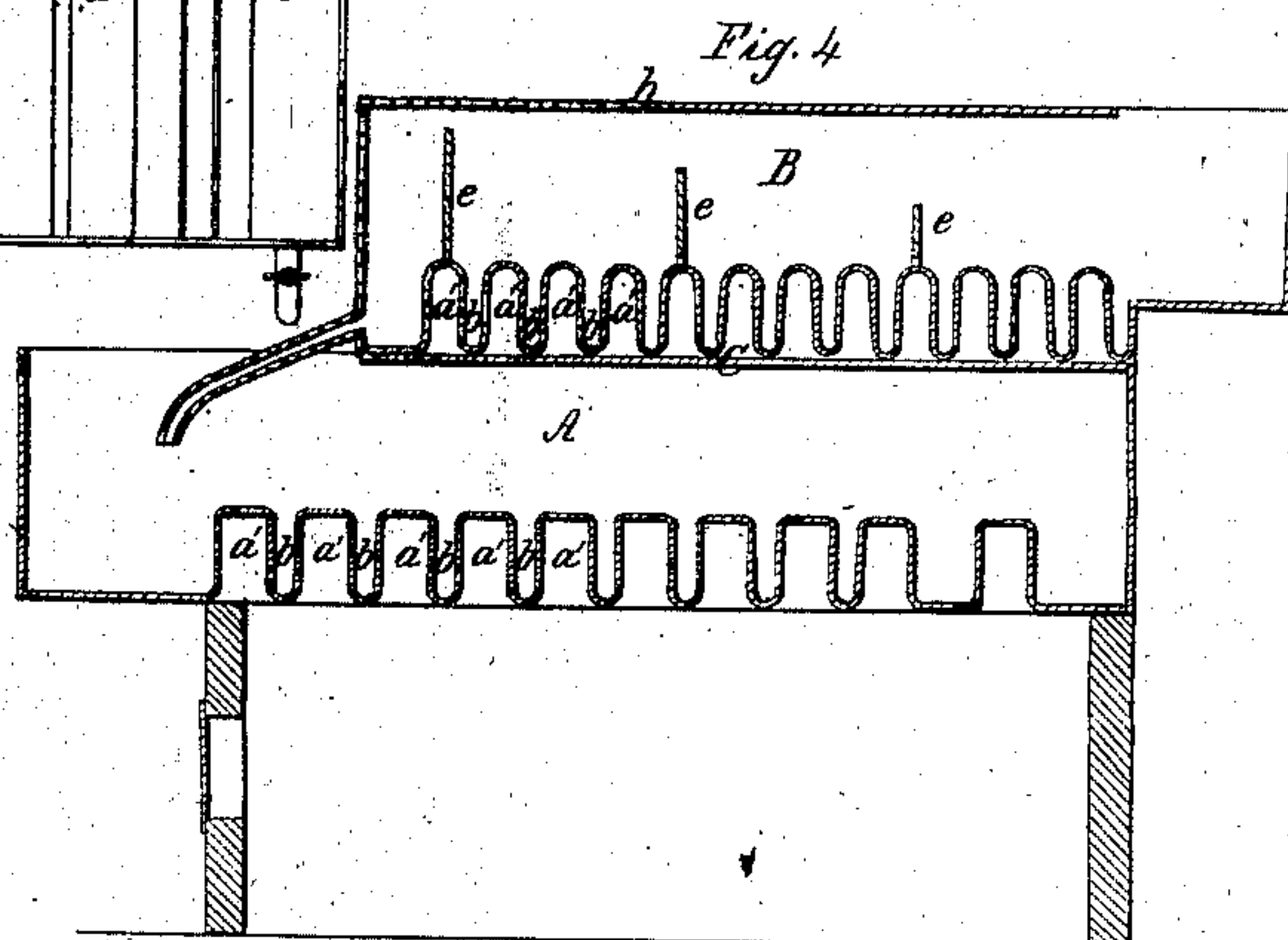
