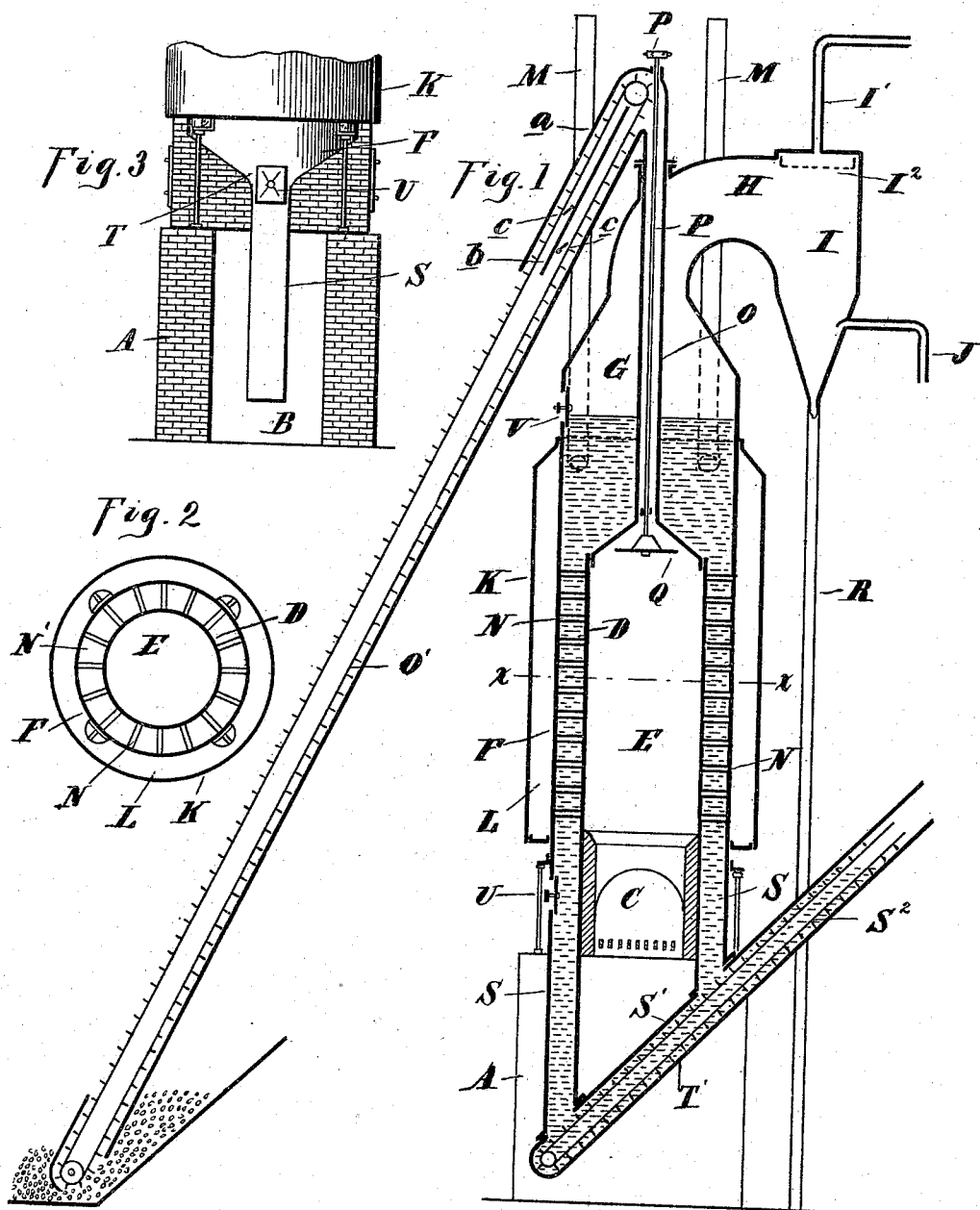


(No Model.)

T. CRANEY.
EVAPORATING APPARATUS.

No. 470,476.

Patented Mar. 8, 1892.



Witnesses:

P. M. Hulbert
M. B. Ogilby

Inventor:

Thomas Craney
By *Wm. Sprague & Co.*
Attys.

UNITED STATES PATENT OFFICE.

THOMAS CRANEY, OF BAY CITY, MICHIGAN.

EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 470,476, dated March 8, 1892.

Application filed April 23, 1891. Serial No. 390,189. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CRANEY, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Evaporating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in evaporating apparatus, especially designed for use in the manufacture of salt; and the invention consists in the peculiar construction of an evaporating-tank combined with a furnace, whereby I get the best possible results from the fuel, together with economy in cost of the apparatus.

The invention further consists in the peculiar construction of the evaporating-tank, whereby the salt is collected in an elevator-conduit for discharging it outside of the machine; further, in the peculiar arrangement and construction of the parts, whereby the heating-tubes from the furnace through the tank are easily accessible for cleaning purposes; further, in the peculiar construction of the evaporating-tank in combination with a condenser, and, further, in the peculiar construction of the fuel-feeding mechanism to the furnace, all as more fully hereinafter described.

