J. KITCHEN & U. C. ALLEN.

Apparatus for Evaporating and Calcining Alkaline Solutions.

No. 196,462. Patented Oct. 23, 1877.

Fig. 1

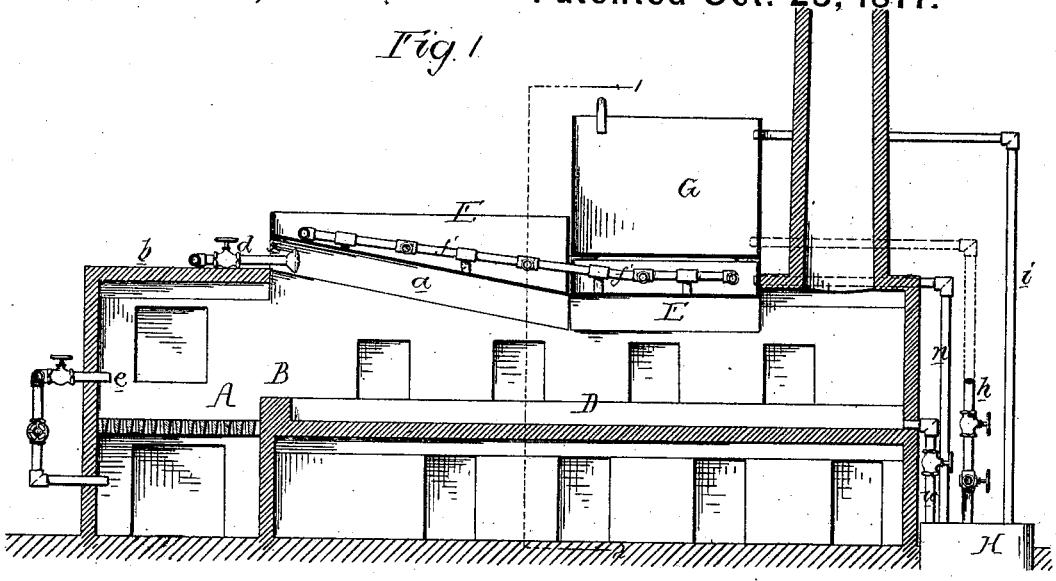


Fig. 2

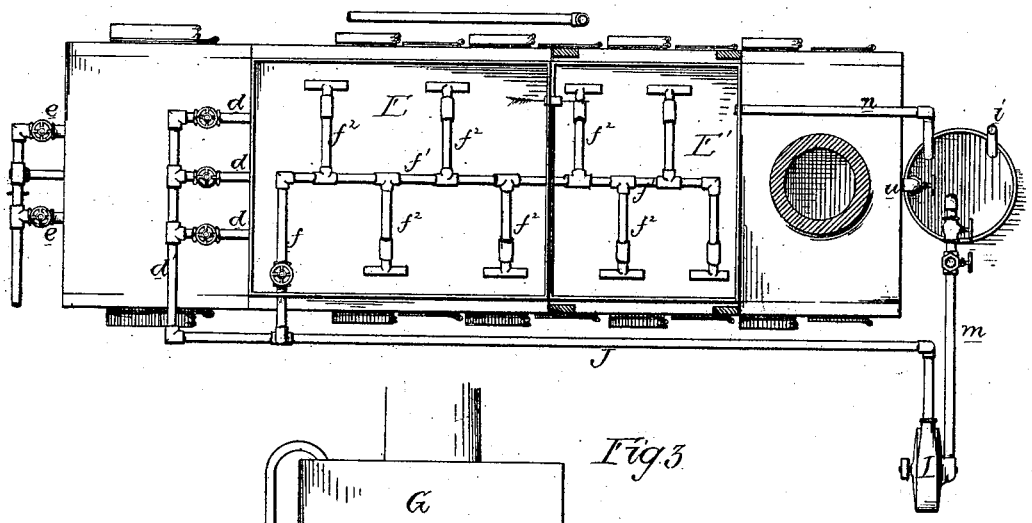
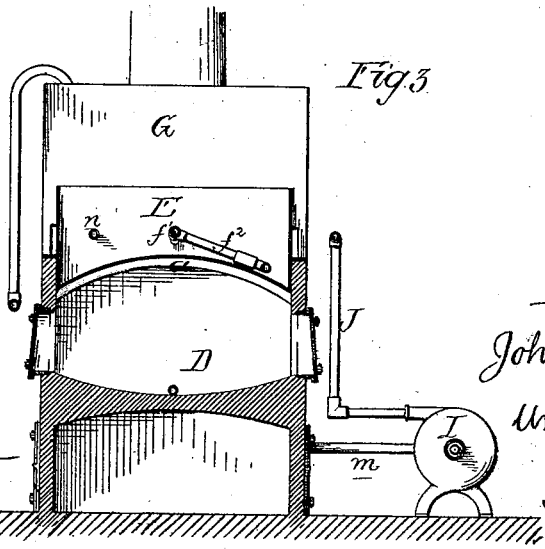


Fig. 3



Witnesses.
John M. Deemer
John K. Rupertus

Inventor.
John Kitchen
and
Uriah C. Allen
by their attys.
Howson & Son

UNITED STATES PATENT OFFICE.

