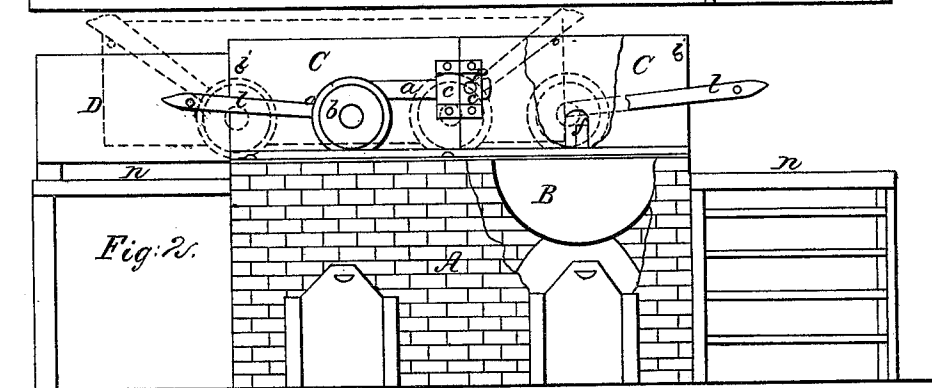
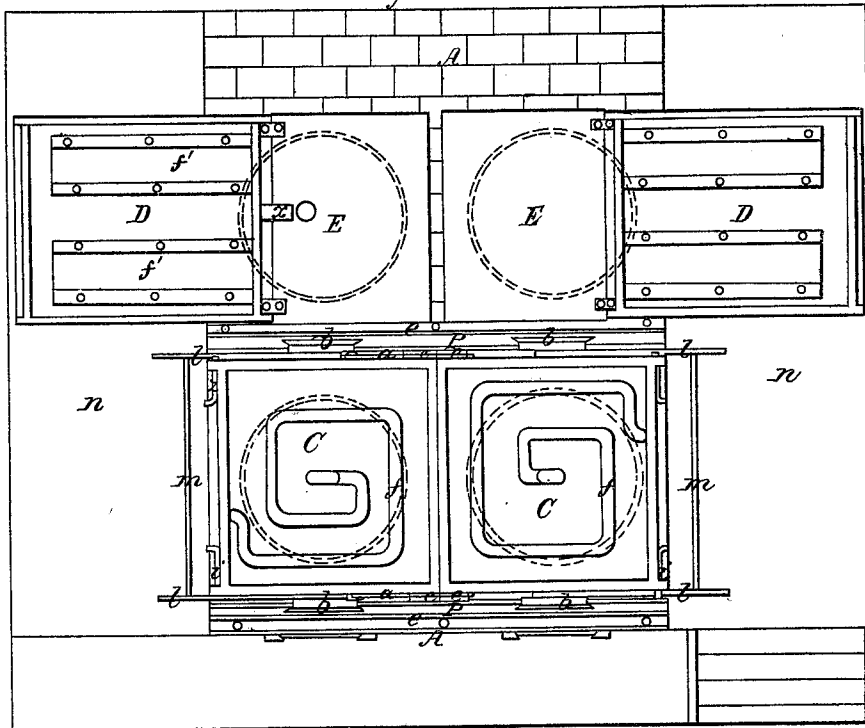


# *D. Reynolds's* *Evaporating Apparatus.*

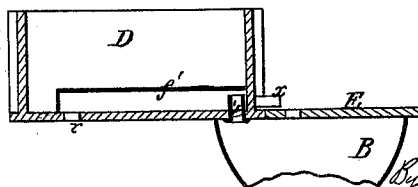
*N<sup>o</sup> 9,485.*

*Patented Jan. 15, 1869.*

*Fig. 1.*



*Fig. 3.*



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# United States Patent Office.

DEXTER REYNOLDS, OF ALBANY, NEW YORK.

Letters Patent No. 91,485, dated June 15, 1869.

## IMPROVED EVAPORATING-APPARATUS.

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, DEXTER REYNOLDS, of Albany, in the county of Albany, and State of New York, have invented a certain new and useful Evaporating-Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a top view of my improvement as applied to an ordinary salt-block.

Figure 2 is a front elevation of the same, with portions broken away, to show a section of one of the kettles, and the form of the steam-pipe *f*.

Figure 3 is a vertical section of one form of evaporating-box D.

The object of my invention, the nature of which will be understood by reference to the drawings and specifications, is more especially to utilize the heat of the steam produced in evaporating liquids, which steam now escapes into the atmosphere, by employing it to heat and evaporate additional quantities of liquid.

To enable others to understand and use my invention, I will describe its construction, and operation.

I use the ordinary form of arch, A, figs. 1 and 2, in which are set, at proper intervals, kettles B, fig. 2, (shown in dotted lines, fig. 1,) supported in the usual manner upon the walls.

Over these kettles I may use the evaporating-boxes C, two of which are locked together by links *a*, secured to one box, and slipped through the sockets *c*, provided on the sides of the boxes, at their contiguous edges.

The pins *p*, put through the sockets and straps, fasten them securely together.

