(No Model.)

G. SEILER.

APPARATUS FOR RECOVERING ALKALI.

No. 420,835. Patented Feb. 4, 1890.

Fig. 1.

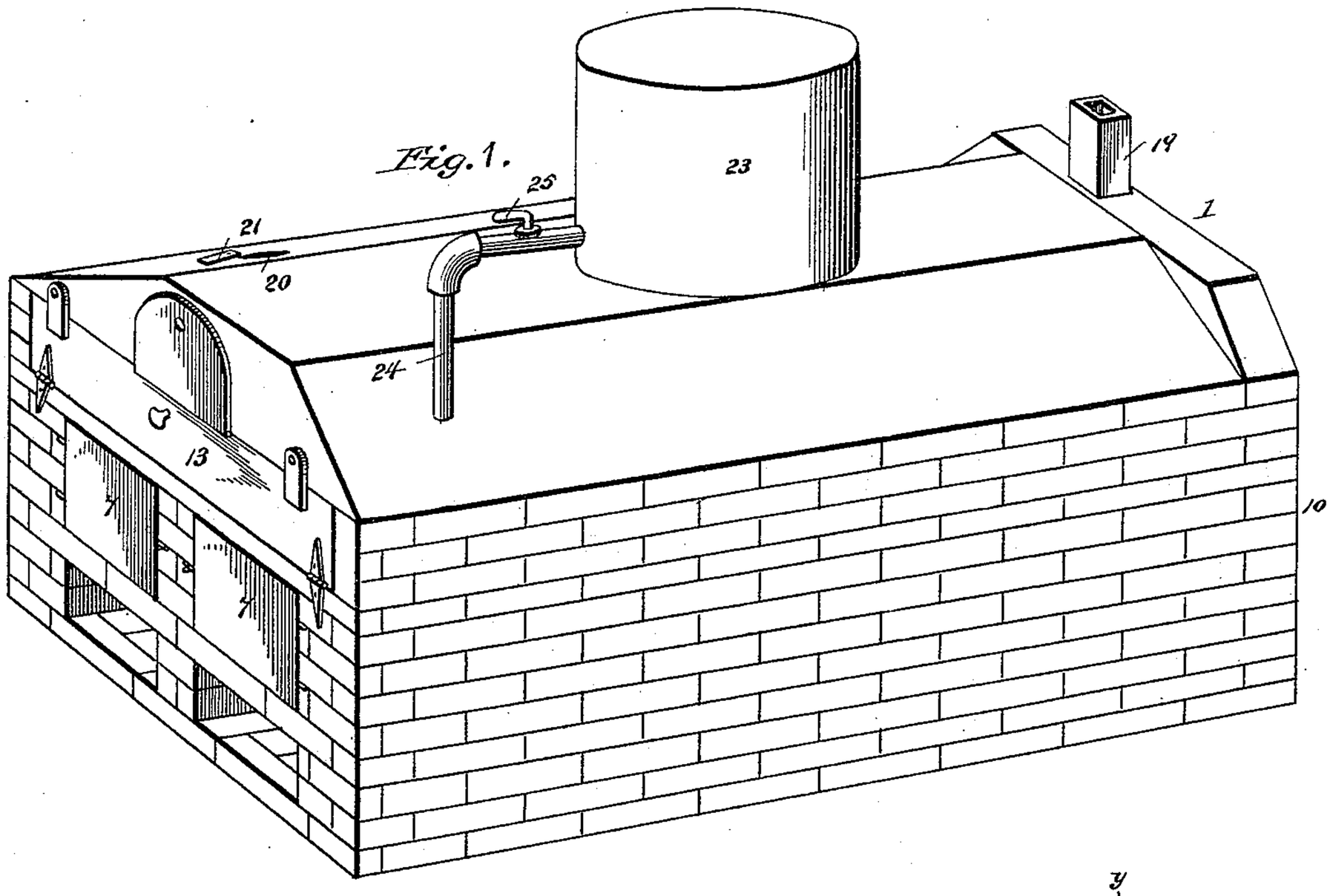


Fig. 2.