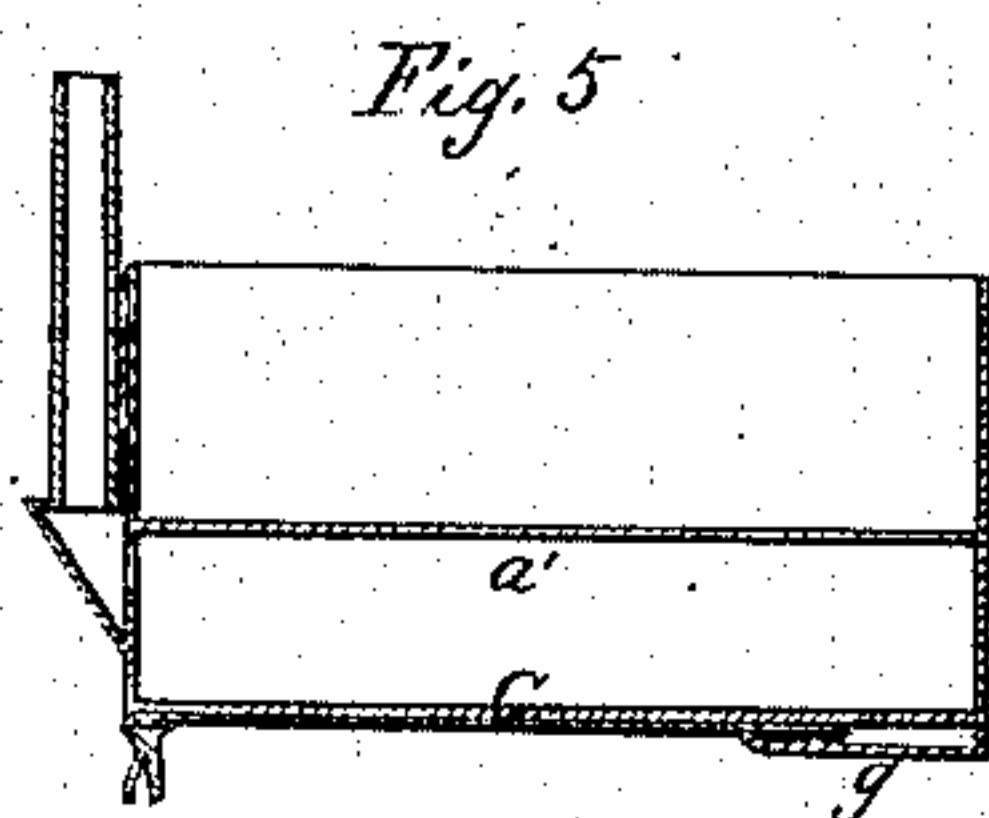
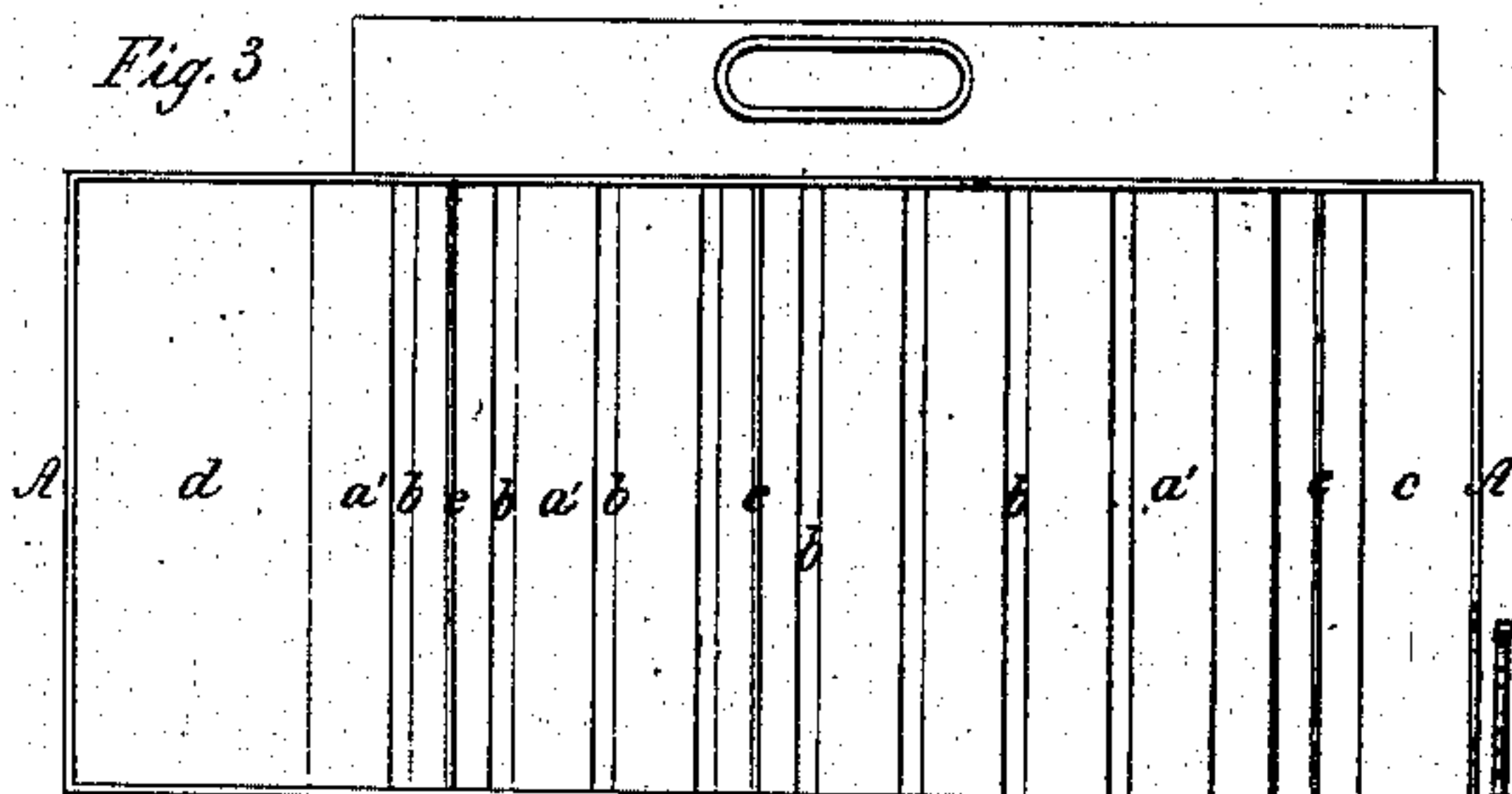
