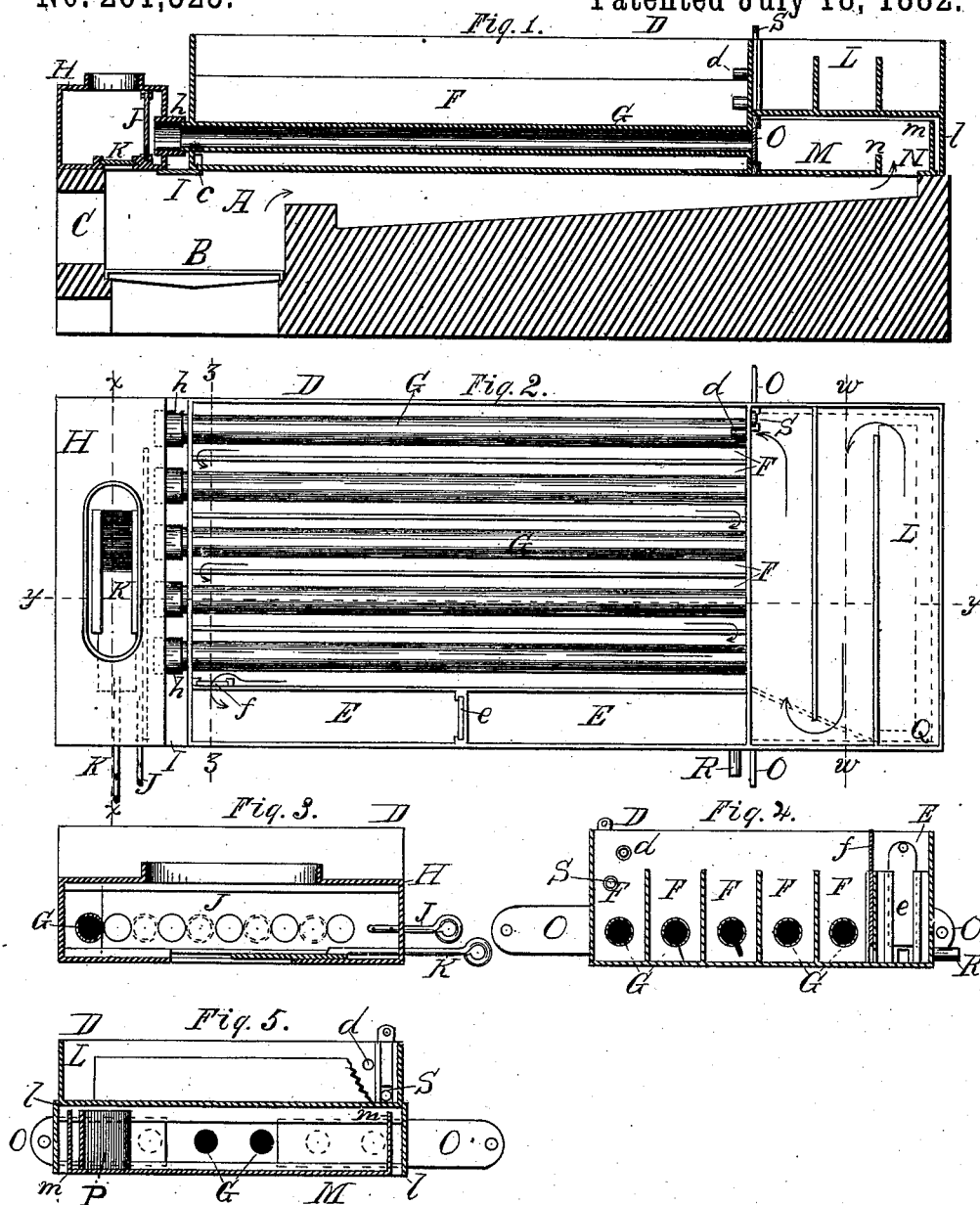


(No Model.)

P. S. EWINS.
SAP EVAPORATOR.

No. 261,325.

Patented July 18, 1882.



Witnesses:
John B. F. Fregeau
John W. Elder

Inventor:
Phil S. Ewins
per *Wm. W. Lange*
Attorneys.

