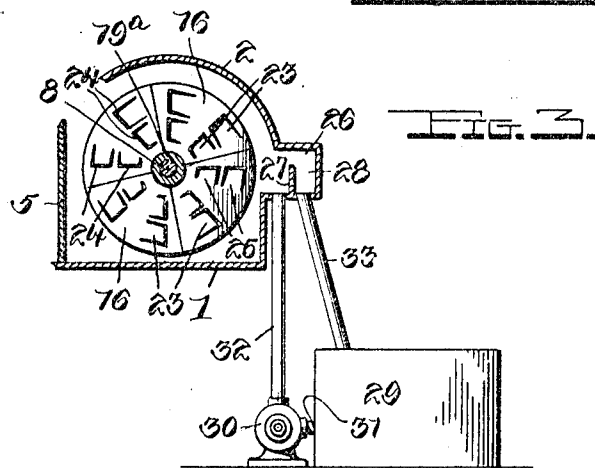
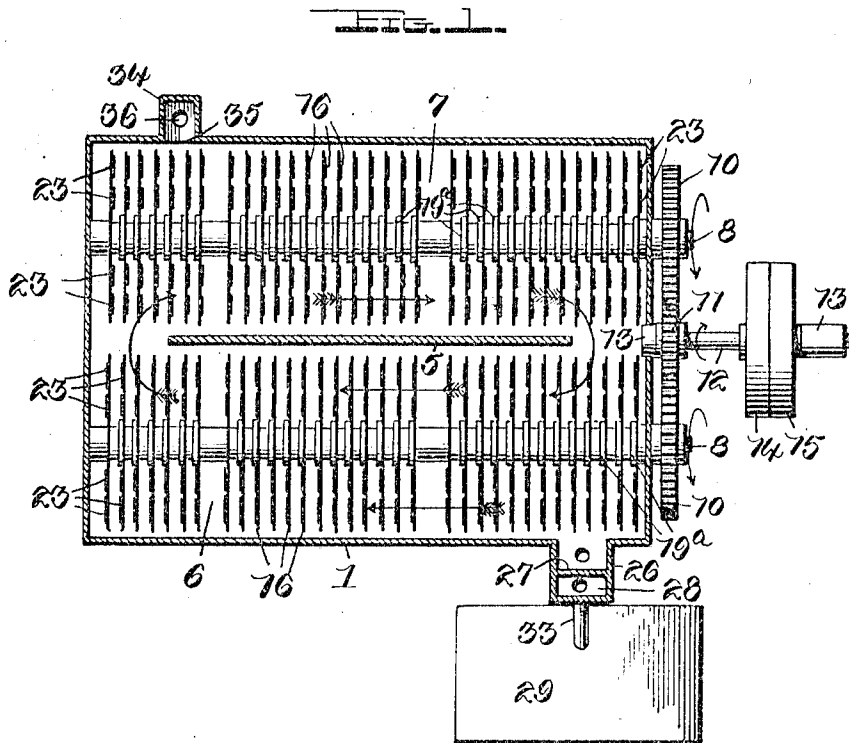


EVAPORATING APPARATUS FOR RECOVERING SODA ASH.
APPLICATION FILED JAN. 9, 1911. RENEWED DEC. 20, 1911.

Patented Aug. 6, 1912.

2 SHEETS—SHEET 1.



G. H. Marshall.

Witnesses
Chas. L. Griestauer.

