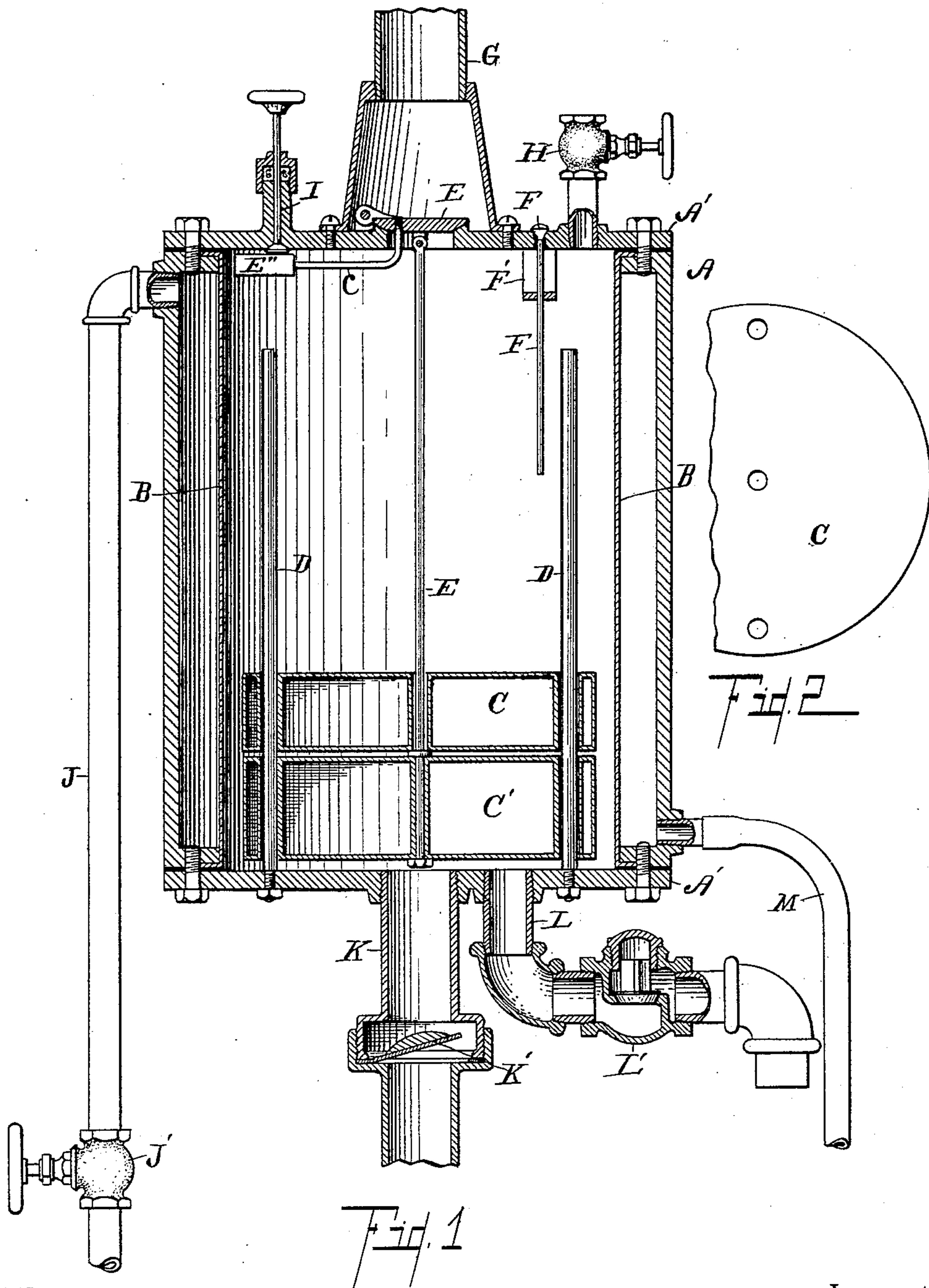


(No Model.)

F. R. CRUMBAKER.
STEAM VACUUM PUMP.

No. 602,498.

