

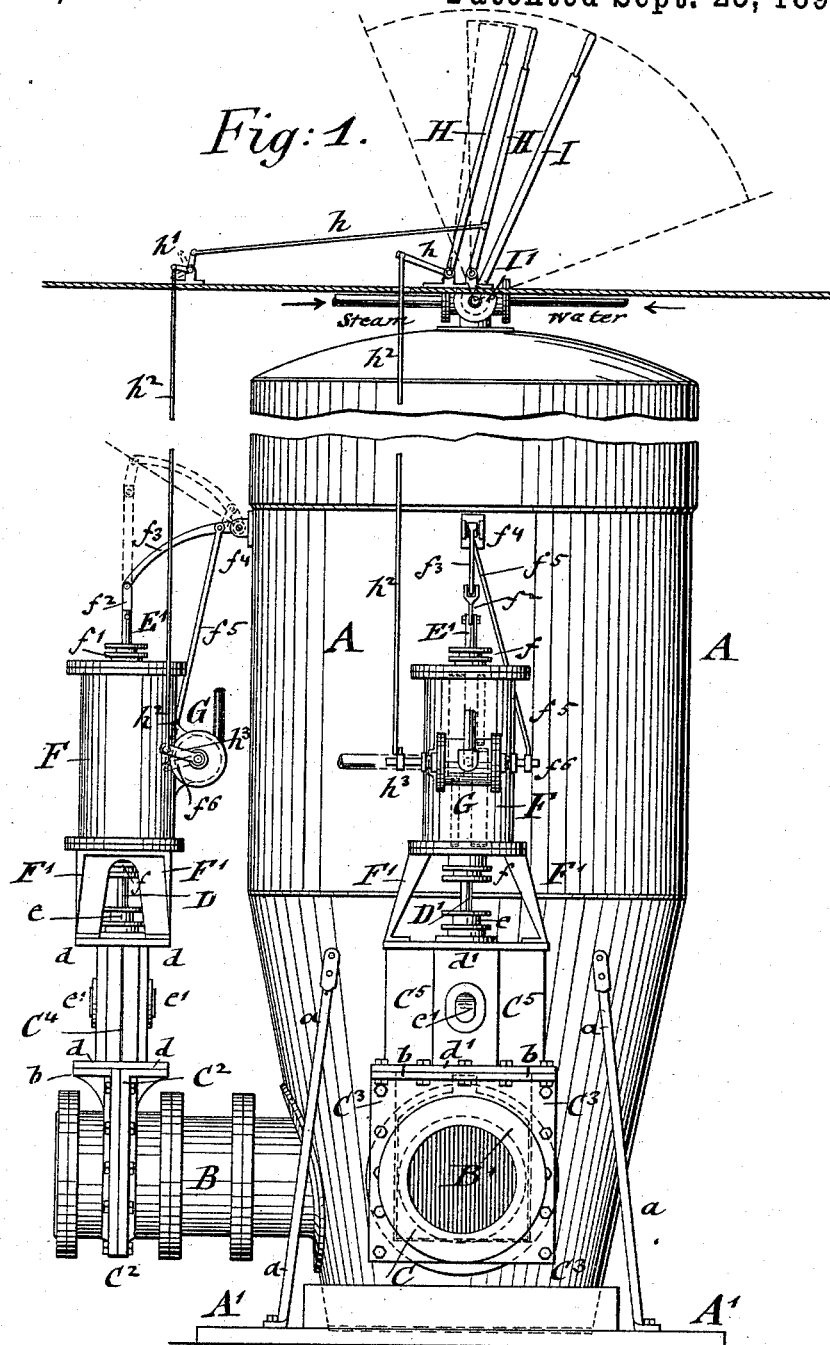
(No Model.)

2 Sheets—Sheet 1.

L. HUSSEY.
STEAM VACUUM PUMP.

No. 526,652.

Patented Sept. 25, 1894.



