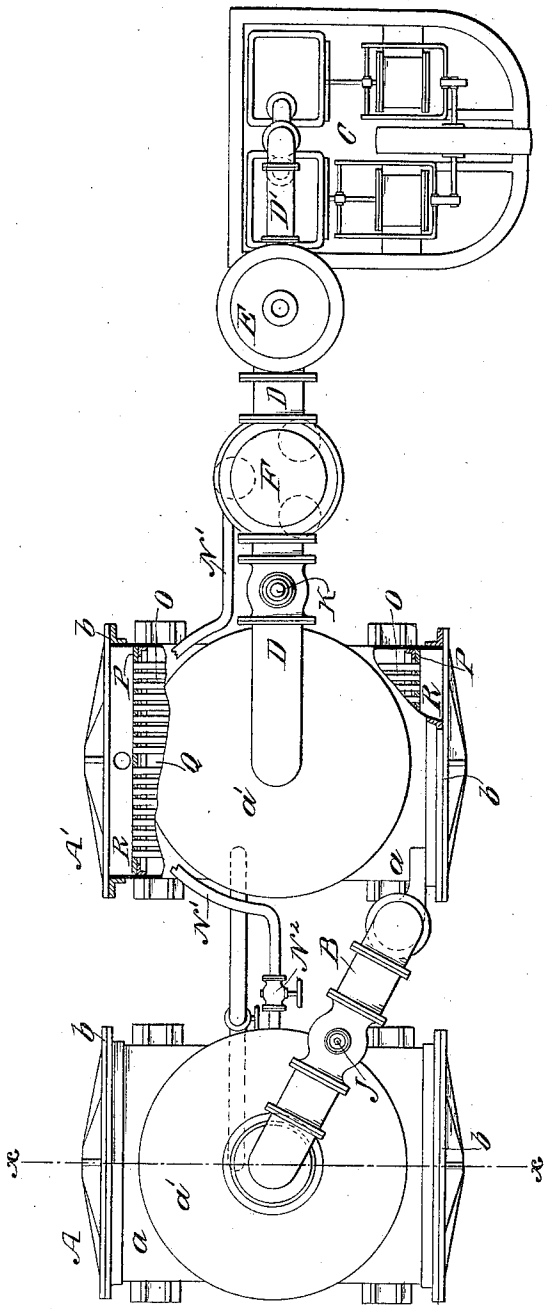
(No Model.) 4 Sheets—Sheet 1.

J. D. EDWARDS & L. F. HAUBTMAN.

VACUUM PAN.

No. 307,635. Patented Nov. 4, 1884.

Fig. 1.



