J. McCRACKEN.

Evaporating Apparatus.

No. 12,516. Patented March 13, 1855.

Fig. 4.

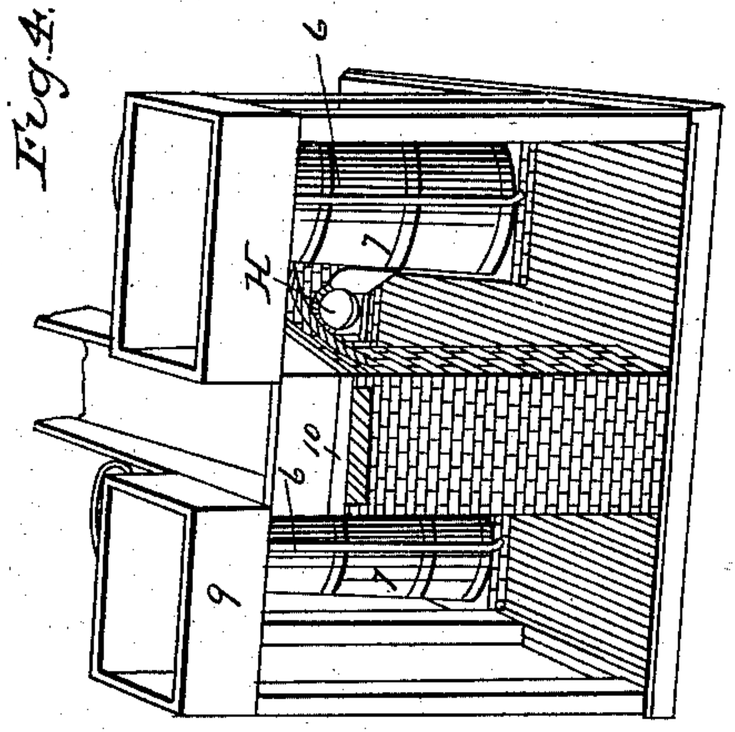


Fig. 3C

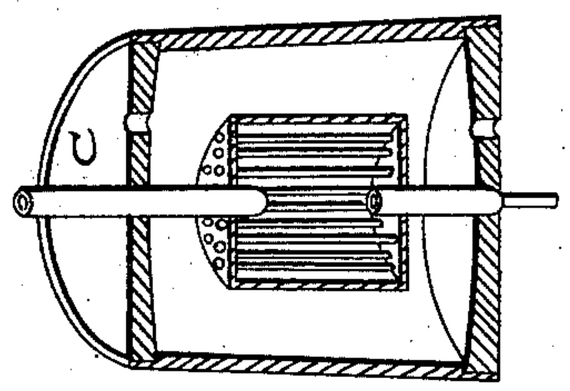


Fig. 2 B