Each of the boxes C is provided with a pair of wheels, *b*, one upon each side, revolving on studs secured to the levers *l*, which levers are pivoted at *o*, fig. 2, to the boxes, and are connected, two and two, by rods *m*.

This arrangement allows the boxes to be raised and lowered about one inch, so that when lowered the bottoms of the boxes rest on the rims of the kettles, between which bottoms and rims felting or other suitable material may be interposed as a packing, to make a steam-tight joint, if desired; and when raised, as shown in red lines, fig. 2, the bottoms shall be raised from the rims of the kettles, and the wheels shall rest and run upon the tracks *e*, placed between the kettles, and extending across the arch A to any desired length.

The levers *l*, when raised, are supported by the pins *i*, so that the boxes may be sustained and rolled together to one side, for the purpose of uncovering the kettles, to remove sediment or deposits.

The object of this arrangement of double boxes and locking-device is to allow each kettle to be partially uncovered, by a simple movement of the boxes to either side; and if it is desired to wholly uncover the same,

the boxes can be disconnected and set up, one in each alley-way *n*.

Inside of the boxes C, I may use the steam-pipe *f*, figs. 1 and 2, arranged spirally or in any other convenient form, and communicating at one end with the kettles below, and at the other with a suitable trough, to conduct away the condensed water, through which pipe the steam from the kettle passes, giving up, in condensation, its heat, latent or otherwise, to the liquid in the box.

This pipe *f* is raised perpendicularly a short distance above the bottom of the box, at the point of entrance of the steam, as shown in fig. 2, to prevent the condensed water from returning into the kettle.

In fig. 1, I have shown another arrangement, on the same principle, whereby I use stationary evaporating-boxes D, placed partly over the kettles, and partly over the alley-ways *n*, the kettles being provided with covers E, either with or without hinges, both boxes and covers removable when desired, the covers being intended to be used as alley-ways, in place of the alley-ways *n*, and the pipes *x* supplied with plugs or faucets, conducting the concentrated liquids to the kettles below. The steam passes into the pipe or receptacle for it, at any desired point in the bottom over the kettle, and escapes into a gutter at the other end; this arrangement being intended for use, where, from the present construction of the salt-blocks, there is not room to place the boxes between the rows of kettles, and it is not desirable to place them overhead.

I may also use, in any or all of the evaporating-boxes, an equivalent for the pipe *f*, as shown more particularly in fig. 3.

The case or receptacle *f'*, made of sheet-iron or other suitable material, is secured steam-tight to the bottom of the box, the steam from the kettle entering through the short pipe *t*, (the top of which is somewhat above the bottom, to prevent the return of the water of condensation,) and escaping through the opening *t'*, to be conducted away.

I am aware that Letters Patent have been granted to Josiah J. Sherman, dated February 16, 1869, for an improved process and apparatus for evaporating liquids, and that the said Sherman therein describes and claims substantially an evaporating-box, made of wood or any non-conducting material, with a metallic diaphragm, or false metal bottom or pan, to hold above or therein the liquid to be evaporated, placed sufficiently above the true bottom to form a steam-chamber, communication being had to this steam-chamber from the kettle containing the liquid subjected to heat, and which steam it is proposed to utilize, by a hole and short pipe, or an open space with a shed, to prevent the return of the condensed steam, and also another hole and pipe in such chamber, for the escape of the condensed steam; and that he provides for the

placing of this box directly over the kettle, and its removal therefrom, either vertically or horizontally, in order to have access to such kettle; and he also provides for placing such boxes directly over or diagonally from such kettle, in combination with a cover to such kettle, wholly or partially removable, a communication or passage being provided for the steam to pass up through such cover to the steam-chamber of his evaporating-box, with faucets or pipes to let down the concentrated liquid from such pan, or over such metallic diaphragm, to the kettle or any desired receptacle, therefor; and he also provides for similar boxes, with vats and steam-chambers, to be placed one over another.

His boxes, however, when prepared to be moved on a track, have each four wheels and four levers, and I propose, as an improvement thereon, to use only two on each box, one upon each side thereof, and to join the boxes together, as shown in figs. 1 and 2, by the removable straps *a* passing through the sockets *c*, and held in place by the removable pins *p*, or any equivalent mechanical device, for the purpose of dispensing with two wheels and two levers on each box, and having the two boxes move as one, so as to uncover one-half or more of a kettle on each side; and when access is desired to the whole of either or both of the kettles and surrounding parts, the straps can be removed and the boxes rolled off and set up in the alley-ways *n*.

With two wheels on each side of each box, as provided by Sherman, where the wheels are of any suitable size, the alleys being lower than the track, one-half of a kettle cannot be uncovered without extending and supporting the tracks over the alleys, so as to seriously obstruct them.

I am aware, also, that steam has been passed through pipes placed in boxes or tubs, surrounded by the liquid to be heated, but I nowhere find that the steam so used was the steam from the liquid itself, used to heat and evaporate additional liquid of the same character, in the manner proposed by me and herein described.