Patented Apr. 19, 1898.



Witnesses.

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STEAM VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 602,498, dated April 19, 1898.

Application filed June 1, 1897. Serial No. 638,996. (No model.)

To all whom it may concern:

Be it known that I, FRED R. CRUMBAKER, a citizen of the United States, residing in the village of Mendon, in the county of St. Joseph and State of Michigan, have invented a certain new and useful Steam Vacuum-Pump, of which the following is a specification.

My invention relates to improvements in low-pressure steam vacuum-pumps, particularly to improvements in this class of vacuum-pumps for use in mint-stills.

The objects of this invention are to provide an improved vacuum-pump which can be used with steam at very low pressure and yet supply a considerable quantity of water for use; second, to provide an improved construction of steam vacuum-pumps generally which shall be very economical and which shall be positive and quick in its action.

Further objects will appear in the detailed description.

I accomplish these objects by the devices and means described in the following specification, definitely pointed out in the claims, and illustrated in the accompanying drawings.

Figure 1 is a vertical central detail sectional view through my improved vacuum-pump. Fig. 2 is a detail top plan view of the upper float C.

In the drawings similar letters of reference refer to similar parts throughout both views.

Referring to the lettered parts of the drawings, A represents the external shell or cylinder of my improved pump. B is the internal cylinder. Between the two is an open space which forms a water-jacket for condensation purposes. This is supplied by a pipe M, leading to the bottom on one side. A pipe J, leading from the top on the opposite side, carries the water away. This pipe has a valve J' below the water-level on the opposite side, so that when circulation is set up through the pipes the water will be siphoned through the water-jacket. This is the preferred construction for use in mint-stills, though of course when the pump is in action a portion of the water can be pumped through the jacket and serve the same purpose. This is the construction preferred in a mint-still, because the water can be taken from the cold-water tank through the same and be somewhat heated by the

steam and delivered through pipe J to the boiler. These cylinders A and B are retained together by suitable heads A' A'', one at the top and one at the bottom. In the head A'' at the bottom are inserted a supply-pipe K, containing the usual check pump-valve K', and the delivery-pipe L, containing a globe check-valve L' to prevent the return of any fluid pumped through the same.

On the head A' at the top is a steam-supply pipe G, within which is the check-valve E' to check the flow of the steam at the required interval. This valve E' has a lever e secured thereto which is within the inner chamber of the pump. Back of the pivot of the valve it carries a weight E'' to counterbalance the weight of the valve E' to such an extent that it will be easy to open against the steam-pressure. The spindle I extends through a suitable packing up to this weight, with a handle for depressing the same, so that the valve can be opened by hand-pressure. A globe-valve H, connected by a short piece of lead to the head A', affords a convenient means of opening the same to permit the introduction of water to prime the pump. A small aperture T in the head A' is closed by the valve F', which has a long downwardly-extending stem within the boiler which extends within the pump-chamber through a suitable guide F'. A rod E is pivotally connected to the steam-valve E' on its under side and extends down to near the bottom of the pump-cylinder. To this rod E is secured a float C', which is only sufficient in size to raise the valve E' and open it against the steam-pressure alone when the float is immersed. This float is guided to place by rods D D, secured in the head A'' at the bottom. Upon these rods is also guided a second independent float C, which moves up freely over the guide D D into contact with the valve F', its function being to strike the bottom end of the valve F' and open it to admit air and destroy the vacuum.

The operation of my improved pump is as follows: In starting the pump the spindle I is depressed, which operates on lever e, opens valve E', which admits steam from the low-pressure boiler through the pipe G, the air being driven out through the aperture or vent F. When the air is driven out by the steam, valve E' is allowed to close. Cold water be-

