S. BOWERMAN.

Evaporating Pan.

No. 45,470. Patented Dec. 20, 1864.

Fig. 1.

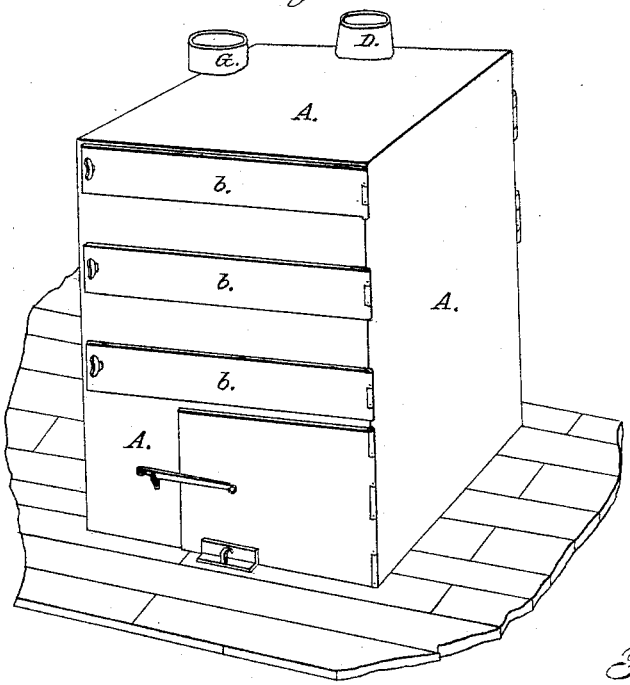


Fig. 3.

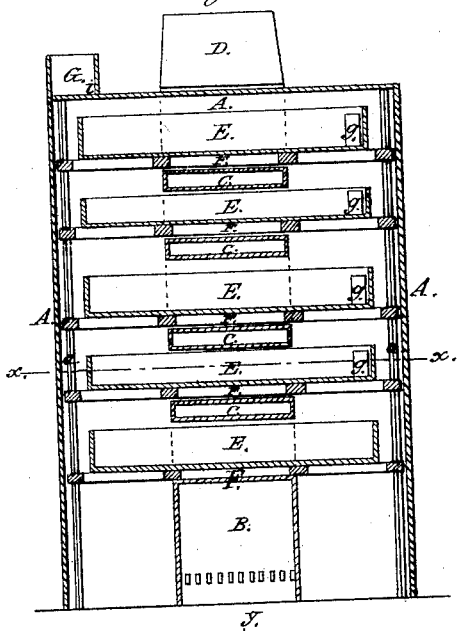


Fig. 2.

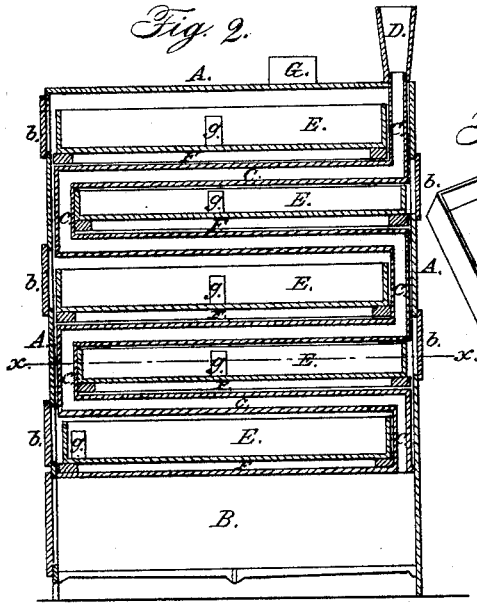


Fig. 5.

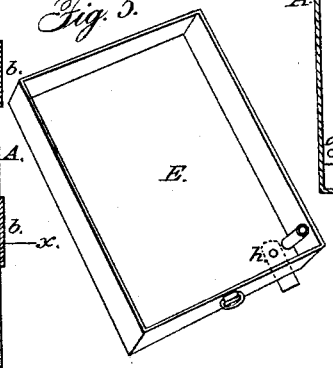


Fig 4.

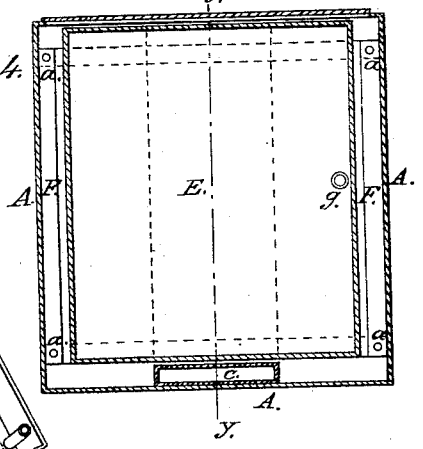
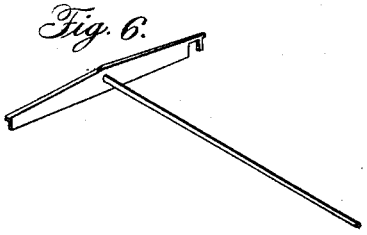


Fig. 6.



