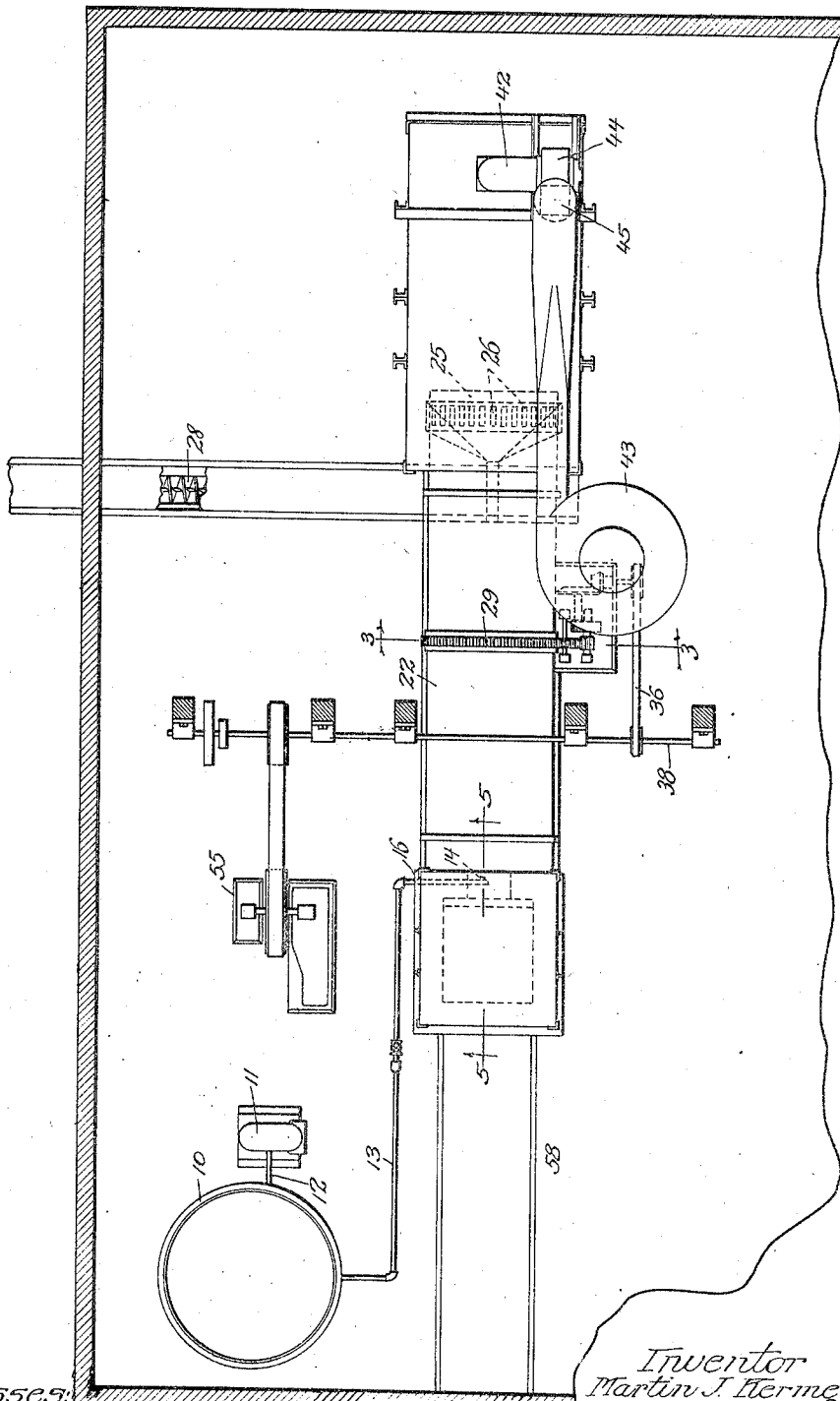


M. J. KERMER.
 MEANS FOR DEHYDRATING METAL SALTS.
 APPLICATION FILED DEC. 13, 1917.

1,303,682.

Patented May 13, 1919.
 3 SHEETS—SHEET 1.

