(No Model.) 2 Sheets—Sheet 1.

T. CRANEY.

SALT EVAPORATOR.

No. 525,757. Patented Sept. 11, 1894.

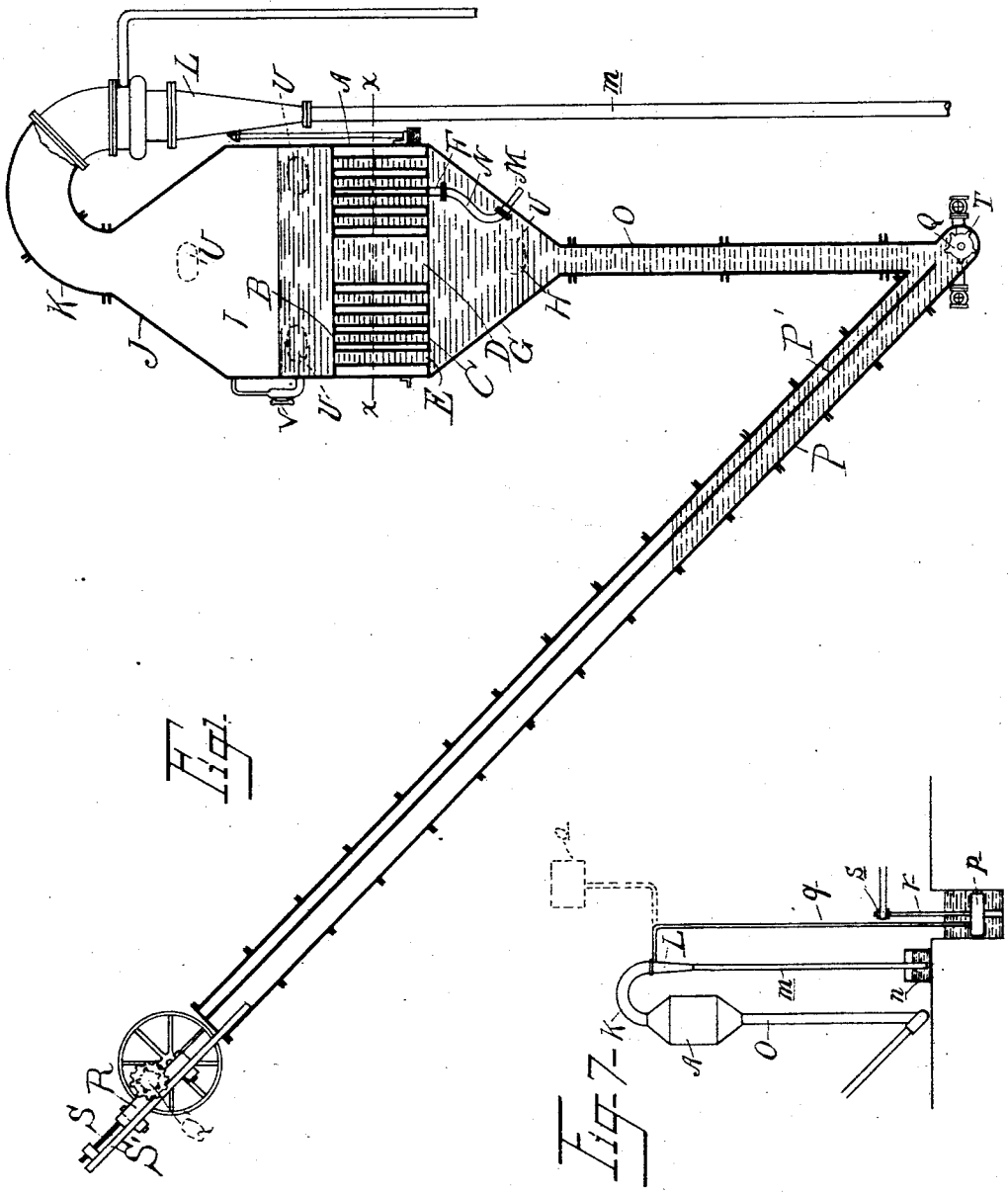

Fig. 1.

Fig. 7.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

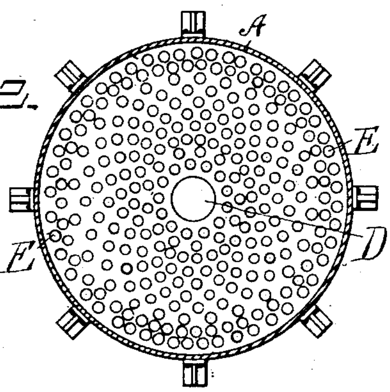


Fig. 3.

