J. E. Morse.

Evaporating Pan.

No. 46,260. Patented Feb. 7, 1865.

Fig. 1.

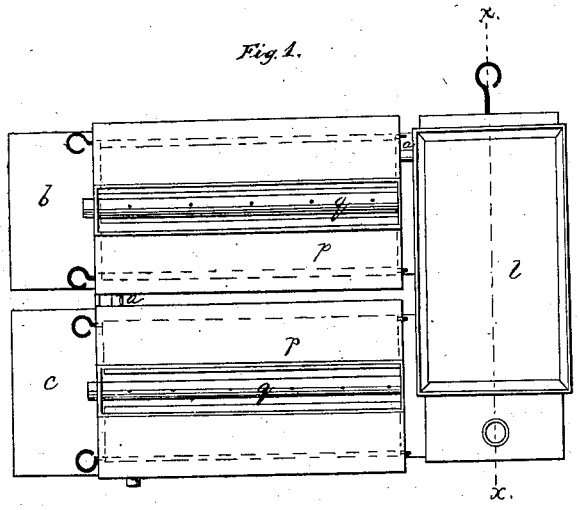


Fig. 2.

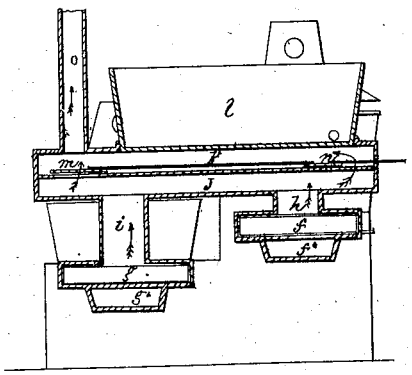


Fig. 3.

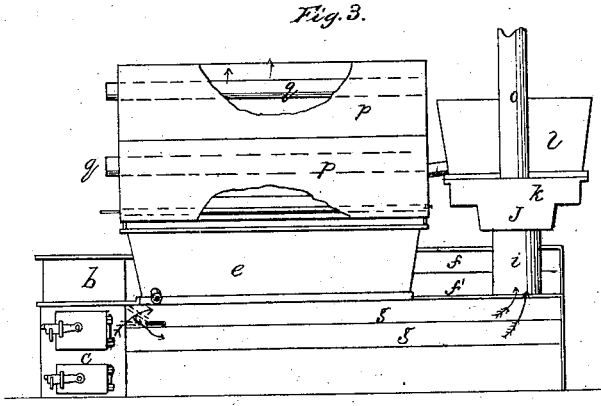
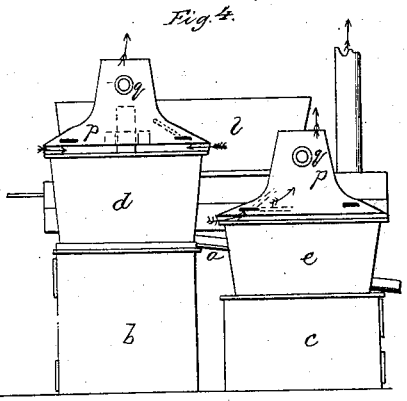


Fig. 4.



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UNITED STATES PATENT OFFICE.

JONATHAN E. MORSE, OF BOSTON, MASSACHUSETTS.

IMPROVED EVAPORATOR FOR SACCHARINE AND OTHER LIQUIDS.

Specification forming part of Letters Patent No. **46,260**, dated February 7, 1865.

To all whom it may concern:

Be it known that I, JONATHAN E. MORSE, of Boston, in the county of Suffolk, in the State of Massachusetts, have invented certain new and useful Improvements in Evaporators; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

Of said drawings, Figure 1 represents a plan of a train of evaporators and their appendages in which my invention is embodied. Fig. 2 is a vertical cross section of the same, taken on the line *x x*. (Seen in Fig. 1.) Figs. 3 and 4 are respectively side and front elevations of the apparatus.

This invention relates to a system of open evaporating-pans designed, chiefly, for use in expelling water from saccharine liquids; and it consists in a peculiar arrangement of the furnaces and flues by which the heat of the furnace-fires may be made available under the evaporators or by which it may be concentrated upon but one of them, or by which it may be made to pass off without affecting the contents of any of the evaporators; also, in the arrangement, substantially that shown and described, by which steam-jets are employed to cause a current of air to pass over the surface of the liquid contained in the evaporators, and by such passage to absorb and carry off rapidly the watery matter.