Fig. 1.



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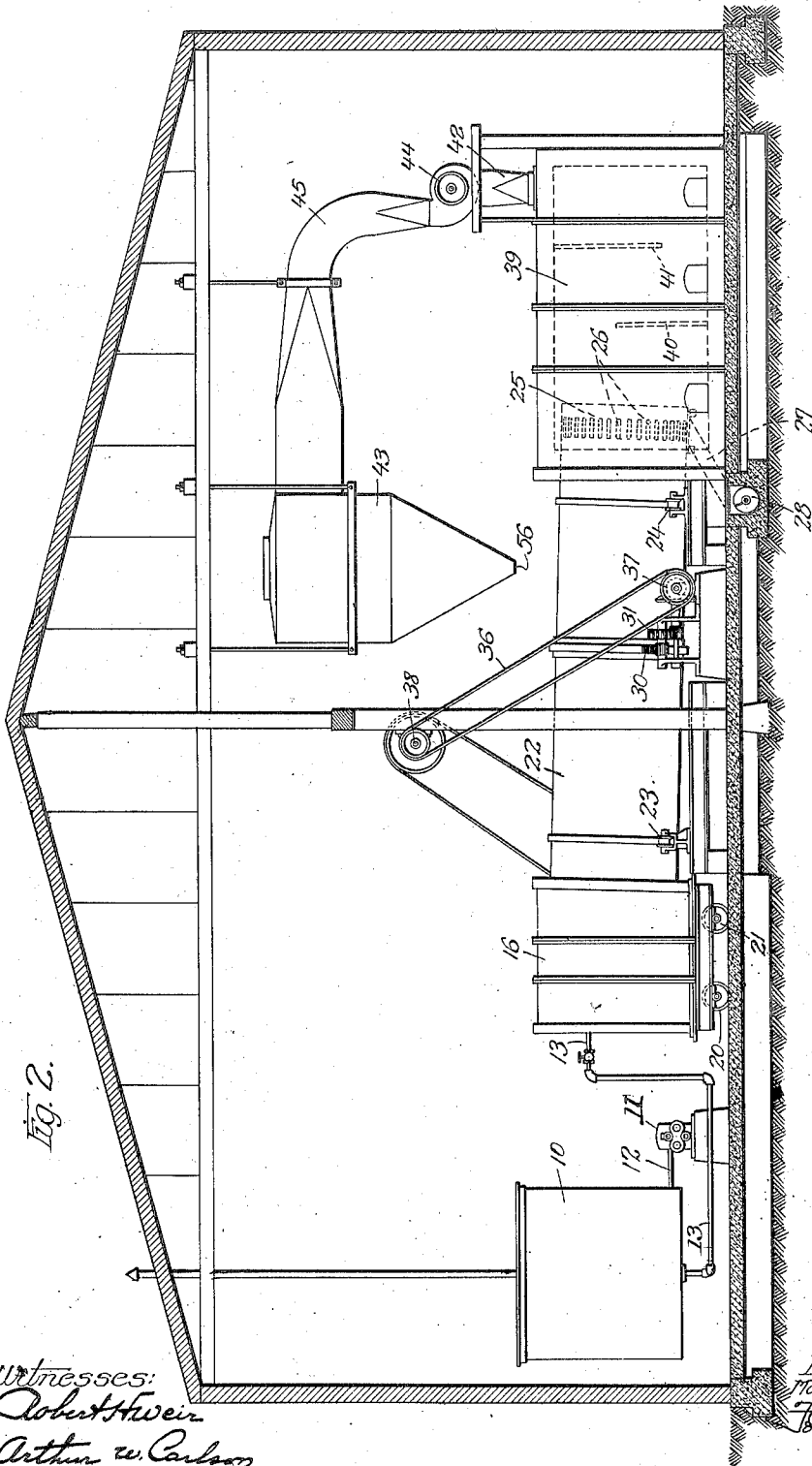


Fig. 2.

