F. MICHAEL.
Evaporator.

No. 208,624. Patented Oct. 1, 1878.

Fig. 1

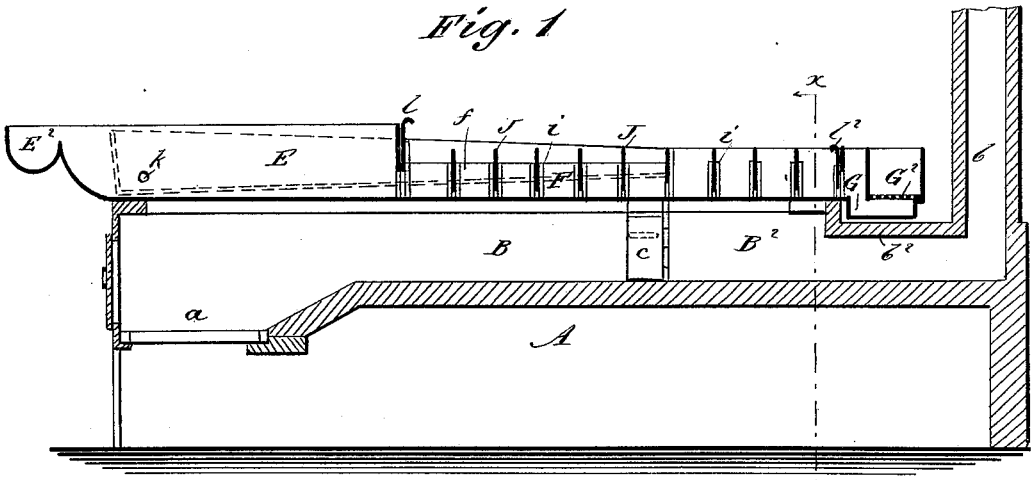


Fig. 2

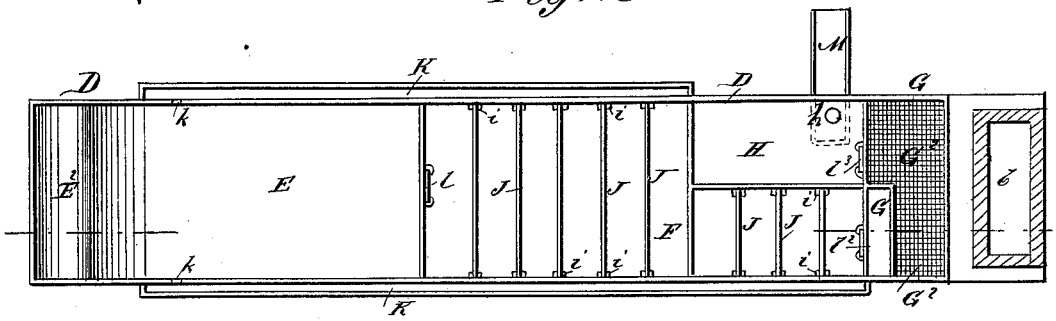


Fig. 3

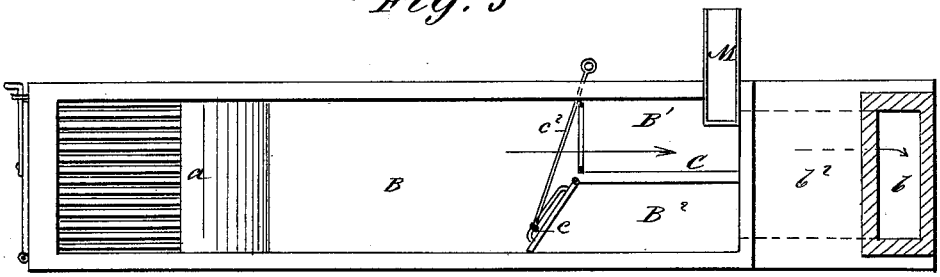
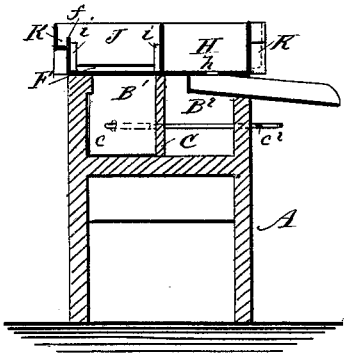


Fig. 4



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UNITED STATES PATENT OFFICE.