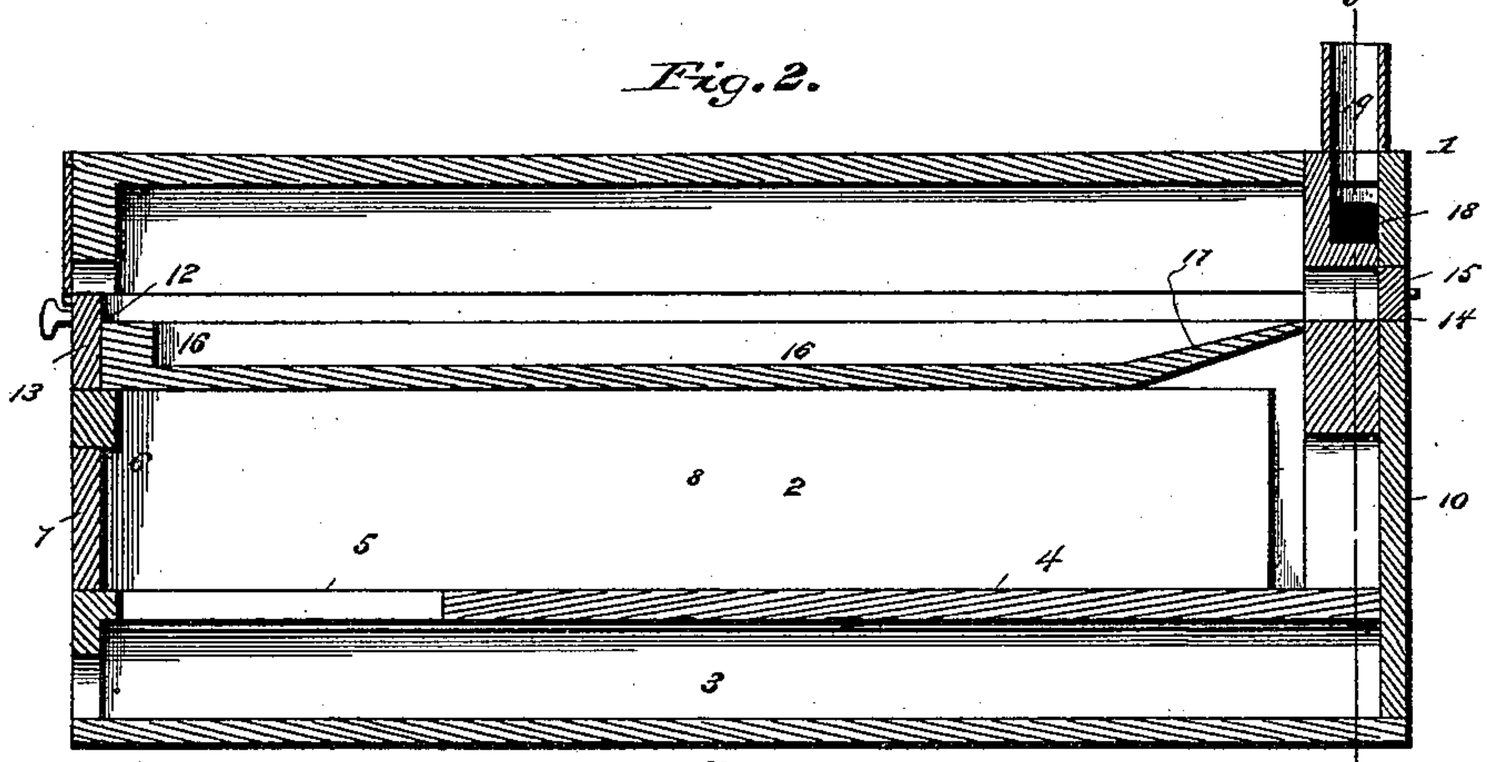
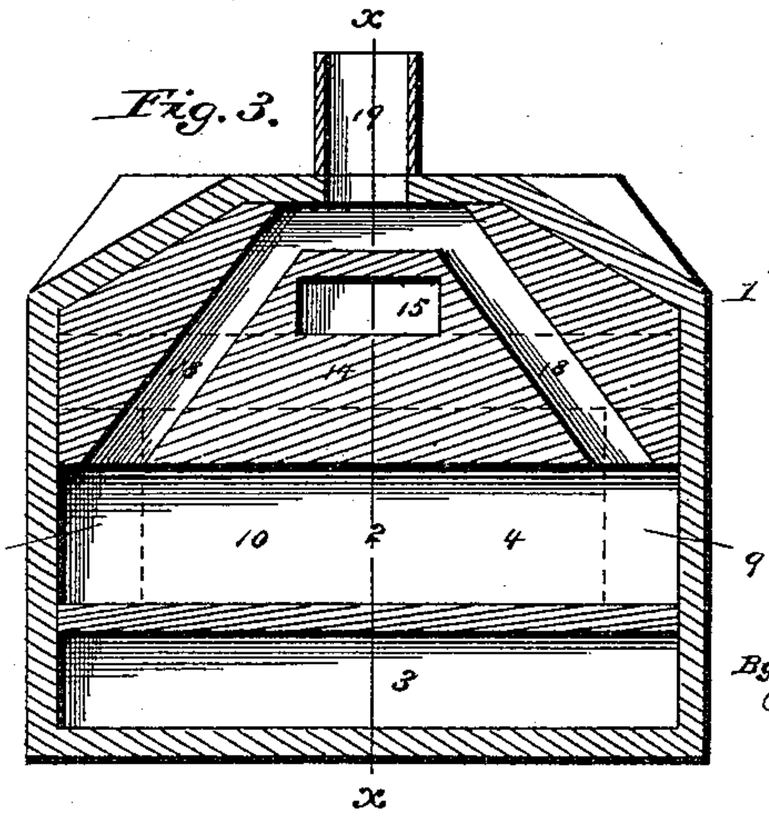


Fig. 3.



