J. L. HUMPHREY.

Evaporating Apparatus.

No. 15,884. Patented Oct. 14, 1856.

Fig. 1.

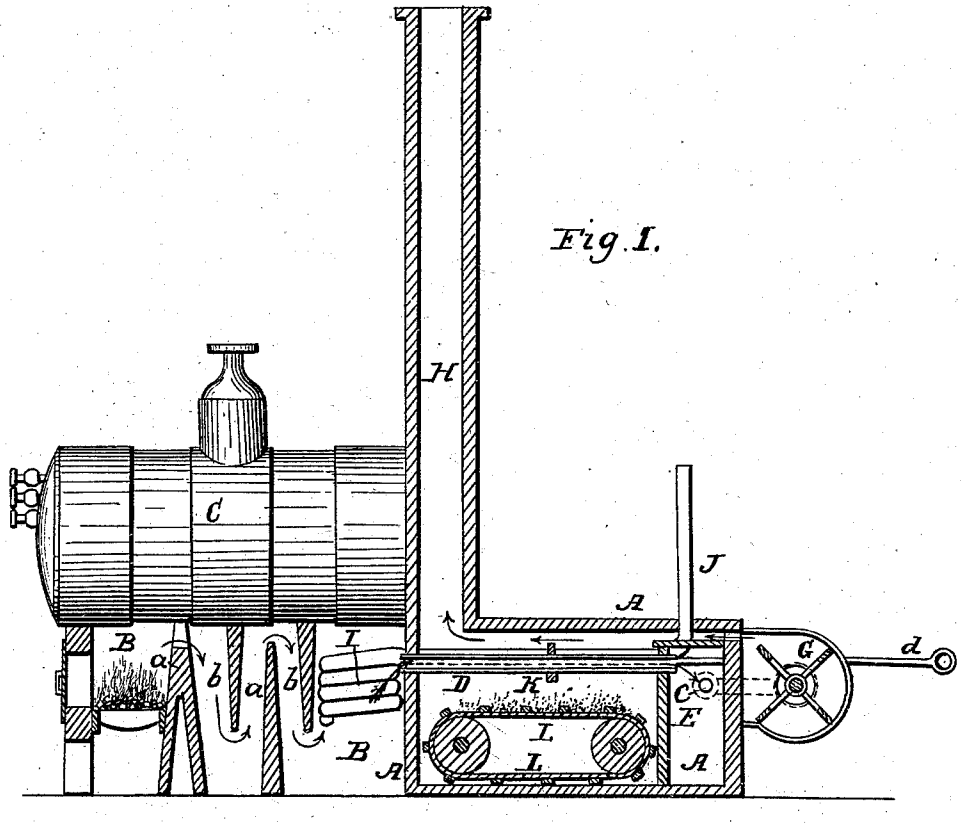


Fig. 3.

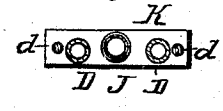
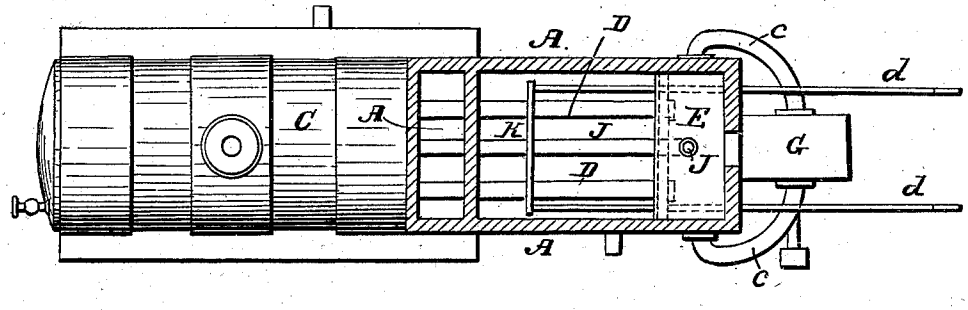


Fig. 2.