My evaporating-box differs also from Sherman's in this, that I construct a box with bottom and sides of any non-conducting material, and of any desired or convenient size. I dispense with the false metal bottom or pan, and the steam-chamber formed thereby, and also with the pipe or shedded opening for the passage of steam from the kettles to such steam-chamber, and also the pipe for the passage of the condensed steam from such chamber; and instead, I use the box itself to contain the liquid to be evaporated, placing therein a pipe of metal or any conducting-material, passing around the inside of the box, or in any manner within it, as hereinbefore described.

It is obvious that the sooner or more direct the pipe, from where it receives the steam from the kettle below is carried to the highest point it is desired to have it extend, the less condensed steam will flow back into the kettle, and that protecting it through this space will be of advantage, and that the lower comparatively the other end is, the more effectually and speedily the condensed water will pass away; and that the longer it is, or the greater its diameter, the greater will be the effect in heating and evaporating such liquid, and that any parts of such pipe that may be above the surface of the liquid are of no advantage whatever, and rather a loss.

I do not confine myself to the use of one pipe, or any particular size or arrangement thereof within the box, or to the point of receiving the steam or discharging the condensed water, as several pipes, of any size or length, and arranged in any manner, may be employed. Nor do I confine myself to the use of a pipe or pipes, as in place thereof, and as their equivalent, acting substantially in the same manner and producing the same results, there may be employed any-

shaped tube, case, or receptacle, of metal, or partly of metal and other material, or formed by the use of metal and part of the bottom and sides of the box, having openings for the ascent and escape of steam, as described.

One or more boxes may also be used for each kettle, or one box may receive and utilize the steam from several kettles, and the boxes may be placed and adjusted over the kettles, and removed vertically or horizontally therefrom, by any suitable mechanical device, so as to uncover the kettle in part or in whole, for any purpose whatever. Or the boxes may be made stationary, and placed partly or wholly over, or diagonally away from the kettles, in combination with a cover to such kettle, or such part as is not covered by the box, such cover being made so as to be raised or lowered, or wholly removed, to furnish access to the whole or any part thereof, a communication being had between the steam under the cover and the receptacle in the box.

One box may also be placed away from or higher than another, the upper box receiving and utilizing the steam arising from the liquid being evaporated in the lower; or the pipe may be made to pass up through or outside of the lower box to the upper one, and after passing around or through it in any manner, and to any extent desired, be then made to pass down into and around or through the lower box, and discharge its condensed water through its bottom or side. In such case the liquid in the upper case will be the first heated before much effect will be had in the lower; or separate pipes may carry the steam from the kettle or kettles to each box.

Felting or other suitable packing may be placed between the covers and the rims of the kettles, to make a steam-tight joint, and a weight or other mechanical device may be employed to hold the covers firmly down upon the rims of the kettles, capable of being readily removed, to allow easy access to the latter.

All the pipes, tubes, cases, or receptacles for steam or liquids should be japanned or coated with red lead, or otherwise protected from the oxidizing effect of steam, air, or salt-brines.

As salt-brine sometimes boils furiously, and may have a tendency to be projected up through the hole in the bottom of the box, where it is proposed to have the steam ascend, and as this brine contains lime, and salt, and other impurities which might be carried up and deposited in the pipe, and tend to destroy its efficacy, I protect the mouth of such opening by placing over it a board considerably larger than the opening, and of suitable thickness, supported by wooden posts, similar to an inverted table, which, while allowing the ready access of the steam, prevents the passage of any water whatever.

Having described my invention,

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

1. The straps *a* and sockets *c*, with their removable pins *i*, for the purpose of joining two boxes together, and of separating them, when desired, substantially in the manner described.

2. The evaporating-box or boxes, with their pipes, cases, tubes, or receptacles for steam, when constructed and adjusted as herein described, so as to utilize the heat of the steam from a liquid in a primary vessel or vessels subjected to heat, for the purpose of heating in such box or boxes, or concentrating by evaporation, further liquid of the same or similar character, in combination with any suitable mechanical device for raising it or them vertically, or removing it or them horizontally from such primary vessel or vessels, in order to have access to such primary vessel or vessels, or their surroundings, for any purpose whatever.

3. The evaporating-box or boxes, with their pipes,

cases, tubes, or receptacles for steam, when constructed and adjusted substantially as described, so as to utilize the heat of the steam from a liquid in a primary vessel or vessels subjected to heat, for the purpose of heating in such box or boxes, or concentrating by evaporation, further liquid of the same or similar character, when such box or boxes are placed vertically over, or under, or diagonally from a primary vessel or vessels subjected to heat, in combination with a cover or covers to such primary vessel or vessels, or such parts thereof not covered by such box or boxes, opening or removable, or both, so as to have access to such primary vessel or vessels, and its or their surroundings,

for any purpose whatever, with a communication, by pipes or otherwise, for the passage of steam from under such cover or covers, either through, back, under, or aside from it or them, to one end or any part of the pipes, cases, tubes, or receptacles for steam in such box or boxes, through which heat is to be transmitted to the liquid surrounding it or them, substantially in the manner and for the purposes set forth.

DEXTER REYNOLDS.

Witnesses:

O. MEADS,

MARTIN D. CONWAY.