WITNESSES

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APPARATUS FOR RECOVERING ALKALI.

SPECIFICATION forming part of Letters Patent No. 420,835, dated February 4, 1890.

Application filed March 25, 1889. Serial No. 304,624. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SEILER, a citizen of the United States, residing at Spring Forge, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for Recovering Soda-Alkali from Caustic Liquors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a furnace for recovering soda-alkali from the caustic liquors used in paper or paper-pulp mills which will be more simple and cheaper in construction and repaired at less expense, labor, and delay than the furnace heretofore used.

As is well known to those skilled in the art, it is the common practice to recover soda-alkali from the caustic liquor used in the manufacture of paper or paper-pulp by evaporating the caustic liquor and calcining the vegetable and other deleterious substances held in suspension in the liquor in order to recover the soda-alkali in a condition fit for use again; but the furnaces heretofore used for evaporating the liquor are objectionable because they are expensive in construction, frequently get out of order, and are expensive to repair, and require a comparatively large amount of fuel for their proper maintenance. I aim to overcome these objections; and my invention consists of a furnace having a central longitudinal flue extending from the fire-grate at the front of the furnace to the rear thereof and communicating with uptake flues that lead from the sides of the furnace to a common central chimney or outlet, and a removable pan or tray resting on longitudinal walls or supports at the sides of the furnace and immediately above the fire-grate, so that the entire bottom of the tray is subjected to the action of the heat and other products of combustion as they pass from the grate to the chimney. This tray or pan is designed to contain the caustic liquor to be evaporated and is removable from the furnace through a suitable opening at one end, which is closed by a door when the furnace is in use. At the opposite rear end of the furnace I provide an opening located between the divided uptakes or flues and beneath the outlet or chimney, through which opening the soda-alkali can be readily withdrawn by a suitable implement without removing the pan or tray from the furnace, and this end of the tray is inclined or sloped upward from its bottom, so that it terminates on a level with the lower edge of said opening, whereby the removal of the soda is facilitated and the escape of the liquor from the pan is prevented. The furnace has a suitable steam-outlet for the escape of the steam and gases generated during the evaporation of the liquor, and on top of the furnace I place a tank which has communication by an intermediate valved pipe that runs through the top of the furnace or by any other suitable means with the interior of the furnace, so that the liquor to be evaporated can be expeditiously and readily supplied to the evaporating tray or pan.

To enable others to understand my invention, I will now proceed to describe the same in connection with the accompanying drawings, in which—

Figure 1 is a perspective view. Fig. 2 is a vertical longitudinal sectional view on the plane indicated by the dotted line $x\,x$ of Fig. 3, and Fig. 3 is a vertical transverse sectional view on the line $y\,y$ of Fig. 2.

Like numerals of reference denote corresponding parts in all the figures of the drawings.

1 designates the furnace, which is divided longitudinally into an upper combustion-chamber 2 and an ash-pit 3 by a horizontal wall 4, which is located a short distance above the bottom of the furnace, and which extends from side to side thereof and from front to rear. At the front of this horizontal division-wall 4, I provide a fire-grate 5, of any preferred construction, fuel to which can be supplied through suitable openings 6, which are closed by doors 7. Above this horizontal wall 4 and the grate, and on opposite sides of the furnace, I arrange longitudinal supports or walls 8 9, which extend from the front of the furnace through the combustion-chamber 2 nearly to the rear wall 10 of the furnace; and on these walls or supports I place my evaporating tray or pan 11, which is of such di-

mensions as to extend the entire length of the furnace and from side to side thereof for the purpose of securing as great an area or surface as is possible with a furnace of given dimensions. This tray or pan is adapted to be inserted in or removed from the furnace with ease and facility through an opening 12 in the front of the furnace on the same horizontal plane as the pan or tray, which opening is closed by a door 13, having suitable fastening devices; and in the opposite rear end of the furnace I provide another opening 14, also on the same horizontal plane as the tray or pan, through which the soda-alkali can be expeditiously removed by a suitable implement after the liquor has been evaporated without requiring the removal of the pan or tray from the furnace. This opening is adapted to be closed by a door 15, as shown.

