(No Model.) 2 Sheets—Sheet 1.

C. M. ALLEN.

PROCESS OF AND MECHANISM FOR SMELTING ORES.

No. 522,446. Patented July 3, 1894.

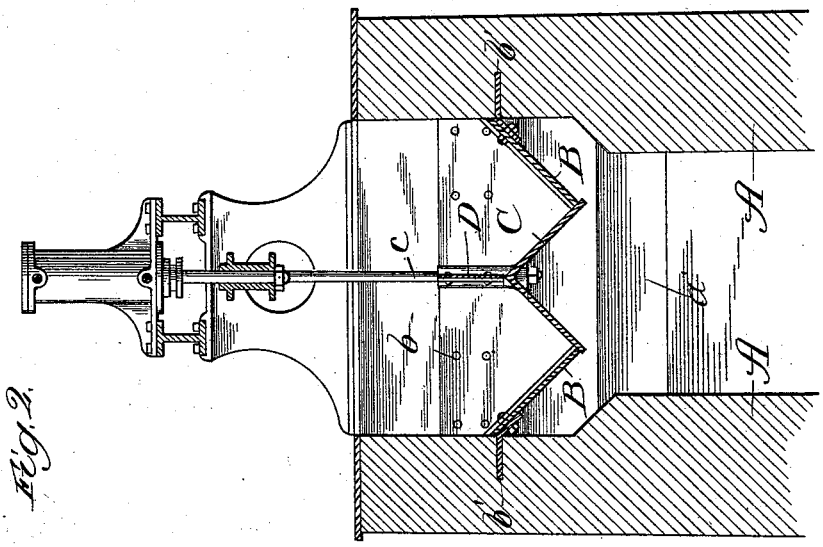


Fig. 2.

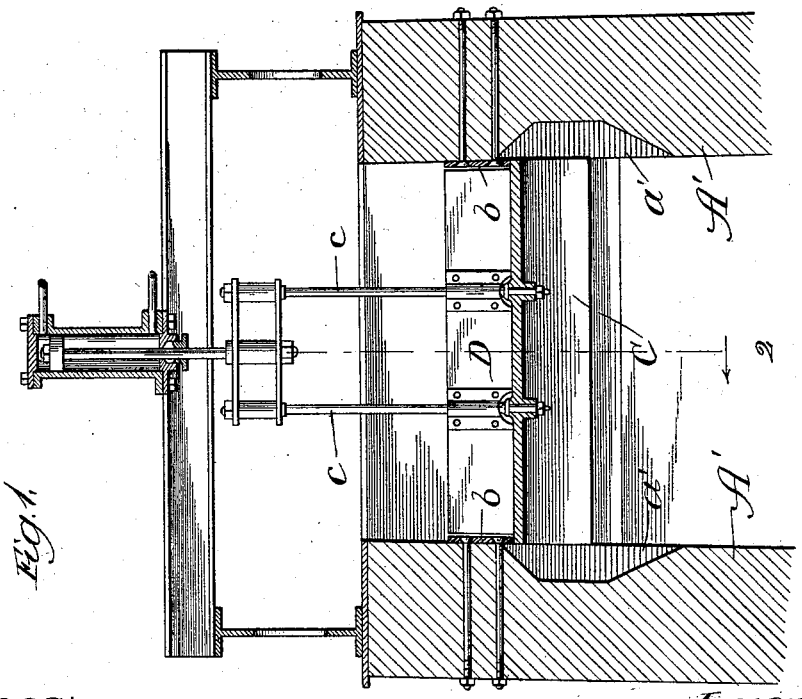


Fig. 1.

Witnesses:
Chas. E. Gaylord,
Lute S. Alter.

Inventor:
Charles M. Allen,
By Banning & Banning,
Attys

(No Model.) 2 Sheets—Sheet 2.

C. M. ALLEN.

PROCESS OF AND MECHANISM FOR SMELTING ORES.

No. 522,446. Patented July 3, 1894.

Fig. 3.

