T. EDWARDS

DUST PREVENTING ORE DROPPING APPARATUS AND THE LIKE FOR ROASTING FURNACES.

APPLICATION FILED JUNE 25, 1910.

979,937. Patented Dec. 27, 1910.

Fig. 1.

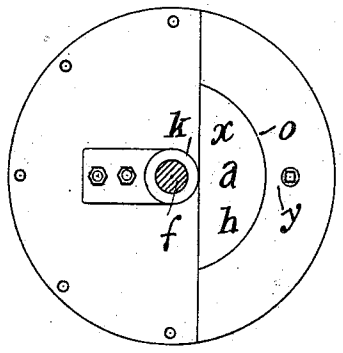
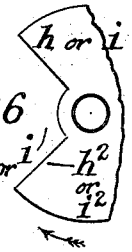


Fig. 6



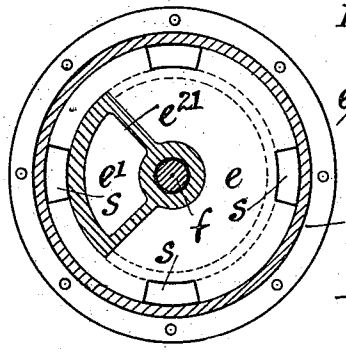
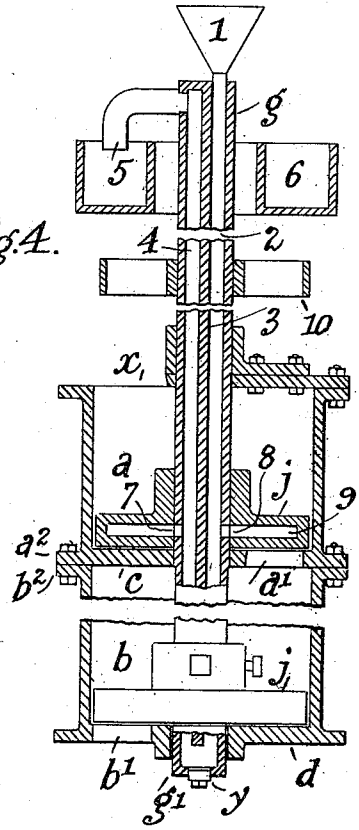


Fig. 2.

Fig. 4.



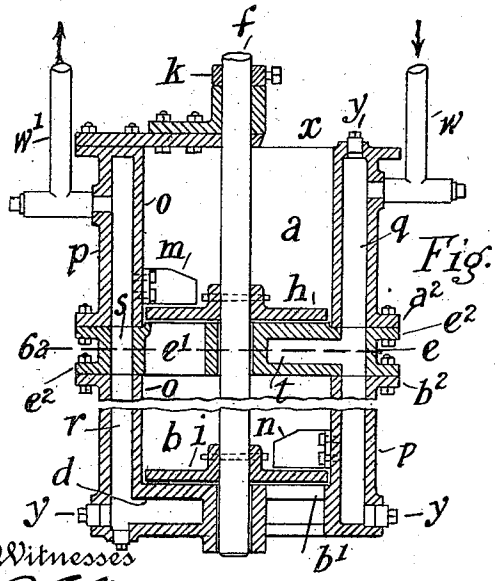


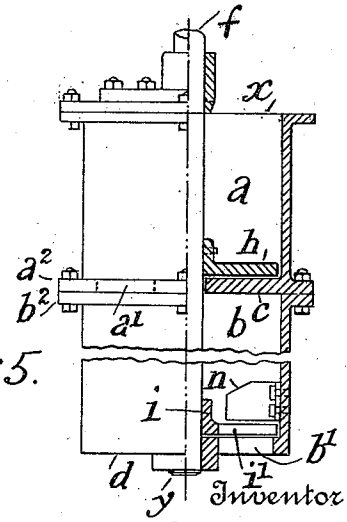
Fig. 3.

Witnesses

J. E. Ginsta

A. W. Neale Jr.

Fig. 5.



Inventor

Thomas Edwards.

by Williamson, Fitze & Watkins

his Attorney

UNITED STATES PATENT OFFICE.

THOMAS EDWARDS, OF BALLARAT, VICTORIA, AUSTRALIA.

DUST-PREVENTING ORE-DROPPING APPARATUS AND THE LIKE FOR ROASTING-FURNACES.

979,937. Specification of Letters Patent. **Patented Dec. 27, 1910.**

Application filed June 25, 1910. Serial No. 568,884.

To all whom it may concern:

Be it known that I, THOMAS EDWARDS, a subject of the King of Great Britain and Ireland, &c., residing at Ballarat, in the State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Dust-Preventing Ore-Dropping Apparatus and the Like for Roasting-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention comprises an ore dropping apparatus or the like constituting an ore saver, dust preventer, and—when desired—ore cooler.

