

John Howarth

PATENTED JUL 4 1871

Improved Apparatus for Evaporating & Concentrating
Saline, Saccharine and other Liquids.

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Fig. 1.

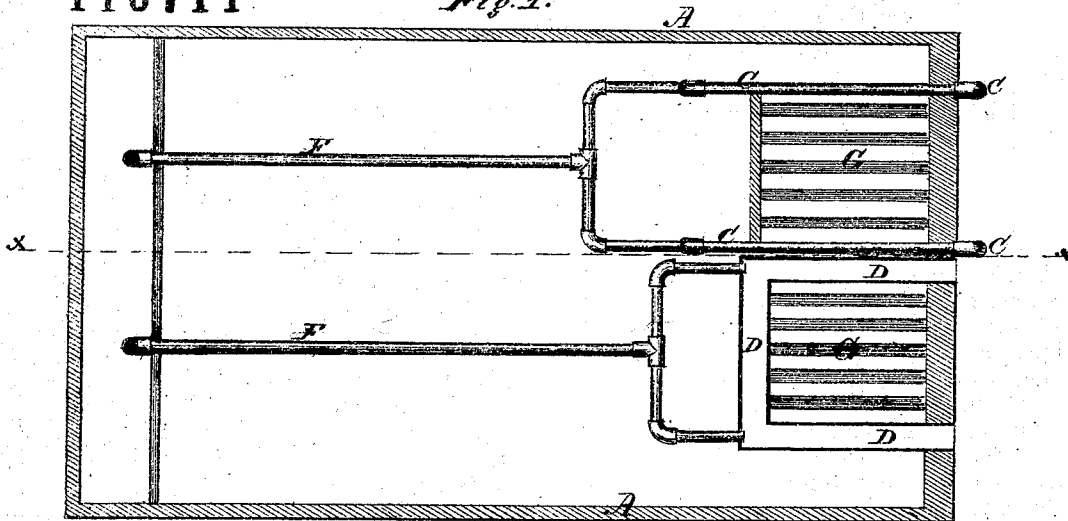


Fig. 2.

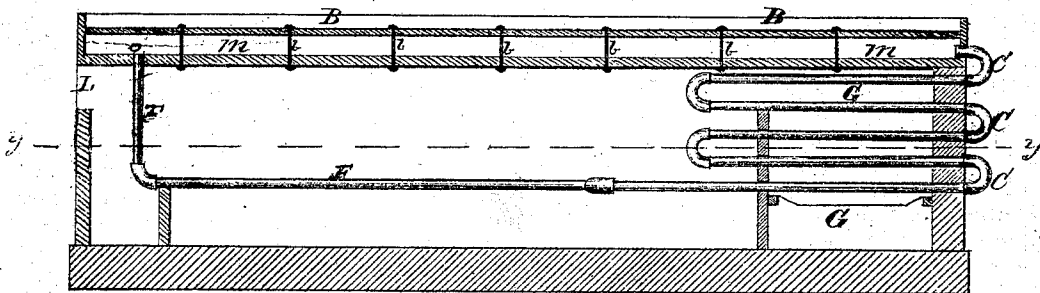


Fig. 3.

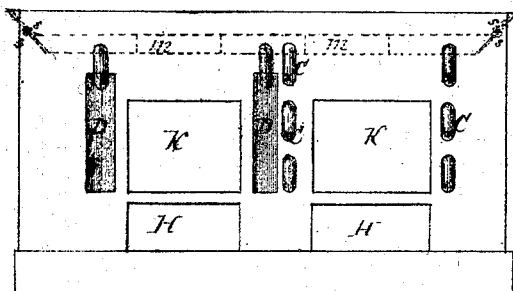
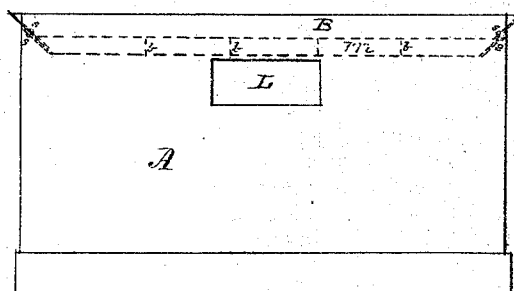


Fig. 4.



Witnesses.

Frederick Cuthbert

Edward Griffith

Inventor.

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UNITED STATES PATENT OFFICE.

JOHN HOWARTH, OF SALEM, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR EVAPORATING SALINE AND OTHER LIQUIDS.

Specification forming part of Letters Patent No. 116,711, dated July 4, 1871.

To all whom it may concern:

Be it known that I, JOHN HOWARTH, of Salem, in the county of Essex and Commonwealth of Massachusetts, have invented a new and improved method of evaporating or concentrating saline, saccharine, and other liquids, and of generating and applying steam for heating, drying, and other purposes, of which the following is a full, true, and exact description, reference being had to the accompanying drawing, in which—

Figure 1 represents a horizontal section of my apparatus through the line *yy* of Fig. 2. Fig. 2 represents a vertical section of the same through the line *xx* of the plan, Fig. 1. Fig. 3 represents a front-end elevation. Fig. 4 represents a rear-end elevation of the same.