FREDERICK MICHAEL, OF EATON, OHIO, ASSIGNOR TO HIMSELF AND FRANCIS M. MICHAEL, OF SAME PLACE.

IMPROVEMENT IN EVAPORATORS.

Specification forming part of Letters Patent No. **208,624**, dated October 1, 1878; application filed June 4, 1878.

To all whom it may concern:

Be it known that I, FREDERICK MICHAEL, of Eaton, in the county of Preble and State of Ohio, have invented new and useful Improvements in Evaporators, of which the following is a specification:

My invention particularly relates to evaporators for saccharine juices; and the invention consists, first, in a novel construction of the evaporating-pan, and in certain details of construction and arrangement of parts in connection therewith, whereby provision is made for separating the scum from the sirup, and preventing it from being burned, broken, and mixed with the sirup, and for straining the sirup before drawing it from the pan.

In carrying out my invention, I divide the evaporating-pan into a number of compartments, and provide it with overflow troughs or channels for receiving the scum and conducting it away from the sirup. After being sufficiently boiled, the sirup flows from the heating-chambers to a settling-chamber, provided with a strainer, where the lime and sediment are collected, and from thence it rises through the strainer and flows into a finishing-chamber, where it is retained until reduced to the proper consistency, and is then run out into a conduit and carried to the cooler. The furnace has its flue divided into three parts, and is provided with a door or damper, for regulating the direction of the current from the fire-box to the chimney.

The accompanying drawing illustrates the manner of carrying out my invention.

Figure 1 is a longitudinal vertical sectional view of an evaporating apparatus embodying my improvements. Fig. 2 is a top view of the same. Fig. 3 is a top view of the furnace with the pan removed. Fig. 4 is a transverse vertical section taken in the line *x x* of Fig. 1.

Similar letters of reference indicate corresponding parts.

The evaporating-pan D rests on the upper part of the furnace A, extending in length from somewhat forward of the fire-box *a* to a point immediately over the arch b^2, and in width equal to the width of the furnace.

The pan is divided by stationary partitions into four compartments or chambers, E F G H. The compartment E rests immediately over the fire-box *a*, and constitutes the main heating-chamber. Its front end extends forward of the front end of the furnace, and is formed into a trough, E^2.

The second compartment, F, rests over the main or wide part B of the flue, and also over the narrow part B^2. This chamber F is provided with movable partitions, consisting of boards or plates J, the ends of which work in grooves *i* in the sides of the chamber, so that said partitions may be raised to allow the sirup to flow under their lower edges. The portions of the sides of the pan which bound the sides of the chamber F are cut away, so that the upper edges of these portions are lower than the remaining portions of the sides of the pan, as shown at *f*, Figs. 1 and 4. Outside of these cut-away portions, on the exterior of the sides of the pan and parallel therewith, are two troughs or channels, K K, one on each side, extending the entire length of the chamber F on both sides, and as far forward as the front end of the furnace. The bottoms of these troughs or channels are inclined downward toward the front end of the pan, near which are openings *k* in the sides of the chamber E. The troughs or channels K K communicate with the chamber F by means of the cut-away portions of its sides, and with the chamber E by means of the openings *k*. The partition which separates the chambers E and F is provided with a vertically-adjustable gate, *l*, to allow the sirup to flow from one chamber to the other.

The third compartment, G, rests over the arch b^2, and constitutes a settling-chamber. It is provided with a vertically-adjustable gate, l^2, to allow the sirup to flow into it from the chamber F. The bottom of the settling-chamber G is lower than the bottoms of the other chambers, and over this bottom rests a strainer, G^2, about on a level with the bottom of the chamber F.

