(No Model.)

2 Sheets—Sheet 1.

E. I. NICHOLS.

STEAM VACUUM PUMP.

No. 551,400. Patented Dec. 17, 1895.

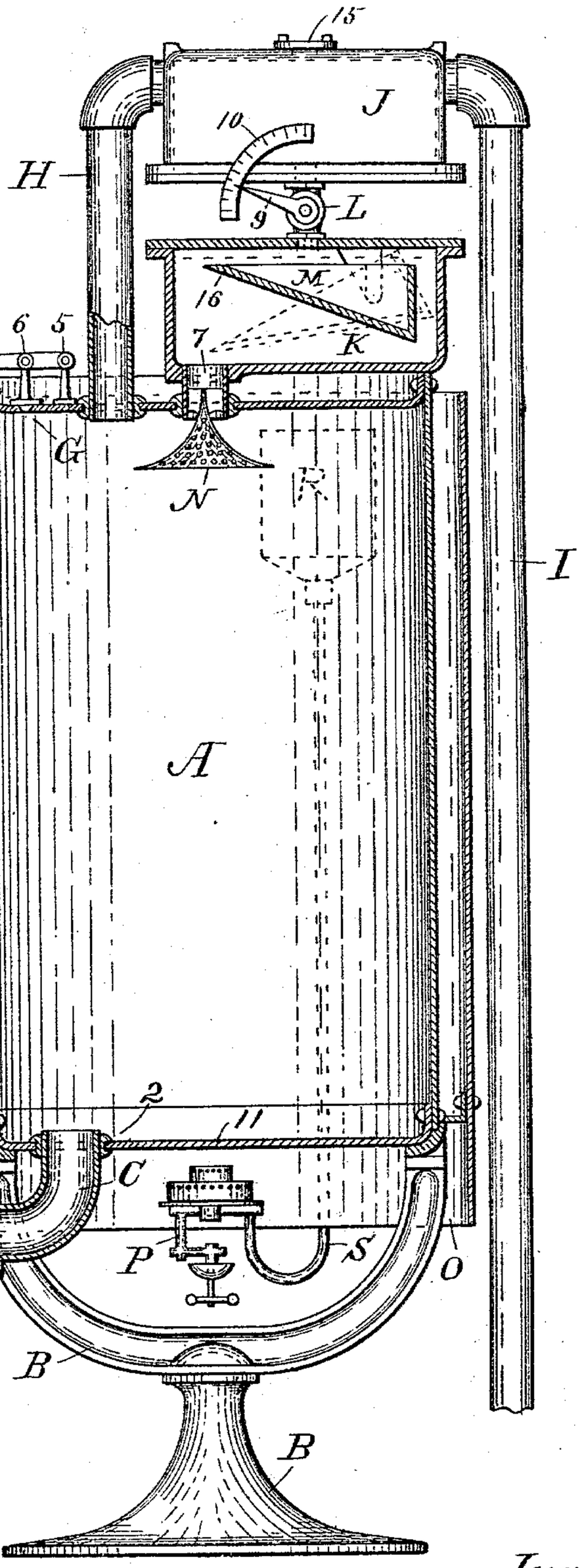

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