JOHN KITCHEN, OF PHILADELPHIA, PENNSYLVANIA, AND URIAH C. ALLEN, OF SANDY HILL, NEW YORK.

IMPROVEMENT IN APPARATUS FOR EVAPORATING AND CALCINING ALKALINE SOLUTIONS.

Specification forming part of Letters Patent No. **196,462**, dated October 23, 1877; application filed February 9, 1877.

To all whom it may concern:

Be it known that we, JOHN KITCHEN, of Philadelphia, Pennsylvania, and URIAH C. ALLEN, of Sandy Hill, Washington county, New York, have invented a new and useful Improvement in Apparatus for Evaporating and Calcining Alkaline Solutions, of which the following is a specification:

The object of our invention is to rapidly and effectually concentrate and calcine spent alkaline solutions.

In the accompanying drawing, Figure 1 is a vertical section of our improved evaporating and calcining furnace; Fig. 2, a plan view of the same, and Fig. 3 a vertical section on the line 1 2.

A is the fire-place of the furnace; B, the bridge-wall, and D the bed, of the furnace, consisting of a shallow pan, in which the spent alkaline solutions are evaporated and calcined. E is a pan, the arched bottom *a* of which forms part of the roof of the furnace, the said bottom of the pan being inclined from the front downward, as shown in Fig. 1. Between the permanent roof *b* of the fire-place and the front elevated end of the pan E is an opening, *x*, through which project a number of pipes, *d*, terminating in roses; and through these pipes the alkaline solution is forced toward the bed of the furnace in the condition of spray.

Nozzles *e* (two in the present instance) pass through the front wall of the furnace above the grate, and communicate with a fan or other air-compressor. Below the grate there may be another blast nozzle or nozzles communicating with the same blower.

E′ is a second concentrating-tank, forming part of the roof of the furnace, and there may be as many of these tanks as the length of the furnace may demand.

Above the concentrating-tanks, and supported by the same, or by any such framework as the location of the furnace may suggest, is a reservoir, G, into which the spent alkaline solutions are first received; and from this reservoir the liquid is permitted to flow through a pipe, *h*, furnished with a suitable valve or cock, into a tank, H, a pipe, *i*, communicating with the same tank H, and preventing the overflowing of the liquid from the reservoir.

A suction-pipe, *m*, forms a communication between the tank H and a suitable pump, I, which forces the liquid derived from the said tank through the pipe J, thence through the branch pipe *d′*, pipes *d*, and their roses, into the furnace, part of the liquid being forced through the branch *f* and pipe f^1, which extend through the concentrating-tanks, and which have a series of branches, f^2, each branch having two orifices for projecting the liquid into the tank in different directions. This causes a continual disturbance of the alkaline solution in the tanks, and facilitates the concentration of the same prior to its passage through a pipe, *n*, into the tank H.

It will be seen that while this tank is furnished with a continual supply of unconcentrated alkaline solution, it also receives a continuous supply of the liquid concentrated in the tanks E E′, the combined liquids being in a proper condition to be forced through the roses into the furnace in the form of spray.

There may occasionally be a surplus of the solution on the calcining-bed of the furnace, in which case it may be drawn off from time to time, or continuously, through a pipe, *w*, into the general receiving-tank H.

The blasts through the nozzle *e* intensify the flame from the furnace, and force it along the interior of the same to an extent which cannot be attained by an ordinary draft, and the volume of the flame may be increased by the blast below the grate-bars; hence the alkaline spray must pass through a volume of flame of intense heat before it reaches the calcining-bed.

We claim as our invention—

1. The combination of the tank E, having an inclined bottom, *a*, forming part of the roof of the furnace, and the permanent roof *b* of the fire-place, with injection-pipes *d*, projecting into the opening *x* beneath the said tank, all substantially as set forth.

2. The combination, in a concentrating-furnace, of blast-pipes *e* above the grate, with

injection-pipes *d*, for forcing the alkaline solution into and across the path of the flame, as described.

3. The combination of concentrating-tanks E E′ with pipe f^1 and branches f^2, arranged as described, whereby the liquid is forced, in different directions, into the said tanks.

4. The combination of the concentrating-tanks E E′ and reservoir G with the general receiving-tank H, with which the said tanks E E′ and reservoir G communicate, as herein specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN KITCHEN.
URIAH C. ALLEN.

Witnesses:
HERMANN MOESSNER,
HARRY SMITH.