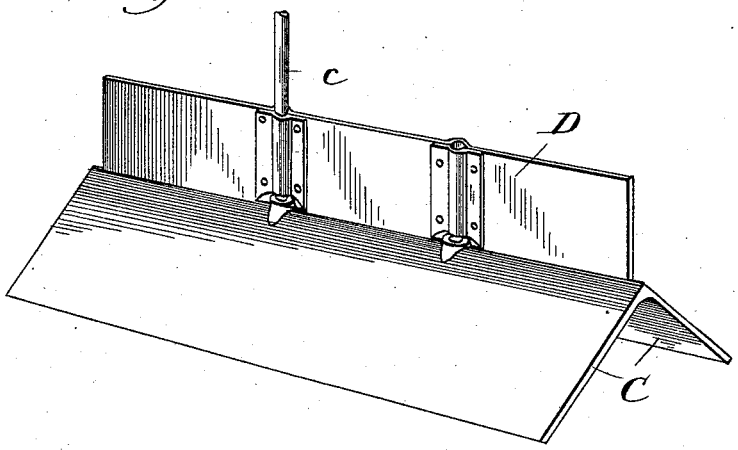
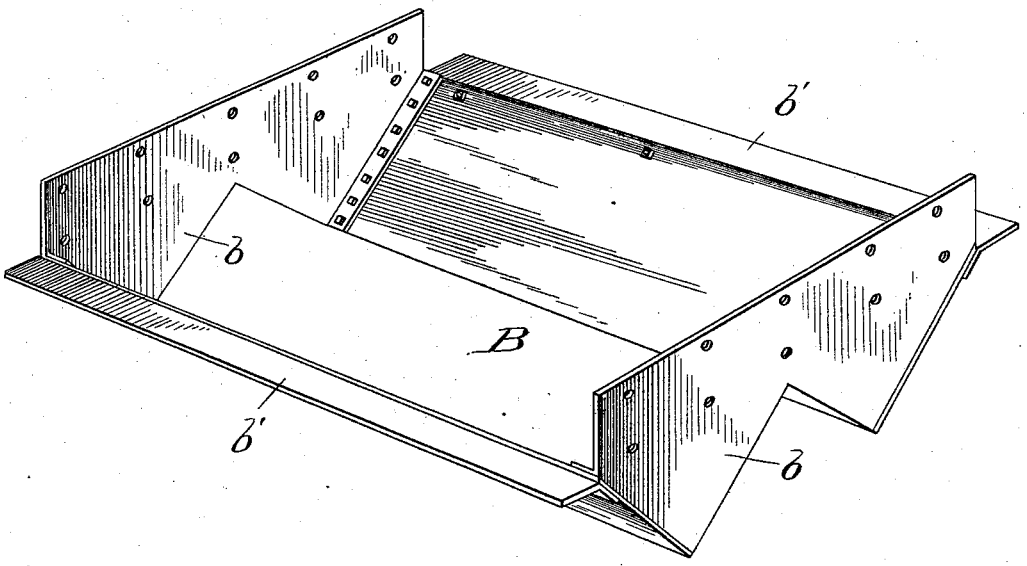


Fig. 4.



Witnesses,
Chas. E. Gaylord,
Lite B. Alter,

Inventor:
Charles M. Allen,
By Banning & Banning,
Att'ys

UNITED STATES PATENT OFFICE.

CHARLES M. ALLEN, OF BUTTE, MONTANA.

PROCESS OF AND MECHANISM FOR SMELTING ORES.

SPECIFICATION forming part of Letters Patent No. 522,446, dated July 3, 1894.

Application filed November 9, 1893. Serial No. 490,431. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. ALLEN, of Butte city, Silver Bow county, Montana, have invented a new and useful Improvement in Apparatus for Smelting Ores, of which the following is a specification.

The object of my invention is to provide for introducing dry, hot calcines or fine material into a blast furnace and treating the same therein; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view of the top or upper portion of a rectangular blast furnace provided with my improved bell and hopper feed; Fig. 2 a transverse sectional view taken in line 2 of Fig. 1; Fig. 3 a perspective view of the bell; and Fig. 4 a perspective view of the hopper.

A A are the side walls and A′ A′ the end walls of the furnace, and *a′* recesses or insets in the end walls; B the hopper, *b* the ends thereof and *b′* anchors securing the same to the walls of the furnace; C the bell, and *c* rods securing the bell to a proper support or cross-head connected to operating mechanism of any ordinary or convenient construction; and D a plate or partition extending upwardly from the apex or crown of the bell.