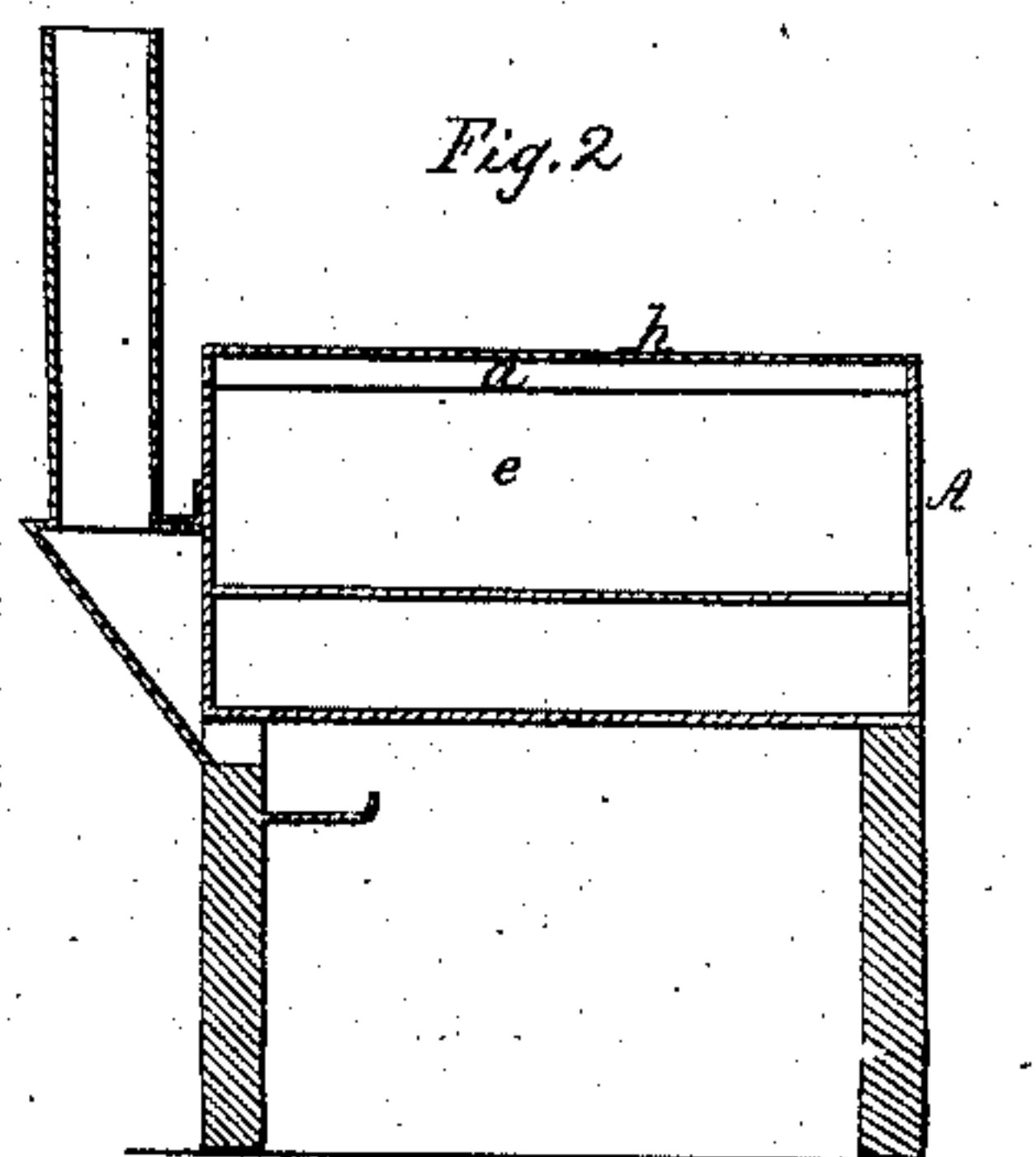