WITNESSES:

J. Kissblatt,
K. K. Brenner

INVENTOR

INVENTOR
Levi Hussey
BY
L. Hussey & Co.
ATTORNEYS.

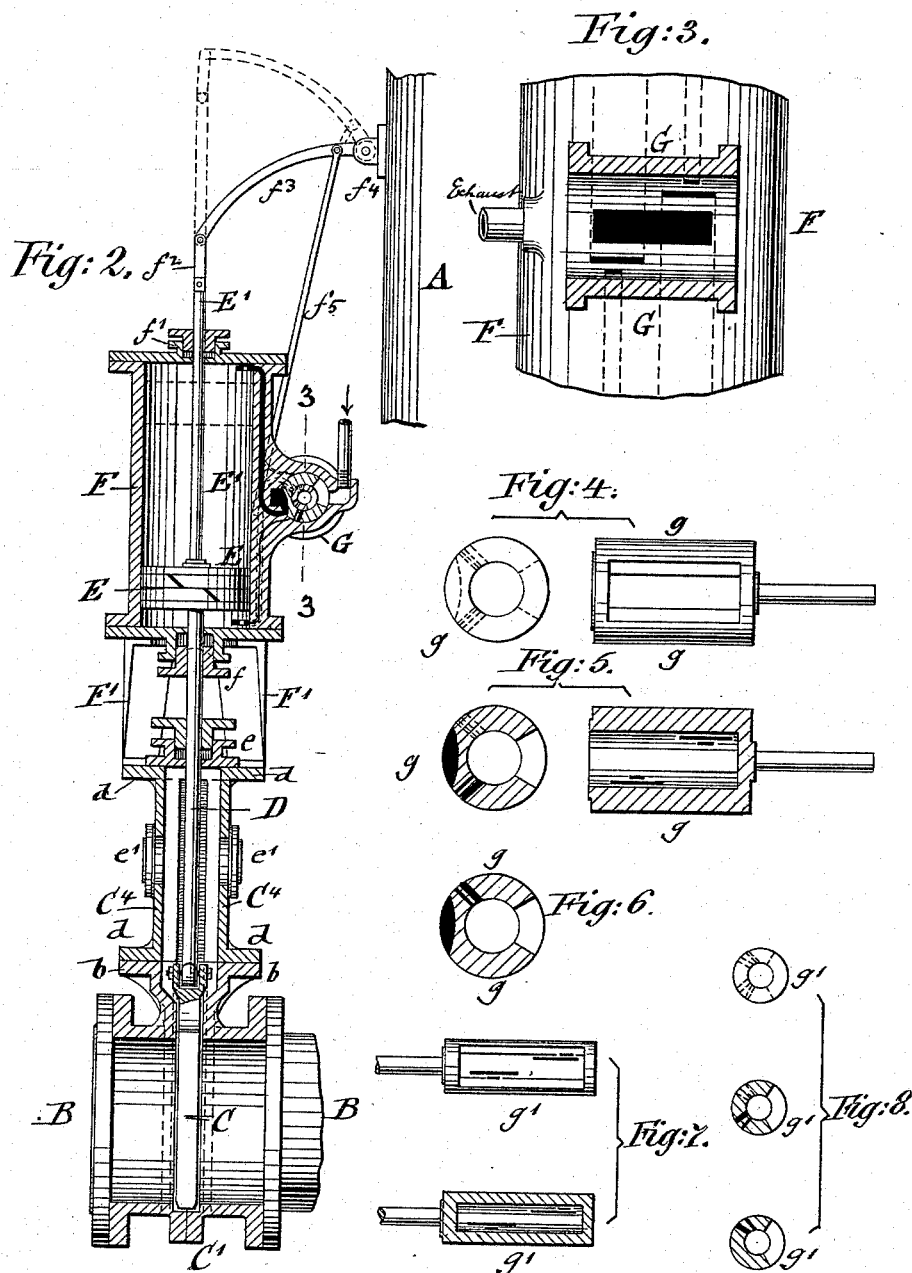
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J. Nussblatt
A. R. Brennan

INVENTOR

Levi Hussey
BY
George P. Rogers
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UNITED STATES PATENT OFFICE.

