

UNITED STATES PATENT OFFICE.

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METHOD OF UTILIZING SALINE SOLUTIONS.

SPECIFICATION forming part of Letters Patent No. 558,240, dated April 14, 1896.

Application filed March 19, 1894. Serial No. 504,242. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES N. WAITE, a citizen of the United States, residing at Rumford, in the county of Oxford and State of Maine, have invented certain new and useful Improvements in Methods of Utilizing Saline Solutions, of which the following is a specification.

My invention has for its object an improved method for the utilization of saline solutions. It is fully set forth in the following description, and its novel features are pointed out in the claim which is appended hereto.

In the production of chlorin and of caustic by the electrolysis of a chlorid of an alkaline base the solution of chlorid is subjected in an electrolytic cell to the action of an electric current until the efficient working of the electrolytic cell is interfered with by the presence of such a percentage of the hydrate or caustic as will decrease the efficiency of the current beyond the limit at which the cell may be economically operated. When this occurs, the solution in the compartment of the cell is removed and new solution supplied. The solution removed has lost only about one-third of the chlorid, and thus there occurs a loss of a considerable portion of chlorid which cannot be economically employed in the cell owing to the presence of the hydrate or caustic.

In the production of chemical fiber which is employed in the manufacture of paper the wood fibers or chips are boiled in a digester with the liquor containing caustic in solution. As a result of this treatment the gum and resin in the wood are converted into a soap and the fiber is left free. The fiber is then removed and the soap liquor containing the excess of caustic is evaporated and roasted in a rotary furnace, yielding black ash, which is recausticized with quicklime and used over and over again, enough efficient caustic being added to make up for the loss in recovery.

By means of my process I utilize the solution which is drawn from the cathode-compartment of an electrolytic cell, and which contains, as above stated, the chlorid of the alkaline base and a considerable percentage (usually six to eight per cent.) of the hydrate of the base, by employing the said solution for the treatment of the wood fiber in the digesters

in the production of chemical fiber. The presence in this solution of the chlorid, ordinarily chlorid of sodium, does not interfere with the use of the solution for this purpose. After the wood fiber has been boiled in this solution from the cathode-compartment of the electrolytic cell the fiber is washed and the soapy liquor containing salt and the excess of caustic is evaporated and the residuum roasted. The black ash which results from the roasting contains salt and the carbonate of soda and some impurities—such as coal, tarry matters, and the like. I now preferably treat this ash by lixiviating with a limited amount of water, which results in the removal of the larger proportion of the carbonate of soda. The latter being more soluble than the salt will go into solution first. The salt and the remainder of the carbonate of soda containing the tarry matters, &c., are then dissolved and enough quicklime is added to causticize the carbonate of soda. The resulting dirty solution is then run into the cathode side of the electrolytic cell and re-electrolyzed until there is again produced in it such a percentage of the hydrate or caustic as will interfere with the efficient and economic working of the cell by decreasing the efficiency of the current beyond the economic limit. The dirty solution referred to should be used only on the cathode side of the cell, since the presence in the anode-compartment of the cell of a small percentage of caustic and of the tarry matters would destroy the efficient working of the cell.

Instead of lixiviating the black ash to remove the greater portion of the carbonate of soda I may omit this step and instead dissolve the whole of the black ash, adding to the solution quicklime to causticize the carbonate and then proceeding as above described. By proceeding, however, without lixiviating the black ash a larger amount of caustic will be present in the dirty solution which is used in the cathode-compartment of the cell and less work can be done before it becomes necessary to draw off the caustic, for reasons stated above. When in the operation of the electrolytic cell the solution in the cathode-compartment again contains a sufficient percentage of the hydrate to interfere

with the working of the cell, the liquor is again used in the digesters for the treatment of fiber and the process is repeated. By this method the chlorid, if the chlorid of sodium
5 be employed, can be used up entirely, only enough salt being added to make up for soda lost in the fiber from imperfect washing, without any loss of efficiency in the electrolysis and with no waste of salt.

10 In some localities where paper-making is carried on salt is expensive, and in such localities my process is particularly desirable and effects a considerable saving.

What I claim is—

15 That improvement in the utilization of saline solutions which consists in subjecting the solution to electrolysis in an electrolytic cell,

and producing chlorin and hydrate, then placing the solution containing the hydrate in a digester with wood fiber and boiling the
20 fiber therein, then separating the wood fiber from the liquor and evaporating the latter, then roasting the residuum and producing black ash, then dissolving the ash and causticizing with quicklime, then using this solu-
25 tion in the cathode-compartment of an electrolytic cell, and repeating the operation, substantially as set forth.

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

CHARLES N. WAITE.

Witnesses:

GEO. LINDER, Jr.,

FRED. H. HAMMOND.