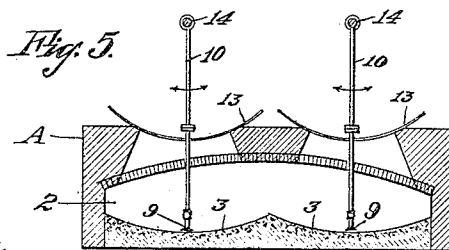
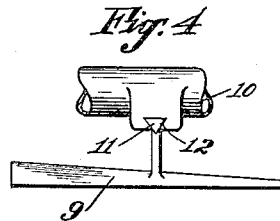
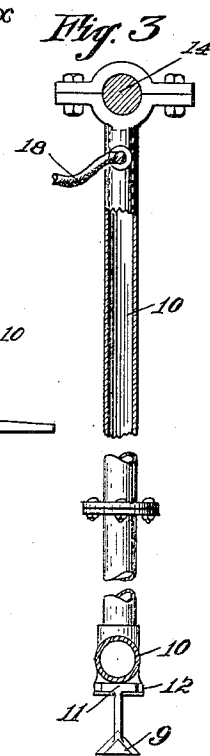
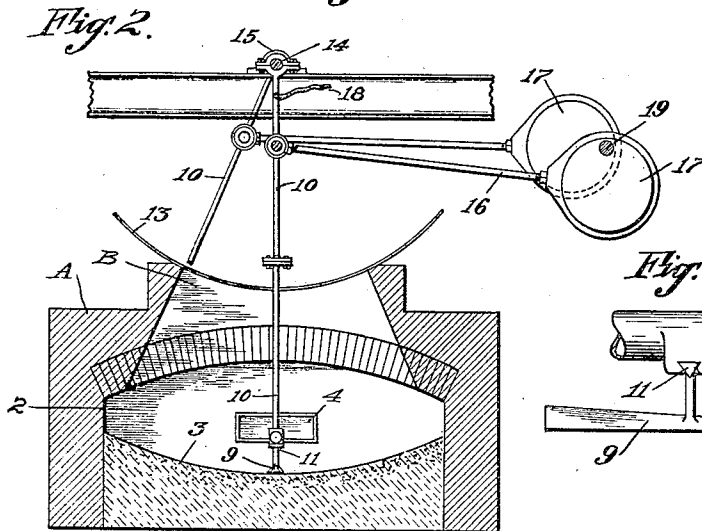
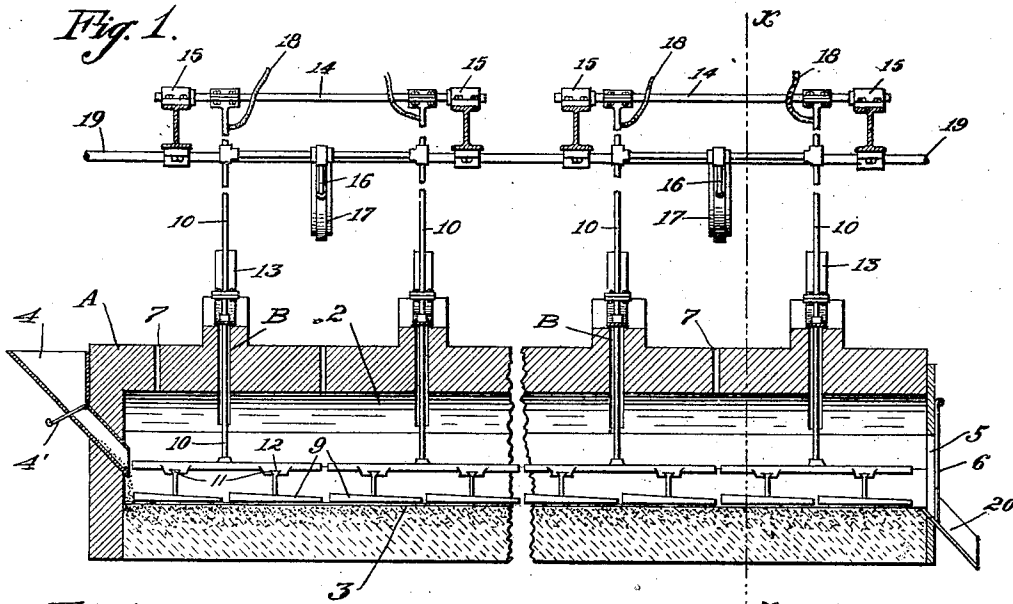


B. HALL.
ORE ROASTING FURNACE.
APPLICATION FILED MAY 5, 1909.

945,522.

Patented Jan. 4, 1910.



