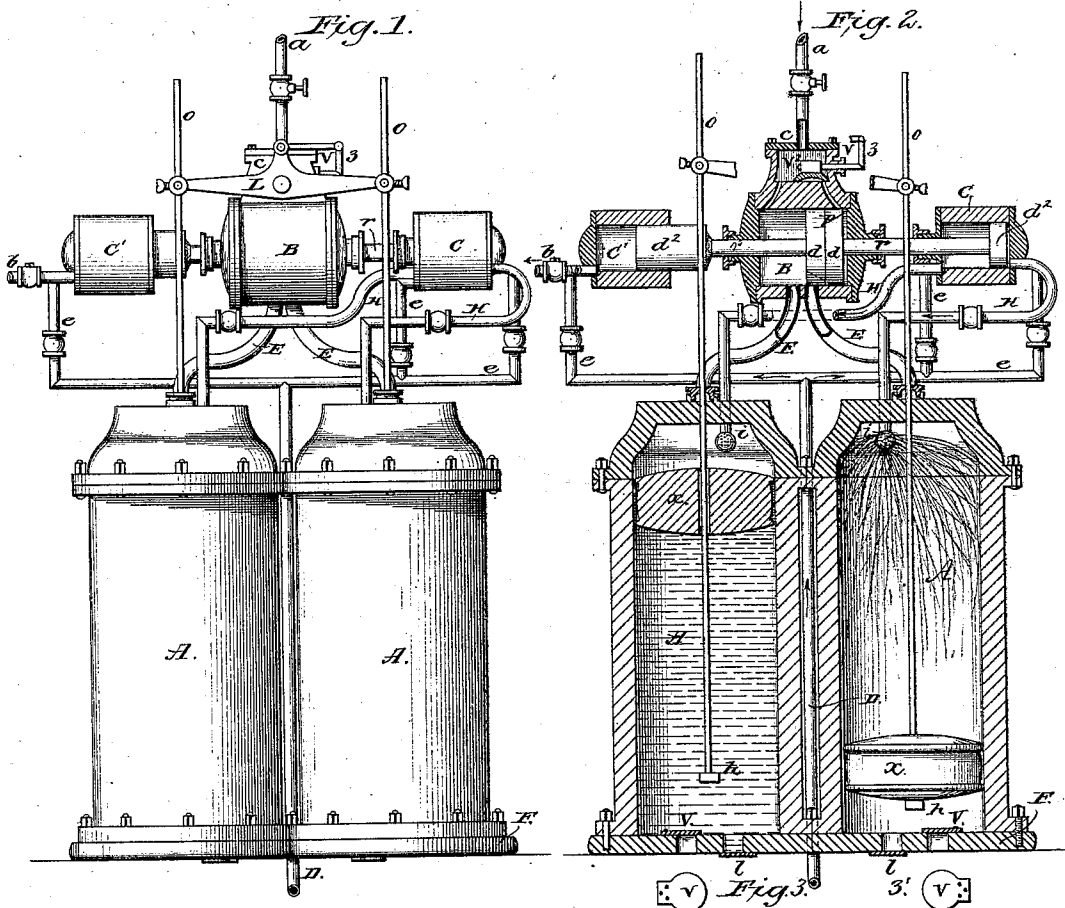


G. R. GLEASON.
STEAM AND VACUUM PUMP.

No. 176,745.

Patented May 2, 1876.



Attest:
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN STEAM AND VACUUM PUMPS.

Specification forming part of Letters Patent No. 176,745, dated May 2, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, GEORGE R. GLEASON, of the city 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 that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Similar letters of reference indicate corresponding parts.

In the drawings, Figure 1 is a plan view of my improved steam vacuum-pump complete. Fig. 2 is a vertical section of a similar view. Figs. 3, 3' represent common check-valves; and Fig. 4 is a top or vertical view of the parts indicated by the letters C', B, and C, including the cylinder-heads of the pump, as shown at Fig. 1.

In the aforesaid drawings, letters A A represent the cylinders of the pump; F F F, the bottom plates of the pump-cylinders. V V are induction-valves, and l l are valves leading to the eduction-pipes. D is a pipe for supplying water to the injecting-pump C and the boiler feeding-pump C' through the pipes e e, with which the pipe D connects, as shown, in the direction shown by the arrows. B is a steam-cylinder, supplied with steam by the pipe a through the steam-chest c, from which steam is admitted to the chambers or main cylinders A A through the pipes E E. L is a walking-beam, connected with the floats x x by means of the adjustable rods o o, stop-collars h h, and which floats, by means of said rods and walking-beam, operate the cut-off valve V² by means of the valve-stem and arm V³. C is a double-acting pump, for injecting water into the cylinders A A through pipes H H. C' is a single-acting pump, for feeding the steam-boiler through pipe b. r r is a piston-stem or rod, provided centrally with a piston-head, P, having expansion packing-rings d d, as shown, and at either end having a water-piston head, d² d², all as shown. i i are perforated hollow globes, connected to the lower ends of the pipes H H, for the purpose of

breaking the water into spray when being forced into the cylinders A A.