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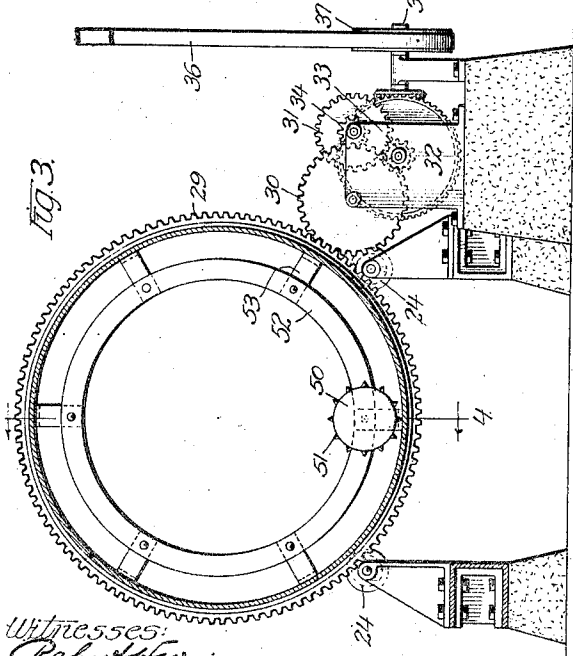
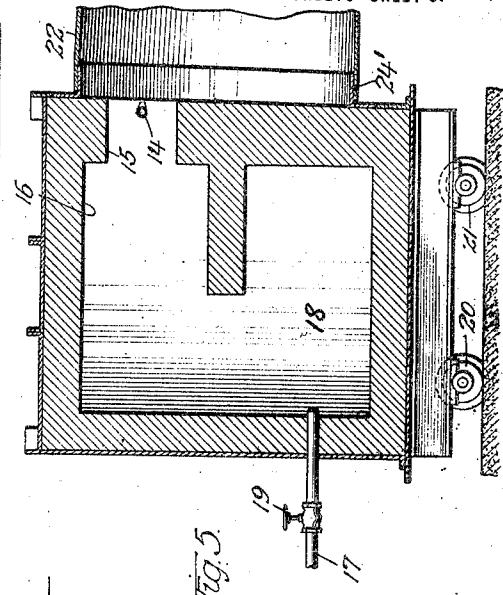
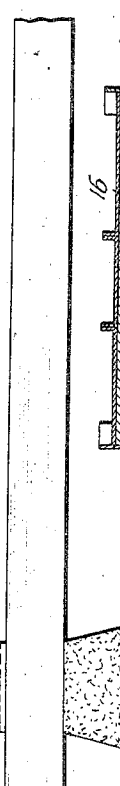
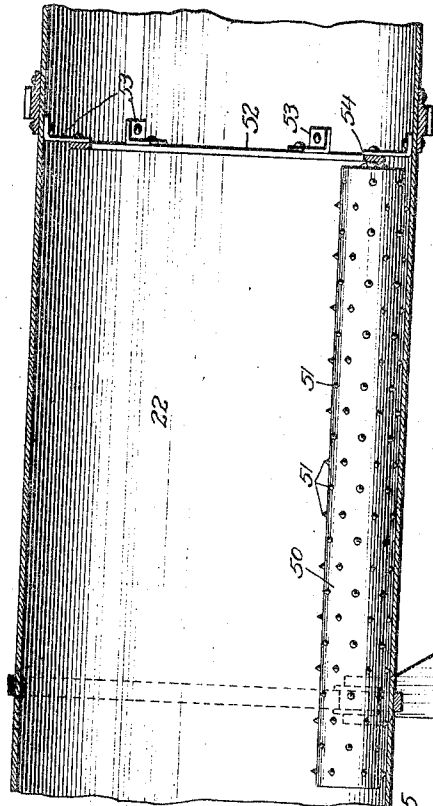
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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MEANS FOR DEHYDRATING METAL SALTS.

1,303,682.

Specification of Letters Patent.

Patented May 13, 1919.

Application filed December 13, 1917. Serial No. 206,913.

To all whom it may concern:

Be it known that I, MARTIN J. KERMER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Dehydrating Metal Salts, of which the following is a specification.