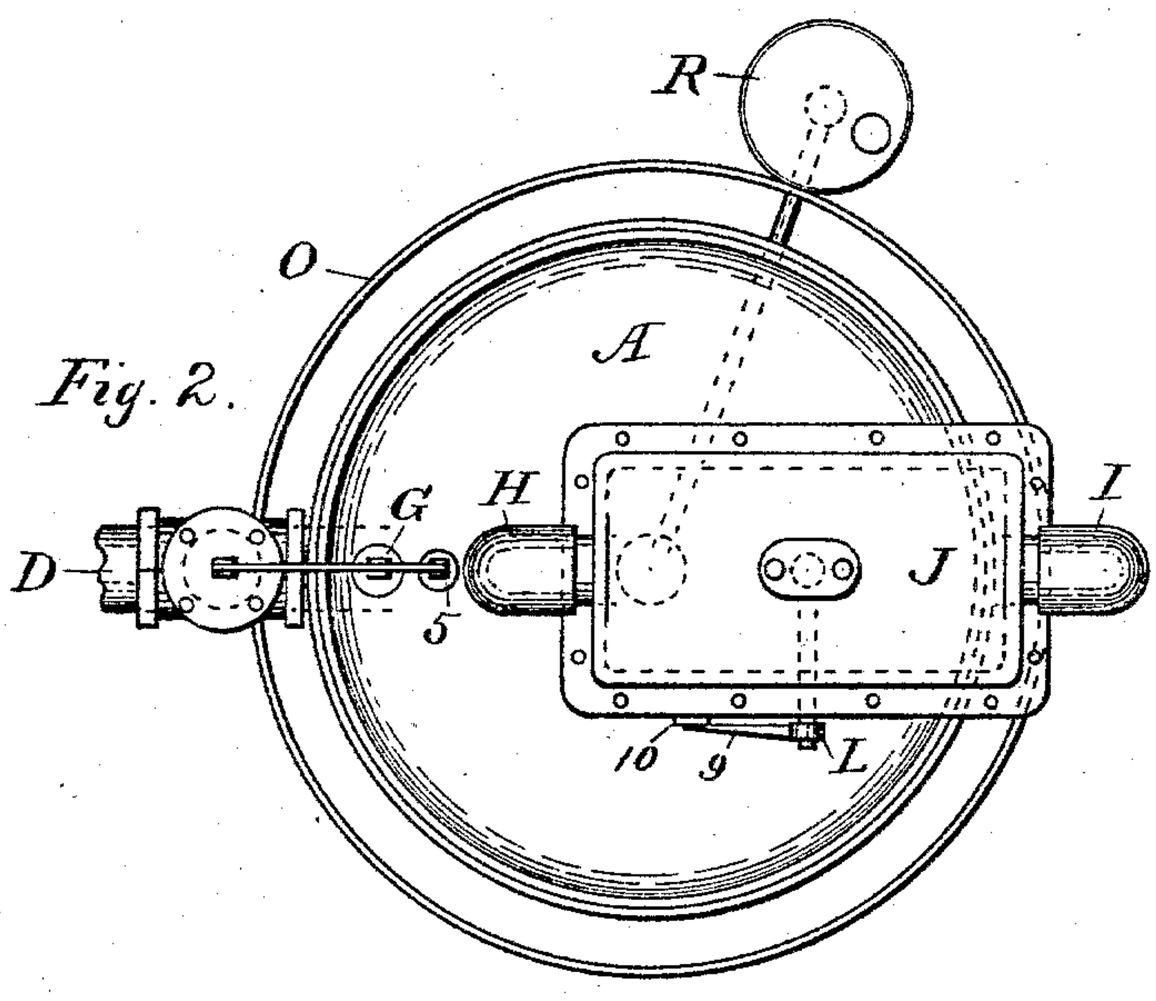


Fig. 3.

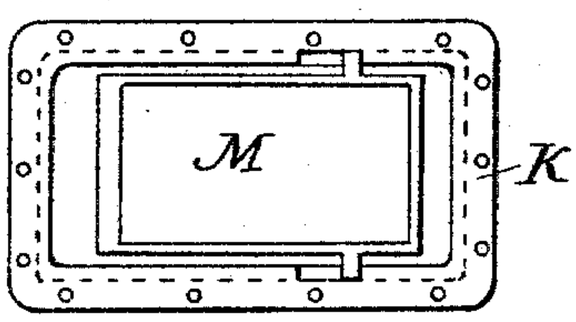


Fig. 5.

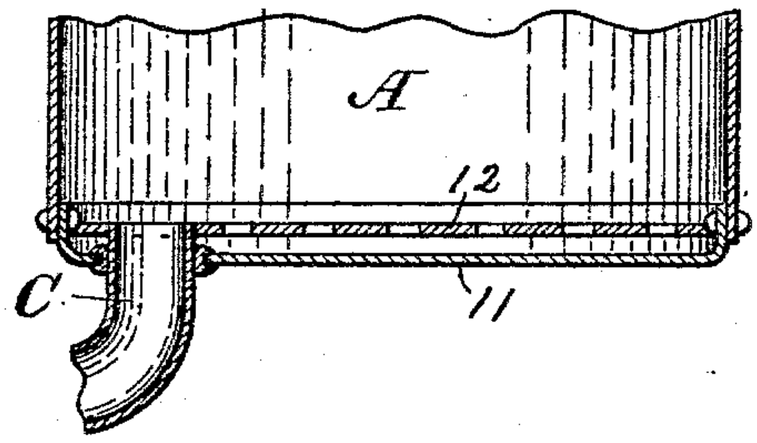


Fig. 4.

