

(No Model.)

2 Sheets—Sheet 1.

J. W. NORTON.
EVAPORATING APPARATUS.

No. 414,436.

Patented Nov. 5, 1889.

Fig. 1.

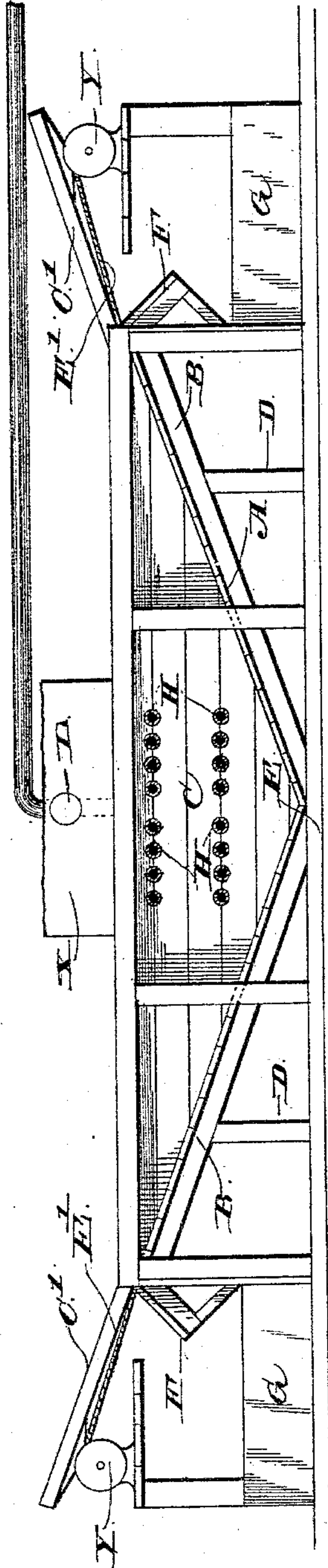
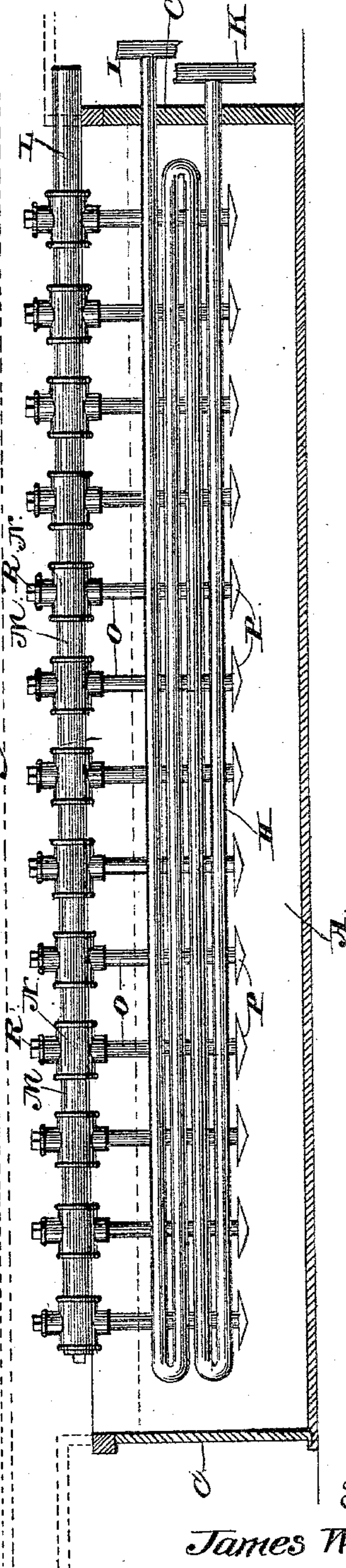


Fig. 3.