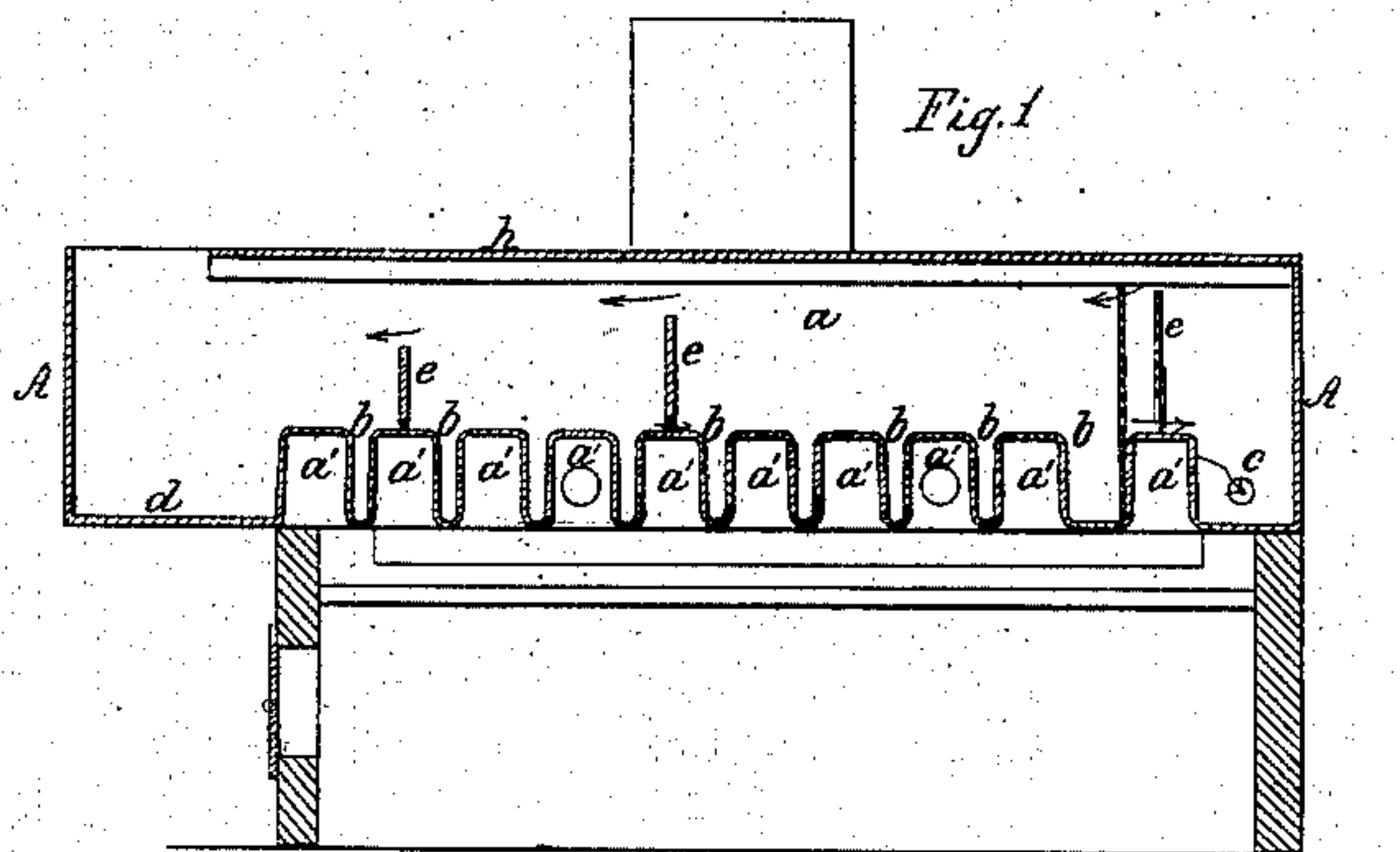


