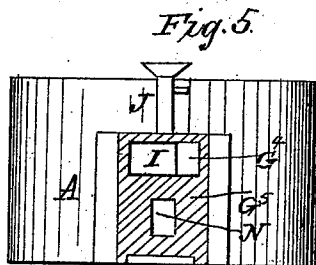
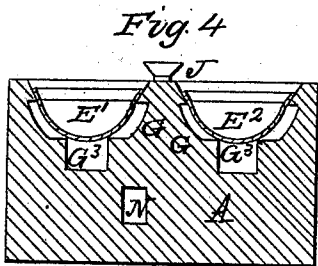
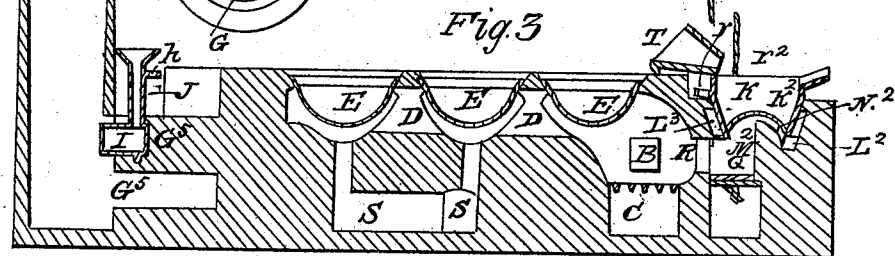
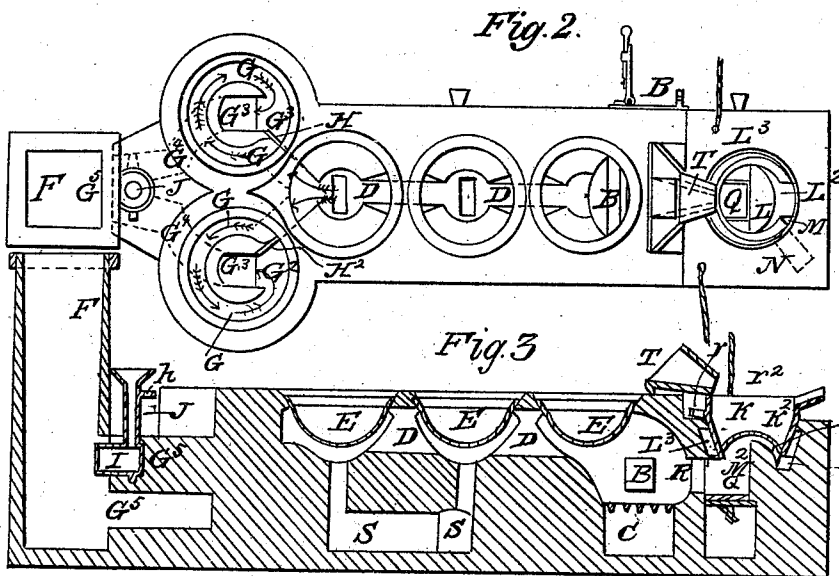
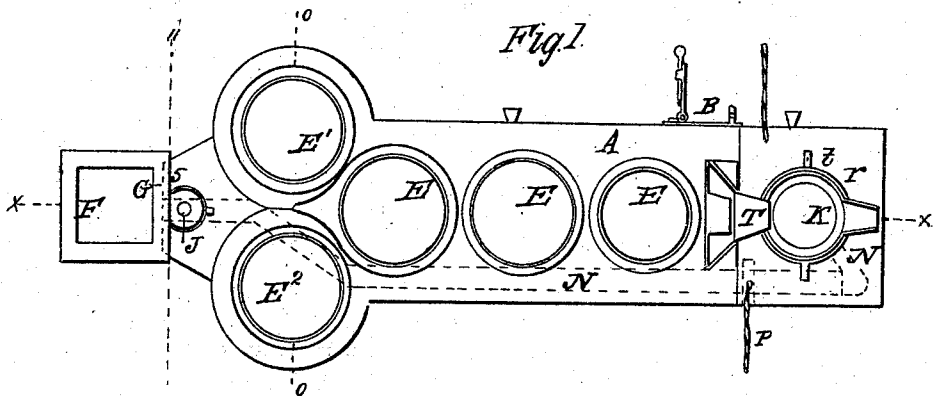


A. HAGER.

Arrangement of Kettles for Making Sugar.