The system shown in the drawings consists of three pans only, though the number of these may be increased, if desirable. Said pans or evaporators are located upon such different levels that fluid in the highest one may be drawn through each of the others in succession, suitable pipes, *a*, being arranged for this purpose and provided with stop-valves. From the lowest pan in the series or train a pipe leads from near the bottom thereof for the purpose of discharging the thickened fluid or sirup into a cooler or crystallizer.

Suitable furnaces, *b c*, are located, as shown, outside of or beyond the evaporators *d* and *e*, and from these furnaces lead flues *f f'* and *g g'*, which are respectively located beneath the evaporators *d* and *e*. These flues *f f'* and *g g'* discharge their contents, respectively, through vertical pipes *h* and *i* into a horizontal flue, *j*, over which is another horizontal flue, *k*, directly above which is the highest evaporating-pan, *l*. A system of dampers is arranged to control the passage of the heat and smoke from the furnaces as follows:

Between the furnaces and the flues *f f'* and *g g'*, and over an opening in the flues *f'* and *g'*, are arranged dampers like that shown in dotted lines in Fig. 3, near the furnace. When said dampers are raised, then the products of combustion are shut off from passing through the upper flues, *f* and *g*, and turning downward pass into the lower flues, *f'* and *g'*; but when the dampers are placed so as to rest on the upper surfaces of the flues *f'* and *g'*, then the openings from the furnaces into the lower flues, *f'* and *g'*, are closed, and the products of combustion pass along the upper flues, *f* and *g*, in contact with the bottoms of the pans *d* and *e*; but whether said dampers prevent the passage of the products of combustion through either of said upper or lower flues the said products pass off therefrom through the pipes *h* and *i*, as stated, for in Fig. 2 may be seen the communication of the four flues *f f'* and *g g'* at their rear end. In said Fig. 2 there may be seen two openings between the flues *j* and *k*, and two dampers, *m* and *n*, so arranged upon one rod that when one of said openings is closed the other must be open. When the opening which is controlled by the damper *n* is open, all of the products of combustion from both furnaces must pass along the whole length of the upper flue, *k*; but when the opening controlled by the damper *m* is open, then said products will pass directly into the chimney *o*, across the end of flue *k*. Thus it will be seen that the heat from furnace *b* can be made to act upon pan *d* or not at pleasure, so also with regard to the heat from furnace *c* and the pan *e*, and, further, that the heat from both furnaces can be made to act or not to act upon pan *l* without regard to whether or not said heat is acting on the pans *d* and *e*. To increase the rapidity of evaporation, any or all of the pans may be furnished with an apparatus substantially like that seen as applied to the pans *d* and *e*. This consists of a cover, *p*, of a shape similar to that shown in the drawings, which, with exception of a long narrow slit or opening at the top, incloses the pan. Within this opening in the cover is a steam-pipe, *q*, having small perforations through its upper side, so as to discharge jets upward from the

cover and the pipe when steam is admitted into the latter. The cover is provided with any convenient means for raising it from the edges of the pan any desired amount and for holding it in such position, said means being also such as will permit removal of the cover from the pan. Still further, the cover may be provided on either side with movable wings or deflectors, (seen in dotted lines in Fig. 4,) the purpose of which will be described beyond.

It will be obvious that if steam of considerable pressure is admitted into the pipe *q* it will escape through the small perforations in the upper side thereof, and that if the cover is raised from the pan, so as to leave a crack or opening all around, that the steam escaping from the pipe will cause a brisk circulation or current of air to pass over the surface of the fluid in the pan. This current of air will take up the vapor from the fluid and will accelerate the removal of the watery particles therein and the thickening of the sirup.

By the wings or deflectors in the cover the current of air can be brought more or less closely into contact with the surface of the fluid in the pan, as may be desired.

Jointed pipes or flexible hose may be employed to connect the pipe *q* with a stationary steam-pipe.

The cover may be closed upon the pan and the opening in the cover may be so contracted above the jets from the steam-pipe as that said jets shall fill the said contracted opening, and by their action produce a partial vacuum in the pan, which, as is well known, will accelerate the evaporation, while at the same time the vapor and gases evolved from the liquid in the pan are removed by the operation of the steam-jets.

I claim—

1. A train of evaporating-pans with furnaces and flues arranged to operate in connection therewith, substantially as described.

2. The employment, with an open evaporator, of a cover and steam-jets when arranged to operate substantially as specified.

In witness whereof I have hereunto set my hand this 23d day of December, A. D. 1864.

JONATHAN E. MORSE.

In presence of—

J. B. CROSBY,

F. GOULD.