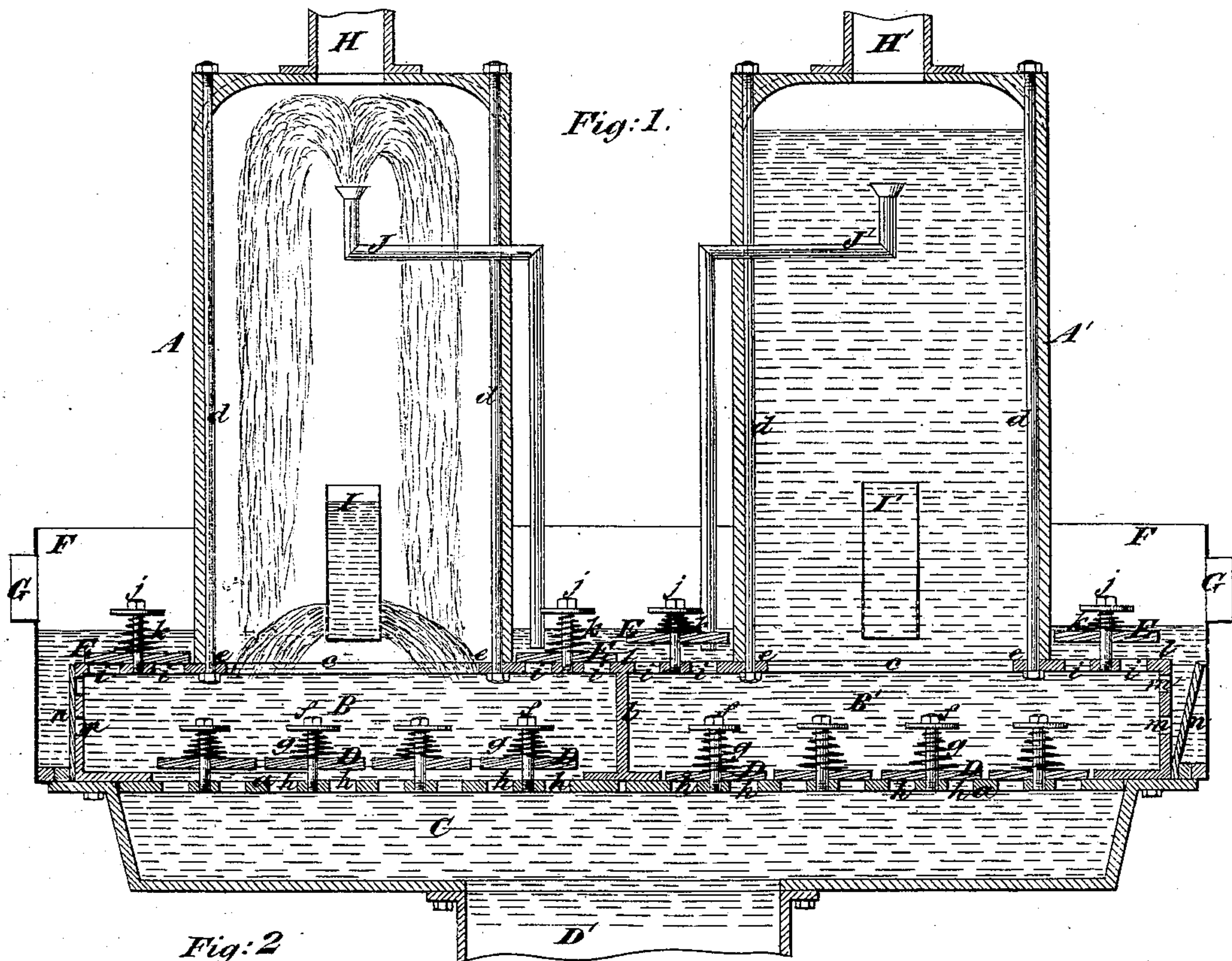


W. BURDON.
Steam Vacuum-Pumps.

No. 135,200.

Patented Jan. 28, 1873.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 135,200, dated January 28, 1873.

P'.

To all whom it may concern:

Be it known that I, WILLIAM BURDON, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Steam Vacuum-Pumps, of which the following is a specification:

The object of this invention is to provide for the freer ingress and egress of the water to and from the vacuum vessel or vessels, and, consequently, for the more rapid performance of the operation of the apparatus, and the more frequent repetition of the same, more especially with a view to the use of low-pressure or exhaust steam, in which case the water must depend mainly or entirely on the force of gravitation to effect its discharge from the cylinders. The improvement consists in a novel system of water-chests and valves, in connection with one or more vacuum-vessels, whereby the desired end is attained.

Figure 1 in the accompanying drawing is a central vertical section of an apparatus illustrating my invention. Fig. 2 is a plan of the water-chests and discharge-valves, the vacuum-vessels being omitted.

Similar letters of reference indicate corresponding parts in the several figures.