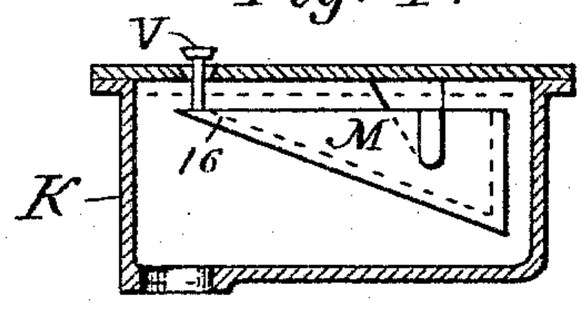
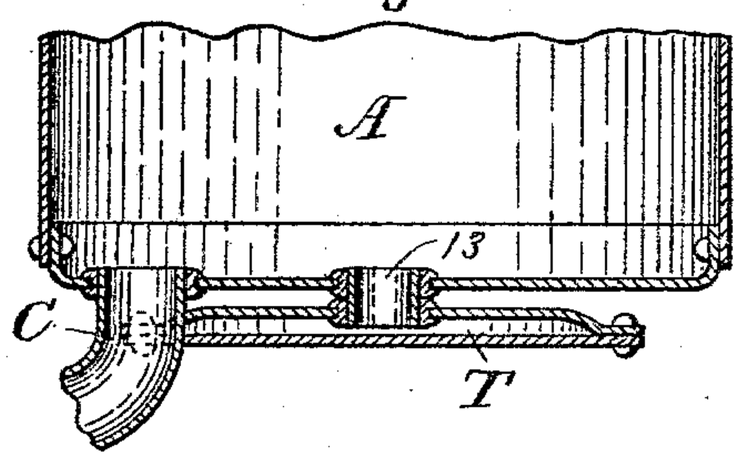


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

EMORY I. NICHOLS, OF SAN FRANCISCO, CALIFORNIA.

STEAM VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 551,400, dated December 17, 1895.

Application filed November 23, 1894. Serial No. 529,777. (No model.)

To all whom it may concern:

Be it known that I, EMORY I. NICHOLS, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Vacuum-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to steam vacuum-pumps; and it has for its object to provide a pumping plant of this class complete in one machine, which is particularly adapted for automatically lifting water or other fluids from a source of supply for whatever use the pump may be employed, and being especially adapted for irrigating or farm use; but is applicable to be used for whatever purpose desired.

Further objects of my invention are, principally, to furnish a better, cheaper, safer, and more convenient means of raising water automatically without using an ordinary steam-boiler as is generally used in pumps of this class.

With these and other objects in view, which will readily appear, the invention consists in the novel construction and mode of operating same hereinafter more fully described and illustrated in the accompanying drawings, in which similar figures and letters of reference indicate corresponding parts throughout the several views.

Figure 1 is a partial central vertical section and partial side elevation showing the general construction of pump. Fig. 2 is a view looking down on top of pump. Fig. 3 is a top view of tilting-box chamber, with cover removed, showing the tilting box in position. Fig. 4 is a section of chamber K, with tilting box M, showing a modified form of constructing the air-valve. Figs. 5 and 6 are modified forms in section of bottom of receiving, discharging, and generating chamber.

Referring to the accompanying drawings, A designates the main water receiving, discharging, and steam-generating chamber of pump, and is preferably cylindrical in shape, of any suitable material, and of any desired size, the same being adapted to be supported upon the frame B. The exact construction of this frame is not essential. It can be made of any desired shape or form, being of sufficient strength and solidity to sustain the weight of pump and contents.

Connected to the lower end of cylinder A, at one side, as shown, or may be in the center of head, is the discharge or outlet spout C, the upper end of which projects at 2 a little above the bottom of cylinder A. Secured to or formed with the outer end of outlet-spout C is the valve-chamber D. Within this chamber is the outwardly-swinging valve 3. Suitably seated and hinged to and within the valve-chamber D, secured to or formed with the valve 3, is the projecting arm 4, upon which rests the air-valve stem E. I do not confine myself to this manner of connecting stem E, or any particular form of check-valve used on the outlet-spout C.

The upper end of stem E is connected to the outer end of lever F. The other end of lever F is hinged to the stationary post 5. Connected to lever F at 6 is the air-valve G, seated in the air-port in the upper end of cylinder A. Though I have shown and described this way of operating the air-valve, also a modified form of air-valve, I do not confine myself to this way of constructing the air-valves or this way of operating the same.

