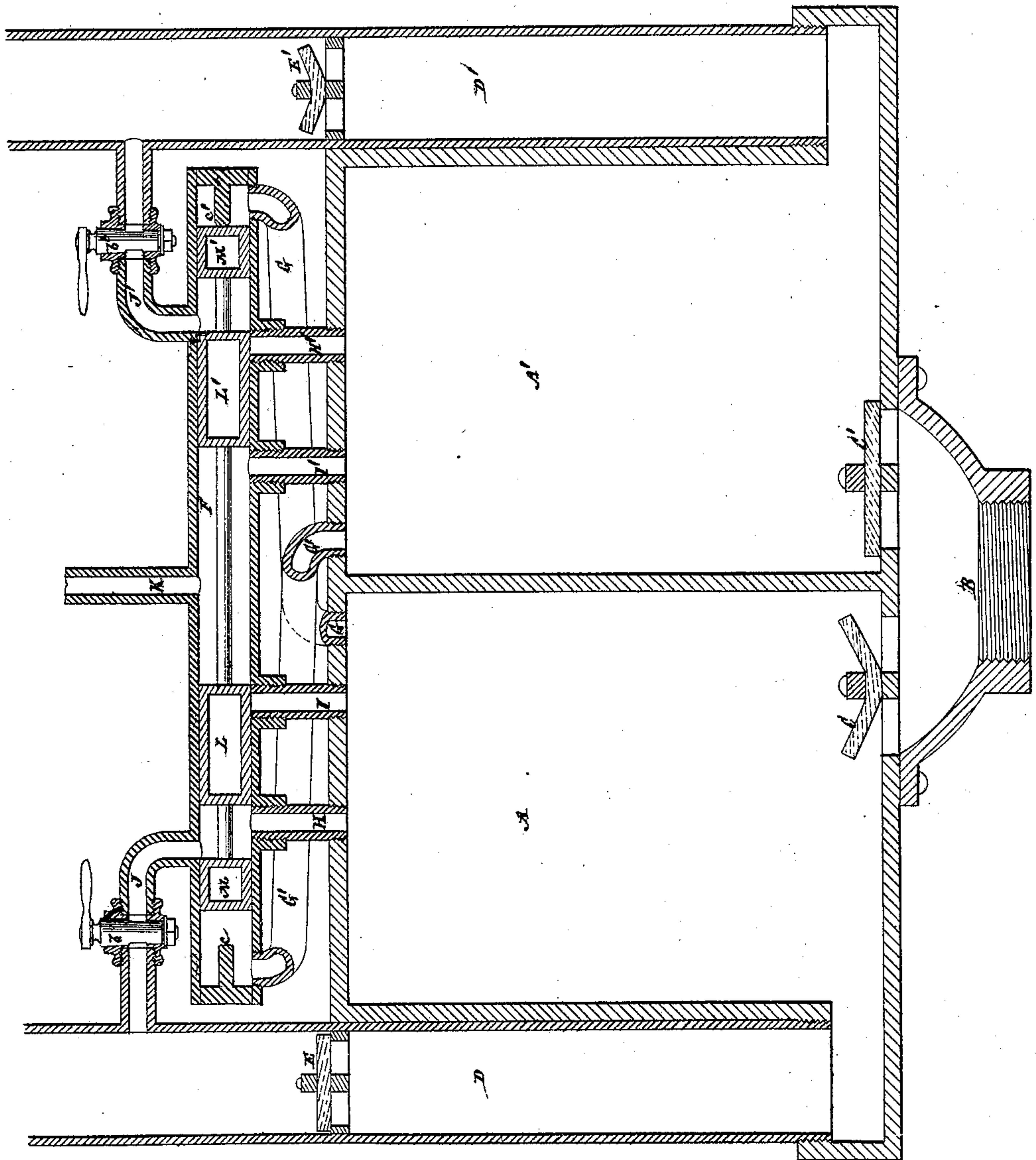


W. BURDON.

Improvement in Steam-Vacuum Pumps.

No. 129,647.

Patented July 23, 1872.



Witnesses
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IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. **129,647**, dated July 23, 1872; antedated July 17, 1872.

