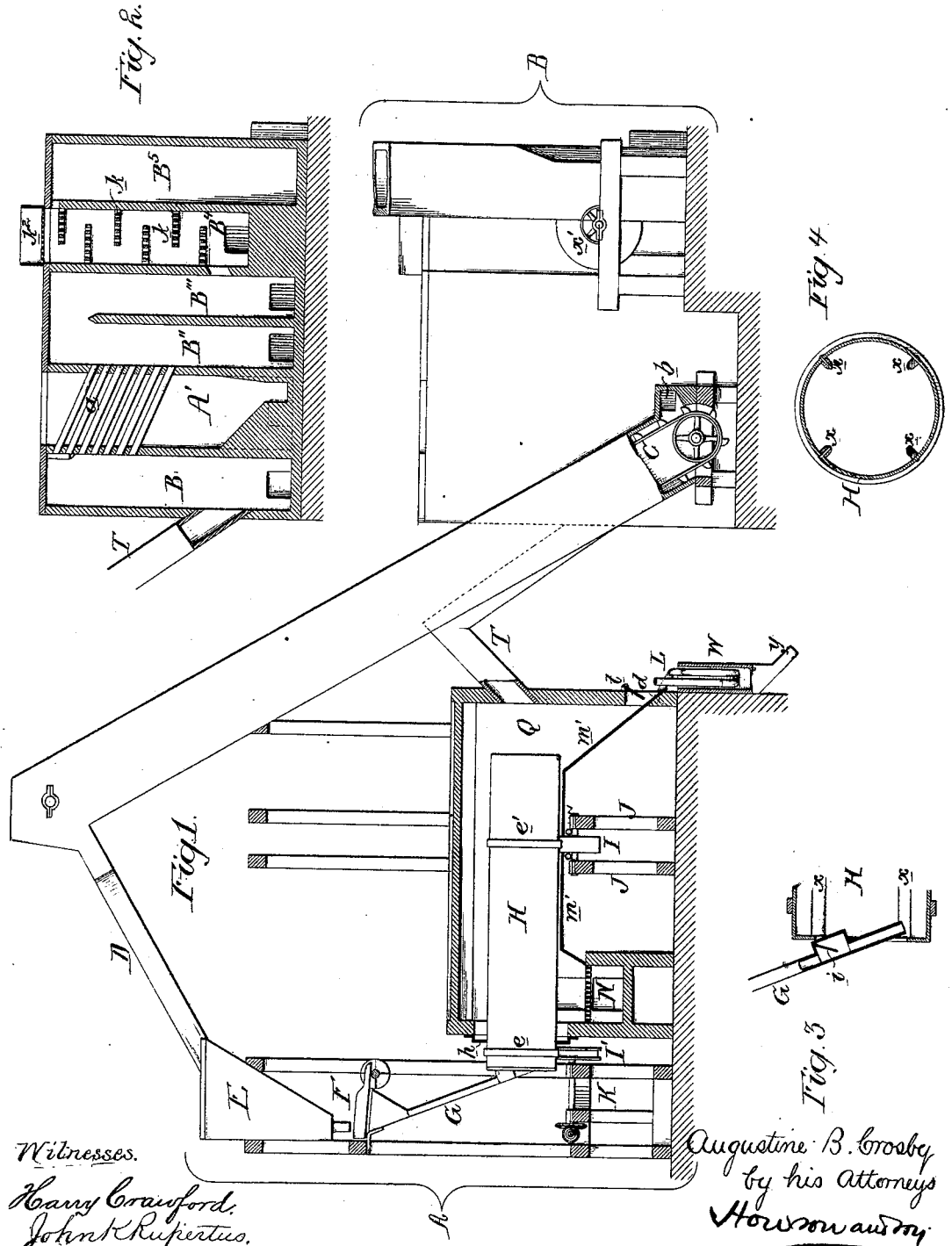
2 Sheets—Sheet 1.

A. B. CROSBY.

APPARATUS FOR ROASTING ORES.

No. 195,581. Patented Sept. 25, 1877.



Witnesses.
Harry Crawford.
John K Rupertus.

Augustine B. Crosby
by his Attorneys
Howson and Sayre

2 Sheets.—Sheet 2.

A. B. CROSBY.

APPARATUS FOR ROASTING ORES.

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Fig. 6.