One of the objects of my invention is to provide a method of and system of inter-related machines and devices, for dehydrating liquid-carried solids, such for example as salts of potassium, sodium, or the like when in solution with large quantities of water.

Other and further objects of my invention will become readily apparent, to persons skilled in the art, from a consideration of the following description when taken in conjunction with the drawings, wherein:—

Figure 1 is a plan view of a plant including certain machines and devices constituting my system.

Fig. 2 is a side elevation thereof.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 1.

Fig. 4 is a transverse section taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 1.

In all the views the same reference characters are employed to indicate similar parts.

In reclaiming metal salts, such for example as the salts of potassium, sodium, or the like, held in solution in relatively large volumes of water, it has heretofore been recognized to be a difficult matter to economically produce precipitation of the solid matter in available form. If the water vehicle be fed in a stream into an area containing hot gases, the water will dry out and the deposit of salt residue will melt in its own water of crystallization due to the high temperature and adhere in solid sheets to the surrounding walls of a conduit into which it may be projected.

In carrying my invention into effect I heat the salt carrying solution, under pressure of approximately 40 pounds per square inch, to a temperature of about 250 degrees Fahrenheit and then spray it or atomize it into an area of hot gases, that are heated to a temperature approximately 3000 degrees Fahrenheit.

The sprayed liquid is projected in the

same direction as the hot gases are moving, and in the path of the spray and of the gases I provide a receptacle to catch the precipitated solids that are liberated by evaporation.

In front of these moving fluids I produce a pressure attenuation, or vacuum tendency, to rapidly draw away the gases and vapors resulting from evaporation of the water, by the effect of the hot gases, and to increase the combustion intensity of the fuel from which the hot gases flow.

The moving gases and vapor will carry away more or less of the comminuted solid matter that is too fine to find lodgment in the receptacle provided for it, and I therefore pass the gases and vapor between baffle plates and subsequently project them into a dust separator, such as the well known "cyclone" or other like devices of similar character. I furthermore provide a means for breaking up any solid sheets or deposits of the solid matter that may adhere to the sides of the vessel through which the material passes.

In the accompanying drawings 10 represents a reservoir, which is preferably pressure tight, to contain the liquid or material that is charged with the salts or solid matter to be reclaimed by my method of operation.

The reservoir 10 may contain a steam coil or other means may be provided for heating the liquid to the desired temperature and the pump 11 may be used for pumping the liquid into the reservoir through a pipe 12. A pipe 13 is connected to the bottom of the reservoir and leads to a sprayer nozzle 14. The spraying nozzle 14 is located in the discharge flue 15 of the furnace 16, through which the hot products of combustion pass. A pipe 17 conveys fuel oil to the combustion chamber 18, of the furnace, for producing the desired heated gases of combustion. Of course coal or other fuel could be used for the same purpose. The liquid fuel is controlled by the valve 19. The furnace is mounted upon wheels 20 and 21 to more conveniently move it away from the inclined rotatable cylinder 22 and to permit inspection of the interior. The end of the furnace confronting the cylinder is provided with an annular flange 24 normally engaging the end of the cylinder 22 as a means for supporting and guiding the proximate end of

the cylinder when the furnace is in its operative position. The cylinder 22 is rotatable and slightly inclined from the furnace 16, and is supported on sets of rollers 23 and 24. The end 25 of the cylinder is open and just back of the head or end 25, in the circumferential wall of the cylinder are a series of discharge openings 26 through which the comminuted material will pass into a trough 27 and from there it is conveyed by gravity to a conveyer 28.

At a suitable location the cylinder is surrounded with a circumferentially extending geared rim 29, suitably secured thereto, and meshing into a gear wheel 30. The train of gears consisting of the gear wheels 30, 31, 32 and the pinions 33 and 34 reduce the speed of the driven shaft 35 to the rim 29 of the cylinder. The shaft 35 is driven by a belt 36 passing over a pulley 37 from a shaft 38 secured to the wall of the building, or otherwise supported.

