

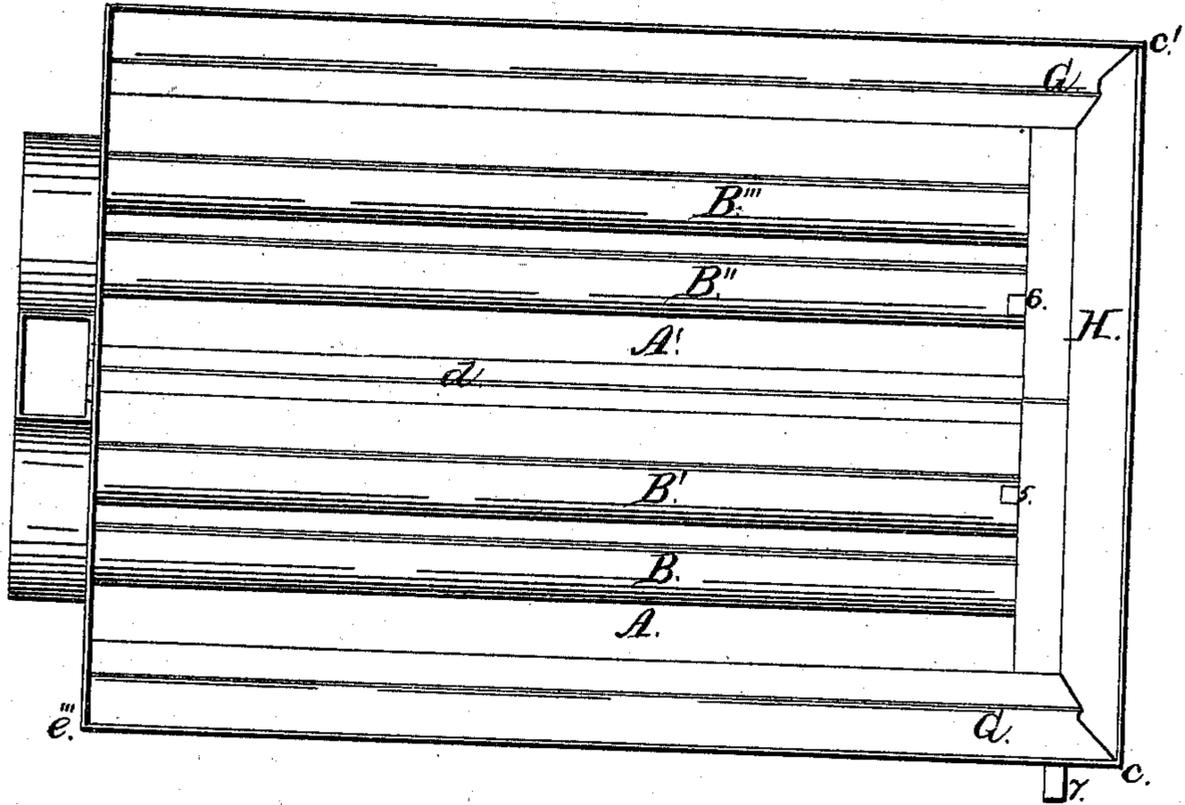
*L. S. Hereford.*

*Evaporating Case Juice.*

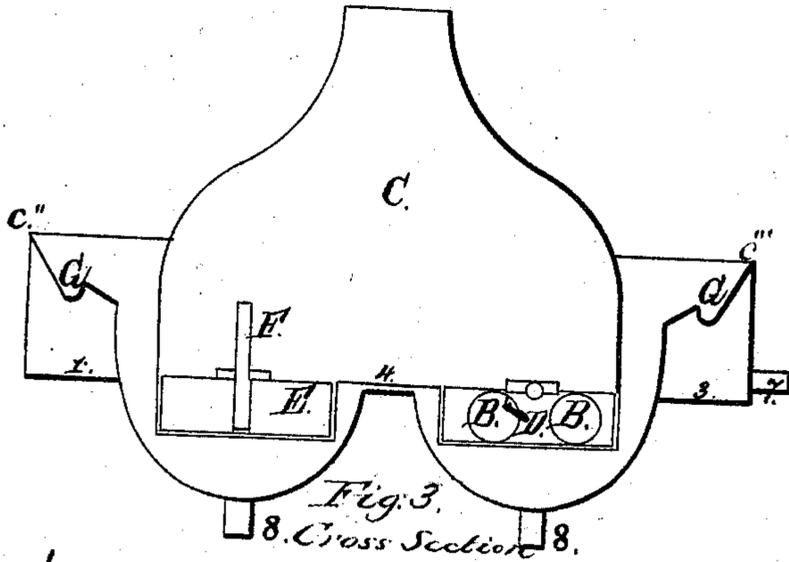
*N<sup>o</sup> 94,959.*

*Patented Sept. 21, 1869.*

*Fig. 1.*

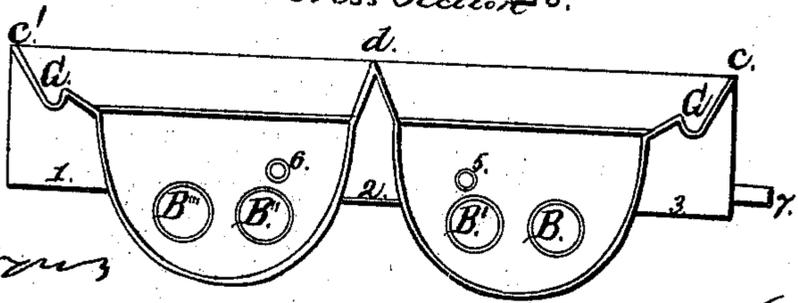


*Fig. 2.*



*Fig. 3.*

*8. Cross Section*



*Witnesses.*

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# United States Patent Office.

L. S. HEREFORD, OF WEST BATON ROUGE PARISH, LOUISIANA.

Letters Patent No. 94,959, dated September 21, 1869.

## IMPROVED APPARATUS FOR EVAPORATING CANE-JUICE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, L. S. HEREFORD, of the parish of West Baton Rouge, State of Louisiana, have invented a certain new and useful Improvement in Boilers, Pans, or Kettles, as they are indifferently called, for Evaporating Cane-Juice, in order to convert it into sugar; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawing, making a part of this specification, whereon—

Figure 1 is a plan or top view;

Figure 2, a front view; and

Figure 3, a cross-section on line *a b* of fig. 1.

The objects of my invention are to economize fuel, and thus to reduce the cost of evaporation; to reduce the number of boilers that are employed to effect evaporation to two, and thus to reduce the cost of what is known as a "set," which usually embraces five boilers; to provide means for conveying all foreign matters that rise to the surface of the juice while it is boiling, into a suitable recipient, with little or no skimming; to attach said recipient to the boilers in such manner as to make it practically a part of the organism of which they (the boilers) constitute the principal part, and to provide means for taking the sirup which escapes with the foreign matters into the recipient out of the same, and putting it back into the boilers, without the use of a ladle, or the like usual appliance that is employed for such purpose; to provide for an extension of the fire-surface beyond that which is presented by the external surfaces of the boilers, and for regulating the draught from the furnace, so as to prevent the application of a destructive degree of heat, and all consequent injury to the sugar.