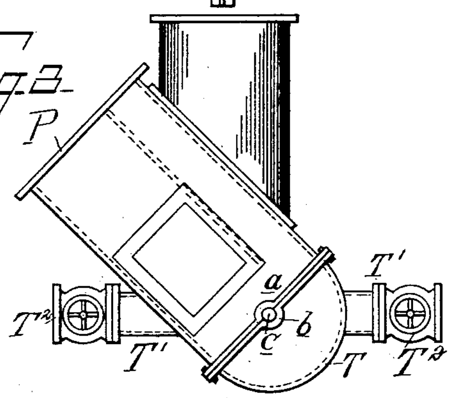


Fig. 5.

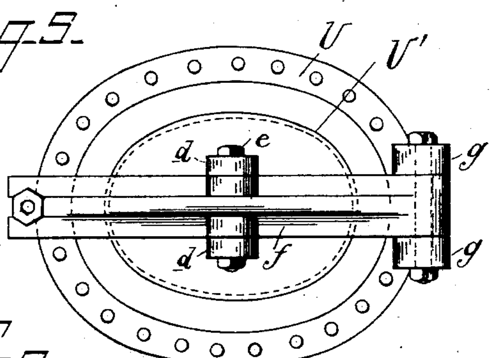


Fig. 6.

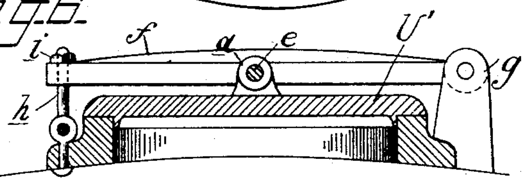
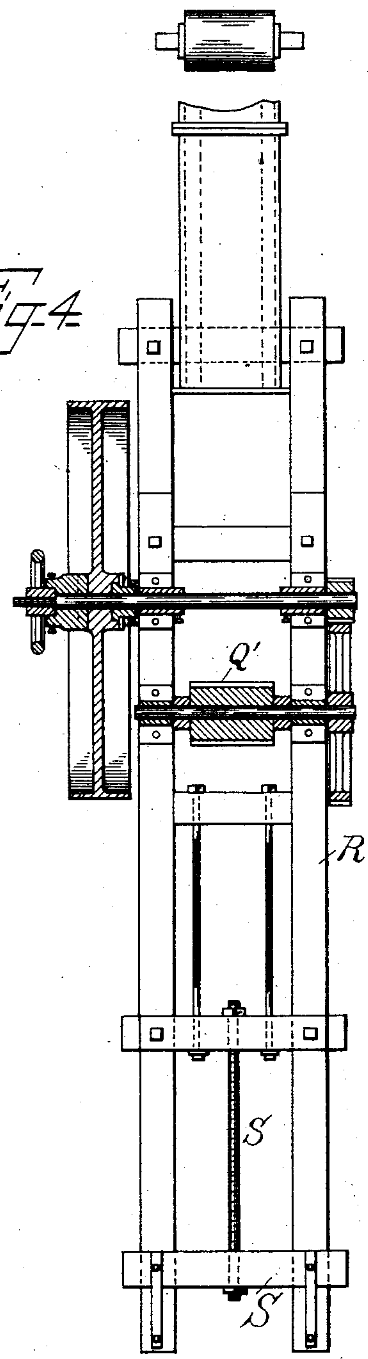


Fig. 4.



—Witnesses—

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UNITED STATES PATENT OFFICE.

THOMAS CRANEY, OF BAY CITY, MICHIGAN.

SALT-EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 525,757, dated September 11, 1894.

Application filed November 14, 1893. Serial No. 490,895. (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 Salt-Evaporators, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in the peculiar construction, arrangement and combination of the heating chamber, the settling chamber, the evaporating chamber and the vacuum making apparatus connected with said evaporating chamber; further in the settling leg applied to the settling chamber and the conveyer connecting with the foot of the said leg, and further in the peculiar construction, combination and arrangement of the various parts, all as more fully hereinafter described.

In the drawings, Figure 1 represents a vertical, central section through my improved grainer, partly in elevation. Fig. 2 is a horizontal section thereof through line x x, the discharge pipe from the condenser being omitted. Fig. 3 is an enlarged side elevation of the foot of the settling leg, and the conveyer tube. Fig. 4 is a plan view partly in section showing the supporting frame and tension device for the upper end of the conveyer. Fig. 5 is an enlarged elevation of the man-hole cover. Fig. 6 is a vertical, central, longitudinal section therethrough; and Fig. 7 is a diagram elevation.

A is the cylindrical casing in the lower end of which are secured the heads B and C.

D is a large central tube or passage between the heads, and E is a series of smaller tubes arranged around the central tube and extending between the heads. Between these two heads is formed the heating chamber. Steam being admitted thereto at any suitable point will entirely fill the space around the pipes, finding exit through the drain pipe F at the bottom thereof. Secured to the lower end of the casing A is a tapering casing G forming below the heating chamber the settling chamber H.

