(No Model.)

R. H. EMERSON.

APPARATUS FOR RECOVERING SODA.

No. 377,551. Patented Feb. 7, 1888.

Fig. 1.

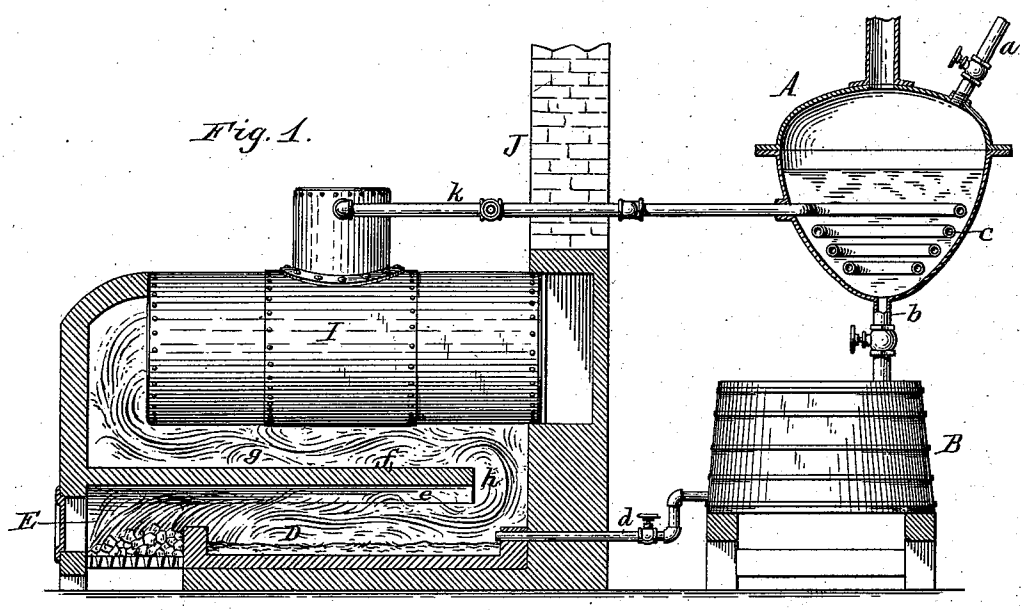


Fig. 2.

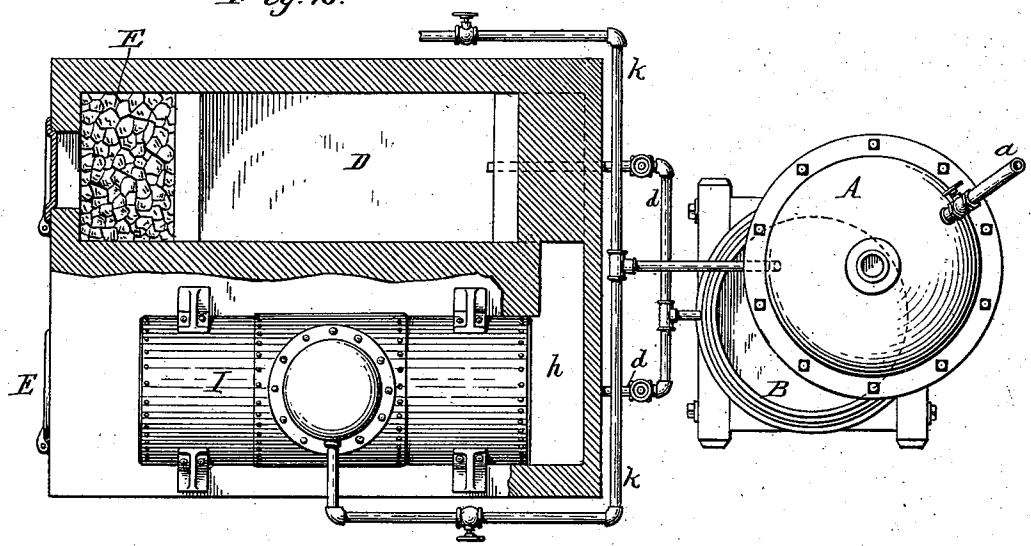
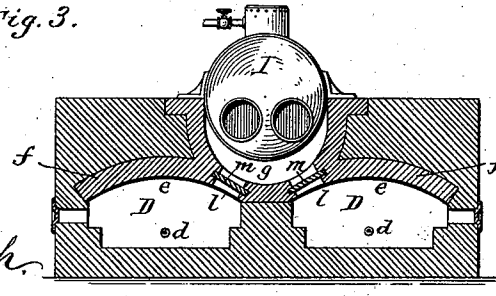


Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR RECOVERING SODA.