Witnesses

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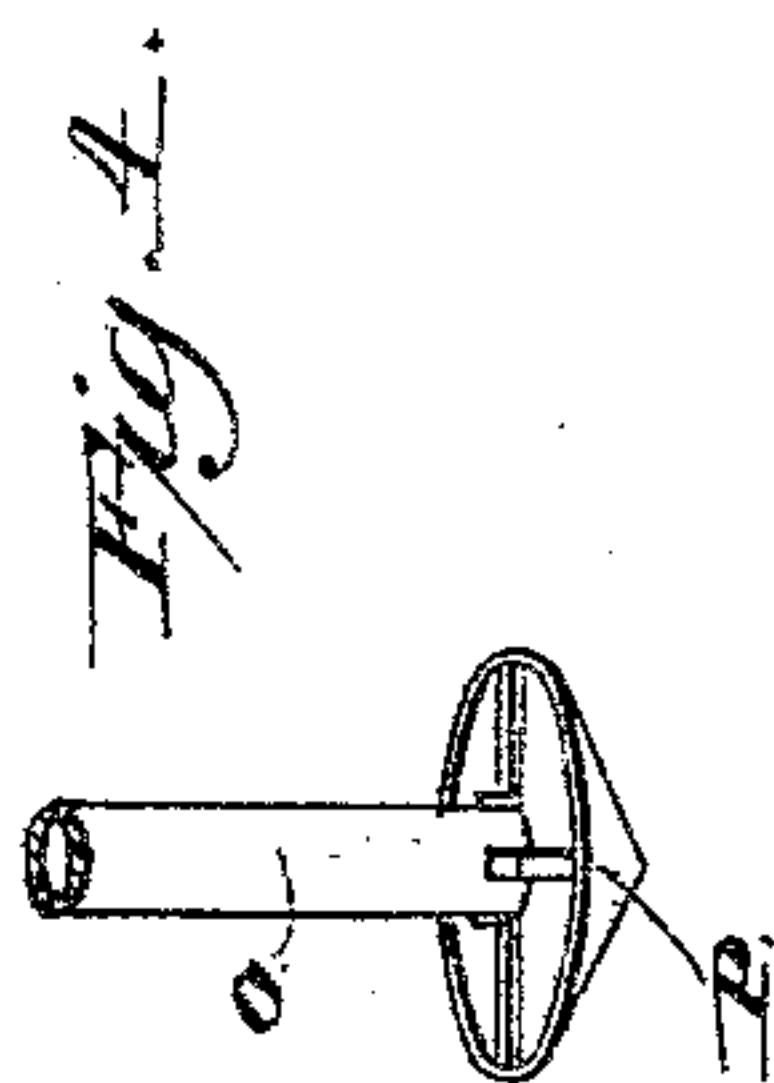
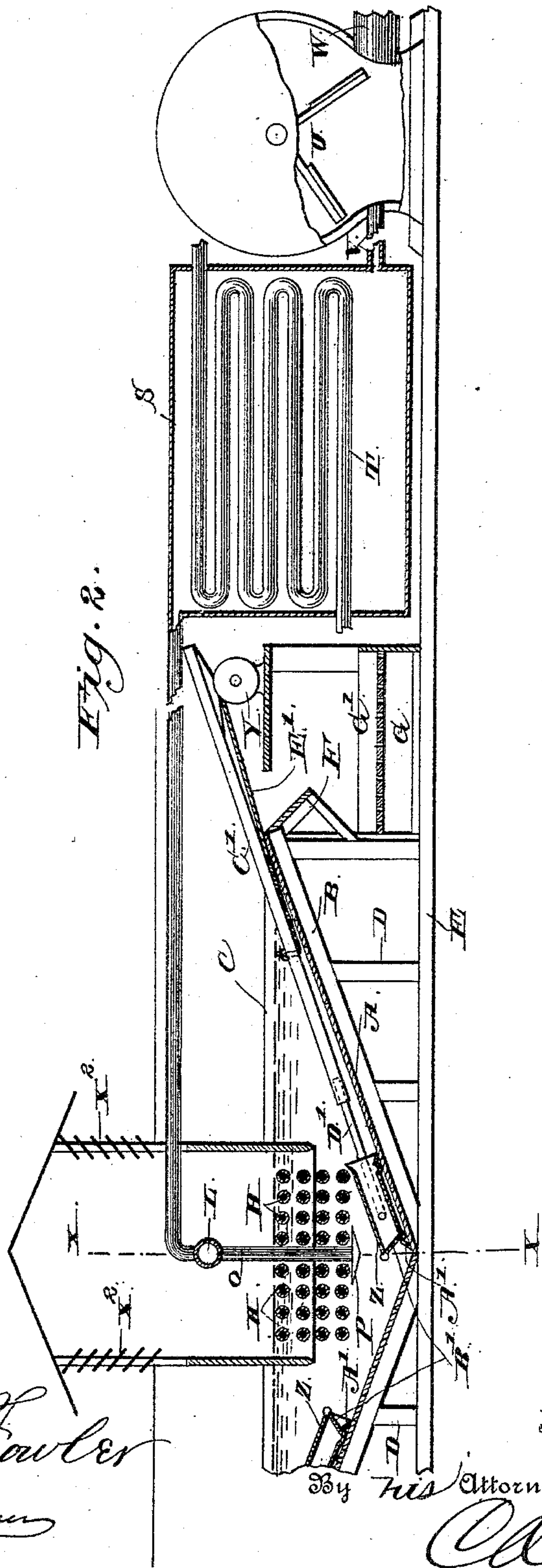
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UNITED STATES PATENT OFFICE.