I will now proceed to describe the construction, arrangement, and manner of operating my improved steam vacuum-pump, which is substantially as follows:

The cylinders, and all other parts for which cast-iron is available, are made of that metal. The piston-rod r r is of steel, the rods o o of brass or other suitable metal, and the floats x x are made of sheet-copper or other available material, all manufactured and finished in the usual style of the machinist's art. The pump is started or put into working operation by first turning on steam through the pipe a, admitting it to the steam-chest c. The cut-off valve V² is then set in motion by means of hand manipulation of the walking-beam L, thus operating the valve V² by means of the arm and valve-stem V³, alternately admitting to and cutting off steam from the right and left hand ports to the steam-cylinder B, as shown, and when steam is thus admitted to said cylinder the piston-rod r r, upon which is rigidly fixed the piston-head P, provided with expansion packing-rings, as shown, is caused to reciprocate to the right and left by regular alternate strokes, as shown, and which will be readily understood. The piston-rod r r also has a suitable head or plunger rigidly attached at each end, marked d² d², and it will be seen that when set in motion, as hereinafter described, the piston-heads P and d² d² all coact and discharge their respective proper functions at the same time, causing the pumps C and C' each to draw water through the pipe D and branch pipes e e. A suitable and regular supply of water is then, with concentrated force, injected by the pump C, through pipes H H and perforated globes i i, into each of the cylinders A A alternately. The pump C', at the same time, forces a regular and sufficient supply of water into the steam-boiler through the pipe b. When the pump has thus been set in motion by hand-power, as before described, a supply of steam being in readiness for working the whole mechanism of the device, steam is admitted through the pipes E E into the cylinders A A, regularly alternating with the injection of water into said cylinders, as hereinbefore described. The alternating

supply of steam through pipes E E is regulated by the lateral action of the piston-head P, thus discharging the function of a valve. The action of the piston-head P (acting as a valve) and the strokes of the pump C produce exactly equal alternating admissions of steam and injections of water into each of the cylinders A A, and as soon as the steam and water thus admitted and forced into either of the cylinders A A, as before described, come into contact with each other, a vacuum is instantly formed, at once causing the cylinder to fill with water, forced in by atmospheric pressure from the well or reservoir through the induction-pipe V, and the float *x* in the cylinder, thus filled, will be carried upon the surface of the water to the top of the interior of the cylinder; and while one of the cylinders is thus being filled the water in the opposite cylinder is being expelled therefrom by the force of steam admitted thereto, as aforesaid, through the outlet-port *l*, and when the water in said cylinder shall fall below the stop-collar *h* upon the rod *o*, the weight of the float *x*, acting by its gravity upon said stop-collar *h*, causes the steam to be cut off and reversed to the opposite port of the cylinder B, as shown, and thus causing the operation above described to be repeated.

The rod *o* may be adjusted by means of thumb-screws in the ends of the walking-beam L, so as to check the downward movement of the floats *x x* at any desired point, and by this means the pump may be caused to work at any percentage or degree below its maximum capacity; and this is a feature in my invention of great importance in an economical point of view.

The floats *x x* are made a trifle smaller than the interior diameter of the cylinders A A, for the purpose of preventing downward pressure of steam upon their upper surfaces, also fitting loosely upon the rods to permit them to move freely up and down thereon.

The pump C' enables me to dispense with the use of a separate pump to supply water to

the steam-boiler, as heretofore used in steam vacuum-pumps, thereby saving much expense.

This invention presents the rare novelty of the combination of a steam-engine and steam vacuum-pump, as will readily be understood by the drawings and description as hereinbefore given.

Having thus fully described the construction, arrangement, and manner of operating my improved steam vacuum-pump, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a steam and vacuum pump, of the pump-chamber, a valve which controls the steam-passages thereto, operated by a direct application of steam, and a cut-off valve.

2. The combination of the chambers A A, main valve P, pipes E E, cut-off valve V², and the injection-pump, substantially as and for the purpose set forth.

3. In a steam and vacuum pump in which the steam-passages thereto are controlled by a valve operated by the direct application of steam, the combination of the main valve and its cut-off, the injection-pump, and the boiler feed-pump, as and for the purpose specified.

4. The combination, in a steam and vacuum pump, of the chambers A A, injection-pump C, boiler feed-pump C', main valve P, which acts as a piston to operate said pumps, and the cut-off valve V², as and for the purpose specified.

5. The combination of the chambers A A, injection-pump C, cylinder B, piston-head P, cut-off valve V², walking-beam L, operated by floats in the vacuum-chambers, as and for the purpose specified.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

GEORGE R. GLEASON.

Witnesses:

ROGER H. MILLS,
C. F. NORTH.