D. M. Cook.
Evaporating Pan.

N^o 48,522.

Patented Jul. 4, 1865.



Witnesses
R. T. Campbell,
O. Schaffer

Inventor
D. M. Cook
by his atty
Wm. L. Loomis

UNITED STATES PATENT OFFICE.

D. M. COOK, OF MANSFIELD, OHIO.

IMPROVED APPARATUS FOR BOILING AND EVAPORATING SACCHARINE LIQUIDS.

Specification forming part of Letters Patent No. 48,522, dated July 4, 1865.

To all whom it may concern:

Be it known that I, D. M. Cook, of Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Cellular or Tubular Boilers for Defecating and Evaporating Saccharine Juice; 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 longitudinal section taken in a vertical plane through the center of my boiler. Fig. 2 is a transverse vertical section through Fig. 1. Fig. 3 is a top view of the boiler with the cover removed. Fig. 4 is a vertical longitudinal section through two boilers arranged one over the other. Fig. 5 is a vertical transverse section through a boiler having a false bottom.

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

In defecating and evaporating saccharine juice it is important that it should be exposed to the action of heat as short a time as is consistent with its nature in order to produce the best results or to prevent injury to the sugar in consequence of a long application of heat to it. It is also important, in order to produce a perfect coagulation of the impurities contained in saccharine juices, that they should be subjected to a high temperature. At the same time provision should be made for removing the impurities at a point which is over a surface free from ebullition; and, finally, it is important to economize or utilize space and fuel in the process of evaporating the juice of the sugar-cane without diminishing the capacity of the apparatus or its heat-absorbing surface.

The nature of my invention consists in so constructing and arranging cellular or tubular boilers as to allow of a continuous or intermittent circulation of saccharine juice, and at the same time to afford facilities for purifying the juice and reducing it to the desired consistency.

My invention further consists in providing for the application of two or more cellular or tubular boilers for evaporating saccharine juice to a single furnace for the purpose of utilizing heat, as will be hereinafter described.

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

In the accompanying drawings, A represents the cellular boiler, consisting of an upper compartment, *a*, which is divided into chambers, or, in other words, which is subdivided by the ledges *b*, forming a broad under flow or current of the juice, and a lower compartment, *b*, which is divided into chambers or cells that are formed by crimping sheet metal into folds and then closing up the alternate crimps or folds, or by forming a solid heading at one or both ends of the crimps. One or more large finishing cells or chambers are formed to allow of a more free circulation of the thick sirup and to afford a convenient chamber for drawing off the finished sirup. The finishing chamber or chambers may be of any desired size or proportion to that of the other cells.