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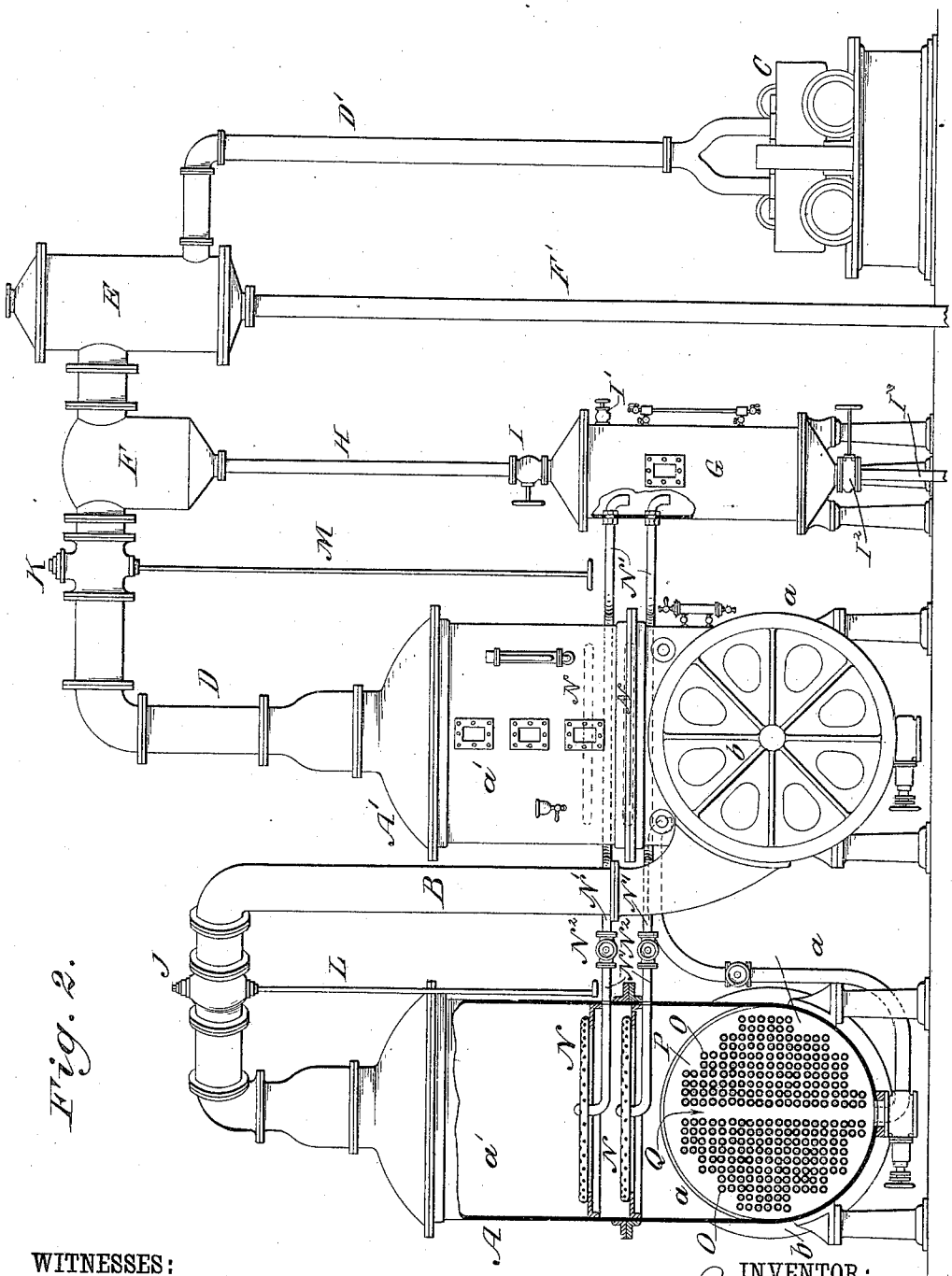

Fig. 2.

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VACUUM PAN.

No. 307,635. Patented Nov. 4, 1884.

Fig. 3.

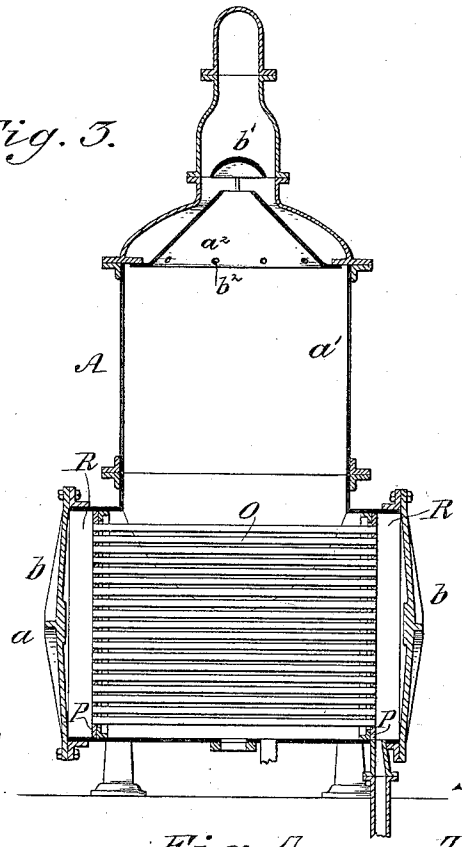


Fig. 5.

