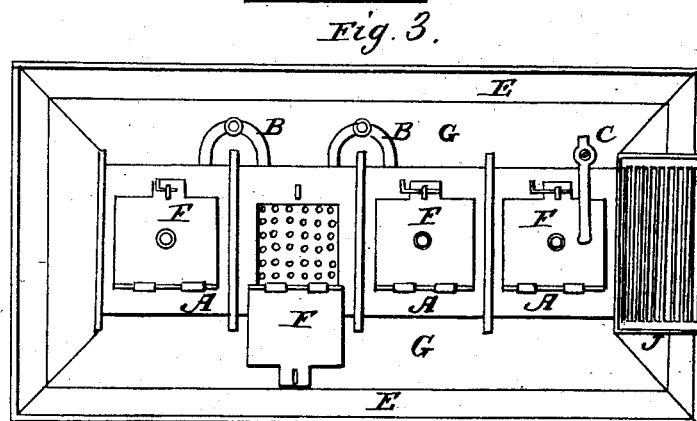
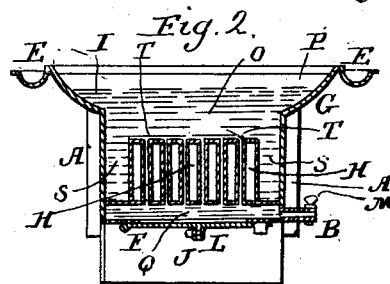
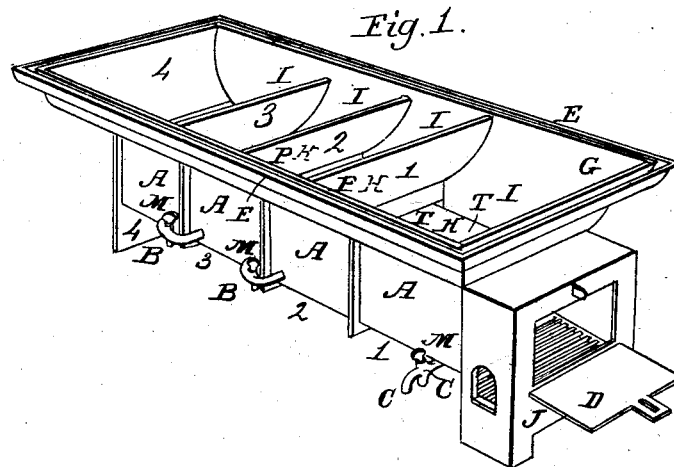


F. HOARD.

Sugar Boiler.

No. 761.

Patented May 30, 1838.



# UNITED STATES PATENT OFFICE.

FRANCIS HOARD, OF BOSTON, MASSACHUSETTS.

## IMPROVED CIRCULATING SUGAR-BOILER.

Specification forming part of Letters Patent No. 761, dated May 30, 1838.

### *To all whom it may concern:*

Be it known that I, FRANCIS HOARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Machine for Boiling Sugar, called "Hoard's Circulating Sugar-Boiler," which is described as follows, reference being had to the annexed drawing of the same, making part of this specification.

This circulating sugar-boiler consists of a rectangular flue, H, sixteen feet long (of copper) by four feet broad, and by two feet in depth, made in four pieces, each four feet long, with flanges one foot broad standing at right angles outward from the ends of each piece. Through the flue stand six rows of copper tubes, T, three inches in diameter, placed in a vertical position equidistant transversely from each other, but longitudinally they may be placed within one inch of each other. Around the bottom and two sides of the aforesaid flue I place a cast-iron vessel, A, leaving a space, S, of eight inches between it and the flue. This vessel is made in lengths of nearly four feet each, with flanges standing outward at right angles from the ends about three inches. In bolting the aforesaid pieces together, the flanges of the flue are to be secured between the flanges of the iron vessel, so that four flanges will be bolted together at each joint, except the ends, where there will be but two. This being done, the vessel will be formed into four distinct compartments, (numbered 1 2 3 4,) in the bottom of each of which will be placed a door, F, of about three and a half feet square, hinged upon one side and secured with screw-bolts, so as to be opened at pleasure, for the purpose of cleaning or repairing the boiler with facility. When the doors are closed, they form a liquid-tight joint, which will be effected by inserting a piece of gasketing between them and the bottom of the vessel. These doors should be formed a little concave on the inside, with cocks L in the center of each, for the purpose of drawing off the liquor in that part of the process of sugar-making called "boiling off." Three of the compartments of the before-described vessel are at times connected near the bottom by means of two bent pipes, B, three inches caliber, with cocks M through them, of which more will be said, as well as of