F

To all whom it may concern:

Be it known that I, WILLIAM BURDON, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Apparatus for Raising and Forcing Water by the Condensation and Pressure of Steam; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to apparatus, of a double-acting or continuous kind, for raising and forcing water, in which a vacuum is formed by the condensation of steam alternately in two adjacent cylinders or chambers, and the water, which is raised by atmospheric pressure alternately within either chamber by reason of the vacuum, is subsequently and alternately expelled from said chambers by the pressure of steam, the condensation of which again produces a vacuum within either chamber for a repetition of the process. The improvement consists in a combination, with such apparatus, of a novel double-acting valve or valves and certain pipes or connections, whereby an automatic reversal of the valve or valves is kept up by the pressure of the steam as against the vacuum in either main chamber alternately, for the purpose of alternately admitting steam and water in regular order and successively to said chamber to keep up an automatic action of the apparatus.

The accompanying drawing shows a vertical section of an apparatus with my improvement.

A A' represent the chambers, into which the water is raised alternately, and from which it is expelled alternately, as hereinbefore referred to. B is a suction-pipe, common to both chambers, and communicating therewith at their bottoms through valves C C', which open inward. D D' are the water-discharge pipes, extending downward from the tops of said chambers, and with their mouths or lower ends in communication with the lower portions of the chambers. These discharge-pipes are provided, at some distance above their mouths, with valves E E', opening outward. Arranged over the chambers A A' is a valve-box, F, the ends of which connect, by pipes G G', in a reverse manner with the tops of the

chambers A A'—that is, the end of the valve-box over the chamber A connects with the chamber A' by the pipe G', and the end of the valve-box over the chamber A' connects with the chamber A by the pipe G. The said valve-box F, furthermore, connects at points intermediate of its length by water-inlets H H' and steam-inlets I I' with the chambers A A' at their tops, and is also provided with water-supply pipes J J' and an intermediate steam-supply pipe or inlet, K. The pipes J J' are fitted with cocks b b' to control the supply of water to the valve-box, and through the latter to the main chambers, for the purpose of condensing the steam in the upper portion of the latter, and for the purpose of stopping and starting the apparatus. The valve-box F is fitted with valves L L', having attached pistons M M'. These valves and pistons may be of any desired shape, and constitute a compound valve, which has a free or independent travel between stops c c' at the ends of the valve-box. The valves L L' control the steam and water inlets I I' and H H', and the pistons M M' have their travel limited between the points at which the pipes J J' and M M' communicate with the valve-box. These pistons serve to alternately throw the compound valve in reverse directions by the pressure of the steam entering by the pipe K as against a vacuum at either end of the valve-box, alternately, by the reverse connection of the pipes G G' with the main chambers A A' of the apparatus.

The operation is as follows: Supposing the compound valve to be in the position represented in the drawing and the chamber A' to be filled with water, then steam entering by the inlet I' will expel the water from said chamber up the discharge-pipe D' till the mouth of said latter pipe is uncovered or thereabout, when a vacuum will be formed in the chamber A', causing the water from the suction B to rise in said chamber, and, by the communication of the pipe G' with the left end of the valve-box F, causing the compound valve to be thrown to the left, thereby closing the steam-inlet I' and uncovering the water-inlet H', which lets in a supply of water to condense the steam in the upper portion of the chamber A' or to perfect the vacuum in said

chamber. This movement of the compound valve to the left also closes the water-inlet H and opens the steam-inlet I to expel the water previously drawn into the chamber A in like manner as has been described for the filling of the chamber A', and prior to the movement of the compound valve to the left. After the water has been expelled from the chamber A, and a vacuum formed in it by the uncovering of the mouth of the discharge-pipe D or descent of the water in the chamber A, then, by the communication of said chamber with the right hand of the valve-box F by the pipe G, the compound valve is thrown to the right by the pressure of the steam as against the vacuum, causing the steam-inlet I to be closed and the water-inlet H to be opened for the perfecting of the vacuum in the chamber A to produce a refilling of the latter from the suction-pipe, and at the same time closing the water-inlet H' and opening the steam-inlet I to expel the

water from the chamber A'. In this way a continuous discharge of water is kept up alternately through the pipes D D', which may or may not be connected above their delivery-valves E E'.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, herein described, with the water receiving and discharging chambers A A', of the automatic compound valve or valves L L' with their attached pistons M M', the valve-box F, the vacuum-pipes G G', the steam-pipe K, and the steam and water inlets I I' H H', the whole operating substantially as herein set forth.

2. In combination with the above, I claim the pipes J J', substantially as and for the purpose herein described.

Witnesses:

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