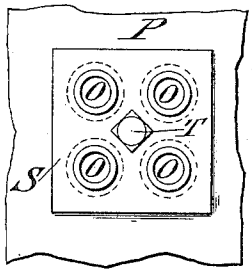


Fig. 6.

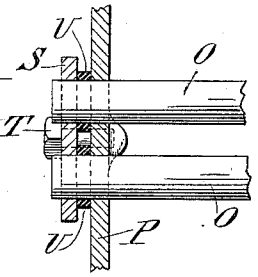
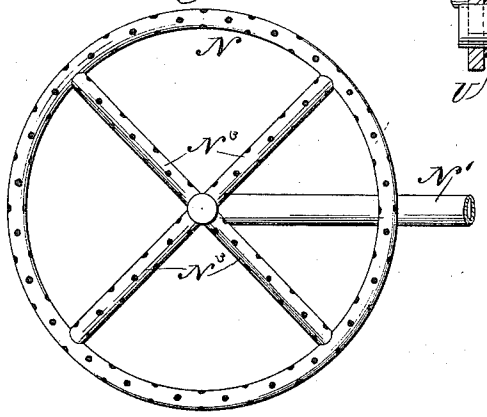


Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

J. D. EDWARDS & L. F. HAUBTMAN.

VACUUM PAN.

No. 307,635. Patented Nov. 4, 1884.

Fig. 6.

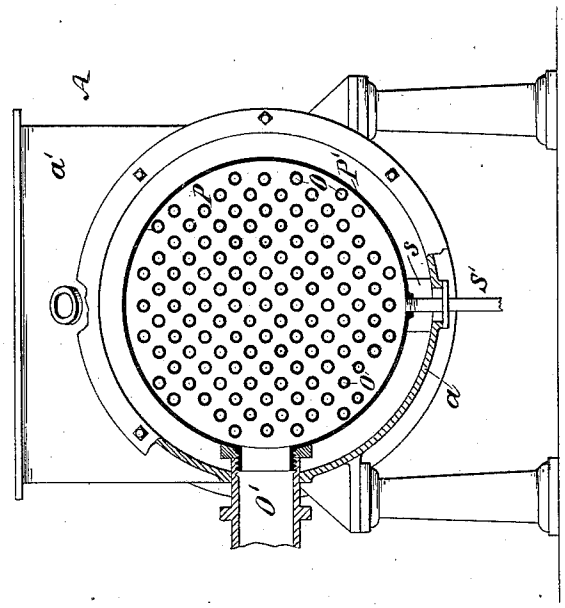
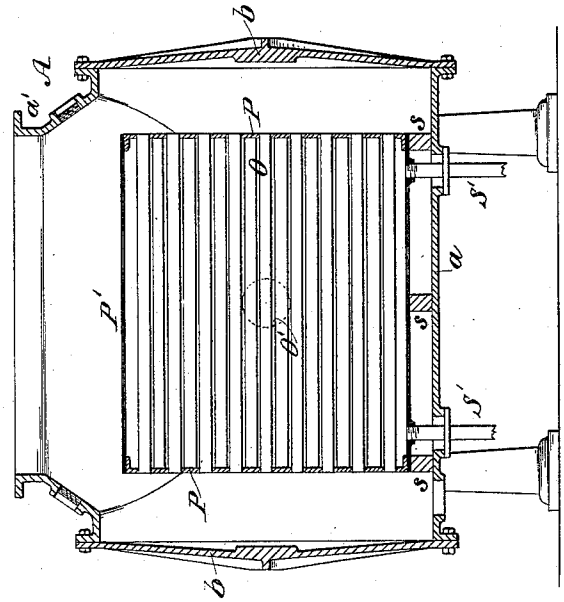


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES D. EDWARDS AND LEON F. HAUBTMAN, OF NEW ORLEANS, LA.