the other cocks, in describing the mode of working the boilers. Upon the edge of the aforesaid cast-iron vessel I build, three feet high, with wood, G, projecting it outward so as to increase the dimensions of the apparatus at the top to about twenty feet in length by about ten feet in width, having three transverse partitions, P, joined to the flanges of the flue, and extending in height within two, four, and six inches of the top of the apparatus, the highest partition being placed next the compartment which is disconnected from the other three. The inside of the wooden part of this apparatus I cover with sheet-lead, and around the top of it I place a trough or gutter, E, for the purpose of taking away the skimmings.

Reference being had to the drawing, A A represent the cast-iron vessel in four pieces; H H H H, the flue joined to the cast-iron vessel at the flanges; I I I I, the compartments numbered 1, 2, 3, and 4; B B, the bent pipes and cocks connecting the compartments 2, 3, and 4; C, the large cock for drawing off the sugar; D, the door for the convenience of cleaning the flue; J, the brick furnace; E, the skimmings-gutter; F F F F, the doors affording a facility of cleaning and repairing the boiler; Q, the cane-juice, colored red.

Mode of working the boiler: Fill the apparatus with cane or other juice to within about eighteen inches of the top, after which make fire in the furnace, and as the juice boils away more must be received into compartment No. 4, and from thence charged forward into compartments 3 and 2, progressively, by means of the cocks B B. No. 1 is the striking-teache or finishing-compartment, and must be charged by dipping or ladling the liquor over from No. 2. The large cock C being opened, the sugar will pass directly into the coolers, which must be placed a little below the level of the cock. In taking off a strike of sugar care must be had in shutting the cock as soon as the surface of the sugar comes down to the level of the top of the flue, after which the teache must be charged immediately, in order to prevent the sugar remaining in the teache from running too high or burning. The process of skimming is exceedingly simple; indeed, the compartments 1, 2, and 3, in a great measure, skim themselves. Most of the skimmings deposit themselves in the back end of the com-

partment 4, from whence they can be removed with very little labor. Once a week will be quite often enough to "boil off," as it produces a waste of fuel and manual labor, and the apparatus will not require cleaning oftener. In boiling off the liquor will be charged forward, by means of the cocks B B, until it comes down nearly to the level of the top of the flue, when the cock B connecting the compartments 3 and 4 must be closed, and the remaining liquor in compartment 4 drawn off, by means of the cock underneath, into a box or cistern, wherein should be placed a pump for charging it up into compartment 3. The same cistern and pump will answer for charging the liquor from any one compartment to another. As soon as any one or more compartments are emptied of liquor, they must be filled above the flue with water. Before taking off the last strike of sugar the fire must be extinguished, when all the sugar may be discharged and the teache charged with water.

An instrument similar to the one used for cleaning the inside of gun-barrels will be found serviceable in cleaning the tubes, and one upon

the same principle will answer for cleaning the sides of the flue.

I have herein described one size and one modification of my circulating sugar-boiler, and also the mode of working it; but I do not confine myself to the size, modification, or materials herein specified, nor to any precise mode of working it, either of which may be deviated from as circumstances call for.

That to which I lay especial claim as my invention, discovery, or improvement may be enumerated as follows:

1. The application of the within-described flue to the purpose of making sugar from any suitable juices.

2. The general modification of the entire apparatus to the purpose of making sugar.

3. The mode herein specified of charging forward the liquor and taking off the sugar.

February 9, 1833.

FRANCIS HOARD.

Witnesses:

I. STATHAM,  
ADAM FLEIJLIGER.