The apparatus represented has two vacuum cylinders or vessels, A A', erected upon the hollow horizontal base B B' C, which constitutes the water-chest. This base or chest has such horizontal form and dimensions that it presents a large area of surface around and between the vessels A A', such surface being very much larger than the aggregate area of the horizontal sections of the two vessels. The said base or chest has the whole of its lower part formed in one compartment, C, with which the suction-pipe D' is connected, said compartment being separated by a horizontal partition, a a, from the upper part, which is divided by a transverse vertical partition, b, into two compartments, B B', over which are situated the vessels A A', one over each. The said vessels are entirely open at the bottom, and are situated over openings c c, of corresponding size and form in the tops of their respective compartments B B' of the water-chest. The said vessels are secured to the chest by means of screw-bolts d d passing through the interiors of the said vessels and through lugs e e pro-

vided for the purpose on the inner edges of the openings c c, and there is always a free communication between each vessel and its respective chest B B', such communication being of the full area of the transverse sections of the vessels. The horizontal partition a a has numerous openings, h h, for the ingress of water from the compartment C of the water-chest; and to these openings are fitted the inlet-valves D D, which may be variously constructed; but I prefer, for the sake of simplicity, to make each of a disk or plate of vulcanized India rubber, of circular or other form, which is kept in place by a pin, f, and spring g, the seat being the upper surface of the partition a. The valve-openings h h are arranged in groups, so that several are covered by one valve. The top surface l of the chest B B' C constitutes the seat for the discharge-valves E E, which may be and are represented of the same kind as the inlet-valves D D, just described, each covering several openings, i i, and being held in place by a pin, j, and spring k. The discharge-valves, as well as the inlet-valves, are as close together as they can conveniently be arranged, and the large horizontal areas presented by the top surface of the chest and the partition a, which constitute the valve-seats, being as numerous as possible with valve-openings, there will be a very free passage of water in filling and discharging the vessels A A'. In order to further facilitate the discharge of the water, which, when exhaust-steam is used, will have to be effected by the force of gravitation alone, as many discharge-openings m m as possible are also provided in the sides of the compartments B B', and these openings are covered by flap-valves n n, secured at their lower edges and opening at the top to give a direct upward discharge. The upper compartments B B' of the water-chest are surrounded for the purpose of collecting the water from the several valves with a curb, F, from which it may pass off by one or more spouts, G, to a suitable receptacle. This curb also keeps the upper part of the water-chest covered with water and the valves submerged, which makes the latter close tighter. H H' are the inlet-steam pipes. In using exhaust steam from an engine, these pipes may connect with separate

exhaust-valve chests, one for each end of the engine-cylinder. I I' are retaining-cups, one in each chamber A A', for the purpose of retaining, during the discharge of each vessel, a small quantity of water, which, after the discharge, issues through perforations in the bottom and lower part of the cup for the purpose of condensing the steam. J J' are condensing-pipes for admitting water from inside the curb E into the vessels A A' to assist condensation. When the vacuum is produced in either vessel A or A' by condensation of the steam therein, the valves D D at the bottom of the compartment B or B' of the water-chest belonging to that cylinder will open, and, by reason of the large area of opening presented, the said vessel will fill very rapidly.

I will here remark that I propose to make the suction-pipe of an area as large as that of the horizontal section of the vessels A A'. When the vessel is filled and steam is admitted, the vacuum being destroyed, the water will be discharged through the compartment B or B' of the water-chest and its respective valves E E by the force of gravitation, the discharging being, of course, aided by such pressure as there may be in the steam.

As I intend to make the water-chest large enough to give an aggregate area of opening to the valves E E much larger than the area of horizontal section of each of the vessels A A', the opening of the said valves will be equivalent to letting the bottom drop out of the vacuum-vessel, and it is evident that the quickest possible discharge will be obtained, and hence the more frequent repetition of the operation of the apparatus.

The same construction of water-chest and arrangement of valves may be used in connection with a single vacuum cylinder or vessel,

the upper part of the water-chest in such case having but one compartment. In such case the single vacuum-vessel will have valves *n n* on all sides of it.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with one or more vacuum-cylinders, A A', of a hollow base or water-chest, of larger horizontal area than the said vessel or vessels, having a partition, *a*, and a system of inlet-valves, D D, substantially as herein described.

2. The combination, with one or more vacuum cylinders or vessels, A A', and a hollow base or water-box having larger horizontal area, of discharge-valves E E, arranged around the said cylinders or vessels in the top of said base or chest, substantially as and for the purpose herein specified.

3. The combination, with the hollow base or water-chest, of the side discharge-openings *m m* and valves *n n*, arranged to open at their upper edges, substantially as and for the purpose set forth.

4. The hollow base or water-chest, constructed with upper and lower compartments and with upper and lower valve-seats, in combination with the vacuum-chambers and suction-pipe, substantially as herein described.

5. The combination, with the water-chest and its discharge-valves E and *n*, of the curb G, arranged as herein described and shown, for keeping the upper part of the water-chest covered with the discharge water and the valves submerged.

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Witnesses:

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