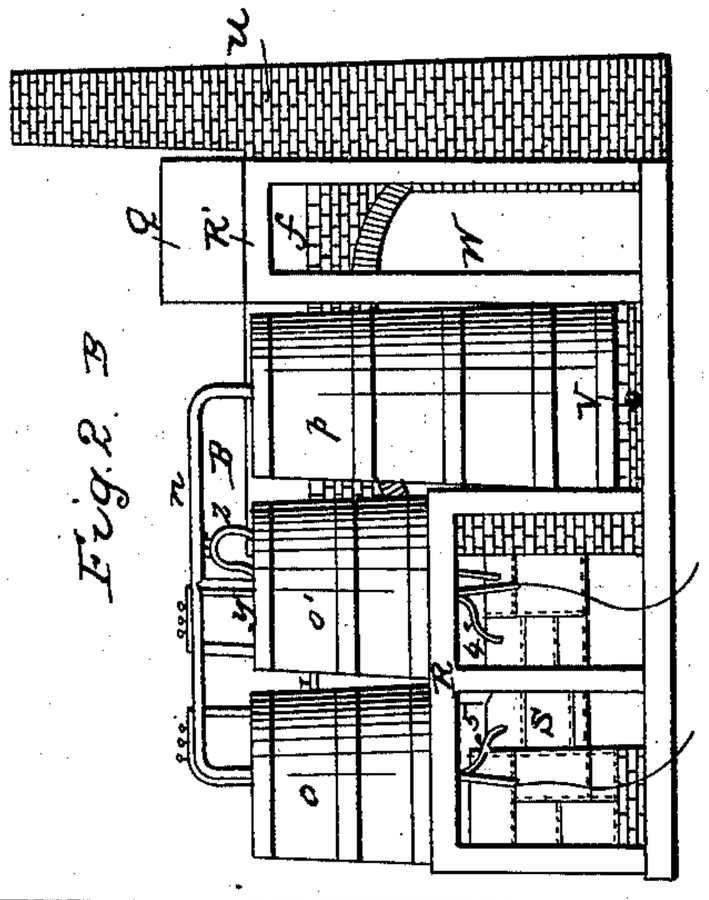
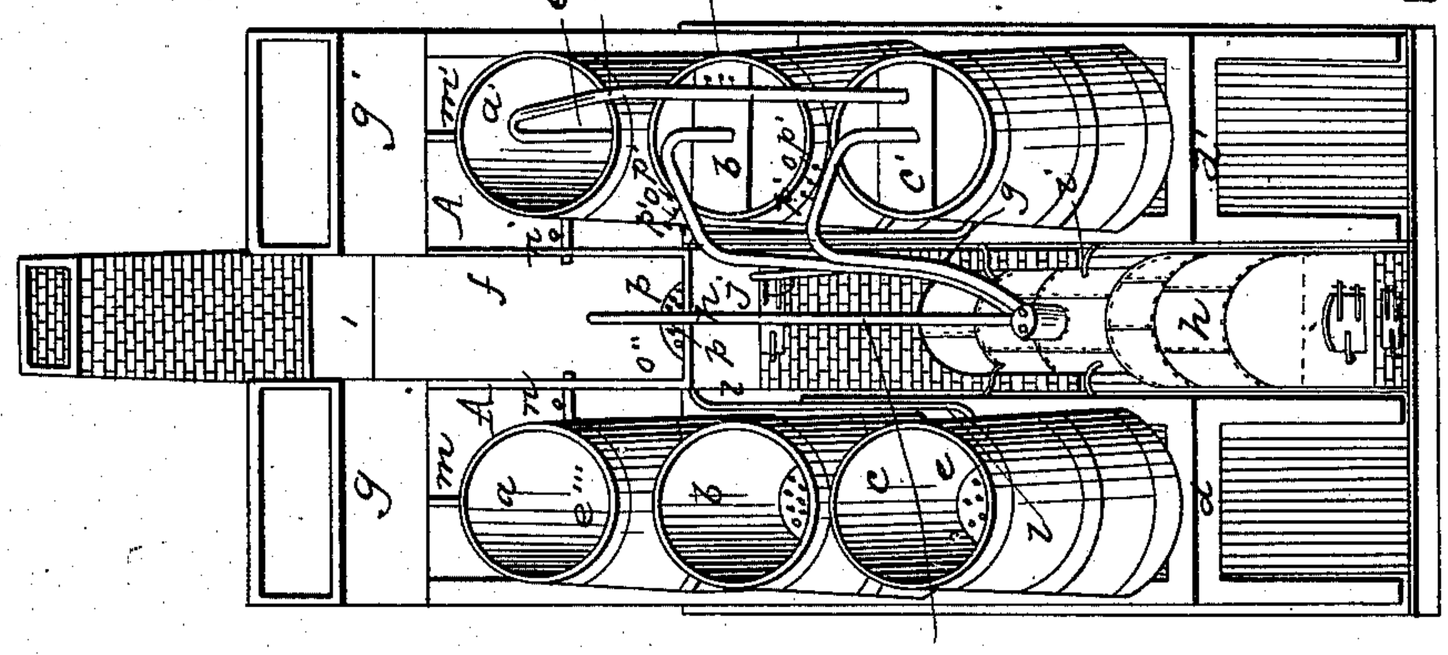


Fig. 2. A. A.



WITNESSES
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JAMES McCRACKEN, OF BLOOMFIELD, NEW JERSEY.