It is valuable for the removal of ore from roasting furnaces and useful in other cases where volumes of dust arise objectionably, as in dry ore crushing machines. Though useful in still other applications, the greatest value attaches to the invention, so far as I have yet ascertained, where it results in a saving of gold in connection with ore roasting.

Roasted ore is discharged from furnaces in general use through passages extending vertically through an opening or openings in the hearth, or obliquely through the furnace side. The discharge is caused as by rotating rabbles, and a strong rising current or draft of air naturally enters the furnace through each such opening through which the ore falls. The ore is in a finely divided condition, and the said draft carries upward, as dust, some of the ore back into the furnace and the strong draft in the latter then carries this dust onward and out of the smoke flues. Arsenic collecting chambers are provided ordinarily in connection with the furnace smoke flues, and in that case the said dust settles in the arsenic chambers and as it then mixes with arsenic and other matter escaping from the furnace, special expense is entailed in refining the arsenic for sale, and in also recovering the gold,—the latter being difficult. Besides being dropped from the furnace, the heated ore needs in some cases to be cooled, and when required my ore saver and dust preventer provides for cooling it simultaneously with its conveyance to a lower level.

Forms of my ore dropper are illustrated in the accompanying drawings but there may be modifications made within the scope of my "claims."

Figure 1 shows a plan view of my ore saver and cooler; Fig. 2 a horizontal section on the line 6^a of Fig. 3; and Fig. 3 an elevation in vertical middle section. Fig. 4 shows partly in vertical middle section my combined dust preventer and cooler, when central cooling spaces are provided; and Fig. 5 shows a non-water-cooling dust preventer partly in vertical middle section. Fig. 6 shows part of a disk or conveyer in plan view.

The material used is iron, or any suitable substance or substances. One, two, three, or more ore receiving chambers, each (except the bottom one) leading down into another, are provided. These chambers are sections internally cylindrical, and having suitable apertured bottoms.

The illustrations show two-chambered devices, the chambers a, b, having respective bottoms c, d, integral therewith; or one or more distinct matching pieces are used, as e, to form when required the base of one chamber and the top of another. There are respective ore discharge openings a^1, b^1 in bottoms c, d, (and e^1 in bottom e). The discharge of chamber a is the inlet to chamber b. Flanges of the chambers and matching piece are marked a^2, b^2, e^2, bolts connecting them being shown. Such chambering allows of a structure of any desired height, and of any number of chambers, being built up to drop and cool the ore to the extent desired.

f is a solid, and g a hollow, central shaft or spindle, passing through all the chambers, and through conveyers or carriers secured thereto. These spindles are mounted and chambers a, b are supported in position in any suitable way. In each chamber, over its bottom is an adjustable conveyer, or carrier, being an apertured rotatable disk, solid as h, i, or hollow as j, and with when preferred any suitable flanges or walls not shown. These disks are so adjusted as to prevent dust rising from below and so that their apertures periodically uncover the chamber base openings, a^1, b^1, or e^1, the disks being rotated slowly (as by gearing or

sprocket chain operating shaft f or g) while the ore is fed from the roasting furnace into upper chamber a.

k is a collar on the spindle.

Each chamber opening and each conveyer aperture is of any suitable size, as for example up to about a quarter the surface area of the chamber bottom. The entrance to chamber a is marked x. It may have attached or in proximity to it any suitable tube or hopper or feeding means (not shown), and is of any suitable shape. The openings at the top and bottom of any chamber are not located one over the other, and ordinarily are about diametrically opposite, and the disks are so connected or keyed on shaft f or g that at no time can the material in one fall travel more than the depth of one chamber before it is arrested or stopped, that is it always falls either on a disk or on to the bottom of a chamber just within a disk opening.

The chambers are not necessarily of equal height; a short top chamber with a longer chamber or chambers below being often preferable, and a shorter bottom chamber than the one above it is at times used. The said stoppage of the ore or material in its fall, prevents the establishing of a dust raising draft through the chambers, and so prevents loss of the material. A plan view of the construction in Fig. 3 would have upper opening x at about the observer's right, then the next lower opening e^1, on the observer's left, and the still lower opening b^1 at the right.

