

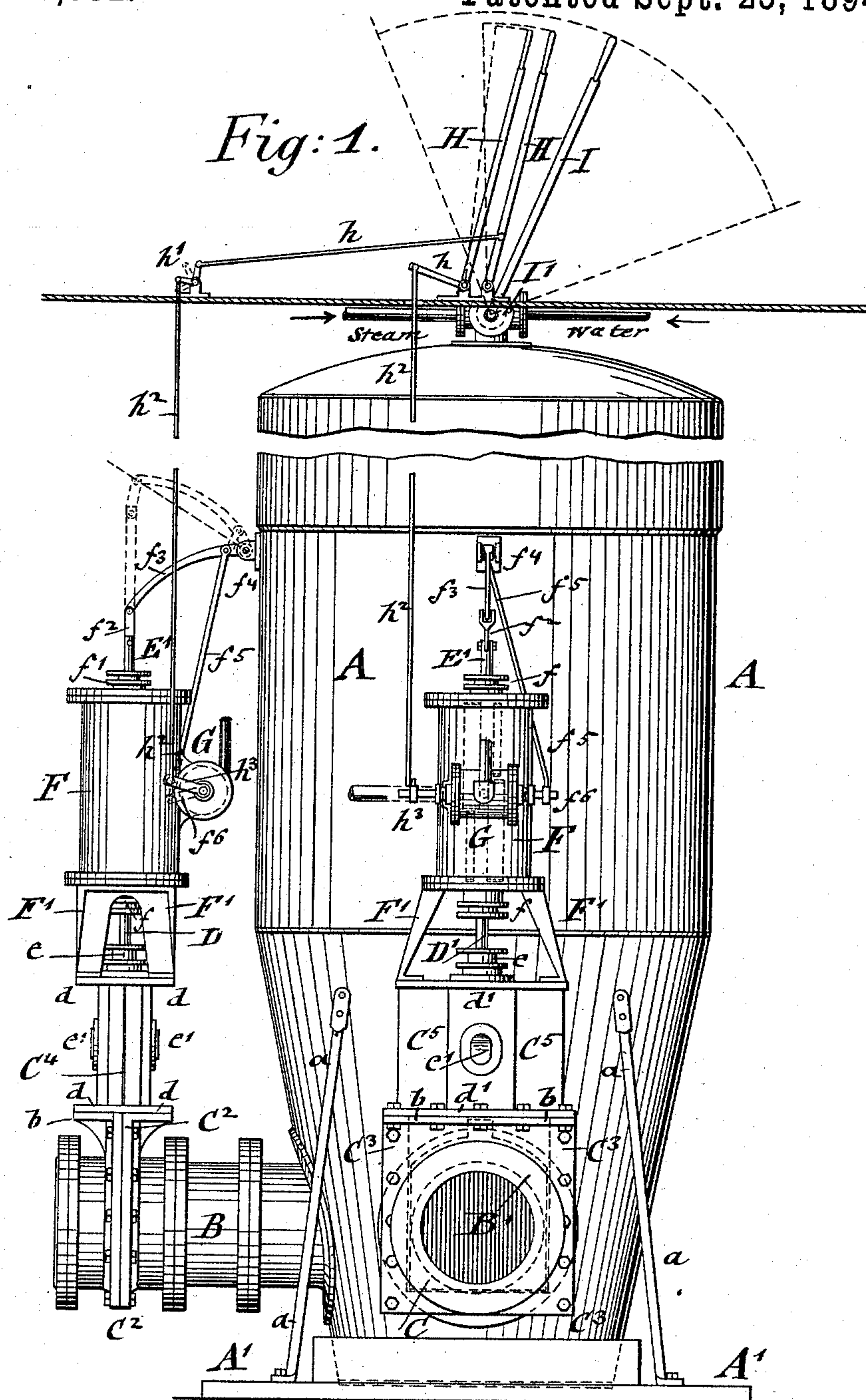
(No Model.)

2 Sheets—Sheet 1.

L. HUSSEY.  
STEAM VACUUM PUMP.

No. 526,652.

Patented Sept. 25, 1894.



**WITNESSES:**

J. Kussblatt  
K. K. Brenner

INVENTOR

INVENTOR  
Levi Hussey  
BY  
G. & C. Rogers  
ATTORNEYS.