N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

J. L. HUMPHREY, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN SALT-EVAPORATORS.

Specification forming part of Letters Patent No. 15,884, dated October 14, 1856.

To all whom it may concern:

Be it known that I, JAMES L. HUMPHREY, of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Apparatus for Evaporating Brine and other Solutions; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal sectional elevation of an apparatus with my improvements. Fig. 2 is a plan of the same, partly in section. Fig. 3 is a detail view, which will be hereinafter explained.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists, chiefly, in a certain arrangement whereby the heated products of combustion from a furnace are drawn by a blower through flues passing through a closed evaporating-vessel below the surface of the brine or other liquor, and by the same blower are forced back again through the vessel over the surface of the liquor and into the chimney of the furnace, thereby using the heat from the furnace to effect evaporation both below and above the surface of the liquor, and using the draft of the chimney to carry off the evaporation.

It consists, further, in a scraper fitting to the flues below the surface of the liquor, and having a movement back and forth along the tubes to remove the deposit which is caused to incrust itself upon them by crystallization, and which, if not removed, would prevent the heat being rapidly conducted to the liquor.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the covered evaporating-vessel, which may be of any convenient form.

B is a furnace, which is represented as being employed to heat a steam-boiler, C, in which steam is generated to drive an engine employed for such purposes as may be required in the manufacture of salt. This furnace has a number of bridge-walls, *a a*, and curtain-walls *b b* at the rear of the fire-place, for the purpose of arresting and causing the fall of sparks and other particles of solid matter escaping from the fire. The evaporating-vessel A is placed immediately in rear of the furnace B.

D D are the flues, consisting of metal tubes of any convenient size, leading from the rear of the furnace B through the whole length of the evaporating-vessel and into a box, E, which stands within the rear end of said vessel, but does not extend quite to the top thereof. (See Fig. 1.)

G is a fan-blower connected with the box E by side tubes, *c c*, and discharging itself into the upper part of the evaporating-vessel above the box E.

H is the chimney belonging to the furnace B. This chimney stands above the front end of the evaporating-vessel, and its only communication with the furnace is through the flues D D, the box E, the blower F, and the upper part of the evaporating-vessel.

By the above-described arrangement of the furnace, evaporating-vessel, the flues D D, the blower F, and the chimney H, the products of combustion from the furnace are drawn through the flues D D below the surface of the liquid and caused to heat it and produce evaporation, and are then forced back again over its surface, where they produce further evaporation and charge themselves with the evaporated moisture, and carry the same away to the chimney, by this latter means very much expediting the evaporating process.

I is a coil of pipe arranged in the rear part of the furnace, and supposed to receive the exhaust-steam from the steam-engine and superheat it. This coil connects with a pipe, J, running through the evaporating-pan below the usual level of the liquid, and conveys through the liquid the superheated exhaust-steam.

K is the scraper, of which Fig. 3 is a front view, consisting of a plate of metal, which has a number of holes bored in it to fit to the several flues D D and pipe J, all of which are arranged parallel with each other. To the ends of this plate are attached two rods, *d d*, which are to be connected with suitable mechanism for drawing the scraper back and forth along the flues and pipe for the removal of the crystals deposited upon them.

L is an endless chain of scrapers working near the bottom of the evaporating-vessel for

the purpose of scraping the salt or other crystallized substance toward one end of the vessel for the convenience of removing it.

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

1. The arrangement of the furnace, the closed evaporating-vessel, the flues D D, the blower F, and the chimney H, whereby the products of combustion are drawn through the evaporating-vessel below the surface of the liquid to produce evaporation by heat, and afterward driven in the opposite direction over the surface of the liquid to produce further evaporation and carry off the evaporation to the chimney, substantially as herein described.

2. The scraper K, fitted to the flues, and pipes which pass through the liquid in the evaporating-vessel, to operate substantially as herein set forth.

JAMES L. HUMPHREY.

Witnesses:
O. J. HUNT,
A. REYNOLDS.