My invention consists of the combination, under a particular arrangement, of two semicircular, open-top boilers, in each of which there are at least two fire-flues, sufficiently large to allow of the free and rapid passage of the heat and flame from the furnace through them, that are severally provided with a damper, to regulate the draught, and thus prevent the development of enough heat to burn the saccharine that is contained in the juice at any stage of the evaporation, a transverse refuse-recipient, for collecting the foreign matters that are brought to the surface by the boiling of the juice, and the action of the lime that has been placed therein, from which two pipes, that are provided with stop-cocks and perforated diaphragms, lead into the boilers, one into each, to serve as conduits for the juice or sirup which passes out of the boilers with the foreign matters, back again into the same, and two troughs, to convey the foreign matters into the recipient therefor, which are placed at the top outside edge of each boiler respectively.

But my invention will be better and more quickly understood by referring to the drawing, on which—

A A' represent my boilers, and

B B' B" B"', the fire-flues, that are placed longitudinally therein.

It will be observed that the boilers present cross-sections, that are very nearly semicircular up to the point to which their external surfaces are exposed to the fire, which is indicated clearly at fig. 3 by the lines 1 2 3, but that above that point the sides present a curvature, having a longer radius, so that the cross-sections of the whole of each boiler present elliptical conformations, rather than true semicircles. The object accomplished by giving the boilers this form is the greatest possible measure of fire-surface underneath the same, and a greater containing capacity than would be possessed by them if they were exactly semicircular.