LEVI HUSSEY, OF NEW YORK, N. Y., ASSIGNOR TO THE MINING AND DREDGING POWER COMPANY, OF SAME PLACE.

STEAM VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 526,652, dated September 25, 1894.

Application filed July 6, 1894. Serial No. 516,779. (No model.)

To all whom it may concern:

Be it known that I, LEVI HUSSEY, a citizen of the United States, residing in New York, in the county and State of New York, have invented certain new and useful Improvements in Steam Vacuum-Pumps, of which the following is a specification.

This invention relates to certain improvements in the steam vacuum pump for which Letters Patent were granted to Edward D. Harsen, No. 514,598, dated February 13, 1894, whereby the action of the pump and its gate-operating cylinders and valve-gears is rendered more effective and reliable, the gates being moved accurately to such an extent as required for the opening or closing of the section and discharge-ports and the actuating pistons cushioned in such a manner that the opening and closing takes place without concussions; and the invention consists of a steam vacuum-pump, the main-chamber of which is provided with a tapering lower part and with suction and discharge-pipes which are opened or closed by vertically-movable gates that are guided in air-tight chambers above the guide-ways of the gate-casings, said chambers being provided at their upper ends with stuffing-boxes for the stems of the gates and with bonnets on each side, by which the gates' ends can be inspected. On the flanged top of the gate-chambers are supported on suitable brackets the cylinders by which motion is imparted to the gates, the stems of the gates being connected to the pistons while the piston-rods are extended through stuffing-boxes in the tops of the cylinders, and connected by pivot-links with fixed points on the pump-chamber and with oscillating-valves that are arranged in cylindrical chests at one side of the cylinders, said valve-chests being connected by parts and channels with the upper and lower ends of the cylinder, so as to produce the proper actuating and cushioning of the pistons and gates and thereby the easy motion of the same.

The invention consists further of certain details of construction, which will be fully set forth hereinafter and finally pointed out in the claims.

In the accompanying drawings: Figure 1 represents a front-elevation of my improved

steam vacuum-pump. Fig. 2 is a vertical central section through one of the gates and gate-operating cylinders of the same drawn on a larger scale. Fig. 3 is a vertical longitudinal section on line 3—3 Fig. 2, through the valve-chest of the cylinder drawn on a still larger scale. Figs. 4 to 8 are details of the oscillating valve and valve-piston, by which the steam or other operating medium is supplied to the gate-operating cylinder.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the pump-chamber of my improved steam vacuum-pump. The upper part of the pump-chamber A is made cylindrical in shape, while the lower part is preferably made tapering toward the base A', so as to facilitate the easy flow of material to the discharge-pipe when pressure is applied on the material in the pump-chamber. The lower tapering part of the pump-chamber A is connected by straps a with the base-plate, and provided with suction and discharge-pipes B B', which are arranged at the lower part of the pump-chamber A and connected by pipes respectively with the place from which the material is to be removed and with the place to which the same is to be conveyed. The suction and discharge-pipes B B' are arranged in line with or at right angles to each other provided with gates C C' for opening or closing the same, said gates being guided in ways of the gate-casings C² C³ and pivoted at their upper parts to valve-stems D D', which are connected with the pistons E of upright cylinders F. The gate-casings C² C³, the suction and discharge-pipes B B' are provided at their upper ends with upwardly-extending brackets b, which serve to support the two semi-sections of air-tight chambers C⁴ C⁵ which sections are provided with outwardly-extending flanges d, d' at their upper and lower ends, the lower flanges being bolted to the brackets b of the gate-casings C'.