ing between the cylinders A and B condenses the steam and makes a vacuum thereby, which holds the valve E' very securely against its seat. This vacuum created through the condensation of the steam draws water through pipe K past valve K'. It rises in the pump-chamber past the float C' and raises float C till it strikes valve F' and opens it and admits air through the aperture F, which of course breaks the vacuum. The valve K' checks the backward flow of the fluid, however, and the float C', having only the resistance of the low pressure of the steam in the pipe G to overcome, lifts open the valve F' to admit steam very rapidly, thus allowing the contents of the pump to flow out through the pump L past the valve L'. So soon as the water flows out of the pump the valve F' settles down and closes the opening F at the top, and the float C', descending and following up the water as it passes out, closes the valve E'. Then the condensation immediately takes place. Again the vacuum is created. The valve E', securely closed, retains the float C' at the bottom and allows the float C to rise and break the vacuum and complete the cycle of its operation as before. When it is desired to stop the pump, the valve H is merely opened, and then, as no vacuum can be created, the pump of course stops its operation.

The floats I prefer to use are made of hollow copper; but it is evident any kind of floats can be used and may be guided to their places in any suitable way. They can also be made to operate other valves than the valves F' for opening to the outside air to destroy the vacuum. It is needless to say that other styles of valves than the valve E' might be employed in the position of that valve, and, as I have before remarked, instead of passing the water around the pump, as here shown, a portion of the water pumped might be utilized in condensing the steam. The pump will operate without the water-jacket, but very slowly in comparison with the pump having the water-jacket, its speed of course varying with the temperature of the atmosphere and water. The structure, however, as I have shown it is preferred by me in mint-stills, and I believe that it is best adapted to that purpose. From this statement it will be seen that numerous variations are possible in the details of construction without departing from my invention.

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

1. In a low-pressure steam vacuum-pump the combination of a pump-chamber; a water-jacket around the same; a supply and delivery pipe at the bottom with suitable valves therein; a steam-inlet at the top with a suitable outwardly-opening valve therein; a float in the bottom of said pump-chamber connected to said valve of only sufficient size to raise the valve against the steam-pressure; an opening in the top of said chamber with

an outwardly-opening valve to close the same; an independent float within the chamber to strike the valve to the vent-opening to open the same all coacting together for the purpose specified.

2. In a low-pressure steam vacuum-pump the combination of a pump-chamber; means of cooling the same; inlet and outlet valves therefor; a steam-inlet pipe with outwardly-opening valve therein; a float toward the bottom of said pump-chamber connected to the valve in said steam-inlet of sufficient size to raise the valve against the steam-pressure only; a vent-opening with a valve to close the same; an independent float in the pump-chamber guided to rise and open the vent to admit air and destroy the vacuum and allow the water to escape all coacting for the purpose specified.

3. In a low-pressure steam vacuum-pump the combination of a pump-chamber; inlet and outlet valves therefor; a steam-inlet pipe with outwardly-opening valve therein; a float toward the bottom of said pump-chamber connected to the valve in said steam-inlet of sufficient size to raise the valve against the steam-pressure only; a vent-opening with a valve to close the same; an independent float in the pump-chamber guided to rise and open the vent to admit air and destroy the vacuum and allow the water to escape all coacting for the purpose specified.

4. In a low-pressure steam vacuum-pump the combination of the outer and inner cylinders A, A', with heads A', A'', forming an inner pump-chamber with water-jacket around it; supply-pipe M, leading to said water-jacket; waste-pipe J, leading therefrom with valve J', below the line of water-supply; supply-pipe K, with inlet-valve K', leading to the bottom of said pump-chamber; a delivery-pipe L, leading from the bottom of said pump-chamber; a steam-inlet pipe G, leading to the top of said pump-chamber; an outwardly-opening valve E', in the steam-passage having a lever e, with weight E'', to counterbalance the valve; a spindle I, extending through the wall of the pump-chamber to actuate the lever to open the valve; a float C', in the bottom of said pump-chamber with a rod E, connecting it to valve E', the said float being only of sufficient size to open the valve against the steam-pressure alone; a vent F, with a valve F', to close the same suitably guided to place; an independent float C, to actuate the valve and open the vent in rising and suitable guide-rods D, engaging the floats C, C, to guide the same all coacting together substantially as described for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

FRED R. CRUMBAKER. [L. S.]

Witnesses:

CHAS. B. LONG,
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