When opening b^1 allows the ore to fall through by reason of disk opening i^1 registering with it, then the opening e^1 or a^1 will be closed by reason of disk opening h^1 not then registering with it, but so long as the locations of the parts are such as to prevent the loss of the material as dust they may be obviously varied. As the disks turn, edges i^2 or h^2 at the side of the disk openings will push some ore before them and this will reach the chamber opening a^1 e^1 or b^1 in due time and fall through. Most of the ore however falls on the conveyer and so travels around until it is arrested. For the purpose of such arrest there is secured to, or projecting from the side of each chamber, a wing or ore stop m, n, (not shown in Fig. 4) at about over an edge as e^{21} of the opening in the chamber base. This stop arrests ore being carried around on the adjacent disk, so that the ore banks up against the stop plate, and then, when the apertures in the disk and chamber bottom begin to register with one another, the banked ore drops through into the next chamber. The stop plate of the lowest chamber causes the ore to drop from the dust preventer to any suitable receiver, not shown. To simultaneously cool the ore as well as drop it, I provide the chamber or chambers with a jacket inclosing a space or spaces through which cooling liquid is supplied or circulated around the chambers; or I make the central shaft hollow and use hollow disks, or combine such devices.

In Figs. 1 to 3 there are walls p, o, which have between them the spaces q, r. The matching piece is hollow with any suitable holes s connecting spaces q, r, and an arc shaped space t extending from one or more holes s inwardly between the chambers. w and w^1 are respective inlet and outlet tubes to allow of circulation of the cooling medium, or liquid. As the liquid circulates its temperature rises but an undue rise is prevented by allowing the liquid to escape through pipe w^1, while fresh cold liquid continues to enter at w. Any known additions or modifications of construction for causing suitable water circulation to take place are at will usable. Any suitable means are provided for cleaning the cooling spaces, and steam and scale removing solutions or scrapers may be introduced into and forced through said spaces at will. The whole apparatus may furthermore be taken to pieces, when desired. Some plugs y are shown.

When the spindle is hollow, with construction as in Fig. 4, the cooling fluid is fed by a funnel or tube 1, and passes down one side 2 of the spindle interior which has a suitable partition 3,—and then up the other side 4 to an outlet tube or nozzle 5 fixed to the spindle and discharging the liquid as to an annular fixed pan 6, having any suitable outlet not shown. On its way the fluid passes through holes as 7, 8 in the spindle into an arc shaped space or hollow 9 in one or more of the conveyers or disks.

10 indicates a driving wheel.

The spindle foot g^1 is shown with a removable plug y by which to facilitate the clearing out of the spindle interior at will; any suitable cap may be employed.

In some cases a matching piece e but with or without recesses as found appropriate or desirable is used between non water cooled chambers, or between chambers centrally water cooled. Conveyers like j with a spindle like g will be used instead of disks h, i, and spindle f, in Fig. 3 in some instances, thus having external and internal cooling.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In a dropping apparatus for ore roasting furnaces, a series of dust preventing ore saving chambers, one below another, each having an inlet opening, a discharge opening below and out of vertical alinement

with the inlet, an apertured rotatable carrier, and an ore stop plate mounted above said carrier, substantially as described.

2. In a dropping apparatus for ore roasting furnaces, a series of chambers one below another, a rotatable spindle passing therethrough and apertured carriers adjustably mounted on said spindle to prevent draft, substantially as described.

3. In a dropping apparatus for ore roasting furnaces, a chamber having its outlet below and out of immediate alinement with its inlet, a hollow carrier apertured for ore dropping, in combination with means for rotating and cooling said carrier, substantially as described.

4. In an ore dropping apparatus for ore roasting furnaces having an ore chamber and an inlet and outlet therefor, the combination of a movable carrier within said chamber provided with an aperture coöperating with said outlet, a water conduit associated with said chamber for cooling the contents of same, and means for moving said carrier, substantially as described.

5. In a dropping apparatus for ore roasting furnaces the combination of a plurality of superposed chambers each having an inlet and an outlet, the outlet of one chamber being disposed out of vertical alinement with the outlet of its adjacent ore chamber, a rotatable carrier for each of said ore chambers provided with an aperture coöperating with the outlet of its chamber, a shaft extending through said chambers and connected with said carriers for rotating same, ore stops disposed in said chamber above said carriers and adjacent said outlets, and a water conduit associated with said chambers for cooling the contents thereof, substantially as described.

6. In a dropping apparatus for ore roasting furnaces the combination of a plurality of superposed ore chambers each having an inlet and an outlet, the outlet of one chamber being arranged out of vertical alinement with the outlet of its next adjacent chamber, a hollow rotatable shaft extending through said chambers, a carrier in each of said chambers mounted on said shaft and provided with an aperture coöperating with said outlets, a partition dividing said hollow shaft vertically substantially its length, whereby a cooling medium may be circulated lengthwise of said hollow shaft, substantially as described.

7. In a dropping apparatus for ore roasting furnaces having an ore chamber provided with an inlet and an outlet, a hollow carrier located in said chamber and provided with an opening coöperating with said outlet, and a hollow shaft connected to said carrier and having passageways communicating with the interior thereof, whereby said shaft operates to rotate said carrier and to circulate a cooling medium therein during rotation, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

THOMAS EDWARDS.

Witnesses:
GEORGE G. TURRI,
BEATRICE M. LOWE.