

(No Model.)

2 Sheets—Sheet 1.

H. BURGESS.

Concentrating Alkaline Solutions.

No. 229,090.

Patented June 22, 1880.

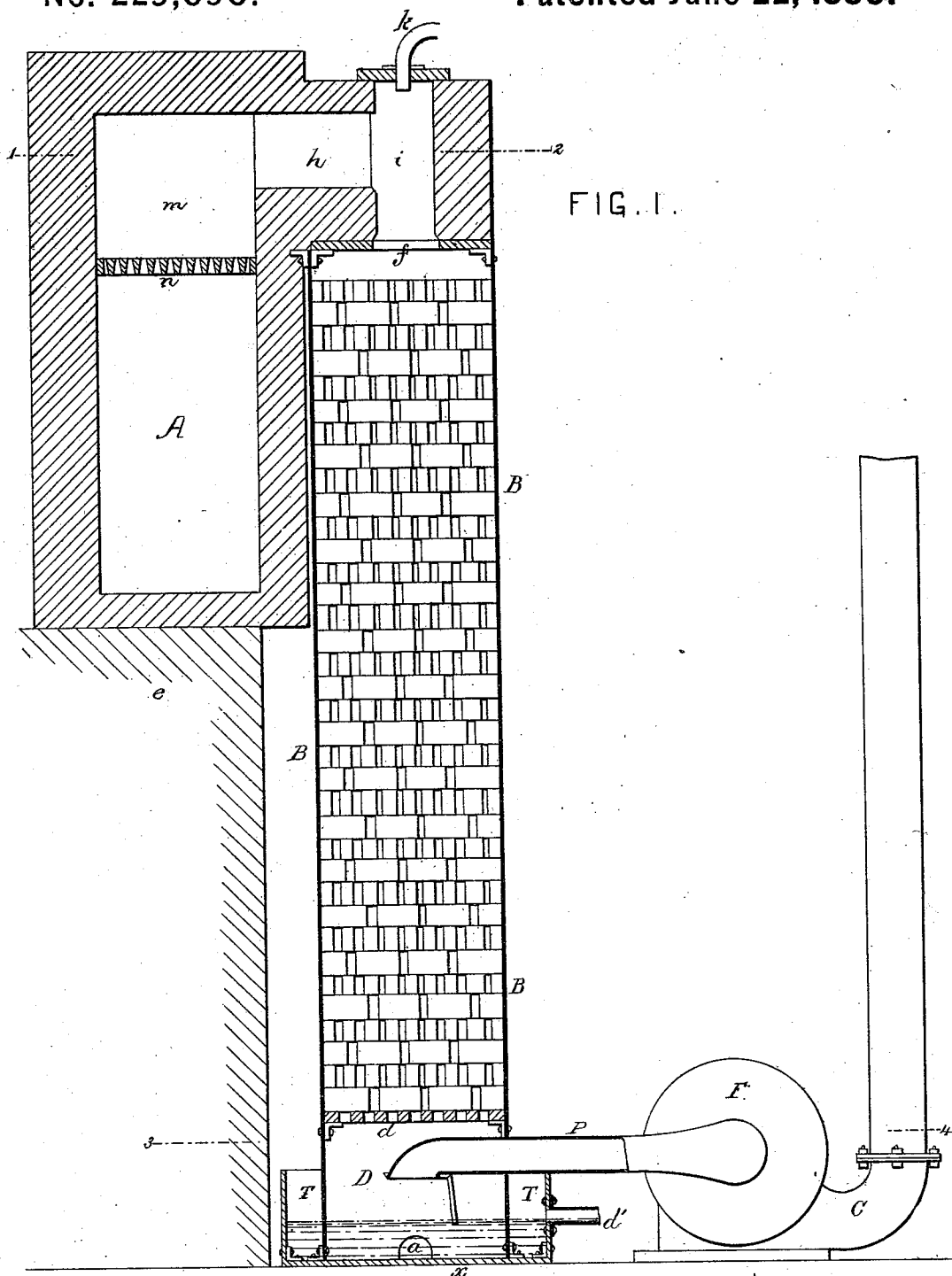


FIG. 1.