The air-tight chambers C⁴ C⁵ are provided at their opposite ends with suitable ways for the gates C C', and at their upper ends with stuffing-boxes e for the stems D D' of the gates C C'. The middle portions of the side-walls of the gate-chambers C⁴ C⁵ are provided

with bonnets e' by which the pivot-connection of the gates with their stems may be inspected, so that any injury to the same can be quickly repaired. The chambers $C^4 C^5$ 5 act in the nature of guides for the gates and serve for the purpose of rendering the gate-casings perfectly air-tight so that the air is prevented from entering into the casings, whereby a better vacuum can be maintained in the 10 pump and the latter be operated in a more reliable and effective manner and with less loss of power. On the upper flanges of the air-tight chambers $C^4 C^5$ are supported upright brackets F' , to which the lower heads 15 of the gate-actuating cylinders F are bolted. The upper ends of the stems $D D'$ of the gates $C C'$ are connected with the pistons E and guided in suitable stuffing-boxes F in the lower-heads of the cylinders, while the 20 piston-rods E' are guided in stuffing-boxes f' in the upper heads of the cylinders F . The pistons E are provided with tightly-fitting packing-rings of any approved construction. The piston-rods E' are extended beyond the 25 upper heads of the cylinders and are connected at their upper ends by pivot-links f^2, f^3 with fixed lugs f^4 attached to the sides of the pump-chamber A , the links f^3 being again connected by pivot-rods f^5 with crank- 30 arm f^6 on the spindles of oscillating slide-valves, by which steam, water or compressed air is admitted into the cylinders for operating the pistons E . The oscillating slide-valve G is arranged in a cylindrical valve- 35 chest G' arranged at one side of the cylinder, the body of the chest being made preferably in one casting with the cylinder and provided with inlet, exhaust and cushioning ports for the steam or other actuating medium. The 40 oscillating slide-valve G consists of a cylindrical main-valve g and an interior valve g' which are both provided with the necessary inlet, exhaust and cushioning ports, as shown in Figs. 3 to 8, by which the slide-valve and 45 chest are connected with the upper and lower ends of the cylinder, so that the operating medium is supplied to one end of the cylinder while it is exhausted at the other end.

The interior valve g' is located with the 50 main-valves g their inlets, exhaust and cushioning ports being made to register at the proper time, the inlet, exhaust and cushioning ports in the steam-chest, so that the piston connected with the gate of the suction or 55 discharge-pipe can be raised or lowered as may be required.

By referring to Fig. 2 it will be seen that the piston in the steam-cylinder is at the bottom of the cylinder, with the valves set 60 ready to raise the piston and gate. The chambers for the steam and cushioning ports for the up-stroke are shown by dotted lines; the chambers for the exhaust-port in full black lines. The main valve g is connected by the 65 pivot-links and levers $f^2 f^3 f^5$, as shown in Fig. 4 with the upper end of the piston-rod E' and is so arranged that at either end of the

stroke, the main-valve will be ready to admit steam at one end and exhaust at the other end, while the cushioning-ports will be opened 70 at the proper time.

The interior valve g' is called the operator's valve, and is operated by the engineer when the piston is at either end of its stroke, and main-valve ready to admit steam; by moving 75 the lever connected with the interior or operator's valve, and admitting thereby steam to the main-valve. As the ports are open it enters into the cylinder and the piston commences to move. The main-valve being con- 80 nected to the piston-rod by the intermediate lever and links it moves with the piston-rod. The operator's valve remains stationary, except when moved by the operator and as the main-valve continues to move with the pis- 85 ton-rod it closes the steam and exhaust ports at the proper time, and opens the cushioning-ports and admits steam or other operating medium so as to properly cushion the piston, whereby a separate cylinder above the work- 90 ing cylinder as shown in the Harsen patent referred to, can be dispensed with.

As two cylinders are arranged, one for gate of suction-pipe and the other for the gate of the discharge-pipe, two actuating-levers H 95 have to be arranged on the engineer's platform, which is located above the pump A , as shown in Fig. 1, said levers being connected by pivot links h , bell crank levers h' , and rods h^2 with cranks h^3 on the spindle of the operator's valve g' . A third lever I is arranged, which operates a two-way valve I' by which 100 alternately water or steam is supplied to the pump-chamber, the water being supplied in a spray so as to produce the condensation of 105 steam in the pump-chamber, and thereby the vacuum by which the material is sucked in, while the steam is used for the purpose of forcing out the material, sucked into the pump-chamber, through the discharge-valve 110 and by a suitable conveying-pipe to the place where the material is to be deposited.