JAMES W. NORTON, OF WESTFIELD, NEW YORK, ASSIGNOR OF ONE-HALF
TO JACOB C. FULLER, OF KINZUA, PENNSYLVANIA.

EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 414,436, dated November 5, 1889.

Application filed November 17, 1888. Serial No. 291,097. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. NORTON, a citizen of the United States, residing at Westfield, in the county of Chautauqua and State of New York, have invented a new and useful Improvement in Evaporating Apparatus, of which the following is a specification.

My invention relates to an improvement in evaporating apparatus; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is partly an elevation and partly a sectional view of a salt-evaporating apparatus embodying my improvements. Fig. 2 is a vertical longitudinal sectional view of the evaporator and its attachments, one side being broken away. Fig. 3 is a vertical transverse sectional view taken on the line *xx* of Fig. 2. Fig. 4 is a detail view of one of the distributors.

A represents an evaporating pan or vessel, which has its bottom formed of two inclined planes B, arranged at a suitable angle and extending in opposite directions, and has its ends formed by a pair of vertical walls C. The pan or evaporator is supported on the vertical frame-work D, which rises from the sills E, the ends of the latter extending a suitable distance beyond opposite sides of the evaporator. The latter has at its opposite sides and communicating with the upper ends of the inclined planes a pair of downwardly-inclined portions F, which project beyond the sides of the evaporator, as shown.

G represents a pair of receptacles, which are supported on the sills and arranged at opposite sides of the evaporator.

H represents a steam-heating coil, which is arranged transversely in the center of the evaporator over the deepest portion thereof, and has its ends extending through one of the vertical walls C, as shown in Fig. 3. To the upper end of the coil is coupled a steam-supply pipe I, which extends from a suitable boiler, (not shown,) and to the opposite lower end of the steam-coil is coupled an exhaust-steam pipe K, which may either extend back to the boiler, below the water-line thereof, in order to feed the condensed steam back to the boiler, or the said pipe K may communi-

cate with the outer air. Any suitable number of the steam coiled pipes H may be employed, according to the capacity and style of the evaporator.

L represents a hot-air pipe, which is arranged transversely over the center of the evaporator, at a suitable distance above the steam-coil H. The said pipe L is composed of a number of comparatively short sections M, which are connected together by means of four-way or double T-couplings N. From the lower arm of each coupling M depends a pipe O, which is arranged between the steam coiled pipes H and extends to within a suitable distance of the bottom of the pan or evaporator, and each pipe O has at its lower end a circular disk P. The upper end of each pipe O is closed by a plug R, which may be removed when necessary to enable the pipes O to be cleaned. One end of the pipe L extends through one of the vertical sides C of the evaporator and communicates with an air-heating chamber S, in which is arranged a steam-heating coil T; or the said pipe L may communicate with an air-chamber heated by a furnace or other suitable means, as a steam-coil need not necessarily be employed for this purpose.

U represents an air pump or fan, which communicates with the air-heating chamber S through a pipe V, and has an air-induction pipe W of suitable length, the outer end of which communicates with the pure external air.

A casing X, which is rectangular or of any other suitable form in cross-section, is arranged transversely over the evaporating-pan, and has its sides extending downward on opposite sides of the steam coiled pipes H, and of sufficient depth to extend below the water-line in the evaporator, the said casing X having its lower side open, and having at its upper side a ventilator X², which extends through the roof of the building in which the evaporator is located, said ventilator permitting the ready escape of vapor and air from the casing.

Journalled in suitable bearings, and arranged at a suitable height and beyond the sides of the evaporator, are pulleys or drums Y.