H and I represent the inlet water-pipes to cylinder A. The lower end of pipe H is secured in the upper end of cylinder A, and the upper end of pipe H, as shown, is connected to one end of reservoir-chamber J, near the upper side, or it may be connected to the top. At the other end of chamber J is connected the upper end of inlet-pipe I. The lower end of this pipe is adapted to be beneath the water used as a source of supply. At the lower end of this pipe is a foot-valve. (Not shown in the drawings.)

K represents the tilting-box chamber connected at the bottom to the upper end of cylinder A by the pipe 7 and connected with the reservoir J by the valve L. Within the chamber K is the tilting box M. As shown, it is pivoted to the sides of chamber K. The box M, as shown by full lines, is in a position to receive the water through the regulating-valve L. The box, as shown by the dotted lines, would be in a position of discharging its contents in the bottom of chamber K, which in turn would pass through the pipe 7 onto

and through the small openings in the circular cone spraying device N, which is secured to the pipe 7, or may be secured to the end of cylinder A.

I am aware that the chamber K and box M may be made in many different forms and located and connected differently with the reservoir and the chamber A, and I do not confine myself to this particular form as shown in the drawings.

The reservoir J, as shown, is constructed in the form of a box with a cover 8, forming a receptacle for water below the line of connections of pipes H and I. This reservoir may be constructed in many different ways, or may be formed by making a depression in the pipes H and I over the chamber K for supplying the tilting box M with water or other fluids.

The valve L is shown with a handle 9 pointing to the register 10. This valve L is to regulate the flow of water to the box M, which governs the speed of working of pump. This valve L may be constructed in many different forms, or an opening or port between the chambers A and K will serve the same purpose.

The spraying device N is shown in the form of a concave cone, but may be constructed by extending the pipe 7 into chamber A, or a number of smaller pipes with small openings connected to pipe 7.

As a convenient form of heating the chamber A for generating the steam, I have shown a vapor-burner P under the lower end of chamber A, and by dotted lines I have shown an oil-reservoir R and a pipe S leading therefrom to the burner P; but I do not confine myself to this way of heating the chamber A. It may be heated by any kind of fuel, or a fire-box may be constructed under the end of cylinder A and coal or wood used for heating; but I prefer a vapor burner or burners, as I obtain a more regular heat.

I have shown an outside casing O surrounding the cylinder A and projecting below said cylinder to protect the fire and keep the rising heat close to sides of cylinder A.

I have shown in the top of chamber K in Fig. 4 a modified form of constructing the air-valve V, the stem of which is suitably seated in the top of chamber K, the lower end extending down into said chamber and is operated by the tilting box M coming in contact with lower end of valve-stem as the box tilts back after discharging its contents.

In Fig. 5 I have shown a cross-section of end of cylinder A with an extra end 12, provided with a series of small openings therein. This end 12 is located a little above the end 11 of cylinder A, forming a small water-space between the ends 11 and 12.

In Fig. 6 I have shown a cross-section of lower end of cylinder A in a modified form, provided with an extra heating-chamber T, connected to the end 11 by the pipe 13. The objects of these modified forms in Figs. 5 and 6 are to protect the heating-surfaces from the cold water coming into the cylinder A, and at the same time to permit of the free flow of water to the heating-surfaces, and the free escape of steam arising therefrom to enter the cylinder A.

The operation of the pump is automatic after the same has once been started by the operator, and is as follows: First fill the reservoir J, through the port 15, with a sufficient quantity of water, or until the same will flow down through inlet-pipe H into cylinder A, so that a small amount of water will cover the bottom of cylinder A, or in other words turn in water through the port 15 until it flows out of outlet-pipe C. The operator then closes port 15 and lights the burner P and opens the regulating-valve L to the desired point, or to admit of the proper amount of water to flow through said valve, so as to fill the tilting box M in a given time. Steam is soon generated from the small amount of water on the bottom of cylinder A, steam filling the cylinder completely, and at the proper time the box M, being filled with water, gets its greatest weight at the point 16, tilts down and empties its contents in the bottom of the chamber K. The box M then tilts back to its filling position ready to receive another charge of water. The water emptied in the bottom of chamber K flows through the pipe 7′, on and through the condensing device N, and almost instantly condenses the steam in cylinder A, thus filling the cylinder with water through the inlet-pipes H and I. As soon as the vacuum ceases in cylinder A the weight of the water opens the valve 3 and flows out of the cylinder A. The swinging of the valve 3 raises the stem E, which opens the air-valve G and admits air to pass into the cylinder to take the place of the water as fast as same flows out through the outlet-pipe C to the place of delivery. The water now being discharged, the valve 3 closes on its seat, which carries the stem E with it and closes the air-valve G. The cylinder A is again filled with steam from the water left on the bottom 11, and the alternate automatic operations of the pump are repeated in the manner just described.

