(No Model.)

C. A. BUTLER.

APPARATUS FOR BOILING SAP.

No. 271,786. Patented Feb. 6, 1883.

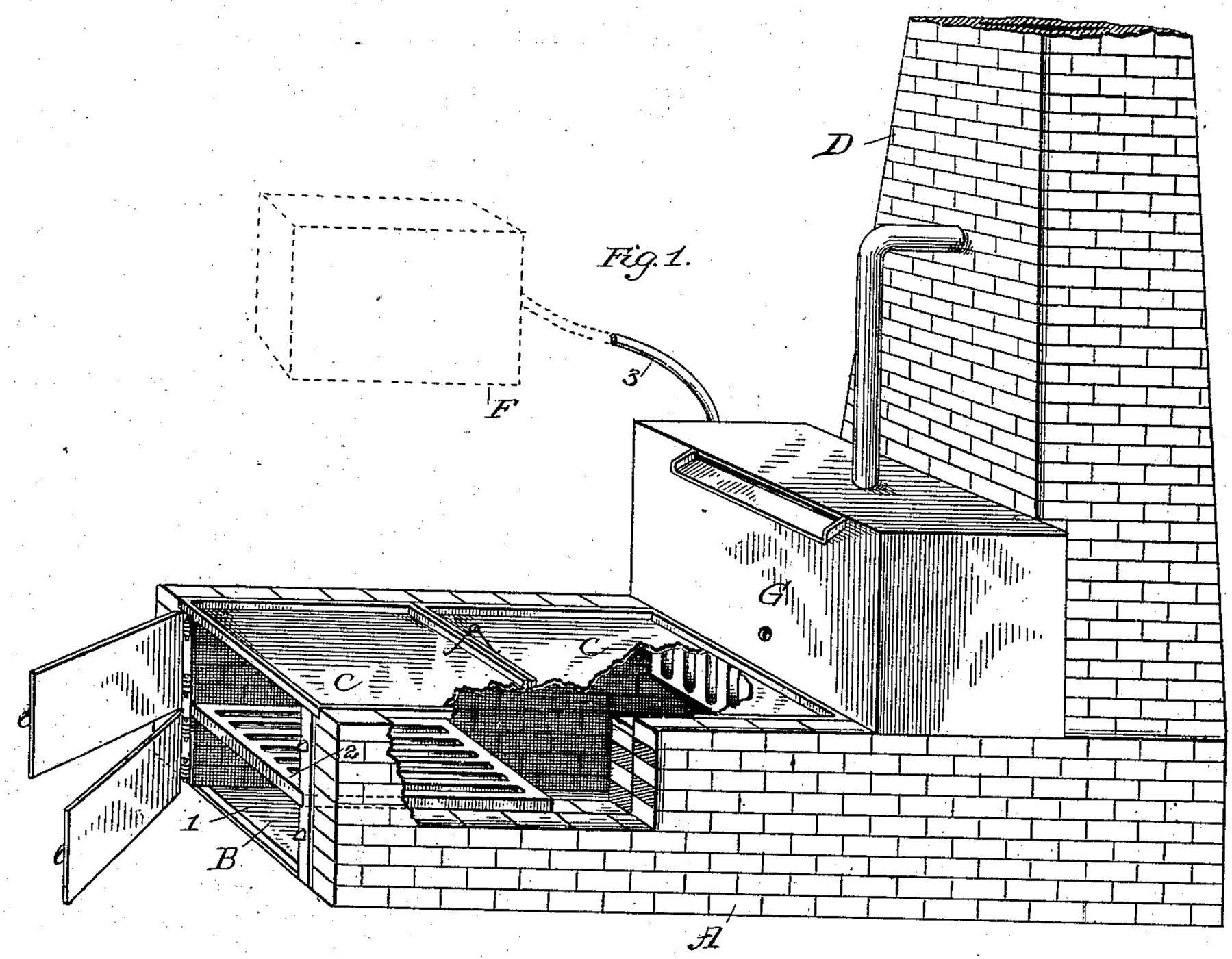

Fig. 1.

