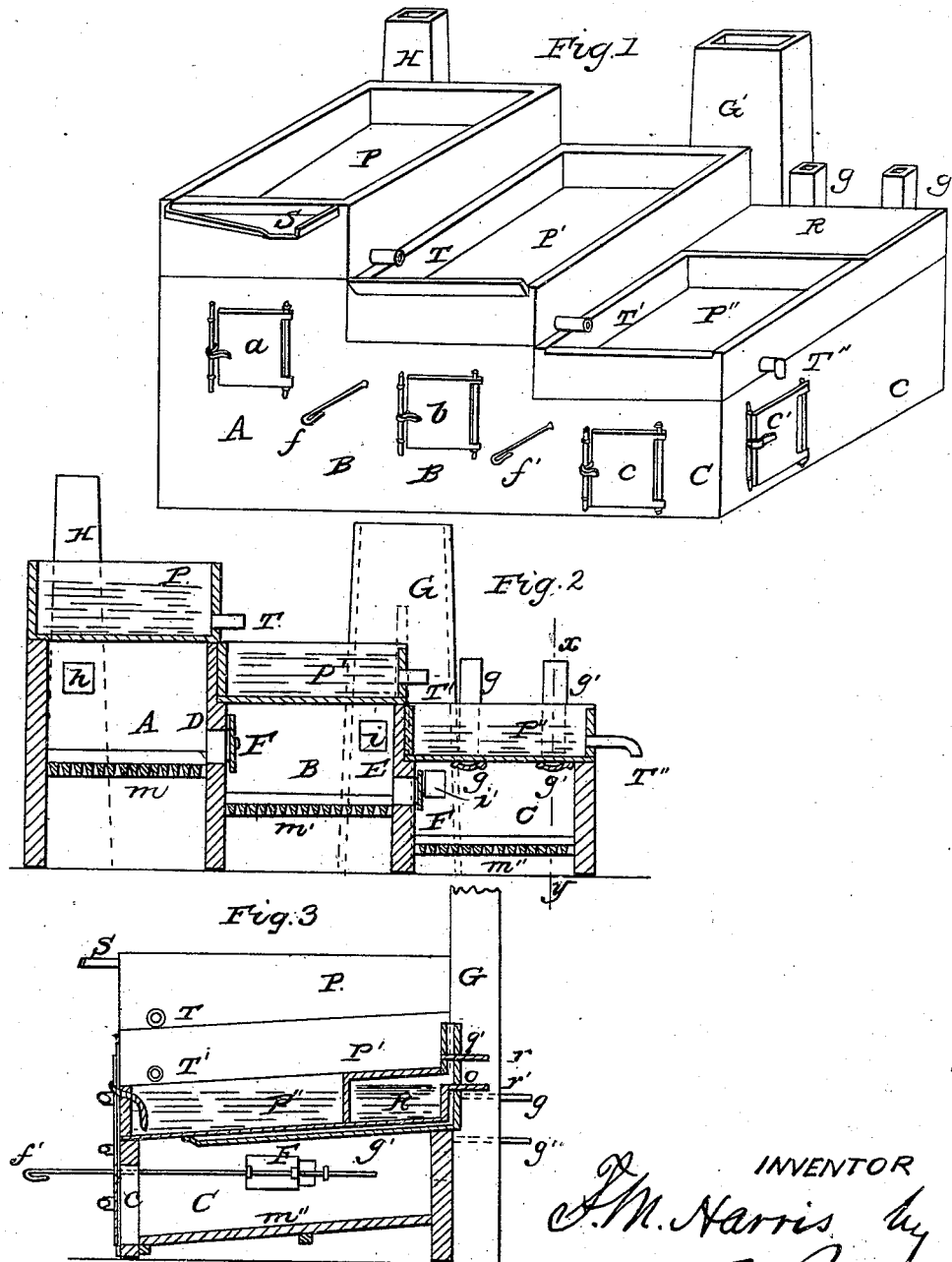


F. M. HARRIS.

Evaporator.

No. 51,828.

Patented Jan'y 2, 1866.



WITNESSES
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UNITED STATES PATENT OFFICE.

FRANCIS M. HARRIS, OF WINAMAC, INDIANA.

IMPROVEMENT IN EVAPORATORS.

Specification forming part of Letters Patent No. 51,828, dated January 2, 1866.

To all whom it may concern:

Be it known that I, FRANCIS M. HARRIS, of Winamac, in the county of Pulaski and State of Indiana, have invented certain new and useful Improvements in Sugar-Evaporators; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of an apparatus constructed in accordance with this my invention; Fig. 2, a longitudinal section of the same, and Fig. 3 a transverse section on line *xy* in Fig. 2.

The object of this invention is to so construct a sugar-evaporator as to effect the concentration and granulation of the sirups by boiling them down in a more expeditious and economical manner than this has been done heretofore. To this effect the arrangement proposed of the furnaces is such as to enable the operator to easily regulate the fires under the several pans; to facilitate the removal of the scum or other impurities; to expedite the decantation from one pan into the other of the juices in their various conditions of concentration; to prevent the scorching of the more concentrated juices; and, finally, to prevent rapid deterioration of the apparatus.