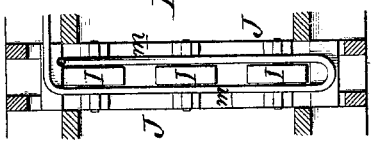
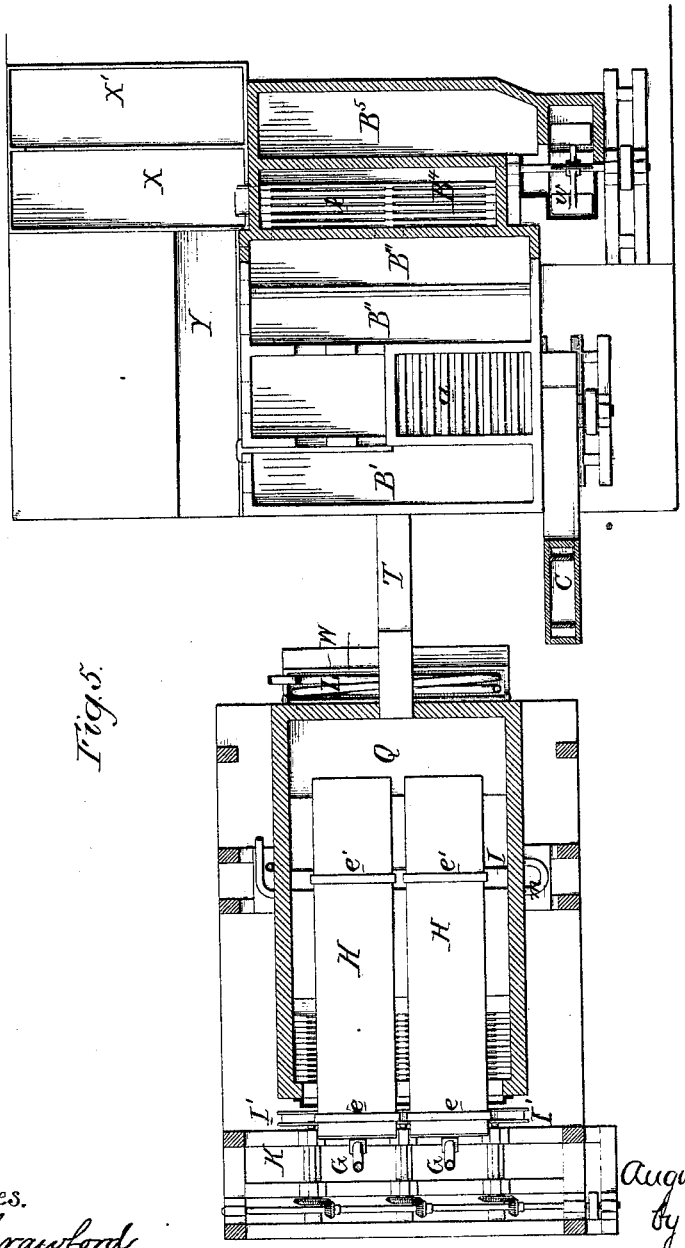


Fig. 5.



Witnesses.
Harry Crawford
John K. Rupertus.

Augustine B. Crosby
by his Attorneys
Howson and Sons

UNITED STATES PATENT OFFICE.

AUGUSTINE B. CROSBY, OF GREENE, MAINE, ASSIGNOR TO UNITED STATES GOLD AND SILVER AMALGAMATING COMPANY, OF VIRGINIA.

IMPROVEMENT IN APPARATUS FOR ROASTING ORES.

Specification forming part of Letters Patent No. **195,581**, dated September 25, 1877; application filed January 29, 1877.

To all whom it may concern:

Be it known that I, AUGUSTINE B. CROSBY, of Greene, Androscoggin county, Maine, have invented a new and useful Improvement in Apparatus for Roasting Ores, of which the following is a specification:

The main object of my invention is the complete oxidization of what are known as difficult or obstinate gold-bearing ores, such as sulphurets of iron, copper, and other base metals and ores, with which are associated arsenium, selenium, antimony, tellurium, &c., in variable proportions, my invention being such that the gold or other precious metals shall be automatically and economically liberated and metallized without loss.

In the accompanying drawing, Figure 1, Sheet 1, is a side view, partly in section, of apparatus wherewith I carry my invention into effect; Fig. 2, a vertical section of part of Fig. 1; Figs. 3 and 4, detached views of parts of the roasting-cylinder; Fig. 5, Sheet 2, a sectional plan of the apparatus; and Fig. 6, a sectional plan of part of Fig. 5, showing the bearing-rollers for the roasting-cylinders.