By the improved devices herein shown and described the cost of constructing a steam vacuum pumping plant is very materially reduced, and is more durable, and is less liable to get out of order, and the operation of my improved pump is thought to be apparent without further description.

I claim—

1. In a steam vacuum pump the combination, with a chamber having valved receiving and discharge openings, a spray condenser, and an automatic tilting-box adapted to receive the fluid from the source of supply and discharge the same in the vacuum chamber, of a heating device to heat said chamber for generating the steam therein, substantially as set forth.

2. In a steam vacuum pump, the combina-

tion with a steam or vacuum chamber with receiving and discharge openings and a spray condenser, of an automatic tilting box for supplying the spraying device and regulated by a valve or port being connected to a fluid supply for filling said box, substantially as and for the purpose described.

3. In a steam vacuum pump, the combination with a steam or vacuum chamber having receiving and discharge openings, a chamber, of a tilting box therein, said box adapted to receive fluid from a reservoir by a valve or port, and the whole connected to the vacuum chamber for supplying the condensing device, substantially as described.

4. In a steam vacuum pump the combination with the steam or vacuum chamber having receiving and discharge openings and a condensing device, of a chamber containing an automatic pivoted box constructed and adjusted when containing a certain amount of fluid to tilt down automatically and discharge its contents, and then tilt back again to its filling position, substantially as and for the purpose described.

5. In a steam vacuum pump, the combination with the steam or vacuum chamber, with inlet and outlet pipes or openings, of a reservoir constructed with or connected to said inlet pipe, and an automatic tilting box supplied through a regulating valve or port from said reservoir, for operating the condensing device, substantially as set forth.

6. A steam vacuum pump consisting of a supporting frame, a steam generating or vacuum chamber, a vapor burner or burners with an oil supply pipe, a fluid inlet and a fluid outlet, a spray condenser, an air valve, and an automatic tilting box supplied with fluid from a reservoir through a regulating valve or port for operating the spray condenser, substantially as described.

7. A steam vacuum pump consisting of a vacuum cylinder having receiving and discharge openings, an air valve, a spray condenser, an automatic tilting box adapted to receive the fluid for supplying the spraying device, a regulating valve or port, a vapor burner or burners for generating the steam in the vacuum cylinder, and a casing surrounding the vacuum cylinder for protecting the burner and said cylinder substantially as described.

8. In a steam vacuum pump the combination, with a vacuum chamber having receiving and discharge openings, a spray condensing device, an automatic tilting box, adapted to receive fluid for supplying the spraying device, and a vapor burner or burners, of an extra bottom or an extra water space formed with or connected with the vacuum chamber, so as to admit of a free flow of water thereto, and the free escape of steam therefrom, substantially as shown and described.

9. In a steam vacuum pump the combination of a steam or vacuum chamber having receiving and discharge openings, a spray condenser, an automatic tilting box adapted to receive the fluid for operating the spray condenser and a heating device substantially as shown and described.

10. In a steam vacuum pump the combination with a steam or vacuum chamber having valved receiving and discharge openings, a spray condenser, an automatic tilting box adapted to receive the fluid for supplying the spray condenser, a vapor burner or burners, of an air valve operated by the movement of the said discharge valve, substantially as shown and described.

11. A steam vacuum pump consisting of a steam or vacuum chamber having receiving and discharge openings, a spray condensing device, an automatic tilting box adapted to receive the fluid for operating the spraying device, a reservoir for supplying fluid to the tilting box, and a vapor burner or burners for generating the steam, substantially as shown and described.

12. In a steam vacuum pump, the combination, with a steam or vacuum chamber having receiving and discharge openings, a spray condenser, an automatic tilting box adapted to receive the fluid for supplying the spraying device, and a vapor burner or burners, of an air valve operated by the movement of the said tilting box, substantially as shown and described.

In testimony whereof I affix my signature, in presence of two witnesses, this 12th day of November, A. D. 1894.

EMORY I. NICHOLS.

Witnesses:
E. F. WAGER,
O. L. MCMURRY.