IMPROVED EVAPORATING APPARATUS.

Specification forming part of Letters Patent No. **12,516,** dated March 13, 1855.

To all whom it may concern:

Be it known that I, JAMES McCRACKEN, of the town of Bloomfield, in the county of Essex and State of New Jersey, have invented a new, novel, and useful improvement in the construction and application of a set of pans of a cylindric form for evaporating purposes, by the application of steam, in vertical cylinders, composed of vertical tubes; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which drawings constitute a part of this specification.

My invention consists in the construction of a set of vessels or pans, as follows: The vessels (or pans) next the boiler are placed upon a frame (or husk) of sufficient elevation to bring their bottoms on a level with the top of the boiler. These pans are six feet high, more or less, and their diameters (at the bottom) are equal to their height. These vessels or pans are closed at the top and bottom, and each one contains a metallic cylinder three feet high, more or less, and its diameter is also equal to its height. This cylinder is composed of vertical tubes, which pass through and are riveted to its heads. Thus the liquor that passes into the outer vessel (or pan) fills the tubes, and their whole outer surface (which is inside of the metallic cylinder) is exposed to a heat sufficient to boil the liquor in them very rapidly. The heat that produces this effect is the steam that comes direct from the boiler through a steam-pipe, and enters the head of the outer (wooden) vessel (or pan) at its center, and passes downward through the upper head of the metallic cylinder, (or heater,) and thus distributes the steam among the vertical tubes. There is also a pipe leading from the steam-chamber of the boiler into the bottom of the first vessel, (or pan,) and enters the lower head of the metallic cylinder (or heater) at its center. This pipe conveys the condensed steam back to the boiler from the heater. There is also a steam-pipe that leads from the upper head of the first vessel, (or pan,) which connects with the second vessel (or pan) by a short perpendicular pipe from its upper head, and the steam of both vessels is then conveyed to the condenser or third vessel or pan, which is open at the top, and contains a metallic cylinder similar to those in the other vessels, only of much greater length and diameter, sufficient to condense the required amount of steam. There is also a small pipe leading from the bottom of the third vessel or pan into the bottom of a reservoir or cistern, that is placed on a level with the top of the condenser or open wooden vessel, (or pan.) There is also a small pipe near the top of the condenser that communicates with the horizontal pan or evaporator, which is placed over the fire-flue that runs from the boiler to the smoke-stack. There is a small vertical metallic heater placed in the front end (next the boiler) of this pan. This small heater is connected with the steam-chamber of the boiler by pipes, similar to the other heaters. (See drawings, J *k*.)

The mode of conveying the liquor to be evaporated from one vessel to the other is as follows: It is first conveyed into the reservoir or cistern, from thence is carried through a pipe into the bottom of the third vessel or condenser, out of which it flows (near the top) through a pipe into the horizontal pan (or evaporator) over the fire-flue, where it is brought up to the boiling-point, after which it passes into the vertical evaporators through a pipe running along the sides, as shown in the drawings, *l l*. All the pipes are regulated by the ordinary stop-cocks or faucets, (see drawings,) O O′ P P′. The concentrated liquor in the cylinder-evaporators is forced by its own steam through a pipe in the bottom, by simply cutting off the connection with the condenser by turning the cock in the connection-pipe.

The superiority of my apparatus over those already in common use is that in all double-jacketed evaporating-pans the greatest amount of heating-surface is exposed to the action of the atmosphere, whereas by my arrangement the entire heating-surface is submerged in the liquor to be evaporated. Consequently, a more active evaporation is produced, and at less expense of fuel. The superiority of the vertical over the horizontal tubes is that the liquor passes through them (the tubes) instead of the steam, thereby preventing any incrustation or sediment being formed in the pipes or tubes, (as is always the case by any of the other modes now in use,) on account of the rapid circulation of the liquor in passing through them. The vacuum is kept up in the condenser by means of a pipe at its bottom, connecting with a pump which is worked by

a small engine, in order to draw off the condensed steam that may accumulate in the condenser.