Witnesses:
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UNITED STATES PATENT OFFICE.

BENJAMIN HALL, OF NEVADA CITY, CALIFORNIA.

ORE-ROASTING FURNACE.

945,522.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed May 5, 1909. Serial No. 494,123.

To all whom it may concern:

Be it known that I, BENJAMIN HALL, citizen of the United States, residing at Nevada City, in the county of Nevada and State of California, have invented new and useful Improvements in Ore-Roasting Furnaces, of which the following is a specification.

This invention relates to ore roasting furnaces of the reverberatory type, and pertains particularly to a furnace in which the ore in the form of concentrates, is conveyed across a hearth by a system of mechanically operated rabblers.

In the usual type of roasting furnace, the rabbling mechanism travels from one end of the hearth to the other, which for perfect roasting is objectionable as the rabblers carry adhering unroasted material from the feed end of furnace to the discharge end which renders it impossible to obtain the desired perfect roast; furthermore the rabbling mechanism is either exposed to the heat of the furnace, or is placed in close proximity thereto, requiring a long slotted wall, to seal which in a satisfactory manner has proved a difficult and in most cases an unsatisfactory procedure.

The object of my invention is to overcome these defects which I accomplish by having the rabblers swing as a pendulum across the furnace, and obtain the required movement of the roasting material from one end of furnace to the other by the shape or form of shoes or rabblers which are tapered, the wider and thicker end of shoe being toward the feed end of furnace; as the shoes or rabblers pass through the material it slides gently toward the smaller end from where it passes on to the adjoining shoe, and so on until it reaches the discharge end, where it passes out roasted to any condition required.

Another object is to provide a continuous, automatically operated, ore-roasting furnace of simple construction, in which the ores to be treated will receive a thorough and perfect roast, being fed into the furnace and discharged therefrom continuously instead of intermittently as at present.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the

invention. Fig. 2 is a transverse section on line X—X, Fig. 1. Fig. 3 is a detail view of the pendulum. Fig. 4 is a detail of a rabble. Fig. 5 is a transverse view of a furnace with double hearth.

In the drawings, A is a furnace body of suitable size, shape and construction, in which is constructed a roasting-chamber 2 having a transversely concaved hearth 3. A feed hopper 4 is provided at one end through which ore is delivered to the roasting chamber 2. The admission of the ore being suitably controlled according to the capacity of the furnace by appropriate means as the gate 4'. An outlet or discharge opening is shown at 5 at the opposite end of the roasting chamber. This discharge opening is provided with a door or gate 6 by which the air feed and draft in the roasting chamber may be regulated. Vents 7 are provided at intervals in the arch of the roasting chamber to facilitate the draft.

Rabblers or shoes 9, triangular in cross-section and tapered lengthwise, are removably attached to pendulum arms 10 by means of wedge keys 11 engaging in slots 12 on the lower horizontal members of the pendulums 10. The pendulums 10 with the rabblers 9 are adapted to be swung transversely over the concave hearth 3, the bottom face of the rabblers being suspended just out of contact with the hearth, and with the narrower tapered ends of the rabblers pointing toward the discharge end.

Slots B are provided in the arch of the chamber 2 through which the pendulums 10 pass. The upper outer edges of this slot B are segmental in form, on a radius corresponding to the pivot of the pendulum, and a segmental piece of sheet iron 13 is secured to each pendulum stem, which is adapted to slide in contact with the mouth of the slot B, so that as the pendulum swings lengthwise in the slot, the segment 13 will act as a cover and keep the slot B closed at all times, and so retain the heat and fumes within the furnace.

The pendulums 10 are secured to shafts 14 mounted in bearings 15. In this case I have shown the pendulums as mounted in pairs on each shaft, but it is obvious that the number may be increased or decreased without altering the scope of the invention, and that as many pendulums may be employed as the occasion requires.

Shafts 16 operated by eccentrics 17 driven by any suitable means, are connected with the pendulums 10 in such manner that as the eccentrics are rotated, the pendulums 5 will be swung backward and forward across the roasting chamber 2.

The pendulums 10 are constructed of metallic tubes, as shown in Fig. 3, and are connected with a cold air or water supply by 10 means of flexible hose 18, the object of which is to introduce a cooling medium into the pendulums, thereby greatly increasing their durability.