The evaporating tray or pan is provided around both of its sides and at one end with a continuous raised rim 16 to retain the contents of the same, and at the other end of the tray the bottom thereof is inclined gradually, as at 17, to the plane of the upper surface of the raised rim, whereby the upper extended end of the bottom of the tray lies flush with the lower edge of the opening 14 when the pan is properly adjusted in the furnace. By this construction the soda-alkali can be readily drawn without waste from the tray through the opening 14 by means of a suitable implement and without necessitating the removal of the tray from the furnace.

In the rear end wall of the furnace, above the combustion-chamber 2, two converging uptakes or flues 18 are provided, which are arranged on opposite sides of the opening 14 and meet or open into a common vertical outlet or chimney 19 at one extremity of the longitudinal center of the furnace, the lower extremities of these uptakes or flues communicating at all times with the combustion-chamber 2 of the furnace.

In the top of the furnace, near the front thereof, I provide an outlet-port 20 for the escape of the steam and gases generated during the processs of treating the caustic liquor, and over this port is arranged a valve-plate 21 for opening or closing the same. The port is of sufficient size to permit lime in lumps or masses to be introduced into the furnace for the purpose of securing a better quality of soda-alkali, as will be understood by those skilled in the art to which my invention relates.

The top of the oven is preferably made flat, and on it is placed a tank 23, which communicates with the interior of the furnace—as, for instance, by means of a pipe 24, having a cock or valve 25. This tank is designed to receive the liquid to be treated, and by it the necessary quantity of liquor can be expeditiously and conveniently supplied to the furnace.

The operation of my invention is obvious from the foregoing description. The caustic liquor containing the soda-alkali to be recovered by evaporation and treatment in the furnace, as well as the vegetable and other deleterious substances which it has acquired in boiling wood, straw, and rags in the mills, is placed in the tank, and from the latter is fed to the evaporating tray or pan through the intermediate pipe-connection. The fire having been started in the combustion-chamber, the heat and products of combustion pass through the chamber to the uptakes or converging flues and along the entire bottom surface of the tray or pan, which is thereby heated very highly. The liquor contained in the pan or tray is very rapidly evaporated by the intense heat from the fire, the steam and other gases escape through the port 20, and the vegetable and other deleterious substances are calcined or burned out of the soda-alkali, after which the latter can be expeditiously withdrawn from the tray through the opening 14.

If it is desired to obtain a better quality of soda-alkali with a whiter color than can be secured by merely evaporating the liquor, unslaked lime of good quality can be introduced into the tray through the port 20 before the liquor is evaporated, and thus secure the addition of the lime, which is a necessary ingredient in making the caustic liquor, to the soda-alkali during the process of recovering the soda-alkali from the spent or used caustic liquor.

My improved furnace is very much simpler and cheaper in construction than the furnaces heretofore and at present in use for recovering soda-alkali from the used caustic liquors of paper and paper-pulp mills, and it effects a very material economy in the quantity of fuel and cost of recovering the soda-alkali. The parts are not liable to get out of order, are easily repaired at a slight cost, and the tray or pan can be replaced by another at a trifling cost when it has become worn to such an extent as to be no longer useful.

I am aware that slight changes in the form and proportion of parts can be made without departing from the spirit or sacrificing the advantages of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A furnace for recovering soda-alkali from caustic liquors, having a longitudinal combustion-chamber and an uptake or outlet at one end for the products of combustion of said chamber, an evaporating-pan arranged longitudinally within said furnace above the combustion-chamber thereof and removably supported in the furnace, said pan having the raised sides 16 and an upwardly-inclined bottom 17, which terminates substantially on the plane of the upper faces of said raised sides, and an opening in one of the end walls of said furnace on the plane of the bottom of the pan, substantially as described, for the purpose set forth.

2. A furnace for recovering soda-alkali from caustic liquors, consisting of a longitudinal combustion-chamber, a removable evaporating tray or pan supported above said chamber so that its bottom is exposed directly to the heat and products of combustion passing through the chamber, an opening in the rear of the furnace on the plane of the tray or pan, and the converging uptakes or flues located in the rear of the furnace on opposite sides of the opening therein and meeting or opening into a common vertical outlet above said opening, substantially as described.

3. A furnace for recovering soda-alkali from caustic liquors, consisting of a longitudinal combustion-chamber having an opening 14 in its rear end, the longitudinal walls or supports arranged on opposite sides of said chamber above the grate, a removable evaporating tray or pan resting on said supports and having a raised rim and the upwardly-inclined continuation of the bottom at one end, which terminates on the plane of the lower side or edge of the opening 14, and the converging uptakes or flues communicating with the combustion-chamber and a common vertical outlet, substantially as and for the purpose described.

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

GEORGE SEILER.

Witnesses:
J. JESSOP,
WM. BERTZEL.