WITNESSES

Henry Tulenwider
Henry Howson Jr.

INVENTOR.

Hugh Burgess
by his Attorneys
Howson and Son

(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

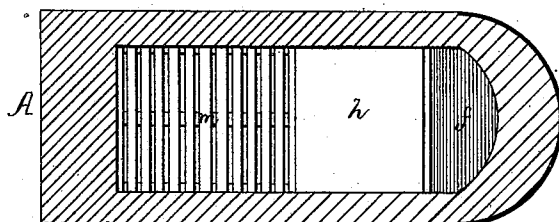
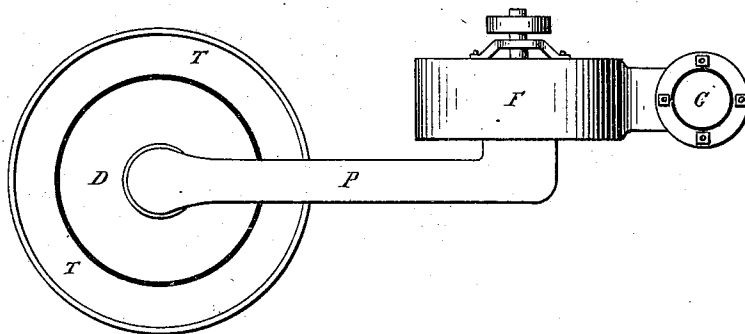


FIG. 3.



WITNESSES.

Henry Finkenwider,
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INVENTOR.

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by his Attorneys
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UNITED STATES PATENT OFFICE.

HUGH BURGESS, OF ROYER'S FORD, PENNSYLVANIA.

CONCENTRATING ALKALINE SOLUTIONS.

SPECIFICATION forming part of Letters Patent No. 229,090, dated June 22, 1880.

Application filed April 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, HUGH BURGESS, a subject of the Queen of Great Britain and Ireland, residing at Royer's Ford, in the county of Montgomery and State of Pennsylvania, have invented an Improved Mode of Concentrating Alkaline Solutions, of which the following is a specification.

My invention relates to the evaporation and concentration of alkaline solutions and other liquids; and it consists in causing the same to trickle down circuitous passages or channels in the presence of heated air or products of combustion which are induced to take the same downward course, substantially as described hereinafter, the object of my invention being the intimate and effective association of the said heated air or products of combustion with the liquid and the concentration of the latter at a comparatively small expense of fuel.

In the accompanying drawings, Figure 1, Sheet 1, is a vertical section of apparatus whereby my invention may be carried into effect; Fig. 2, Sheet 2, a sectional plan on the line 1 2; and Fig. 3, a sectional plan on the line 3 4.

I erect on a suitable foundation, *x*, a vessel, or, as it is technically termed, a "tower," *B*, which is preferably cylindrical and made of plate-iron. When the apparatus is used for concentrating the alkaline solutions from pulp-digesters I prefer to make this tower about seventeen feet high and about three feet in diameter; but it will be understood that it is not necessary to adhere to these dimensions.

A chamber, *D*, is formed in the lower portion of the tower by a transverse perforated partition, *d*, through which the liquid concentrated in the manner described hereinafter escapes from the tower into the said chamber, whence it passes through an opening, *a*, into the reservoir *T* surrounding the lower portion of the said tower, the height of the liquid in this reservoir being determined by the outlet-pipe *d'*, and the liquid serving to seal the chamber *D* and prevent the access of air thereto from below.