In operation, the ore to be roasted is introduced through the hopper 4 into the roasting chamber 2, and falls upon the hearth 3. The pendulums 10 are set in motion by driving the eccentrics 17 at suitable speed. This causes the rabblers 9 to pass through the 20 ore, thereby spreading it over the surface of the hearth 3 to be acted upon by the heat of the furnace. The triangular and tapered or pyramidal shape of the rabblers operates to carry the ore forward over the hearth 3, 25 at the same time turning it over and agitating it, so that it is completely exposed to the roasting action. The pyramidal form of the rabblers, their arrangement, and their operation at right angles to the travel of the 30 ore gently works the ore forward to the final point of discharge.

To facilitate the forward movement of the ore, the pendulums are operated in staggered arrangement; that is to say, each series of rabblers and pendulums are alternated 35 by fixing the eccentrics 17 in different positions on the shaft 19. In this way, as the ore leaves one set of rabblers it will be taken up by the succeeding series, and thus passed on to the outlet 5, where it is discharged, 40 thoroughly roasted, into the chute 20.

This furnace may be constructed with a plurality of sets of rabblers working parallel to each other, in a double concaved furnace, 45 as shown in Fig. 5.

The rabbling mechanism is in the furnace at all times, such parts as are exposed to the greatest heat being hollow, and being supplied with a cooling medium such as 50 air or water.

The passages or openings B in the arch through which the rabble arms 10 pass, are built in the form of a segment of a circle, and are closed by means of the semicircular 55 pieces 13 of sheet iron that move with the stems and slide up and down as the arch may rise or fall from expansion or contraction, and as the travel of each plate 3 is circular, there is no difficulty in keeping the 60 passage perfectly closed at all times.

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

1. A reverberatory furnace having feeding and discharge means at opposite ends, 65

and rabbling mechanism operable transverse to the length of the furnace and adapted to gradually advance the ore from the feed to the discharge end, said rabbling mechanism being suspended from a point outside the 70 furnace and including rabblers of pyramidal form having their narrower ends pointing toward the discharge means.

2. A reverberatory furnace having feeding and discharge means at opposite ends, 75 and rabbling mechanism operable transverse to the length of the furnace and adapted to gradually advance the ore from the feed to the discharge end, said rabbling mechanism including pendulums extending through the 80 arch of the furnace and suspended from a point there-above, and carrying rabble members of pyramidal form.

3. A reverberatory furnace having feeding and discharge means at opposite ends, 85 and rabbling mechanism operable transverse to the length of the furnace and adapted to gradually advance the ore from the feed to the discharge end, said rabbling mechanism including pendulum members extending 90 through the arch of the furnace and suspended from a point there-above, and carrying removable shoes, which shoes extend lengthwise of the furnace and are triangular in cross-section and tapered endwise, with 95 the tapered ends of the shoes disposed toward the discharge end of the furnace.

4. A reverberatory roasting furnace having its hearth transversely concaved, and rabble members extending through the arch 100 of said furnace and suspended from a point there-above, said members being operative across said hearth in a direction transverse to the length of the furnace.

5. A reverberatory roasting furnace having its hearth transversely concaved, said 105 furnace having an arch provided with transverse slots, rabble members operative across said hearth in a direction transverse to the length of the furnace, said rabble members 110 mounted on swinging pendulums, which pendulums operate through slots in the furnace top, and means operating over the top of said slots and carried by the pendulums for closing the slots. 115

6. A reverberatory roasting furnace having its hearth transversely concaved, rabble 120 members operative across said hearth in a direction transverse to the length of the furnace, said rabble members mounted on swinging pendulums, which pendulums operate through slots in the furnace top, said 125 members having wedge keys engaging slots in the lower parts of the pendulum whereby the members are removably attached, and means carried by the pendulums for closing 130 the slots in the furnace top, said last-named means including concaved plates on the pendulum members operating across corresponding concaved mouths of the slots.

7. A reverberatory roasting furnace having its hearth transversely concaved, rabble members operative across said hearth in a direction transverse to the length of the furnace, said rabble members mounted on swinging pendulums, which pendulums operate through slots in the furnace top, and means carried by the pendulums for closing the slots, said last-named means including concaved plates on the pendulum members operating across corresponding concaved mouths of the slots, said concaved plates being loosely mounted on the pendulums to adapt them to the expansion and contraction of the furnace.

8. A reverberatory roasting furnace having its hearth transversely concaved, rabble members operative across said hearth in a

direction transverse to the length of the furnace, said rabble members mounted on swinging pendulums, which pendulums operate through slots in the furnace top, said pendulums having lower members provided with slots and the rabble members having keys removably engaging said slots, and means carried by the pendulums for closing the slots in the furnace top, said pendulums being made hollow and having fluid cooling connections.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

BENJAMIN HALL.

Witnesses:

FRANK T. NILON,
NICHOLAS SNELL.