No. 3,473.

Patented March 9, 1844.



UNITED STATES PATENT OFFICE.

ABRAHAM HAGER, OF DONALDSONVILLE, LOUISIANA.

IMPROVEMENT IN SUGAR-BOILERS.

Specification forming part of Letters Patent No. 3,472, dated March 9, 1844.

To all whom it may concern:

Be it known that I, ABRAHAM HAGER, of Donaldsonville, in the parish of Ascension, in the State of Louisiana, have invented a new and useful Improvement in Setting Kettles for Evaporating Saccharine Juices in the Manufacture of Sugar, and for other purposes, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a top view of the stack with the kettles in their proper places. Fig. 2 is a top of the same, the kettles being removed in order to show parts of the flues under and around them. Fig. 3 is a vertical longitudinal section on the line *xx* of Fig. 1. Fig. 4 is a vertical transverse section on the line *oo* of Fig. 1. Fig. 5 is a vertical transverse section on the line *oo* of Fig. 1.

The stack A, furnace B, ash-pit C, flues D, kettles E, chimney F, are made in the usual or most approved manner.

The main improvements consist, first, in constructing spiral flues G beneath the grandes or clarifying-kettles E' E², increasing gradually in size as they wind around the kettles and approach the flue F, with a partition, H, and an enlargement of the flue at G², by which a spiral draft is produced around and under the bottoms of said kettles, and a more active and intense heat and quicker draft, causing the kettles to be heated with a much smaller quantity of fuel and in less time than in the old plan, the said flues after encircling the bottoms of the kettles and diving down obliquely under them at G³, and then passing off through flues G⁴ (shown by dotted lines) toward the chimney F, and uniting in a single flue at G⁵, where a valve, I, is placed for opening or closing either of said flues G⁴ at pleasure; second, in making said valve I and its stem or axle J hollow, and filling the same with water to take off the intense heat acting on said valve, thereby preventing it from being warped or consumed; third, in constructing the bottom of the granulating-kettle K concave on the bottom surface next the fire, at K², for producing a more direct action of the heat applied to it in a circular corresponding flue, L, constructed under said kettle, which is formed with a partition, M, therein, for the purpose of preventing the heat passing to the chim-

ney before it has circulated around and under the surface of the concave bottom of the said granulating-kettle, whose lower edges rest upon the brick seat or bed, except at a place, L², near the partition, where a space is left open for the draft to pass under the edge of the kettle to the flue L³, formed around the outside of the kettle K; fourth, in the construction of a flue, N, in the stack, extending nearly its whole length, leading from the granulator to the chimney, in which a slide-valve, P, is placed for opening or closing said flue when required, (represented by dotted lines in Fig. 1;) fifth, in the arrangement of a hinged valve, Q, in the flue R, leading from the furnace to the flue or space under the granulator, for regulating the heat applied to the same; sixth, in the construction of man-holes S under the kettles, for removing the accumulated dirt or ashes from under them.

The aforesaid spiral drafts or flues under the grandes E² or clarifying-kettles are produced by carrying up the brick-work of the stack to the requisite height, where seats are formed, and then placing the bottoms of said kettles upon said seats in the brick-work and supporting the kettles in an upright position, and then continuing to carry up the brick-work, at the same time forming the circular flues G G² around them to the proper size and shape, gradually increasing in size, and then running partitions across the said flues at H, so as to cause the hot air to pass around under the bottoms of the kettles to the opposite sides of the said partitions, where the aforesaid circular flues are considerably enlarged, as at G², and conducted downward in an oblique direction under the kettles G³, and from thence conducted to the side of the chimney, where they unite in a single flue at G⁴, and from thence conducted into the chimney F.