The flues, it will be seen, extend the whole length of the boilers, and are sufficiently large to offer no appreciable impediment to the free and rapid rush of the flame and heat through them, and to extend the fire-surface to about double what it would be, if entirely confined to the external surfaces of the boilers, connecting with the open space of the furnace, at the rear ends of the boilers, the flues lead at the front ends thereof into a "breaching," C, technically so called, which, in its turn, leads into the stack or chimney, which carries off the products of combustion.

At the front of the breaching C, an opening, D, is made in front of the flues of each boiler, which are covered by hinged dampers E, as shown at the left-hand boiler at fig. 2.

The dampers E are provided with bars F, that are attached to and project above them, to serve as handles to operate or move them into any desired position. These bars F are weighted at their upper ends, so as to overbalance the weight of the dampers, when the latter are placed in horizontal position, as shown at the right-hand boiler at fig. 2. This position completely shuts off the draught, for the space between the dampers, on the line 4, fig. 2, is closed by a plate in the breaching, against which the damper impinges, when placed therein, and cuts off communication between the flues of the boiler, at the front of which it is placed, and the chimney or smoke-stack. If the hinges of the dampers are so made as to work with some degree of stiffness, they will themselves hold the dampers in any given intermediate position between that shown at the right-hand boiler and that which it occupies at the left-hand boiler at fig. 2; but if the hinges work too loosely to do this, any ordinary appliance or means may be employed to accomplish the object.

On each upper outside edge of the two boilers, a

trough, G, is provided, that extends from the front ends of said boilers, a few inches beyond their rear extremities, as shown at fig. 1, where their open ends occupy a position over the recipient H, so as to insure the flowing into the latter of whatever gets into them of a liquid nature.

The recipient H is placed in direct contact with the boilers, at their rear ends, and in such manner that its bottom shall occupy a horizontal plane, that is coincident, or very nearly so, with a line that crosses the boilers at the top of the flues, as shown at figs. 2 and 3. The size of the recipient H should be sufficient to enable it to hold all the foreign matters expelled from the juice during the process of evaporation, with such portion of the juice itself, as may pass out of the boilers with the same. To convey this juice back into the boilers, I insert the short pipes 5 6 into the recipient, in which I introduce perforated diaphragms, if necessary to strain the juice, and fix stop-cocks, so as to be able to open or close the said pipes at pleasure.

A pipe, 7, at one end of the recipient, affords a means for drawing off the foreign matters, or, as they are called by sugar-makers, the "skimmings." The front plates of the boilers, the outsides of the troughs G G, and the rear side of the recipient H, all rising several inches above the boilers, and being connected at the four corners *c c' c'' c'''*, constitute a rim, which prevents the juice from boiling over externally, while the ledge *d*, projecting upwardly between the boilers to the same height as the outer rim, prevents one boiler from boiling over into the other.

My boilers, and everything about them, are made of sheet or plate-iron, of proper thickness, and in such

manner that every part is connected with the others, and composes but a portion of a single organism, as shown on the drawing.

Any suitable furnace, made of brick, and constructed upon any approved plan, may be used in connection with my invention.

I do not restrict myself to the use of any furnace, provided, always, I invade no private right or ownership, but hold myself at liberty to use any I may see fit to employ. Nor do I restrict myself to any specific length or diameter in making my boilers, but they should never be so extended in length as to make it difficult to force the flame from the grate or fire-bed to their rear ends, at which point there should always be sufficient space in the furnace to allow of the easy deflection of the said flame into the flues. To withdraw the sirup from the boilers, pipes 8 are employed, which are provided with stop-cocks, to close them when not in use.

Having thus described my invention,

What I claim, and desire to secure by Letters Patent, is—

The two elongated semi-cylindrical or elliptical boilers A, when provided with flues B B' B'' B''', and the dampers E, in combination with the troughs G and the recipient H, when the latter is provided with the pipes 5, 6, and 7, in which are placed stop-cocks, and all the parts are constructed, arranged, and operate substantially as described, for the purpose set forth.

L. S. HEREFORD.

Witnesses:

GEORGE MORROW,  
H. N. JENKINS.