In the drawings, Plate 1, A A′ is a double apparatus. *a* is the open vessel or condenser. *a′* is also an open vessel or condenser, with pipes attached ready for use. *b* is the heater or second vessel, with the top off, in order to show the vertical heater. *b′* is also an exterior view of the second vessel or pan closed, with pipe attached ready for use. *c* is the first vessel, opened for a similar purpose to *b*. *c′* is the first vessel or pan closed, with pipes attached and ready for work, similar to *b′*. *d d′* are frames or husks supporting the vessels. *e e′ e″ e‴ e⁗* are vertical heaters composed of vertical tubes. *f* is a horizontal pan or evaporator, with a metallic bottom, and is placed over the fire-flue that runs from the boiler to the smoke-stack. *g* is a reservoir or cistern. *g′* is also a reservoir or cistern. *h* is the boiler. *i* is a pipe that leads from the boiler to the bottom of the first vessel or pan. *i′ i″* are pipes that convey the steam through the upper head of the vessel *c′* into the upper head of its heater. *i″* is a pipe leading from the upper head of the first vessel, *c′*, to the condenser *a′* and enters the upper head of its heater *e⁗*. *i‴* is a perpendicular pipe running from the head of the second vessel (or pan) into the pipe *i″*, which conveys the steam into the condenser from both vessels. J is a pipe leading from the boiler into the small heater *e⁗*, through the bottom. *k* is a steam-pipe leading from the upper steam-chamber of the boiler into the small heater *e⁗*, which is placed in the horizontal pan *f*. *l l* is a horizontal pipe that leads from the two first vessels into the horizontal pan *f*, which is placed over the fire-flue that leads from the boiler to the smoke-stack. *m* is a pipe leading from the bottom of the third vessel or condenser into the bottom of the cistern *g*. *m′* is a similar pipe leading from the bottom of *a′* into the bottom of *g′*. *n n′* are short pipes leading from the condensers near their tops into the horizontal pan *f*. *o o′* are stop-cocks (or faucets) for regulating the steam in the heaters. P P are small cocks or faucets used for drawing off the cold air out of the heaters. P′ P′ are similar cocks for regulating the steam from the boiler.

Plate 2: B is a side view of A′, or one set of pans. *o o′* are the first vessels or pans. P is the third vessel or condenser. Q is a cistern or reservoir. R is a frame or husk supporting the two first vessels. R′ is a frame supporting the cistern. S is the boiler. T is the fire-flue supporting the horizontal pan *f*. *u* is the smoke-stack. *v* is a pipe leading from the bottom of the condenser, and connects with the pump that is worked by a small engine at W. *w* is a horizontal pipe which conveys the steam from the heaters to the condenser P. *y* is a vertical pipe running from the head of the second vessel or heater *o′*, and connects with the horizontal pipe *w*. *x x′* are steam-pipes running from the upper steam chamber of the boiler into the head of the first and second vessels and their heaters. *z* is a steam-pipe running from the steam-chamber of the boiler into the small heater, which is placed in the front end of the horizontal pan *f*. & is a horizontal pipe that runs from the first and second vessels into the horizontal open pan *f* over the fire-flue. 2 3 are pipes leading from the bottoms of the first and second vessels or (*o o′*) heaters. 4 5 are pipes leading from the boiler into the bottom of the first and second vessels or pans.

Plate 3: C is a sectional drawing of *o*, Plate 2, showing the formation of the heaters *e e′ e″ e‴ e⁗*, Plate 1.

Plate 4 is a drawing of the back end, showing the pipes 6 6′, fire-flue 10. 7 7 are the condensers. 8 is the arch supporting the fire-flue and horizontal pan. 9 9 are the reservoirs or cisterns. 10 is the fire-flue. 11 shows the fire-flue at the back end of the boiler. 12 is the open pan over the fire-flue, which is also called an evaporator. Therefore,

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

The arrangement and use of a set of metallic cylinders containing vertical tubes, as described, in connection with the mode of conveying the escape steam from the pans to the condenser, in the manner and for the purpose herein set forth.

In testimony whereof I hereunto subscribe my name in presence of two witnesses.

JAMES McCRACKEN.

Witnesses:

JAMES V. HAMLIN,

JAMES P. McLEAN.