In the drawings, Figure 1 is a vertical central section through my improved device. Fig. 2 is a cross-section thereof on line *x x*. Fig. 3 is an elevation of the base thereof at right angles to Fig. 1.

A are the foundation-walls, between which are formed a pit B. Upon these walls is supported the furnace C, having suitable feed and draft doors.

D is the casing, extending above the furnace and within which is formed the combustion-chamber E.

F is a casing arranged concentrically to the casing D and of somewhat larger diameter, formed within the evaporating-chamber G.

H is a lateral extension at the top of the evaporating-chamber G for conducting the vapors therethrough to a lower portion of condensing-chamber I, depending beside the chamber G.

I' is a water-supply pipe for such condens-

ing-chamber, and I² is a spraying device therefor.

J is an air-pipe leading to a pump for creating a partial vacuum to aid in the evaporation.

Outside of the casing F is an annular casing K, forming between it and the casing F a chamber L, which at the top connects into suitable exit-flues or chimneys M.

N are a series of tubes connecting the chambers E and L and passing through lower portion of the chamber G. These tubes I arrange in vertical series, as shown in Fig. 2, leaving between them suitable vertical passage-ways N'.

O is a vertical feed-duct leading into the combustion-chamber E and to which fuel is fed by means of an elevator O' of any suitable construction.

P is a shaft journaled in bearings centrally of the feed-duct O and extending through the top thereof, where it is provided with suitable sprocket-wheel P' or other means for imparting a rotary motion thereto from any suitable source of power. At the base and within the combustion-chamber is secured to this shaft a spreader Q, upon which the fuel will fall and be suitably spread before falling into the furnace.

To prevent the products of combustion from passing out of the duct O and thence into the elevator-duct, I form a casing *a* at the top of the elevator-duct and centrally thereto, a partition *b* extending across the sides, while dampers *c*, pivoted or secured in the casing at the sides, close the spaces between the carrier and the partitions *b*. It is evident that if the chamber G, which forms the tank for the brine, be supplied with a sufficient quantity thereof and the fire built in the furnace the products of combustion will heat the chamber E, passing through the flues N into the chamber L and thence out through the stacks M. This will result in the application of heat upon both sides of the brine, which is within the annular chamber between the casings D and F, and heat will also be imparted thereto from the flues N, through which the products of combustion pass, thus rapidly heating the brine, the evaporation of which is greatly accelerated by the formation

of a vacuum. The vapor is condensed in the condenser and carried off through the outlet-pipe R. As the salt-crystals settle to the bottom of the chamber G they may be collected 5 and carried away in any suitable manner. I preferably collect them by means of one or more legs or conduits S, extending downward to connect with the conduit S', in which an elevator and carrier S'' is operated. In the 10 drawings I have shown two such legs; but it is evident that by inclining the lower walls T of the tank toward a single leg one will answer as well.

Suitable man-holes—such as U—are formed 15 in the casing F to allow a man to enter therein to clean off such sediment as may accumulate on the tubes N, and by the arrangement described these tubes may be used as a ladder by means of which a man can ascend to 20 the top, passing through the vertical passage N'. Man-holes V are also preferably provided in the casing F or at any other convenient point.

What I claim as my invention is—

25 1. In an evaporating apparatus, the combination of a furnace, an annular evaporating-tank, a combustion-chamber within and a smoke-chamber outside thereof, a series of flues connecting the combustion and smoke 30 chambers through the tank, a downward extension of such annular tank, forming a sediment leg or chamber, and a conduit connecting the base of the tank with an elevator, substantially as described.

35 2. In an evaporating apparatus, the combination of an evaporating-tank, a combustion-

chamber within and a smoke-chamber outside thereof, a series of flues connecting the combustion and smoke chambers through the tank, means for removing the accumulated 40 sediment from the bottom of the tank, an evaporating-chamber above the combustion-chamber, a conduit for the vapors from the evaporating-chamber, and a condenser, substantially as described.

45 3. In an evaporating apparatus, the combination of a furnace, two heating-chambers, an interposed tank extending above the heating-chambers, an evaporating-chamber to one side of and connected with the upper end of 50 the tank, tubes connecting the heating-chambers, arranged in vertical series, and passages formed between such vertical series, substantially as described.

55 4. In an evaporating apparatus, the combination, with the combustion-chamber, furnace, and tank around and above the combustion-chamber, of a vertical feed-duct passing through the tank into the combustion- 60 chamber, and a rotating spreader in the combustion-chamber at the base of said duct, substantially as described.

65 5. In an evaporating apparatus, the combination, with the combustion-chamber, of the feed-duct O, carrier O', casing a, and dampers c, substantially as described.

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

THOMAS CRANEY.

Witnesses:

M. B. O'DOHERTY,
P. M. HULBERT.