SPECIFICATION forming part of Letters Patent No. 377,551, dated February 7, 1888.

Application filed April 11, 1887. Serial No. 234,340. (No model.)

To all whom it may concern:

Be it known that I, RUFUS H. EMERSON, of the city of Jackson, in the county of Jackson and State of Michigan, have invented a new and useful Improvement in Apparatus for Recovering Soda in the Manufacture of Paper-Pulp, of which the following is a specification.

This invention relates to the recovery of soda from the spent liquor in the manufacture of paper stock or pulp by the treatment of vegetable fiber with a solution of caustic soda, and it has the object to utilize in an efficient manner the heat which is generated by incinerating the waste material in recovering the soda.

My invention consists of the improvement which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of an apparatus embodying my improvements. Fig. 2 is a sectional top plan view of the same. Fig. 3 is a cross-section showing a modified construction of the apparatus.

Like letters of reference refer to like parts in the several figures.

A represents an evaporating apparatus of any suitable or well-known construction, in which the spent liquor coming from the digester is evaporated and concentrated. A vacuum apparatus—such, for instance, as is described in Letters Patent No. 300,185, June 10, 1885—is preferably employed for this purpose. The spent liquor is introduced into the evaporator through a pipe, *a*, and the concentrated liquor is discharged through a pipe, *b*, into a receiver, B.

c represents a steam-coil, arranged in the evaporator A for heating its contents; but any other suitable steam-heating appliance—such, for instance, as a heating-jacket—may be employed, if preferred.

D D represent the incinerating-hearths, which receive the concentrated liquor from the receiver B by pipes *d d*.

E E represent furnaces arranged at the front ends of the hearths, and *e e* represent the direct flues, which extend from the furnaces over the hearths.

f f represent the arches which cover the flues *e e* and separate the latter from the return-flues *g g*, which are arranged above the arches, and which communicate with the rear ends of the direct flues *e* by passages *h h*.

I I represent steam-boilers, arranged above the return-flues *g*, and provided with suitable flues, through which the gases pass from the front ends of the return-flues *g* to the chimney J.

k k represent steam-pipes, which connect the boilers I I with the evaporator A and supply steam to the same for evaporating the spent liquor.

The spent liquor coming from the digester has a gravity of about 4° Baumé, and is concentrated in the evaporator A to a gravity of about 32° Baumé. This concentrated liquor is supplied to one of the hearths D, where it is still further concentrated to a gravity of about 40° Baumé by means of a fire started in the connecting-furnace E. When the liquor reaches a high gravity, it assumes a pasty consistency and becomes ignited and burns fiercely. The fire in the furnace is now permitted to go down and the steam is generated in the boiler surmounting the hearth by the heat derived from the burning material on the hearth. Before the incineration begins the steam-boiler is heated by means of the furnace E, which is fired for the double purpose of concentrating the material on the hearth to the point of ignition and heating the steam-boiler above the hearth. I prefer to use two sets of hearths, furnaces, and boilers, so that one hearth can be charged with fresh liquor and made ready for incineration while the incineration proceeds on the other hearth, thereby generating steam of the required temperature in one or the other boiler for supplying the evaporator. By thus employing the waste heat of the incinerating process in generating steam a large percentage of said heat is absorbed or utilized in making steam and enabled to be used for evaporating the spent liquor or for other purposes in such quantities and at such distances from the incinerating-hearths as circumstances may require.

If preferred, one steam-boiler may be employed in connection with two hearths, as indicated in Fig. 3, in which the direct flues extending over the hearths are connected with a single return-flue under the boiler by passages *l*, provided with dampers *m*, so that the direct flue over the hearth which is cold can be sepa-

rated from the flue under the boiler by shutting the damper.

I claim as my invention—

1. The combination, with an incinerating-hearth, of a steam-boiler heated by the waste heat from said hearth, and an evaporator heated by steam from said boiler, substantially as set forth.

2. The combination, with an incinerating-hearth, of a furnace arranged at one end of said hearth, a flue extending from said furnace over said hearth, a steam-boiler having its flue connected with the exit-flue of the hearth, and an evaporator connected with said steam-boiler, substantially as set forth.

Witness my hand this 28th day of March, 1887.

RUFUS H. EMERSON.

Witnesses:
C. H. BENNETT,
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