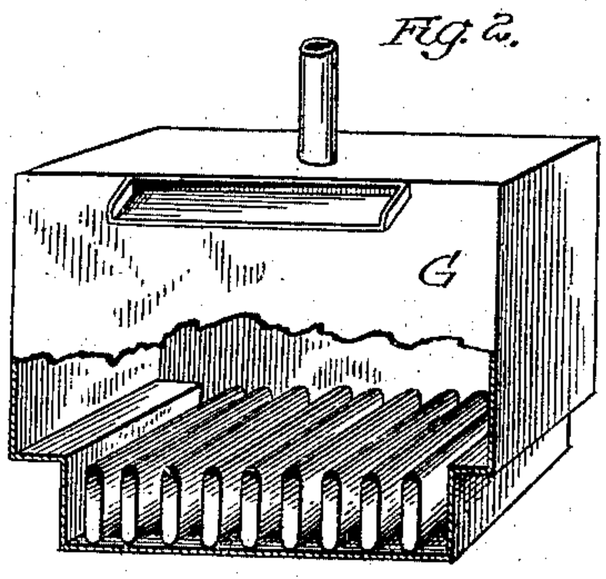

Fig. 2.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BOILING SAP.

SPECIFICATION forming part of Letters Patent No. 271,786, dated February 6, 1883.

Application filed July 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. BUTLER, of Moriah, in the county of Essex and State of New York, have invented a new and useful Improvement in Apparatus for Boiling Sap; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to an improvement in apparatus for boiling and evaporating cane juice and sap in the manufacture of sugar; and its object is to economize the heat used and to save a great portion which is ordinarily wasted, whereby a larger quantity may be boiled or evaporated by the same heat and the thoroughness, cleanliness, and efficiency of the process increased, and the process itself expedited.

The invention consists in interposing between the reservoir of liquid sap and the evaporating-pans an auxiliary heater, in which the liquid is kept rapidly boiling, and when in that condition evaporating faster on account of gaining more heating-surface by the use of this heater with tubes or flues therein placed, (as hereinafter more fully set forth,) and within a smaller space than by the use of any other pan or boiler heretofore used in the manufacture of sugar; and, further, in the peculiar construction of said heater, and particularly in the peculiar construction, shape, and arrangement of its tubes or flues, all as fully hereinafter explained.

The drawings represent, in Figure 1, a perspective of the entire device; and Fig. 2 is a perspective of the improved boiler.

A represents a brick foundation or setting, which incloses the furnace B, with the ash-pit 1 and grate 2. Supported on the brick setting are the shallow evaporating-pans C C, two of which are shown, one being situated directly over the grate and the other to the rear thereof, a sufficient space being left below the pans to form that air chamber or flue through which the products of combustion pass below the evaporating-pans to D, the chimney or smoke-exit. In the apparatus ordinarily used the heat, after passing below the pans, is carried to the stack and wasted.

This heater consists of a rectangular chamber, constructed of metal and connected by a pipe, 3, to a reservoir, F. The bottom of this heater is a series of flues or tubes placed closely together and parallel. These flues are of a flattened, elliptical, or elongated shape in cross-section, and are placed with their major axis in a vertical position. In front of the heater, and immediately over the pans, is a small outlet to provide for the passage of the sap from the heater to the pan; also, an overflow-chute, which would permit the liquid to escape into the pan should it boil sufficiently to make it necessary. It will be understood that the flues open and connect with the hot-air space below the pans in front and communicate in the rear with the stack or chimney, thus continuing the flue to the chimney, the heat from the fire-box thereby heating the flues (in its passage to the chimney) and the mass of liquid which surrounds the flues in the heater. By the use of tubes of flattened cross-section having their major axis placed vertically the liquid is exposed to a much greater area of radiating-surface, and the heating is much more thoroughly accomplished than if round tubes or simple partitions were used. The end of pipe 3 connecting with the heater is provided with a valve working automatically in said heater, similar to a ball-valve—that is, it is furnished with a float—and as the liquid rises and reaches a given point the float rises, and by its rising closes the valve and obstructs the flow until the liquid evaporates or flows into pans, when the float descends, opening the valve and causing an additional supply of sap to enter from the reservoir.

Near the center of the heater, attached to the outlet, is a valve of similar construction to that described above, which floats in the pan to prevent an overflow of said pan, and by its construction keeping the contents at a uniform height by opening the valve when it evaporates sufficiently and closing it when full. The pans are connected by a siphon furnished with an air-chamber on its apex, which, as the contents boil away, conducts from one to the other.

I am aware that various devices have been employed for heating the liquid contained in an evaporating-pan; and I am also aware that an auxiliary heater for heating the sap before it is admitted to such pans has been employed; but as my device is an improvement in the

specific construction of such heaters, I desire to disclaim the broad invention thereof.

Having thus described my invention, what I claim is—

In combination with the furnace, the pans, and the reservoir, the intermediate heating-chamber, G, having the flattened tubes in the bottom thereof, substantially as described, and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES A. BUTLER.

Witnesses:
J. R. GILMAN,
FRED H. STIMPSON.