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AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

STEPHEN BOWERMAN, OF BATTLE CREEK, MICHIGAN.

IMPROVED EVAPORATING APPARATUS.

Specification forming part of Letters Patent No. **45,470**, dated December 20, 1864.

To all whom it may concern:

Be it known that I, STEPHEN BOWERMAN, of Battle Creek, Calhoun county, State of Michigan, have invented a new and Improved Evaporating Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the apparatus complete. Fig. 2 is a longitudinal section taken in a vertical plane through the center of Fig. 1. Fig. 3 is a transverse section taken in a vertical plane through the entire apparatus. Fig. 4 is a horizontal section through Figs. 2 and 3, taken at the point indicated by red line *x x*.

Similar letters of reference indicate corresponding parts in the several figures.

The object of my invention is to arrange the flues and evaporating-pans of sugar or salt works in such relation to each other within a closed furnace that a very large amount of heating and evaporating surface is obtained in a very compact space, and so that both the upper and lower surfaces of all the pans shall be subjected to the influence of the heat radiated from said flues, and also that of the steam, as it rises from the pans, as will be hereinafter described.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation.

The furnace, within which the evaporating-pans and flue are arranged, is of a rectangular form, as shown in Fig. 1, and may be made of any desired height, according to the number of pans which it is found convenient to use. The outer walls of this apparatus, which are represented by the letter A, may be made of brick or metal, or partially of both.

The fire-place B is arranged at the base of the apparatus, and the products of combustion therefrom are conducted through a flue, C, which takes a zigzag course through the furnace-chamber, as represented in Figs. 2 and 3, and finally terminates at the top thereof in a chimney, D. This flue C is arranged in horizontal and vertical planes, the vertical portions being very short, and the horizontal portions extending from the front to the rear walls, so as to form receptacles between them for the introduction of the evaporating-pans E, as shown in Figs. 2 and 3.

In the apparatus represented in the accompanying drawings provision is made between the horizontal portions of the flue C for five pans, but it is obvious that by continuing the flues C upward and increasing the height of the furnace-chamber a greater number of pans may be used, arranged one above the other.

In order to support the pans E and flue C, I have arranged a series of frames, F, which may be made of light bars, under each horizontal portion of the flue C, and supported these frames in their proper position by means of rods *a a a a*, located at the corners of the furnace-chamber, as shown in Figs. 3 and 4. The pans rest upon these frames and the flue C is connected to and supported by them at several points. The flue C is of such width horizontally as to occupy an area of about one-third that of the pans, leaving a wide space on each side of it to allow the steam rising from one pan to impinge upon the bottom of the succeeding higher pan, and also to allow the heat from the fire-chamber B and edges of this flue to circulate freely around the pans. In order to arrange the evaporating-pans E within all the spaces between the horizontal portions of the flue C, it will be necessary to make openings through the back wall of the furnace, as well as through the front wall. The front wall has three openings through it, corresponding to the three receptacles for the pans, and the rear wall has two openings through it, corresponding to the receptacles for the intermediate pans. All of these openings are closed by means of doors *b b* when the apparatus is in operation. By this arrangement of flue and pans it will be seen that a very large amount of heating-surface is obtained, and that this surface is brought into close proximity to the top and bottom of all the pans, which latter can be removed from the furnace at pleasure without disturbing the flues. The central arrangement of the flue brings the greatest heat directly in the center of the pans, and allows the cooling or crystallization to take place at and near the sides of the pans. This arrangement is also beneficial in another respect, which will be hereinafter shown.

The pans E are rectangular shallow vessels

provided with handles on their front ends, by means of which they can be drawn out of their receptacles and introduced therein conveniently. Each one of the pans is provided with an overflow-pipe, *g*, and an outlet-opening, *h*. The former does not rise as high as the top of its pan, and consequently the liquid will escape through these pipes if the pouring should be continued after it rises above their upper ends. The pans are all properly supplied with liquid, after they are arranged within the furnace-chamber, through the opening *i* in the top wall or plate of the furnace. The liquid is poured into the vessel G, surrounding the opening *i*, and escapes into the pan, which is arranged directly beneath it. When this pan is supplied, the liquid escapes through its overflow-tube into the next lower pan, and so on until it fills the lowermost pan, when the supply is stopped.

In Fig. 4 I have represented one of the pans E in perspective, and in Fig. 6 a skimmer, which is formed so that it can be used with the pans, which have overflow-tubes without removing them from the furnace.

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

1. The arrangement of the evaporating-pans E and central zigzag flue, C, within a closed furnace, A, in such manner that the top and bottom surfaces of said pan, will be subjected to the heat radiated from said flue, substantially as described.

2. A flue, C, which is conducted in its upward course through the furnace insuch manner as to form an upper and a lower heating-surface for each one of a series of removable pans, arranged substantially as described.

3. Supporting the flue C, and also the pans E, when they are arranged, substantially as described, upon frames F and rods *a a*, substantially as set forth.

4. The application of overflow-pipes *g* to removable or stationary evaporating-pans, which are arranged one above the other within a closed furnace, substantially as described.

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