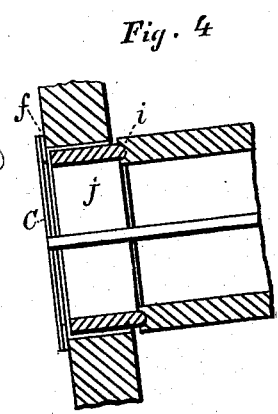
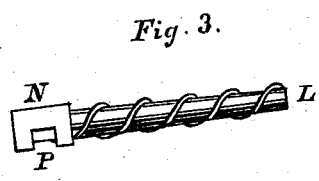
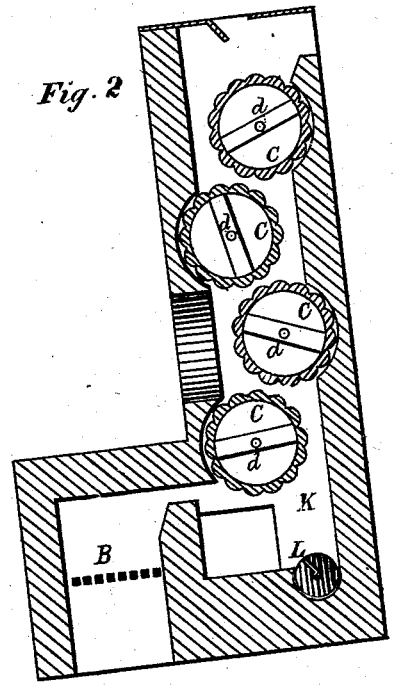
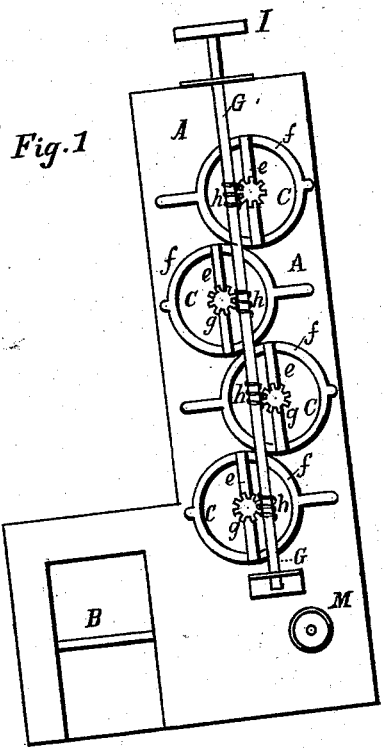


M. P. BOSS.  
Ore-Roasting Furnace.

No. 219,614.

Patented Sept. 16, 1879.



Witnesses  
*Wm. Floyd Cuckett*  
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Attorney

# UNITED STATES PATENT OFFICE.

MARTIN P. BOSS, OF OAKLAND, CALIFORNIA.

## IMPROVEMENT IN ORE-ROASTING FURNACES.

Specification forming part of Letters Patent No. **219,614**, dated September 16, 1879; application filed December 21, 1878.

*To all whom it may concern:*

Be it known that I, MARTIN P. BOSS, of the city of Oakland, county of Alameda, and State of California, have invented an Improved Ore-Roasting Furnace; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the drawing accompanying this specification and forming a part of the same.

My invention has reference to that class of continuously-operating furnaces in which the pulverized ore is dropped down a vertical chimney or stack, and is precipitated from one retarding-shelf to another in its descent, so as to pass a number of times across and through the upward-rising heat and flames before it reaches the bottom of the stack, by which means it is roasted in its passage downward.

My invention consists, first, in combining, with a furnace, a set of cylindrical shelves situated on opposite sides of a chamber, and a vertical shaft with worms engaging with pinions on the ends of the shafts forming the journals of the cylindrical shelves, whereby the latter are revolved in opposite directions; second, in an arrangement by which these cylindrical shelves are all rotated simultaneously by means of a single driving-shaft; third, in the peculiar construction of the cylindrical shelves; and, fourth, in a means for packing the ends of the cylinders to prevent the escape of dust, heat, or fumes, all as hereinafter more fully described.

Referring to the accompanying drawings, Figure 1 is a side view. Fig. 2 is a vertical section. Fig. 3 is a detached view of the screw-conveyer. Fig. 4 is a detached view of the packing for the cylinders.

Let A represent an upright stack or chimney. The fire-place B is constructed at one side of the furnace, as shown, and connects with the chimney or stack near its lower end, in the ordinary manner of constructing stack or upright furnaces.