The function and operation of the vacuum pump itself is fully described in the Harsen patent before referred to, and does not require 115 any further description in this connection. It may only be added that the two-way valve I' , as well as the valves of the cylinders have to be operated at the proper time so as to produce the prompt and reliable working of the 120 pump and gates.

Any approved construction of slide-valve and valve-gear for operating the supply of steam or other actuating medium to the cylinders may be used, as I do not desire to con- 125 fine myself to the special construction of the oscillating-valve shown in the drawings.

By the arrangement of the air-tight chambers for the gates of the suction and discharge-pipes, the proper working of the gates with- 130 out admitting air to the pump is obtained, while by the proper cushioning of the pistons the easy and noiseless working of the gates is secured, so that the vacuum pump can be

worked in a more reliable manner and with less friction, less steam and with less pounding action than with the vacuum-pumps of this class heretofore in use.

5 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a pump-chamber, suction and discharge-pipes arranged at the lower part of the same, gates guided in casings in said pipes, air-tight chambers provided with ways arranged above the guide-ways in said casings, said chambers being provided with stuffing-boxes at their upper ends for the stems of the valves, so as to prevent access of air to the air-chambers, gates and pumps, substantially as set forth.

2. The combination of a pump-chamber, suction and discharge-pipes at the lower part of the same, gates guided in casings in said pipes, gate-actuating cylinders above said gates, and pistons in said cylinders connected with said gates, a valve-chest oscillating valves in said valve-chest, said chest and valves being provided with inlet, exhaust and cushioning ports, means for connecting the piston-rods with the main-oscillating valves, for automatically setting said valves, and a lever-mechanism for operating the oscillating interior or operators' valves for admitting the actuating medium to the cylinders, substantially as set forth.

3. The combination, with a pump-chamber, of suction and discharge-pipes arranged at the lower part of the same, gates guided in casings of said pipes and air-tight chambers arranged above the guide-ways of said gates, said chambers being made in two sections provided with ways in line with the ways in the casings and with a stuffing-box on the upper ends for the stem of the gate, substantially as set forth.

4. The combination, of a pump-chamber, having suction and discharge-pipes, gates

guided in casings of said pipes, air-tight chambers provided with ways for said gates, upright brackets supported on said chambers, and gate-actuating cylinders supported on said brackets, substantially as set forth.

5. The combination, of a pump-chamber provided with a two-way supply-valve for the water and steam, suction and discharge-pipes at the lower part of the pump-chamber, gates located in said pipes, gate-operating cylinders above said gates, valve-chests on said cylinders, exterior main-valves in said chests, interior operators' valves, said chests and valves having inlet, exhaust and cushioning-ports, means for connecting the piston-rods of the cylinders with the main-valves and levers connected with the interior or operator's valve said levers admitting live steam so as to operate the pistons and gates, while the connection of the piston-rods with the main-valves produces the cutting off of the steam, and the proper cushioning of the pistons and gates, substantially as set forth.

6. In a vacuum pump the combination with a pump-chamber, having a suction or discharge-pipe, a gate guided in a casing in said pipe a gate-actuating cylinder, a piston in said cylinder, a stem connecting the gate with the piston, a piston-rod guided in the upper head of the cylinder, a valve-chest on the cylinder, an oscillating main-valve in said chest, an oscillating interior or operator's valve, in the main-valve, said chest and valves having inlet, exhaust and cushioning ports, a lever-connection between the piston-rod and main-valve, and an actuating-lever connected with the operator's valve, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

LEVI HUSSEY.

Witnesses:

PAUL GOEPEL,
K. R. BRENNAN.