Z represents a pair of buckets which are adapted to slide on the inclined planes B, which constitute the bottom of the evaporator,

have their ends open, and have their lower sides provided with projecting scrapers A', that bear upon the inclines B. To the upper side of each bucket is hinged a gravity gate or valve B', which is adapted to close the lower end of the bucket and to swing inwardly.

C' represents a pair of operating-bars of suitable length, which have bails D' at their lower ends, that are pivoted to the sides of the bucket at a slight distance below the centers of the same.

On drums Y are coiled wire ropes or chains E', the ends of which are attached to the bars C'. The said drums or pulleys Y are provided with cranks, by means of which they may be rotated; or said drums may be provided with belt-pulleys to enable them to be rotated either simultaneously or alternately by a steam-engine or other motor.

The operation of my invention is as follows: The brine to be evaporated is introduced to the evaporator and caused to submerge the steam coiled pipes H and the lower edges of the sides of the casing X. The steam which passes through the steam-coil pipes H serves to heat the brine to such a degree as to cause it to evaporate rapidly. The hot air forced through the pipe M by the pump or compressor escapes downward through the pipes O into the deepest portion of the brine, and is distributed laterally through the same by the disks P, and serves to maintain the high temperature of the brine, and thereby causes the rapid evaporation thereof. It will be understood that the air is forced under pressure and at a high rate of speed through the brine, thereby causing the air to absorb and eliminate a maximum quantity of water, and hence causing the process of evaporation to be very rapid and thorough. The hot air, as it passes through the brine, causes the latter to ebulliate and hence prevent the particles of salt which are deposited on the inclined-bottom plates B by precipitation from forming a compact mass, and thereby effectually performs the operation of graining the salt and completely fitting the same for the market and for use on the table. The heated air, as it passes through the brine, imparts oxygen thereto, and thereby improves the quality of the salt. Another useful function performed by the heated air is that the ebullition of the brine caused thereby prevents gypsum or earthy matter from being deposited on the coiled steam-pipes.

In order to remove salt from the evaporator, the drums Y are first rotated in one direction to cause the rods C' to move the buckets Z downward on the inclines B to the bottom of the evaporator. During this downward movement of the buckets the gates or valves B' thereof are opened, as will be readily understood, and the scraper at the lower end of each bucket scrapes the salt from the bottom of the evaporator and directs the same into the bucket. The rotation of the drums or

pulleys Y is then reversed to cause the buckets to move upward on the inclines B. At the initial upward movement of the buckets the valves B' close to prevent the escape of the salt from the buckets, and the scrapers at the upper ends of the latter scrape salt from the inclines B into the buckets as long as the latter are submerged in the brine. When the buckets reach the upper ends of the inclines B, they tilt automatically onto the inclined portions F, and the contents of the buckets are thereby discharged onto the perforated false bottoms G' of the receptacles G. The water is drained from the salt through the perforations in the false bottoms and the salt remains on the upper side of the false bottoms, from whence it may be removed when a sufficient quantity has been accumulated.

Having thus described my invention, I claim—

1. The evaporator having the bottom formed by the incline B, in combination with the heating-coils arranged transversely in the evaporator over the central or deepest portion thereof, the casing X, arranged transversely over the evaporator and over the coils, and having its sides extending downward into the evaporator below the water-line thereof, said casing having the ventilators, and the hot-air pipe passing through the side of the casing and then downward through the steam-coils, substantially as described.

2. The evaporator having the bottom inclines B and the inclined portions F at the outer sides thereof, in combination with the longitudinally-movable rods C' and the buckets pivotally connected to the lower ends of said rods and adapted to travel on the bottom of the evaporator, said buckets having the valves B' at their lower ends, substantially as described.

3. The combination, with the evaporator having the bottom inclines B and the inclined portions F at the outer ends thereof, of the receptacles G at the sides of the evaporator, and the buckets adapted to move on the bottoms B and portions F, said buckets having the scrapers at their ends on their lower sides and having the valves B' at their lower ends, substantially as described.

4. The evaporator having the inclined bottoms B, in combination with the drums or pulleys Y, the rods C', the cords, wires, or chains coiled on the drums and having their ends extending in opposite directions and attached to the rods C', and the buckets connected to the lower ends of said rods and traveling on the bottom inclines of the evaporator, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JAMES W. NORTON.

Witnesses:

ROSS KNIGHT,
JAS. W. NORTON, Jr.