I is the evaporating chamber formed above the heating chamber, and having the conical cap or top J, which connects into the vapor pipe K leading to any suitable condenser L.

The exit pipe F passes through the settling chamber H and to the outside through a pipe M in the side thereof, the two being connected by a bent flexible metallic connecting pipe N which takes up any expansion or contraction between the parts, and at all times maintains a tight joint without the necessity of packing, which would be required in an ordinary slip joint.

The settling chamber H terminates in a settling leg O, which at its lower end connects with the inclined conveyer tube P, preferably rectangular in cross-section, having a suitable rail P′ for the upper run of the conveyer chain, not shown. This conveyer chain passes at its lower end over a sprocket wheel Q and at its upper end over a sprocket wheel Q′ which is journaled in the sliding frame R, which is adjusted by means of the screw S, the frame R being supported on the stationary frame S′.

The lower end of the conveyer chute is provided with a semi-circular cap or cover T, shown in Fig. 3. Half bearings a are formed in the lower end of the conveyer chute, and corresponding half bearings b in the cap T for the shaft c of the sprocket wheel Q, so that by removing this cap or cover the sprocket wheel may be removed and any sediment in the lower end of the chute thoroughly cleaned out.

To further assist in cleaning the apparatus, I arrange the inlet nipples T′ at opposite sides of the lower end of the elevator chute controlled by valves T^2. At suitable points in the casing, as shown by dotted lines, are manholes U provided with suitable manhole covers U′. These manhole covers are provided with central lugs d apertured to receive bolts e which pass through the clamping lever f hinged to lugs g formed upon the casing of the manhole frame. In this manner it will be seen that the manhole is pivoted to the clamping lever and may be opened by swinging the lever on its pivot and at the same time perfectly adjust itself to a seat. The outer end of the lever is bifurcated to receive the swinging bolt h provided with a clamping nut i. The parts being thus constructed the apparatus is supplied through the supply pipe with a suitable amount of brine up to

the level shown in the evaporating chamber I, the height of the liquid being determined by the gage V.

Steam being admitted into the heating chamber and the condenser being set in operation, a vacuum is formed in the evaporating chamber, the brine is boiled, the salt crystals being formed and settling into the settling chamber H, thence through the leg O to the foot thereof and carried by the conveyer to the top where it is delivered into any suitable receptacle. The arrangement of the small circulating tubes E and the large circulating tube D is such that the brine will circulate through these pipes, being heated as it passes upward, and will pass downward through the tube D in the center, thus maintaining a constant circulation and insuring the perfect heating of the brine with rapid evaporation of the water.

Another important feature of my invention is the condenser which is so constructed as to perform its work with a minimum of power. The conical condensing chamber L is provided with a water discharge pipe *m* from the lower end thereof through which the water flows, the lower end of the pipe *m* being sealed in any suitable manner such as in the tank *n*.

In the previous state of the art such a condenser has been used but in connection with an elevated tank, such as shown in dotted lines at *o*, in which case the cold water for the condenser was first pumped into the elevated tank, and from thence fed by gravity into the condenser, the work required of the pump being to elevate the water from the source, such as a suitable well to the water level of the tank. In place of this arrangement I use the construction shown in Fig. 7 in which *p* is a suitable pump, for instance a centrifugal pump as shown in the drawings, located in a well below the condenser.

q is a discharge pipe from the pump leading directly into the upper end of the condensing chamber and subjected to the low pressure therein. Now after the vacuum is formed in the evaporating chamber, which may be done by any suitable vacuum pump, feed water is supplied through the pipe *q* into the condenser. The vapor from the evaporating chamber will be condensed by the inflowing water and flow with such water through the discharge pipe *m*. As the upper end of the discharge pipe *q* is subjected to the low pressure in the vacuum chamber or condenser, the atmospheric pressure will tend to raise the water in the pipe and thus the work required of the pump will be only sufficient to elevate the water from this elevated level of the fluid in the pipe *q* to a point where the same enters the condensing chamber, thus reducing the work of the pump to a minimum.

The centrifugal pump I have shown is provided with a vertical shaft *r* at the top of which is a suitable pulley *s* through which the motion may be communicated to the pump through any suitable source of power.

What I claim as my invention is—

The combination with the casing A, of the escape pipe K leading from the top thereof, the condenser L into the top of which the pipe enters, the vertical discharge pipe *m* leading from the bottom of the condenser, a water seal at the lower end of the discharge pipe, an unbroken or continuous supply pipe *q* leading into the top of the condenser, its lower end extending down to a point near the base of the apparatus and located in a suitable water supply, and a pump at or near the lower end of the supply pipe for forcing the water through the same, substantially as described.

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

THOMAS CRANEY.

Witnesses:
M. B. O'DOGHERTY,
O. F. BARTHEL.