VACUUM-PAN.

SPECIFICATION forming part of Letters Patent No. 307,635, dated November 4, 1884.

Application filed May 8, 1884. (No model.)

To all whom it may concern:

Be it known that we, JAMES D. EDWARDS and LEON F. HAUBTMAN, both of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Vacuum-Pan, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken plan view of an entire double-effect vacuum apparatus constructed and arranged in accordance with our invention. Fig. 2 is a broken side elevation of the same. Fig. 3 is a transverse sectional elevation taken on the line *x x* of Fig. 1. Fig. 4 is a detached view of one of the "blow-up" pipes or rings. Figs. 5 and 6 show the preferred means of securing the tubes in the head-plates of the pan so that they may be removed for repairs. Fig. 7 is a sectional elevation of the vacuum-pan, showing the whole heating-surface made removable from the pan; and Fig. 8 is a sectional end elevation of the same.

The invention will first be described in connection with the drawings, and then pointed out in the claims.

A A′ represent two vacuum-pans connected together by the pipe B in the ordinary manner.

C represents a set of ordinary air-pumps connected to the vacuum-pan A′ by the pipes D D′; and E represents the vapor-condenser, with which the pipes D D′ connect in an ordinary or any approved manner.

F is a receiver fitted or formed in the pipe D, in front of the condenser E, and this receiver is connected with the lower receiver, G, by the pipe H, which is provided with the valve I. The pipes B D are respectively provided with the valves J K, which are adapted to be opened and closed by the spindles L M, for the purposes hereinafter described. In the vacuum-pans A A′ are placed the rings or pipes N, which are perforated hollow chambers or rings of metal formed with the radial arms N^3, as shown in Fig. 4, and these pipes N are connected with the lower receiver, G, by the pipes N′, which are provided with the valves N^2, as shown clearly in Figs. 1 and 2.

The pans A A′ are each made in two main parts—the horizontal cylindrical base *a* and the cylindrical upright portion *a′*. These are by preference connected together so as to form a T, as shown in Figs. 1 and 3, thus furnishing a large heating-surface with plenty of space above, which tends to obviate all danger of the pan boiling over, and at the top of the upright portion *a′* is secured the hollow truncated cone a^2, as shown in Fig. 3, and a little above this is held the deflecting-plate *b′*, which directs the overflow of juices, should there be any, into the space between the cone a^2 and the shell of the vacuum-pan, from which space it will find its way back into the vacuum-pan through the perforations b^2. In the lower base portions, *a*, of the pans A A′ are placed the steam-heating pipes or tubes O. These are arranged in the head-plates P P so as to form the central vertical space, Q, which permits the liquid, after boiling upward above the tubes O, to settle back down through the space Q, thereby permitting free circulation of the liquid inside of the pans and avoiding the tendency of the pan to boil over.

The tubes O may be held in the head-plates P in the ordinary manner by expanding them in the tube-openings of the plates, the plates P being arranged to form the steam-spaces R R; or the steam-tubes may be held in the head-plates P in sets of four, more or less, by the plates S, through which the tubes pass, as shown in Figs. 5 and 6, the plates S being adapted to be secured to the head-plates P by screw-bolts T, the packing U being placed around the pipes O between the plates S and head-plates P to form liquid and steam tight joints where the pipes pass through the head-plates. By this arrangement for holding the tubes O, by simply removing the bolt T the tubes may be removed from the pans for repairs or for supplying new tubes when any of the old ones become worn or otherwise unfit for use; and when removable steam-tubes O are used the outer heads, *b*, of the pans will be made removable, or will have suitable doors made therein, thereby furnishing easy access to the tubes for replacing or repairing them.