The hollow valve I, filled with water to prevent being consumed by the intensity of the heat, is made in the shape of a hollow wedge, through which at the back is passed a vertical hollow spindle, J, having a funnel-shaped mouth or top, by which it is filled with water, kept always at the requisite height by stop-cock or float, or other convenient apparatus. The hollow spindle has a pivot at the lower end, and its upper end passes through the brick-work and turns therein, having the fun-

nel top above the stack. This valve is turned to the right or left by a handle, *h*, for opening or closing the flues *G*¹ at pleasure, more or less, for regulating the heat under the grandes and all the kettles of the stack.

The granulating-kettle *K* is made with a concave bottom, as represented at Fig. 3, having a circular ring, *r*, around its largest diameter, for strengthening it while hoisting it from its bed, and a circular rim, *r*², above said ring, being a continuation of the sides of the kettle vertically above the brick-work, to prevent boiling over, having trunnions *t* at the sides, to which a common bail-handle is attached for suspending it by a crane or other apparatus for lifting and tilting it in discharging its contents, being provided with a handle for canting or reversing its position. The granulating-kettle rests upon a suitable seat or bed formed in the stack near the furnace.

The circular flue *L* under said granulating-kettle is formed in the brick-work by carrying it up at *M*² in the center of the cavity (made to receive the kettle) above the horizontal bed, upon which the kettle rests, into the concavity or bottom of the kettle to a sufficient height to leave a space, *L*, for a flue, for the proper circulation of the heat therein. Another flue, *L*³, is then formed around the outside or convex surface of the kettle, communicating with the aforesaid flue formed in the concavity of the kettle by means of the continuation of the flue under the lower edge of the kettle at *L*², near a partition, *M*, constructed in the outside flue for causing the draft to pass around the kettle before it passes to the flue *N*, leading to the chimney *F*.

A flue, *R*, is constructed in the brick-work leading from the furnace *B* to the flue *L*, under the granulator *K*. A hinged valve, *Q*, is placed in this flue for letting on or shutting off the heat to or from the generator. Before hoisting the granulating-kettle from its seat or bed this valve must be closed; likewise, the slide-valve *P* in flue *N*.

The flue *N*, leading from the circular flue under the granulator to the chimney, commences near the partition *M*, and dives obliquely downward, then turns horizontally and continues in a straight line till below the

grandes. It then takes a turn toward the middle of the stack. From thence it leads to the chimney *F*. The slide-valve *P* is placed in this flue for regulating its draft and for preventing interference with the draft of the chimney when the granulating-kettle is raised from its seat by the entrance of cold air at the said flue.

The man-holes *S*, for receiving the dirt and ashes collected in the flues under the kettles, are constructed in the brick-work near the bottom thereof, and are cleaned in the usual manner.

The drafts being caused to pass around and under the kettles in the manner described increases their length, and consequently their strength, which is likewise augmented by gradually increasing the size of the flues as they recede from the furnace, and their spiral or circular course tends also to promote an increased draft under the kettles; and causing the flues to descend under the grandes, as set forth, enables the constructor to do away with the necessity of occupying the space around or behind the kettles in the boiling-room required for the tender of the kettles by a mass of brick-work required to admit the flues when they are arranged above the level of the floor of the boiling-room.

A hinged spout or trough, *T*, is placed on the top of the stack, for conveying the boiling cane-juice to the granulating-kettle from the kettle over the furnace.

I do not claim the invention of spiral flues; but

What I do claim as my invention, and which I desire to secure by Letters Patent, is—

1. The use of spiral descending flues under the grandes, as above set forth, said flues being governed by the valve *I*, all as set forth.

2. The arrangement of the flues *L* *L*² *L*³, in combination with the concave bottom of the granulating-kettle *K*, as set forth.

3. The hollow valve *I*, filled with water to prevent burning out, arranged and operating in the manner and for the purpose set forth.

ABRAHAM HAGER.

Witnesses:

WM. P. ELLIOT,

ALBERT E. JOHNSON.