In evaporating apparatus it has hitherto been usual to employ a steam-jacket under the evaporating-pan, into which steam has been conducted from a boiler placed at a distance. I am aware, also, that in Letters Patent of the United States issued to Samuel Platt on the 2d of February, 1869, an apparatus is described in which the bottom of the evaporating-pan forms the top of the boiler steam-space, and that with the boiler and steam-space of this apparatus is combined a furnace which serves, first, to heat the water in the boiler, and then to superheat the steam in the steam-space. My invention is designed to produce a simpler and more effective apparatus than either of the apparatus above mentioned, avoiding the necessity of bringing steam from a distance, and rendering useless, and indeed impossible, the superheating of the steam. It consists in the combination, with the evaporating-pan, of a pan-boiler placed immediately under the same (the top of the boiler forming the bottom of the pan) and over the furnace-fire, which serves to generate steam at a suitable pressure, but at the same time is prevented from superheating the steam, owing to the interposition of the sheet or body of water in the bottom of the pan between the steam and the products of combustion. With a pan and pan-boiler thus arranged I can also combine pipes for maintaining a circulation of the water, and thus establishing an equable temperature in all parts of the pan.

To apply the principles of my invention and accomplish its purpose I set one or more sets of grate-bars, *G G*, Fig. 1, in the usual manner, and with suitable fuel and fire-spaces above them, the

furnace-doors being represented by *K K* and the ash-pits by *H H* in Fig. 3, at the sides of which fire-spaces I place coils of pipes *C C* or a hollow chamber or space, *D D*, for steam and water, connecting at the top, and at or near the end of the steam-generator with the water therein contained, and also connecting through pipes *F F* passing through the fire-flue beyond the bends or joints of the pipes *C C*, projecting, for greater safety and convenience, beyond the fire-bridge and wall, and preferably covered, externally, with a cap or sheath to prevent loss of heat. Directly over the fire-space, and at such distance from the grate-bars *G G* therein as to give the best heating results from the fuel employed, I place a double pan, *m m B B*, Figs. 2, 3, and 4, preferably of boiler-iron, each pan being of equal width across the bottom, and the sides of each flaring or inclining outward at an equal angle, so that the bottom of the upper one sets into and fits into the top edges of the lower one, (as one tumbler or flaring glass of equal size with another slips partly into the other,) as shown in Figs. 3 and 4, and the upper part of the sides of the lower pan laps by the lower part of the sides of the upper pan, at which lapping or place of contact *S S* the two pans are securely riveted together so as to make the seam or joint steam-tight, as in ordinary boiler-work, and leaving a space, *m m*, between for water and steam, the bottom of the upper pan *B* in which the material to be treated is contained thus becoming at the same time the top or upper sheet of the steam-boiler *m m*, which top and bottom are stayed and kept at their proper distance from each other, and prevented from springing or spreading under the pressure of steam, by stay-bolts *b b*, Figs. 2, 3, and 4. This lower pan-boiler *m m*, one end of which is directly over the fire-box, is partly filled with water—to perhaps half its depth—from which water steam is generated in such pan; and to secure the greatest uniformity of temperature of the water and steam in all parts of this pan and the best results from the fuel employed, the end of the lower pan or steam-generator *m m* furthest from the fire-space is connected, as at *O*, Fig. 2, by pipes *F F* running through the furnace-flue under the steam-generator, with the lowest part of the aforementioned steam and water-space *DD* around the fire-space, or of the coils or sections of pipe *C C*, either or both, as may be employed, which space *D D* and

pipes C C in turn connect at their upper part with the steam-boiler pan *m m* at the fire end, by which arrangement any tendency to greater heat in that part of the pan directly over the fire is corrected by the displacement, in accordance with well-known laws, of the more heated water, if any, in that part of the pan, and its replacement by water from the further end of said pan, which, in turn, and rapidly, passes the fire and gives place again to other, thus giving a constant circulation of water and steam through the boiler, and securing the highest and most uniform heat under the evaporating-pan or drying-table through the entire length of the steam-generator, the top of which is, as already stated, at the same time the bottom of such pan or table. This steam-generator may be provided with a steam-valve in the usual manner, but in a pan of the length usually employed it would be unnecessary.

Having thus described my invention and ex-

plained its application and working, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with an evaporating-pan or drying-table, of a steam pan-boiler, substantially as described, placed immediately under the pan or table and over the furnace-fire, and, when in operation, containing water and steam under pressure, substantially as and for the purposes herein shown and set forth.

2. In combination with the pan, pan-boiler, and furnace, arranged and operating as specified in the preceding clause, the system of pipes connected with the boiler, substantially in the manner herein shown and set forth, to insure free circulation of the contents of the same.

JOHN HOWARTH.

Witnesses:

FRED. CURTIS,

EDW. GRIFFITH.