When the vapors arising from the products of combustion and the liquid sprayed into the cylinder 22 have passed through the cylinder, they pass out through the open rear end, to the dust chamber 39. The dust chamber 39 is provided with interior baffle walls or plates 40 and 41. The hot gases and vapors pass through the combustion chamber 39 over the baffle plate 40 and under the baffle plate 41 on the way out through the discharge chute 42. Some of the comminuted solid matter held in suspension will be deposited at the bottom of the baffle plate 40 by the change of direction of the vapors and gases imposed upon them, as the result of the baffle plate 40 being in their normal path. Another change of direction effected by the baffle plate 41 will cause the deposit of any remaining solid matter now carried in suspension that may be reclaimed in this manner, so when the gases and vapors pass out of the dust chamber 39 they will be much freer of the solid matter than when they entered it. There is, however, still remaining in suspension in such gases and vapors some solid matter which is reclaimed, by giving the gases a whirling motion as by means of the cyclone 43. A fan 44 is connected to the outlet 42 of the dust chamber and communicates by means of a conduit 45, with the tangential opening under the deck of the cyclone 43. The reclaimed, comminuted, solid matter passes out through the discharge opening 56 from the cyclone from which it may be conveyed or carried off by any conveyer or other suitable means.

When the liquid is sprayed into the hot gases that are flowing through the inclined cylinder 22 some of it may adhere to the inner walls of the cylinder. This material, which adheres so firmly to the inner surface of the cylinder is in a plastic condition, sub-

sequently hardens and would remain thereon 65 and accumulate if there were nothing for dislodging it. I, therefore, provide an elongated solid, preferably cast iron cylinder 50 provided with a number of spurs or points 51 at intervals on its outside surface. As 70 the cylinder 22 is inclined, this spurred member 50 would slide axially of the cylinder and soon be found at the lower portion thereof. As adhesive material will be found near the upper end of the cylinder 22, it is 75 desirable to retain the rotatable spurred member 50 in this part of the cylinder. I therefore provide an annularly extending abutment consisting of a ring 52, secured by brackets 53 to the interior of the cylinder 80 and somewhat removed from the inner surface thereof to permit the loose granular or comminuted material to move uninterruptedly through the cylinder. The end 54, of the relatively small spurred cylinder, is 85 preferably provided with a curved projection for contact with the ring 52 so as to reduce the frictional movement between the parts as much as possible. When the cylinder 22 is rotated the spurs 51 are brought 90 into contact with the adhering solid matter that has been deposited upon the inner surface of the cylinder and thereby the material thus deposited on the inner surface of the cylinder is broken up and removed because the 95 cylinder 50 is very heavy and its own weight causes the spurs 51 to pass into the solid sheet or mass of adhering substance and dislodge it. As it becomes dislodged it passes through the cylinder, under the ring 52, and 100 out with the other precipitated material through the orifices 26 at the lower end of the cylinder and through the chute 27 into the conveyer 28.

An engine 55 is shown as a means for rotating the shaft 38 and for supplying power for rotating the cylinder 22. 105

The furnace 16 is movable away from the cylinder 22 on the wheels 20 and 21, that move on tracks 58, so as to render the interior of the cylinder and of the furnace, accessible for repairs or inspection. 110

Having described my invention, what I claim is:—

1. A system within which to dehydrate 115 solid matter contained in solution in a large volume of water, comprising a pressure tight tank within which to heat the solution; a furnace having a discharge orifice opening into a revoluble cylinder, said cylinder inclined downwardly from said furnace; means 120 to revolve the cylinder; a sprayer in the mouth of said orifice to spray the solution into the hot gases of combustion to pass through said cylinder and an exhaust fan 125 for drawing air and the resulting gases and vapors through said furnace and cylinder.

2. In a system of the character described, a rotatable open end cylinder; a furnace at one end; means to cause the products of combustion from the furnace to pass through
5 the cylinder; a nozzle for spraying a liquid into the cylinder near the furnace end and a relatively heavy roll, having projecting scarifying points on its circumferential sur-
face adapted to rotate in the cylinder as the cylinder is rotated to disengage deposits of 10 dehydrated material that may adhere to the inner surface of the cylinder.

In testimony whereof I hereunto set my hand.

MARTIN J. KERMER.