24. 7. Peder

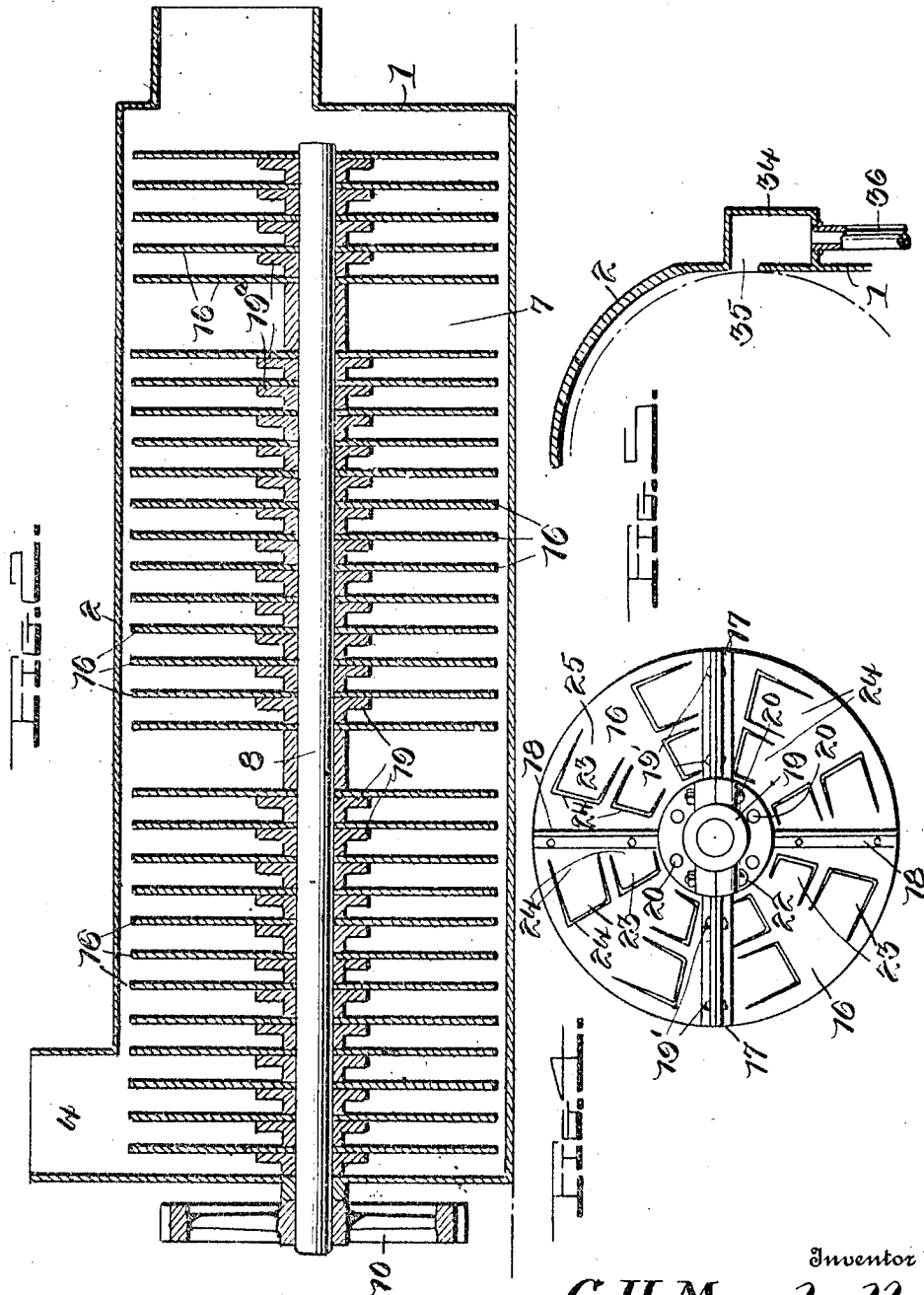
By Watson C. Coleman
Attorney

G. H. MARSHALL.
 EVAPORATING APPARATUS FOR RECOVERING SODA ASH.
 APPLICATION FILED JAN. 9, 1911. RENEWED DEC. 20, 1911.

1,035,097.

Patented Aug. 6, 1912.

2 SHEETS-SHEET 2.



Witnesses
 Chas. L. Gristauer
 J. R. Pease

Inventor
 G. H. Marshall.
 By Watson E. Coleman,
 Attorney

UNITED STATES PATENT OFFICE.

GEORGE H. MARSHALL, OF NEW YORK, N. Y.

EVAPORATING APPARATUS FOR RECOVERING SODA-ASH.

1,035,097.

Specification of Letters Patent.

Patented Aug. 6, 1912.

Application filed January 9, 1911, Serial No. 601,674. Renewed December 20, 1911. Serial No. 667,033.

To all whom it may concern:

Be it known that I, GEORGE H. MARSHALL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Evaporating Apparatus for Recovering Soda-Ash, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in apparatus for retaining soda ash dust, the object of the invention being to provide an improved evaporator for concentrating the black liquor or waste liquor occasioned in the manufacture of wood pulp by the "soda" or "sulfate processes" for recovering the soda from the said waste liquor, one object of the invention being to effect improvements in the construction of the evaporating tank, and in the arrangement of the rotary baffle elements therein, another object of the invention being to provide improved means for feeding the liquor to the evaporating tank so as to maintain the same at a constant level during the evaporating process.

