

Evaporator.

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Witnesses:
Jth Burridge.
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Inventor:
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UNITED STATES PATENT OFFICE.

J. E. YOUNGMAN, OF ROCKFORD, ILLINOIS.

IMPROVED EVAPORATOR.

Specification forming part of Letters Patent No. 58,331, dated September 25, 1866.

To all whom it may concern:

Be it known that I, J. E. YOUNGMAN, of Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in a Sugar Refining and Evaporating Apparatus; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of the evaporator. Fig. 2 is a front-end view. Fig. 3 is a top view. Fig. 4 is a view of the opposite side from Fig. 1. Fig. 5 represents the furnace-grate.

Like letters of reference refer to like parts in the different views.

A is the fire box or furnace of the evaporator, which is lined with a space between the sides and lining to prevent the heat from escaping to the outside of the furnace, but retains it inside, where it is carried up under the pans by the current of air generated by the radiation of heat as it passes between the sides and fire-box.

The bars 1 2 3, &c., (seen in Fig. 5,) form the grate of the furnace, and are hung upon a rod, B. This rod, passing through one end of the bars loosely, allows them to be raised upward at the other end, which is accomplished by means of cogs on a shaft, C, that the free ends of the bars rest upon, that when turned does not lift up all the bars at the same time, but irregularly, for the purpose of shaking the ashes from the grate and freeing the draft.

The drop-door D, Figs. 1 and 4, forms the bottom of the furnace, and is connected to the under side by a hinge, E. This hinge allows the door to drop entirely down, or it may be opened partially, for the purpose of regulating the draft. The door is retained closed or open by a hook, I, as shown in Fig. 2.

G is a door immediately above the fire-box, for the purpose of supplying the furnace with fuel. This door is held opened or closed by a weighted handle, H. I' is also a door, hung and operated in the same manner as the door G, the purpose of which will be hereinafter described.

J, Fig. 3, (indicated by the dotted lines,) is a register, the bars or slats of which are movable by means of a slide, K, that opens or closes the slats, for a purpose hereinafter stated.

L, Figs. 1 and 4, is the flue, the sides and bottom of which are double, leaving a space between the inner and outer sides, for the same purpose as that described in relation to the furnace.

Extending across the lower end of the flue is a damper. (Indicated by the dotted line M in Fig. 1.) The upper end of the flue is divided longitudinally into two sections or chambers by a partition-plate, as indicated by the dotted line N, Fig. 3. Each of these chambers is provided with a damper, as indicated by the dotted line D'. These dampers are operated alike by levers P and Q. On the outside of the flue R is the chimney or stack of the furnace.

S, Figs. 1 and 3, is the boiler or defecator, arranged in two apartments or sections, the partitions I'' for this purpose being double and spreading at the under sides, forming a chamber between the two sections, and into which the heat rises, thereby heating the liquid at the sides of the boiler and the bottom at the same time.

U, Figs. 1 and 3, is the evaporating-pan. Extending the length of the side of the pan is a strainer, V, and on the opposite side are strainers W X and a crank-skimmer, V'.

Z is the finishing-off pan, the bottom of which is double. Extending along one side of this is a skimmer, a, operated with a crank, as the skimmer V'.

b is a filter; c, a siphon, one leg of which connects with the bottom of the filter and the other with the finishing-off pan, the purpose of which will be more fully described.

Having thus far described the several parts of the evaporator and its construction, I will now proceed to explain its operation, which is as follows:

The crude juice on being thrown into the defecator S is then brought to a boiling-point, and when sufficiently boiled it is drawn off into the evaporating-pan U through the vents b', which are opened and closed by means of the screw and crank f. Before, however, the liquid reaches the pan it is run through the strainer V, by means of a conductor, e. This strainer removes all the scum that may have arisen during the boiling of the juice, the waste having passed off through an opening, g, in the lower end of the strainer. A cold-air chamber on the opposite side of the pan, formed by the strainers, causes the liquid to flow over

to that side, when the skimmer V', so arranged as to drop to the bottom of the pan, is, by the force of the boiling liquid, filled with the scum which may have accumulated during the process of evaporation, when by a turn of the crank the skimmer is turned over and the scum deposited upon the dripping-table, the better part of which may drop through into the pan, while the gross is passed off at the spout *h*. From this point of the process the liquid passes into the filter *b*, above mentioned, thence to the finishing-off pan, by means of the siphon, before described. This pan is provided with a double bottom, for the purpose of moderating the heat. Under this pan is the register J, already described, for the purpose of regulating the flow of heat to the bottom of the finisher, for at this stage of the process the sirup is very liable to burn, and great care is required in regulating the heat; also, to assist in this matter, in the top of the door I' is a cold-air slide, *i*, immediately in front of the fire-box. The several dampers in the flues being raised up, and the door I' or slide *i* opened, cold air rushes in, thereby cooling the bottom of the pans, as circumstances may require. Hence by the aid of several dampers in the flue and the door I' and slide, also the register, a complete control of the fire is secured, so that the whole process of evapora-

tion can be conducted without any danger of burning the sirup.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The pans S U Z, when arranged in relation to each other as described, and in combination with the perforated strainers and skimmers connected with said pans, substantially as and for the purpose set forth.

2. The skimmer V' and strainers W X, in combination with the pan U, when arranged and operating substantially as and for the purpose set forth.

3. The dampers, arranged as described, in combination with the fire-box A and grate-bars, Fig. 5, as and for the purpose set forth.

4. The chamber I'', in combination with the pans S and double flues, arranged in the manner and for the purpose set forth.

5. The flue L, with double sides and bottom, in combination with the dampers D' M and pans, as and for the purpose set forth.

6. The vent *d'* and pans S, in combination with the conductor *e*, strainer V, and pan U, as and for the purpose set forth.

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Witnesses:

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