There are two main structures comprised in the apparatus—namely, the structure A, containing the roasting appliances, and the structure B, containing the settling-chambers. Within the latter is a compartment, A′, for the preliminary drying of the granulated ore in a manner which will be rendered apparent hereinafter, the dried ore being directed from this compartment through an opening, *b*, to the buckets of an endless elevator, C, these buckets discharging their contents at an elevated point into the upper ends of a conduit, D, which directs the ore to the hopper E; and below the outlet of the latter is a hopper-bag or feed-regulator, F, from which the ore is fed through two tubes, G G, into the open ends of two roasting-cylinders, H H. Each cylinder has two bands or collars, *e e′*, the collars *e′* of the two cylinders bearing upon the peripheries of the rollers I, the journals of which are adapted to bearings on the walls or frames J J, the journals being maintained in a comparatively cool condition by a pipe, *m*, Fig. 6, through which cold water is caused to circulate. The collars *e* of the roasting-cylinders H bear on the peripheries of the flanged rollers I′, the shafts of which have their bearings on the frame-work K, bevel-wheels on the shaft gearing into wheels on the driving-shaft, so that the cylinders revolve simultaneously, their front ends being always maintained in the same position by the flanges of the rollers I′, while the main body of each cylinder is at liberty to expand and contract under the influence of changes in temperature.

N is the furnace, the products of combustion from which permeate the chamber Q, containing the roasting-cylinders, before they pass off through the conduit T, as explained hereinafter, this chamber Q being bounded below by a partition, *m′*, which protects the frame J and extends from the furnace to the outlet *d*.

The outer end of each cylinder is open for the free entrance of the external air, which is prevented, by a plate, *h*, from gaining access to the chamber Q through the opening in the wall around the cylinders.

The lower end of one of the tubes G projects into the open end of each roasting-cylinder, as shown in Fig. 3, the spout being furnished with a weighted valve, *i*, which permits the ore to pass from the spout into the cylinder in proper and uniform quantities, the valve, with the ore which is always banked against it, forming a trap for preventing the hot air and gases from ascending the tube G.

It should be here understood that the conduit T communicates with exhausting mechanism, as more fully explained hereinafter.

The revolving roasting-cylinders having been heated above the ignition-point of the ore by the fuel in the furnace, the ore is permitted to enter the said cylinders, where it is gradually brought to ignition, the internal ribs *x* of the cylinders continuously raising masses of the ore, and causing it to fall through the volumes of air induced to rush through the cylinders by the exhaust mechanism above alluded to. Hence the ore, which, owing to the rush of air through the cylinders, progresses slowly through the same, is thoroughly oxidized before it reaches the inclined portion of the partition *m′*.

The oxidized ore, escaping through the outlet *d*, falls into a box, W, and passes thence

through a spout, *y*, preparatory to being ground, washed, and subjected to the amalgamating process. In falling from the inclined plane *m'* the roasted ore is brought into intimate contact with a coil or coils of pipe, L, through which cold water is caused to circulate. Hence the ore is cooled before it passes from the spout *y*.

At the outlet *d* there is a suitably-weighted valve, *t*, which permits the free escape of the roasted ore, but which, with the ore, prevents the admission of the external air to the chamber Q.

The hot air, gaseous products of combustion, and particles of ore too light to descend the inclined plane *m'* pass through the conduit T into the first compartment B^1 of the settling-chamber, and thence through a system of tubes, *a*, which extend across the drying-chamber A', previously alluded to, the pulverized ore being dried in this chamber by contact with the tubes prior to being conveyed to the roasting-cylinders, in the manner heretofore explained.

The heated air, gases, &c., pass through the settling chambers B^2 and B^3, particles of ore settling at the bottom of all these chambers, from which they may be removed from time to time.

When there is present in the ore arsenic or other substances which have to be saved or collected to prevent the dissemination of poisonous vapors, the gases are caused to pass upward in a chamber, B^4, and take the zigzag course determined by perforated or grated shelves *k*, through which pass streams of water from a tank, k^2, above, such of the vapors as may escape the influence of the cataract passing into the chamber B^5, which communicates, as shown in Fig. 5, with the fan *w*, the blades of the latter impelling the gases, hot air, and products of combustion upward through a suitable chimney into the external air. From the chamber B^4 the water flows into a tank, X, in which the insoluble portions settle, the water with matter in solution passing into the tank X', which should contain a coil for the circulation of cold water; or other cooling device may be employed.

The cold water in the tank X' may be pumped into the tank on the top of the chamber B^4.

Particles of available ore will be deposited on the bottom of the chambers B^1, B^2, and B^3, from which the ore may be removed from time to time into a cooling-reservoir, Y.

I claim as my invention—

1. The combination of the roasting-cylinder H and feed-regulator F with the elevator C and the preparatory drying-chamber A, wherein the ore is heated before passing to the roasting-furnace, as set forth.

2. The combination of the chamber Q and its valved outlet *d* with the box W, its cooling-coil L, and spout *y*.

3. The combination of the roasting cylinder or cylinders H, the rollers I for supporting the same, and the cooling-pipes *m*.

4. The combination of the roasting-cylinder H with the feeding-spout G, terminating within the open end of the said cylinder, and having a weighted valve, all substantially as set forth.

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

AUGUSTINE B. CROSBY.

Witnesses:

HERMANN MOESSNER,
HARRY SMITH.