In the accompanying drawings—Figure 1 is a horizontal sectional view of an evaporating apparatus or concentrating apparatus constructed in accordance with my invention, the rotary baffle elements being shown in plan together with means for operating the same. Fig. 2 is a vertical longitudinal sectional view of the same on a larger scale. Fig. 3 is a partial transverse sectional view of the same showing the improved feeding construction for the evaporating tank. Fig. 4 is a detail elevation of one of the rotary baffles. Fig. 5 is a detail transverse sectional view showing the outlet for the flow of the concentrated liquor from the tank.

The tank 1 which is here shown as of oblong rectangular form is provided with an arched cover 2. A flue 3, which leads directly from the rotary furnace employed in the usual process of recovering soda ash is provided at one end of the tank 1, at a point above the level of the liquor therein, and from the other end of the tank, a discharge flue 4 extends upwardly from the arched cover. The tank is provided with a centrally disposed longitudinal vertical partition 5 which terminates short of the ends of the tank, and divides the latter into two compartments 6, 7 which are parallel with each other, and communicate at their

ends as shown in Fig. 1. A pair of longitudinally disposed shafts 8 extend through the compartments 6 of the tank and are mounted in bearings at the ends of the tank and each of these shafts is provided at one end with spur gears 10 which are engaged by a pinion 11 of a driving shaft 12, the said driving shaft being here indicated as mounted in bearings 13, and provided with a fast pulley 14 and a loose pulley 15 for a suitable driving belt. Hence the shafts and the baffles which they carry are rotated simultaneously and in the same direction.

The rotary baffles are circular and each of them is made up of a number of segmental metal plates, the baffles being here shown as each composed of a pair of semi-circular segment plates 16. The said segment plates are provided at their ends and also at their centers with radially disposed angle bars 17, 18 which are secured thereto by means of rivets. These angle bars reinforce the segment plates and make the same exceedingly strong, and the end angle bars of the respective segment plates are disposed with their outstanding webs in mutual contact as shown in Figs. 4 and 6, and detachably secured together by means of bolts 19, so that the segment plates may be separated from each other to enable the baffles to be readily removed from their shafts, and replaced by others when the baffles become worn without the necessity of also removing the shafts or disturbing any of the other rotary baffles, each being removable from its shaft independently of all of the others.

Each baffle is provided at its center with a hub 19 for engagement with the shaft. Each hub is a split hub comprising a pair of semi-circular sections which are respectively secured to the respective segment plates of the baffle by means of rivets 20, the said hub sections being provided with radial shoulders 21 having openings through which bolts 22 extend, the said bolts coacting with the said radial shoulders of the hub sections, to detachably secure the hub sections together, and on the shaft, and hence when it is desired or becomes necessary to remove any one of the baffles from the shaft which carries it, it is only necessary to first remove the bolts which connects its angle bars 17 together, and the bolts which connect its hub sections together as will be understood. It will also be understood that the rotary baffles are entirely disconnected from one

another so that the removal of any one of them has no effect upon any of the others, and hence the baffles may be readily kept in good condition, and new parts may be substituted at minimum expense and in a very short time when any of the parts of the baffles become worn. Each of the baffles is provided with wings 23 which are disposed at a slight angle with reference to the plane of the baffles, the wings of each baffle extending all in the same direction, and the wings being integral with the segment plates of the baffles, and struck up therefrom, by first making cuts 24 in the segment plates of the baffles which cuts extend around three sides of the wings, the inner ends of the wings being united as at 25 to the segment plates.