To enable others to make and use my said invention, I shall now proceed to describe the manner in which the same is carried into effect.

Referring to the drawings, A B C are three furnaces constructed in one block, the three furnaces being of different elevations, A being the highest; B, which is the next adjoining furnace, is lower, while C, which adjoins the furnace B, is the lowest. These three furnaces are designed each to support an evaporating-pan, and their respective elevations are such as that the uppermost pan may empty itself in the next and this in the last. Each furnace is provided with a fire-chamber provided with grate-bars *m m' m''* and suitable furnace-doors, *a b c*, as shown in the annexed drawings.

For sake of convenience, and to prevent excessive heat under the pan which contains the sirup of highest degree of concentration, and consequently the juice most liable of being scorched, the last furnace is provided with an auxiliary door, *c'*, through which the fire under the pan may be regulated, or whereby a

stream of cold air may be entered the furnace to check excessive heat.

The several furnaces are separated by walled partitions D and E, in which openings provided with slide-valves or registers F are formed, so that the fires of the several furnaces may communicate with or be cut off from each other, or whereby the fire from each furnace may be used to heat the pans of either of the furnaces.

The sliding register-valves may be operated from the outside of the furnace by means of rods *f f'*, the ends of which pass through the wall in front, as shown in Figs. 1 and 3. The draft in these furnaces is effected by means of two chimneys, G and H. The former is a double chimney having two flues, *i* and *i'*, the one serving the furnace B, while the other serves the furnace C. These flues are also provided with dampers *g g'*, so that the fire of the one furnace may be drawn through the other at pleasure. The chimney H operates the draft for the furnace A through the flue *h*. Upon these furnaces, as before stated, are established the pans P, P', and P''. They are of a quadrangular form, rather shallow, with the bottom inclined downward from the rear to the front end, the object of which is to cause the scum or other supernatant impurities to float down toward the front part of the pan, where they can be removed with greater ease than if they were equally distributed over the whole surface. Each pan has at one of its sides opposite the next succeeding pan a discharge-tube, T, T', and T'', for conveying the sirup from one pan to the other, the last tube discharging into a vat which may be placed under it, but not shown in the drawings. The front end of each pan is slightly recessed to allow of the adjustment of a scum-spout, as shown at S in Fig. 1. The last pan T'' presents the following peculiarity: About one-third of its length, calculating from the rear, is partitioned off into a steam-tight chamber, R, provision being made for the admission of water whenever necessary. In the rear of this chamber, and in the upper part thereof, there are two small openings, *o*, which communicate with a flue or pipe, *q q'*, which extends up and down and under the pan.

Two valves, *r r'*, situated above and below the openings *o*, establish or cut off communi-

cation with the interior of the steam-tight chamber. The object of this arrangement is to prevent the scorching or burning of the concentrated juice in the last pan, and this is effected by filling the chamber with water and forming steam therein, which will pervade the tube underneath the bottom of the pan, and thus act as a jacket, preventing direct action or impinging of the fire on the pan.

The operation of this apparatus is as follows: I first pour the cold juice in the uppermost pan, start the fire in the furnace, and adjust the scum-spout on the front part of the pan. When the juice commences to boil and the scum to form on the surface thereof I place the skimmer, which I make as broad as the pan is wide, in the back part of the pan. This skimmer is made to rest on the sides of the pan, and it is provided with a long handle, whereby it may be moved back and forth by the operator standing in front of the furnace. By the use of this skimmer all the scum may be removed at one sweep. I then decant the liquor into the next pan by straining it through the tube T. Fire is then started in the second furnace, and at the same time the now empty pan P is filled with cold juice. The scum-spout is now removed from the latter pan and placed on pan P', in which the operation of boiling down and removing the scum is performed in the same manner as described in reference to pan P. The juice is thence strained through tube T' into the last pan, by which time the first is ready to be strained into the second, and again to be filled with cold juice. The third furnace is fired up as soon as the third or last pan receives the twice-boiled juice, and

it is there concentrated or condensed sufficient for granulation. The scorching or burning in the last pan is prevented, in the manner before indicated, by filling the chamber in the rear with cold water. The upper dampers, *p*, in the tubes *q q'* are then closed, and the steam formed in the chamber passes through the small apertures *o* into the tube, and passes down along the bottom of the pan near the sides thereof. These tubes have small openings—say one or two inches apart—which allow the steam to escape, whereby the bottom of the pan is kept moist and its contents prevented from being scorched. When the operation is thus completed I remove the concentrated juice by straining it through the tube T'' into a vat. The operation in the three pans is thus repeated without interruption so long as there is any juice to be evaporated.

Having thus described my invention, I claim—

1. The arrangement of the pans upon the furnace in an inclined position, in combination with the scum-spout at the forward end, as herein shown and described.

2. The formation, in pans for concentrating saccharine liquors, of a water-chamber for the formation of steam, and for conveying the same in the form of jets under the pans, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

FRANCIS M. HARRIS.

Witnesses:

GEO. BURSON,
I. W. RYAN.