Heretofore it has been found impracticable to introduce calcines or fine material into a blast furnace, the strength of the blast being such as to eject a large portion of it into the dust chamber. In view of this, it has been considered necessary to wet the calcines or fine material before introducing them into the blast furnace, and then to shovel them in by hand. This is objectionable, in that it involves extra labor and fuel—the shoveling requiring a large amount of work and the temperature of the furnace being reduced by water or moisture in the calcines. Nor has it been considered practicable to use a bell and hopper feed, except in introducing coarse ores into a circular furnace—the construction of the feed being such that the angle of the hopper extends entirely around the furnace. This construction is, of course, not adapted to feed fine material into a rectangular furnace, in which form of furnace the material has to be fed entirely along the sides, and not at the ends. Nor can such material be evenly fed at both the sides and ends of a rectangular furnace, the tendency being toward a double feed or discharge at the corners. The object of my invention is to overcome these objections and provide for smelting dry calcines or fine material in a rectangular furnace.

In carrying out my invention, I calcine raw concentrates in the usual way, and then convey them by any convenient means to the blast furnace, into which they are discharged in a dry, hot condition, and without any previous wetting. Their discharge into the blast furnace is effected by means of a bell and hopper feed, the bell being **A**-shaped and having straight ends, and the hopper **V**-shaped and having straight ends to correspond with the **A**-shaped and straight ends of the bell. When the bell is lowered into the furnace, an opening is formed all along each of its sides, through which openings the dry calcines or fine material pass down into the furnace, being evenly distributed along its sides.

In order to prevent clogging at the ends of the bell, I prefer to form an inset in the brick work at each end of the furnace, this inset being opposite the end of the bell and extending down somewhat below the same. When the bell is lowered any calcines or other material which fall over its ends pass into these insets and thence to the furnace, and are thus entirely removed or taken into such position as to prevent their clogging the bell whenever it is desired to raise it into its normal position.

In order to provide for closing the ends of the feed, I prefer to use a plate at each end, having an **A**-shaped opening corresponding to the shape of the bell. When the bell is drawn up into its normal position, this plate operates to close the ends of the feed, so as to prevent the escape of the material until the charge is properly distributed on the bell and ready to be passed down into the furnace.

When the charge of hot calcines or fine material is run into the hopper and onto the bell, its condition is such that it has a tendency to flow or splash over, after the manner of a liquid. To prevent its passing entirely over from one side of the bell to the

other, I place a suitable plate or partition on the apex or crown of the bell, extending it up a sufficient distance to accomplish the purpose specified.

It will of course be understood that I do not intend to limit myself to minor features or details of construction, or in all cases to the use of all my improvements together or at the same time.

I claim—

1. In combination with a rectangular blast furnace, a bell and hopper feed, the bell being A-shaped and having straight ends and the hopper V-shaped and having straight ends to correspond with the A-shaped and straight ends of the bell, whereby calcines may be fed into the furnace and evenly distributed along its sides, substantially as described.

2. In combination with a rectangular blast furnace, a bell and hopper feed, the furnace having an inset in the brickwork at each end opposite the end of the bell and extending below the same, and the bell being A-shaped and having straight ends, and the hopper V-shaped and having straight ends to correspond with the A-shaped and straight ends of the bell, whereby when the bell is lowered calcines falling over its ends may pass out of the way to avoid clogging, substantially as described.

3. In combination with a rectangular blast furnace, a bell and hopper feed, the bell being A-shaped and having straight ends and the hopper V-shaped and having straight ends to correspond with the A-shaped and straight ends of the bell, and a plate at each end having an A-shaped opening corresponding to the shape of the bell, whereby when the bell is up in its normal position the ends of the feed are closed, substantially as described.

4. In combination with a rectangular blast furnace, a bell and hopper feed, the bell being A-shaped and having straight ends and the hopper V-shaped and having straight ends to correspond with the A-shaped and straight ends of the bell, and a plate extending upwardly from the apex of the bell, whereby fine calcines are prevented from passing over from one side of the bell to the other, substantially as described.

CHARLES M. ALLEN.

Witnesses:
EPHRAIM BANNING,
D. T. BRUBAKER.