As shown in Fig. 1, the wings of the rotary baffles in the compartment 7 of the evaporating tank are reversed with respect to the wings of the baffles in the compartment 6. Hence the wings of the baffles in the two compartments of the tank, owing to their slightly oblique relation to the baffles which carry them, and to the fact that they are on opposite sides of the baffles in the respective compartments, and the further fact that all of the said baffles rotate in the same direction, serve to set up, a slow current in the evaporating tank so as to cause the liquor therein to flow from end to end of the tank from one compartment thereof to the other, and in opposite directions in the said compartments as indicated by the feathered arrows in Fig. 1, the direction of rotation of the baffles being indicated by the unfeathered arrows. The openings in the baffles formed by striking up the wings therefrom, and the turning of the wings out of the plane of the baffles, permit the passage of gases through the baffles and through the space in the evaporating apparatus above the level of the liquor therein. At one end of the tank on one side of the same, is a feed weir 26 which has a longitudinally disposed vertical partition 27 forming a compartment 28 between the outer side of the said partition, and the outer side of the said feed weir. The supply tank 29 which is charged with the thin black liquor or waste liquor, occasioned in the manufacture of wood pulp by the soda or sulfate processes, is supplied to the evaporating tank by a suitable pump indicated at 30 which is connected to the supply tank as at 31, and the feed pipe 32 of which is connected to the bottom of the feed weir 26 at a point on the inner side of the partition 27, a return or overflow pipe 33 leading from the pump of the compartment 28 of the feed or supply weir, back to the supply tank.

An outlet box 34 is at a suitable point on the side of the tank opposite that provided

with the feed or supply weir, the opening 35 of said outlet box being at the required level of the liquor in the tank, and an outlet pipe 36 leading from the pump of the outlet box.

In the operation of my improved evaporating apparatus, the rotary baffles being in motion, and the pump 30 being at work, the said pump maintains a constant level of the black liquor in the evaporating tank, and should the level of the liquor rise it will pass directly over the partition 26 in the feed or supply weir, and from thence back to the supply tank 29, through the overflow pipe 33. Hence the overflow liquor occasioned by an excessive supply of liquor to the tank, should any such occur, will immediately return to the supply tank, back from the feeding point, and only the thick liquor containing the soda recovered by the baffles during the evaporating process will escape from the evaporating tank at the outlet 35.

The gases from the rotary furnace of the plant of which my improved evaporator forms a part, pass from the flue 3 longitudinally through the upper portion of the evaporating tank, past the baffles and escape finally up through the flue 4. These gases strike against the baffles and pass in tortuous paths through the openings therein. Owing to the fact that the baffles are slowly resolved within the tank, they are alternately immersed in the liquor therein, and then presented in the paths of the soda ash dust, which is carried along by the gases. This dust is caused to adhere to the wet, upper exposed portions of the baffles, and is then dipped by the rotation of the baffles into the liquor in the tank, and caused to dissolve therein so that the water content of the liquor is subjected to an evaporating process and carried off with the heated gases through the flue 4, while the soda ash content of the gases is arrested from passage with the gases and is added to the liquor in the tank as will be understood.

I claim:—

1. In apparatus of the class described, an evaporating tank provided with feeding means for supplying liquor for evaporation to the tank and also provided with an overflow outlet at the said feeding means, a flue forming the upper side of the tank, and a series of rotary baffles in the tank extending from near the bottom thereof to a point above the water line and in the flue.

2. In evaporating apparatus of the class described, a tank having a feed weir and provided with a partition wall and forming a compartment outside of the said partition wall, means to supply liquor to the tank through the said weir at a point on the inner side of the partition, and means leading from the compartment on the outer

side of the partition to carry off overflow liquor from over the partition, a flue extending over and forming the upper side of the tank and a series of rotary baffles disposed in the tank and extending up into the flue.

3. In apparatus of the class described, in combination with an evaporating tank having a flue forming its upper side, a fed weir communicating with the tank and having a partition wall and an overflow compartment on the outer side of said partition wall, a supply tank, a pump connected to the said supply tank to force liquor therefrom to the evaporating tank and communicating with the latter at a point on the inner side of the partition, and a return pipe leading from the said overflow compartment back to the supply pipe, and baffles mounted for

rotation in the tank and extending up into the flue.

4. In apparatus of the class described, an evaporating tank having a flue forming the upper portion thereof, means to supply liquor to and maintain the circulation of such liquor in the tank, a shaft disposed longitudinally of the tank and having its bearings therein and rotary baffles on the said shaft, each baffle comprising a plate having wings disposed at an incline to the plane of the baffle, openings in the baffle, in the plane thereof and covered by said wings.

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

GEO. H. MARSHALL.

Witnesses:

THOS. R. H. MURPHY,
J. T. CHASE.