In the form shown in Figs. 7 and 8 the pipes O are secured in the head-plates P P by expanding the ends of the tubes in the tube-

opening of the head-plates, and the tubes and head-plates are inclosed in the drum or cylinder P′, which is secured steam-tight to the edges of the head-plates P P. The ends of the tubes O being open the liquid in the vacuum-pan circulates through the tubes and around the drum P, while the steam for heating enters the drum P′ through the steam-inlet pipe O′, and circulates within the drum P′ and around and among the tubes O. The head-plates P and the drum P′ are of less diameter than the outer end plates, *b b*, of the vacuum-pan, so that by removing one of the plates *b* and disconnecting the steam-inlet pipe O′ and the steam-outlet pipes S′, the whole heating-surface may be easily removed from the vacuum-pan for repairs or for replacing it by a new heating-surface. When the heating-surface is in place in the vacuum-pan, it rests upon the blocks *s s*, and it may be stayed by suitable brackets or other stays to the walls of the pan.

In action, when the saccharine or other juice introduced into the pans to be concentrated is properly defecated, the valves J K I will be opened and the valves N^2 closed, and steam will be admitted to one or other of the pans A A′, which will circulate through or around the steam-tube O and heat the contents of the pans, the vapors from pan A being drawn by the action of the pumps C through pipe B to the pan A′, where it serves to heat the contents of this pan, and passes along with the vapors of pan A′ through pipe D to the condenser E, where the whole vapor becomes condensed and passes out of the apparatus through pipe F′. When the saccharine juices are not thoroughly defecated and clear before they are introduced into the vacuum-pans, after steam has been admitted to raise the gum and impurities to the surface, the valves J K are closed and valves N^2 I opened. This will cut off the pumps from the pans A A′ and connect the perforated rings N with the receiver G, and direct the exhaust-current created by the action of the pumps from the pans through the said perforated rings N, pipes N′, receiver G, pipe H, and receiver F, to the condenser E, which current will cause all the floating matter on the top of the juice in the pans to flow into the receiver G. After the receiver G becomes filled, by closing valve I and opening air-valve I′ and outlet-cock I^2 at the bottom of the receiver the contents of the receiver may be let down into a suitable tank placed below the pipe I^3 and the operation be repeated, if required. The impure matters having in this manner been removed from the vacuum-pans, the valves J K will be opened and the valves N^2 closed, thus connecting the pans A A′ again directly with the pumps, and the action is carried on in the manner hereinbefore described.

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

1. In a vacuum-pan, the pan A, having the interiorly-disposed plates or heads P supporting the tubes O intact with the pan A, substantially as and for the purpose set forth.

2. In a vacuum-pan, the pan A, having the upward extension *a′* and the interiorly-disposed plates or heads P supporting the tubes O intact with said pan A, substantially as and for the purpose set forth.

3. The combination, with a vacuum-pan, of pipes or chambers N, connected to a receiver connected with the pump, substantially as and for the purposes set forth.

4. In a vacuum-pan, the heating-tubes O, passing through the head-plates P, in combination with the plates S, bolt T, and packing U, all arranged substantially as and for the purposes set forth.

5. In a vacuum-pan, the drum P′, with its heads P, supporting pipes O, said drum with its heads and pipes being disposed within the pan, leaving a circulating-chamber between the same and the pan, substantially as and for the purpose set forth.

6. The vacuum-pan having the removable plates *b*, in combination with the heating-drum P′, tubes O, and head-plates P, adapted to be removed from the vacuum-pan, substantially as described.

7. The pipes B D of the pans A A′, provided with valves J K, in combination with the pipes or chambers N, receiver G, valved pipes N′ and valved pipes H, connecting the receiver G with the upper receiver, F, substantially as and for the purposes set forth.

8. The combination, with the upright portion *a′* of the vacuum-pan, of the cone a^2 and deflector *b′*, held above the cone for directing the overflow back of the cone, substantially as and for the purposes set forth.

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