A furnace, *A*, is built on a floor or foundation, *e*, at such an altitude above the lower floor, *x*, that the flue *h* of the furnace shall be above the cover *f* of the tower, with the inte-

rior of which the said flue *h* communicates through a vertical flue, *i*, and through a central opening in the said cover, the flue *i* being closed at the top by a plate, through which passes the pipe *k* for conveying the liquid to be concentrated into the interior of the tower.

The furnace *A* is, in the present instance, of ordinary construction. It has the usual fire-place *m*, grate *n*, and ash-pit below the grate, also the usual openings to the said fire-place and ash-pit, and doors for the said openings, the flues *h* and *i* being formed in an extension of the furnace-structure, which extension is built on the top of the tower.

It may be remarked here that furnaces differing from that described may be used as part of the apparatus. A special furnace for burning petroleum may, for instance, be employed, or appliances for the combustion of gases may be used, all that is essential, as regards this feature of the apparatus, being a constant supply of highly-heated gases or air having free access to the interior of the tower at the top of the same.

An exhaust-pipe, *P*, from an exhaust-fan, *F*, passes through the side of the tower, within which, at a central point, the pipe is bent downward, as shown in the drawings, the products of combustion or heated air and the vapor due to evaporation being received into the casing of the fan and being discharged therefrom through the pipe *C*, which may, if desired, communicate with any neighboring chimney.

It is not necessary to adhere to a fan in carrying out my invention, for the desired end may be attained by any exhausting appliances.

From the perforated partition *d* to the top, or nearly to the top, of the tower the latter is filled with loose pieces of such material as will resist the action of the products of combustion and that of the liquid to be evaporated. Bricks may be used for this purpose, as shown in Fig. 1, the bricks being so arranged as to present numerous interstices, which afford free but very circuitous passages, the spaces between the bricks of the upper layers being preferably larger than the spaces between those of the lower layers; or, in place of brick, rubble or broken stones or coke may be thrown in-

discriminately into the tower, where, owing to irregularity in shape and size, they will present the desired interstices and intricate passages.

5 When the apparatus is in operation there is a constant flow of the solution to be concentrated into the top of the tower, whence it trickles downward through the many channels formed by the bricks in the tower until the
10 liquid finally escapes in a concentrated condition through the perforations in the partition *d*. At the same time the products of combustion or heated air are induced by the exhausting mechanism to take the same downward
15 course, every small stream of the liquid being thus accompanied with a portion of the said products, and the heat thus imparted to the liquid, together with that which it receives from the heated bricks, must have a most effective evaporating influence on the said liquid
20 This induced downward course of the products of combustion through numerous and circuitous channels, and in the presence of the liquid which must take the same course, is the gist
25 and distinctive feature of my invention.

The prominent advantage of this method of evaporating and concentrating liquids is as follows: The exhausting action of the fan is continuous, and the inhaled heated air and gases
30 are compelled, in their downward course, to penetrate every opening and cranny as the colder air is withdrawn. Thus every portion of the mass of brick-work must be exposed to the descending hot air and gases, the loss of heat
35 in the latter as they descend being represented

by an equivalent heating and evaporation of the liquids.

By regulating the speed of the fan the descent of the heated air and gases can be so ordered that they will impart the maximum
40 amount of heat to the escaping liquid.

This liquid and the vapor and gases which escape or are withdrawn from the bottom of the tower should not be much above a temperature of 212° Fahrenheit, the temperature
45 varying with the specific gravity of the escaping liquid at the bottom of the tower.

During the forced descent of the gases through the mass of moistened bricks no heat can be lost by an escape of some of the more
50 highly-heated gases into the open air, as only the coolest substratum of heated gases and vapor at the bottom of the tower can be removed by the exhaust-fan.

I claim as my invention—

55 The mode herein described of concentrating liquids, the said mode consisting in causing the liquid to trickle down circuitous passages or channels in the presence of heated air or products of combustion which are induced to take the same downward course, substantially as described.
60

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUGH BURGESS.

Witnesses:

JAMES F. TOBIN,
HARRY SMITH.