The fourth compartment, H, is of about the same dimensions as the extended portion of the chamber F, and it rests immediately over the narrow part B^1 of the flue, by the side of said extended portion. This compartment H constitutes the finishing-chamber. It is pro-

vided with a gate, l^3, to allow the sirup to flow into it from the settling-chamber G, and an opening, h, to allow the sirup to flow from it to a spout, M, and from thence to a cooler or other receptacle.

The liquid to be evaporated enters the pan at the front end, and is received in the heating-chamber E. As the liquid boils and the scum collects on the surface, said scum flows to the portion of the pan which overhangs the front end of the furnace, and thence to the trough E^2; and as this trough and overhanging portion are cooler than the chamber E, the scum does not become burned or broken up into fine black particles, and its color and bitter taste are not extracted. After boiling sufficiently in the chamber E, the gate l is raised and the liquid flows into the second chamber, F, where it runs under the partitions J, and rises to the same level in all the subdivisions of this chamber. When the boiling commences in this chamber and the scum rises to the surface, a portion of the liquid and all of the scum will overflow the cut-away portions of the sides of the chamber and run into the troughs or channels K on each side of the pan. The number of the partitions J will regulate the overflow. From the troughs or channels K the liquid and scum pass through the openings k to the chamber E, where heating again takes place, and the scum is collected as before.

From the chamber F the sirup flows through the gate l^2 to the settling-chamber G, where the lime and sediment, by their own gravity, settle on the bottom of said chamber, which bottom is lower than that of the other chambers, and is protected from the extreme heat by reason of being located over the arch b^2. From this chamber the sirup rises through the perforated strainer G^2, and flows through the gate l^3 to the finishing-chamber H. The heat under this chamber is regulated by means of the damper or door in the furnace-flue, as hereinafter described. The sirup is retained in the chamber H until reduced to the proper consistency, and is then allowed to flow out through the opening h to the spout M, and thence to a cooler or other receptacle.

The furnace A may be constructed of brick or other suitable material. The fire-box a is in the front end, and terminates in a horizontal flue, leading to the chimney b. This flue consists of three parts, B B^1 B^2. The part B is of the same width as the fire-box, and extends for about half the length of the flue. From thence to the arch of the furnace the flue is divided into two parts, B^1 B^2, by means of a partition, C, which two parts or divisions extend to the arch b^2, and from thence to the chimney the flue is of the full width of the part B. At the front end of the partition is hinged a door, c, provided with a rod, c^2, extending to the exterior of the furnace-wall, for manipulating it, after the manner of a damper. When the door c stands in line with the partition C the current from the fire-box to the chimney is divided, and passes through both of the parts B^1 B^2. When the door is placed in the position shown in Fig. 3, said current is diverted from the part B^2, and the whole of it passes through the part B^1, and when the door is reversed the current passes through the part B^2. By this means the heat under the chamber H is regulated, as before referred to.

I am aware that it is not new to make an evaporating-pan with a bottom pocket or trough outside of the furnace, with sliding partitions, with outside gutter, separated from interior of pan by wire screens, or with a finishing-chamber.

I am also aware that furnaces have been provided with partitioned flues, either of which may be closed by the same damper; but

What I do claim as new and of my invention is—

1. The troughs or channels K, arranged on the exterior of the sides of the pan, and having their bottoms inclined downward toward the front end thereof, in combination with the chamber E, provided with openings k, and the chamber F, having its sides cut away, as shown and described, for the purpose specified.

2. The settling-chamber G, extending over the arch b^2, and having its bottom lower than the bottoms of the other chambers, and provided with the perforated strainer G^2, as shown and described, for the purpose specified.

3. In an evaporating-pan, the combination and arrangement of the chamber E and its extension and trough E^2, the chamber F and its cut-away sides and vertically-adjustable partitions J, and the troughs or channels K, communicating with said chambers, as shown and described, for the purpose specified.

4. The combination of the chamber F, provided with the adjustable partitions J and gate l^2, the chamber G, provided with the depressed bottom and the perforated strainer G^2, and the chamber H, provided with the gate l^3, arranged with relation to each other as shown and described, for the purposes specified.

FREDERICK MICHAEL.

Witnesses:
ELAM FISHER,
GEORGE H. TRUITT.