UNITED STATES PATENT OFFICE.

PHILO S. EWINS, OF WEST BERKSHIRE, VERMONT.

SAP-EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 261,325, dated July 18, 1882.

Application filed May 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, PHILO S. EWINS, a citizen of the United States of America, residing at West Berkshire, in the county of Franklin and State of Vermont, have invented certain new and useful Improvements in Sap-Evaporators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain improvements in sap-evaporators, the purpose of which is to so direct and utilize the heat necessary to carry on the operation of boiling sap as to obtain a rapid evaporation of the sap with the consumption of a comparatively small quantity of fuel; secondly, to cause the heat and flame to be carried beyond the rear ends of the flues and be directed against the bottom of the sap-heater before entering said flues; thirdly, to regulate the draft through the return-flues and to enable the sirup-compartment or one or more sections in the evaporating-pan to be sufficiently protected from the heat when necessary; and, lastly, to cut off the products of combustion from the return-flues and cause them to pass directly into the smoke-box.

To these ends my invention consists of the parts substantially as hereinafter described, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is longitudinal vertical section of my improved sap-evaporator on the line *yy* of Fig. 2. Fig. 2 is a plan thereof. Fig. 3 is a transverse vertical section on line *xx* of Fig. 2. Fig. 4 is a similar view on line *zz* of Fig. 2, and Fig. 5 is a transverse vertical section on line *ww* of Fig. 2.

Corresponding parts in the several figures are indicated by similar letters of reference.

In the annexed drawings, A marks a furnace provided with the grates B and door C, and adapted to receive my improved sap-evaporator, which rests upon and forms, with the plate I, to be hereinafter set forth, the top of said furnace.

D represents the evaporating-pan, prefer-

ably of a rectangular shape, and divided longitudinally by partitions into a sirup-compartment, E, and a number of sections, F, having each an internal smoke-flue, G. The smoke-flues project in the present instance slightly beyond the front of the pan, so as to enter the short connecting-pipes *h*, opening into the smoke-box H, which latter has a smoke-exit to carry off the products of combustion. This provision of the short connecting-pipes is adapted to prevent contact of the smoke-box with the front wall of the evaporating-pan, to avoid burning or discoloration of the sap contained in said pan, and, further, to provide for the expansion and contraction of the pan.

I marks a plate resting on the furnace-walls between the pan and the smoke-box, to prevent the escape of smoke or flame from the fire-box at that point.

The smoke-box is provided with a sliding register-damper, J, arranged forward of and out of contact with the inner ends of the connecting-pipes *h*, as shown in dotted lines in Fig. 2 and in section in Fig. 1. When in its normal position the openings in the damper register with the pipes *h*, so as not to impede the draft; but when drawn out, as shown in Fig. 3, the damper offers an obstruction to the free passage of smoke, &c., from the smoke-flues to the smoke-box, causing a diminished draft through the flues, while not entirely shutting off the same.

The smoke-box is further provided with a slide-damper, K, in the bottom thereof, to permit the smoke, &c., to pass from the fire-box directly into the smoke-box, when the return-flues G are closed, as will be seen hereinafter.

L marks the sap-heater, arranged at the back of the evaporating-pan, and of less depth than said pan, so that its bottom will be above the smoke-flues G, and provided with a depending apron, *l*, resting on the furnace-walls, to inclose the space caused by the difference in depth of the heater and pan. Supported by the walls within this space is the deflector M, of less length and width than the heater, to provide an air-space between the three sides of said deflector and the depending apron *l* of the heater. This air-space is provided to better retain the heat.

The bottom of the deflector is provided with

an opening, N, extending across its rear end, and an upturned edge, n, so that as the products of combustion pass along the bottom of the evaporating-pan they will be carried beyond the flues in said pan, and, entering the opening N, be directed against the bottom of the heater, and thence pass into and through the smoke-flues and enter the smoke-box. By this arrangement of parts the heat will first

be directed where it is most needed—viz., against the bottom of the heater, into which flows the sap from the holding-tank to be heated to or near the boiling-point before passing into the evaporating-pan.