The scum-trough *d* is for the purpose of receiving the scum as it is carried by the foam in the direction indicated by the arrows in Fig. 1, or any other foreign matter that may be in the juice, and thrown there by the ebullition over the cells. Said trough is also for the reception of any chemical agent that may be employed in the process of defecation.

The air or steam spaces *a'* and the liquid-cells *b* may be of any desired width or depth required; nor do I confine myself to any definite shape of cellular surface, as the corrugations or ridges may be made of any desired form which may be found best adapted for the purpose.

The finishing-cells *c* and the scum-trough *d* may be arranged as represented, or at any other point in the pan or boiler, or this trough may be dispensed with, and one or more movable chambers substituted, and placed either on the inside or on the outside of the boiler, so as to receive the scum or dirt.

I desire to employ one or more stationary or movable ledges or gates placed in the cells, or arranged on top of the air-chambers, for the purpose of controlling the current of juice, which is allowed to flow under the ledges, while the foam runs over the ledges. I also desire to employ one or more strainers, movable or stationary, placed in the cells or on top of the air-chambers; but I do not confine my-

self to any particular mode of controlling the current, as it may be an indirect flow, or the juice may be allowed to flow from one chamber to another by means of gates, or the ledges may be dispensed with entirely and the juice allowed to flow over the cells, and the current may be constant or allowed to run at intervals, at pleasure.

The drawings represent the boiler placed upon a portable furnace; but I do not confine myself to any particular kind of furnace. In practice, provision may be made for elevating or depressing either end or side of the boiler.

It is a good plan to use the boiler only in purifying and reducing cane-juice, but it may be used in conjunction with any of the well-known evaporators or boilers. It is also a good plan to place a second boiler over the first or lower boiler, as represented in Fig. 4, the upper boiler being constructed similar to the lower one, with an additional arrangement for conducting the condensed steam or water away from the lower boiler, which consists of a gutter or a partial bottom to the upper boiler, that may serve as a retainer of steam as well as a gutter or trough. This arrangement is for the purpose of utilizing heat that would otherwise be lost. The condensed steam in the form of water runs down the sides of the cells to the edges thereof, and thence along these edges into the conducting-trough, which is represented in Fig. 5. The boiler B should be elevated on one side, so that its bottom will incline toward the trough *g*, above described.

Instead of employing the heat from a furnace to boil the juice, steam may be used advantageously with my boiler; or, if desired, the lower boiler of Fig. 4 may be used as a steam-generator for supplying heat to the upper boiler.

In the operation of my boilers the juice is allowed to run into the chamber *d* of the lower boiler until this chamber is sufficiently full to allow the juice to foam over all the ledges *e*, when an active heat is applied to the boiler, the scum being carried by the foam and deposited in the chamber *d*, the fresh juice flowing into the chamber *d* constantly or at intervals,

as may be desired, while at the same time an under-current of purified juice flows toward the finishing cell or chamber *c*, from which the clear sirup may be drawn off when at the proper consistency for crystallization.

In Figs. 1, 2, and 4 I have represented a cover, *h*, applied to the boilers for the purpose of confining the heat therein as much as possible, and also for preventing the action of air upon the juice. These covers are removable.

The tubular boiler is formed by means of a false bottom, *C*, (shown in Figs. 4 and 5,) which is applied beneath the cellular bottom of the boiler so as to close the air-cells *a'*. This plate may be so applied that it can be conveniently removed at pleasure for cleaning or inspecting the cells. By means of such plate the cellular boiler is converted into a tubular boiler.

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

1. The construction of cellular or tubular boilers, substantially in the manner and for the purposes described.
2. The combination of one or more perforated or imperforated ledges with cellular or tubular boilers, substantially as and for the purposes described.
3. Constructing a tubular or cellular boiler with finishing cells or chambers, substantially as described.
4. The combination of two or more cellular or tubular boilers, arranged substantially as and for the purposes described.
5. The combination of a lid or cover with a cellular or tubular boiler, substantially as described.
6. The construction of a cellular boiler with a bottom plate, *C*, or its equivalent, substantially as described.

Witness my hand in the matter of my application for a patent for improvement in cellular or tubular boilers.

D. M. COOK.

Witnesses:

J. W. JENNER,
MORELL RUST.