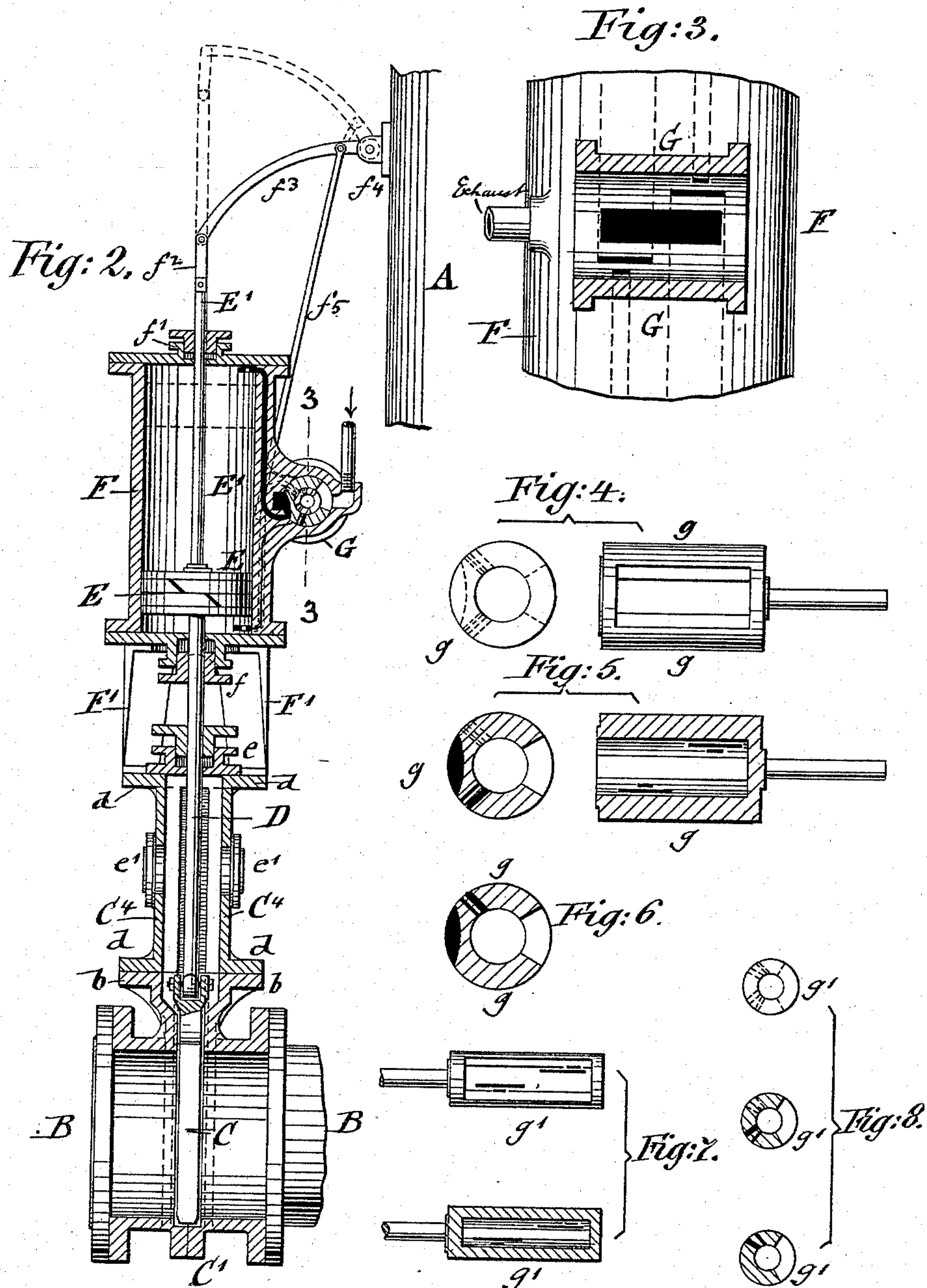
(No Model.)

2 Sheets—Sheet 2.

L. HUSSEY.  
STEAM VACUUM PUMP.

No. 526,652.

Patented Sept. 25, 1894.



WITNESSES:

*J. Muesblatt*  
*A. R. Brennan*

INVENTOR

*Levi Hussey*  
BY *George R. Rogers*  
ATTORNEYS.



# 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  
5 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  
10 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  
15 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  
20 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  
25 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  
30 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  
35 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  
40 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  
45 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.

50 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  
55 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  
60 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  
65 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  
70 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  
75 straps 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  
80 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  
85 of the gate-casings C<sup>2</sup> C<sup>3</sup> 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 C<sup>2</sup> C<sup>3</sup>, the suction  
90 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 C<sup>4</sup> C<sup>5</sup> which sections are provided with outwardly-extending flanges d, d' at their upper and  
95 lower ends, the lower flanges being bolted to the brackets b of the gate-casings C.

The air-tight chambers C<sup>4</sup> C<sup>5</sup> are provided at their opposite ends with suitable ways for the gates C C', and at their upper ends with  
100 stuffing-boxes e for the stems D D' of the gates C C'. The middle portions of the side-walls of the gate-chambers C<sup>4</sup> C<sup>5</sup> 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-arm  $f^6$  on the spindles of oscillating slide-valves, by which steam, water or compressed 30 air is admitted into the cylinders for operating the pistons  $E$ . The oscillating slide-valve  $G$  is arranged in a cylindrical valve-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 35 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 40 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 connected to the piston-rod by the intermediate 80 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 piston-rod it closes the steam and exhaust ports at the proper time, and opens the cushioning-ports and admits steam or other operating 85 medium so as to properly cushion the piston, whereby a separate cylinder above the working 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 alternately water or steam is supplied to the pump-chamber, the water being supplied in a spray so as to produce the condensation of 100 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 confine myself to the special construction of the oscillating-valve shown in the drawings. 125

By the arrangement of the air-tight chambers for the gates of the suction and discharge-pipes, the proper working of the gates without admitting air to the pump is obtained, 130 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  
10 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  
15 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  
20 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  
25 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  
30 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  
35 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  
40 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 cham- 45  
bers provided with ways for said gates, up-  
right brackets supported on said chambers,  
and gate-actuating cylinders supported on  
said brackets, substantially as set forth.

5. The combination, of a pump-chamber 50  
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 cylin- 55  
ders, exterior main-valves in said chests, in-  
terior 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 6c  
connected with the interior or operator's valve  
said levers admitting live steam so as to op-  
erate the pistons and gates, while the connec-  
tion of the piston-rods with the main-valves  
produces the cutting off of the steam, and the 65  
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 dis-  
charge-pipe, a gate guided in a casing in said 70  
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 cyl-  
inder, an oscillating main-valve in said chest, 75  
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 80  
the operator's valve, substantially as set forth.

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

LEVI HUSSEY.

Witnesses:

PAUL GOEPEL,  
K. R. BRENNAN.