At intervals apart in side of the stack or chimney I mount two or more rotating cylinders, C C, on opposite sides of the passage. These cylinders I make of metal tiles, earthenware, or other fire-resisting material, and usually I shall make them hollow. In the present instance they are represented as being

hollow. These cylinders extend entirely across the furnace, and their ends pass through the brick-work and are open, so that the air can pass freely through them to keep them cool. Each cylinder is mounted axially on a shaft, *d*, which bears at each end in a plate or bar, *e*, that extends across the opening at each end, and is secured firmly to a metal frame, *f*, that surrounds the opening, and is attached firmly to the outside of the stack; or they could be attached directly to the stack without the frame.

As stated, these cylinders are placed on opposite sides of the passage, one above another, and at intervals apart extending from the top to the bottom, or to near the bottom, of the stack. The shaft or axis upon which each cylinder rotates is extended outside of its bearing on one side of the shaft, and a toothed wheel, *g*, is secured upon it. A straight shaft, *G*, is secured vertically in bearings to the side of the furnace, so as to pass up between the alternately-placed wheels *g*, so that each two alternate toothed wheels are on opposite sides of the shaft. A short worm, *h*, is formed upon the shaft opposite each toothed wheel *g*, so that the wheels will engage with them. This shaft has a pulley, *I*, on its upper end, around which a belt from an engine will pass in order to drive it. This will cause all the cylinders to be rotated simultaneously; but as two alternate toothed wheels engage with the worm on opposite sides of the shaft they will be rotated in opposite directions.

I prefer to corrugate or roughen the outside surface of each cylinder, so as to retain the ore upon it until it is precipitated by the rotation of the cylinder. The ore will then be received upon the upper cylinder in a thin shower or stream, and as the cylinder rotates it will be precipitated in the same manner across the passing heat and products of combustion upon the next cylinder below. This cylinder, by its rotation, then precipitates the ore again across and through the flames upon the next lower cylinder on the opposite side, and so on down to the bottom of the stack.

To make a tight joint at the ends of each cylinder, I make a groove, *i*, in its edge, in which I fill some fire-resisting material or substance, such as plaster. I then place a ring, *j*, in the opening in the wall, so that its inner

edge will move against the packing. The outer edge of this ring can be pressed inward by the frame *f*, or by a packing similar to that above described. This makes a dust and fume proof joint.

The ore, upon reaching the bottom of the stack, is delivered into a chamber, *K*, where it piles up behind the bridge-wall of the furnace, so that it is further treated by the reverberatory action of the flame upon it. Across the rear part of this chamber I mount a screw-conveyer, *L*, one end of which passes through the side of the furnace, and has a pulley, *M*, secured to it, so that it can be driven by a belt from the engine. The opposite end passes out through a short tube, *N*, in the under side of which is a discharge-opening, *P*. This screw is graduated so that it feeds faster as it approaches the discharge-opening. This graduation can either be obtained by increasing the width of the screw-flange as it approaches the feed-opening or by increasing the pitch of the flange.

In the present instance I have represented an increased width of the flange, thus causing the ore to be moved faster as it nears the discharge-opening, so that there is no danger of its becoming clogged.

The ore can be fed into the top of the stack by any suitable mechanical feeding device.

A series of cylinders similar to those herein described could be mounted side by side on an incline, and be driven in the same direction, so as to deliver the ore from one to the other and carry it down the incline. This would be a very useful application where the heat and

flames could be reverberated upon the cylinders.

By this means I am able to construct a cheap and effective ore-roasting furnace. The cylinders will not become overheated, because the air is permitted to pass freely through them, and one side only is subjected to the heat at one time, so that each part has sufficient time to become cooled after it passes out of the flame, and before it is brought in contact with it again.

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

1. In combination with a furnace, *A*, the cylindrical shelves placed alternately on opposite sides of said furnace, and having the pinions *g* on the end of their journal-shafts, and the worm-shaft *G*, all substantially as and for the purposes set forth.

2. In an ore-roasting furnace, the cylindrical revolving shelves *C*, with their exterior portion corrugated, and with open ends for the admission of air, as and for the purpose set forth.

3. The rotating cylinders *C*, mounted as described, and provided with the groove *i* in their ends, in combination with the packing-rings *j*, substantially as and for the purpose described.

In witness whereof I have hereunto set my hand and seal.

MARTIN P. BOSS. [L. S.]

Witnesses:

H. M. CHACE,  
J. A. WAYMIRE.