O marks a damper, made of a longer and shorter section, to cover the ends of the smoke-flues at the rear of evaporating-pan, the shorter section of a length sufficient to be inserted in an opening provided between the end of the pan and the depending apron of the heater, so as to close the end of the flue in the section next the sirup-compartment, when the longer section of said damper is projected inwardly from the opposite side of the pan, by means of a similar opening, to cover the ends of the remaining flues, as clearly indicated in Fig. 5. This construction is designed to permit the flue in the last section, or that next the sirup-compartment, to be closed, when necessary, to prevent the sap in said section from "foaming" and running over the partition into the sirup-compartment, while at the same time the free passage of heat and smoke through the remaining flues is unobstructed.

When the damper, as a whole, is used, the products of combustion are prevented from entering the flues, in which event, upon opening the damper K in the smoke-box H, they will pass from the fire-box directly into said smoke-box. This is carried out when it is desired to suspend the boiling operation for a time, or when the boiling is completed, the sap removed, and the heater and pan partially filled with water to prevent damage to the parts from heat.

A guard, P, is secured to the inside of the deflector in such manner as to form a V-shaped space inclosed by the bottom of the heater and the deflector, and of a width at its forward or open end about equal to the width of the sirup-compartment in the pan, the purpose of which is to protect the rear wall of said sirup-compartment from the strong heat, and thus prevent any damage to the sirup from scorching.

A regulated flow of sap enters the heater at G, and, flowing in the path indicated by the arrows, because of the partitions extending from the sides with alternate openings at their ends, enters the outermost section of the evaporating-pan by means of the spout d, when it follows the route shown by the arrows until it flows through the gate f, as is common in such pans.

Openings are made in the partitions, as shown at e, Fig. 1, to permit the sap to flow

from one section into another in the manner described.

The sirup-compartment may be divided into two parts by the transverse partition provided with the gate e, and the sirup may be emptied therefrom by means of the spout R.

The sap may be entirely discharged from the heater by raising the gate S.

The flues must be kept submerged when boiling sap, and one flue only is arranged in each section to enable the pan to be more easily cleaned and kept in working condition.

It will be seen from the foregoing that the cold sap entering the heater is heated to or near the boiling-point before passing into the evaporating-pan, and after flowing through the several sections it enters as sirup into the sirup-compartment, whence it may be discharged from the spout R; the smoke and heat are first directed against the bottom of the heater, and thence passing through the return-flues, are fully utilized to obtain a speedy reduction of sap to sirup; the sirup-compartment is protected from excessive heat; the draft through the return flues can be easily and effectively regulated; and, lastly, the said flues can be closed and the products of combustion be caused to pass directly from the fire into the smoke-box.

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

1. The combination, with a furnace having over its front wall a smoke-box, of an evaporating-pan provided with a number of flues, and a sub-chamber or receptacle arranged across its back or rear end, and a deflector to cause the products of combustion to be carried beyond the rear ends of said flues before passing into the same, substantially as and for the purpose set forth.

2. The combination, with a furnace having over its front wall a smoke-box provided with a smoke-exit, of an evaporating-pan provided with a number of flues traversing its length, and having a heater or sub-chamber arranged at its back, and a deflector to cause the products of combustion to be carried beyond the rear ends of said flues and be directed against the bottom of the heater or sub-chamber before entering the flues in said evaporating-pan, substantially as set forth.

3. The combination, with a furnace having over its front wall a smoke-box provided with a sliding register-damper and a smoke-exit, of an evaporating-pan having a number of internal smoke-flues, substantially as and for the purpose set forth.

4. The combination, with the evaporating-pan, divided longitudinally into the sirup-compartment and the sections, the latter provided each with an internal smoke-flue, of the damper O, made in two parts, as and for the purpose set forth.

5. The combination, with the evaporating-

pan, divided longitudinally into the sirup-compartment and the sections, the latter provided each with an internal smoke-flue, of the guard P, as and for the purpose set forth.

- 5 6. The evaporating-pan, divided longitudinally into the sirup-compartment, provided with the gate *f*, and the sections F, having the openings *c*, and the sap-heater, arranged transversely at the back of the evaporating-pan,

and provided with the spout *d* and gate S, in combination, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

PHILO SENICA EWINS.

Witnesses:

HENRY LADD,
M. B. MARSH.