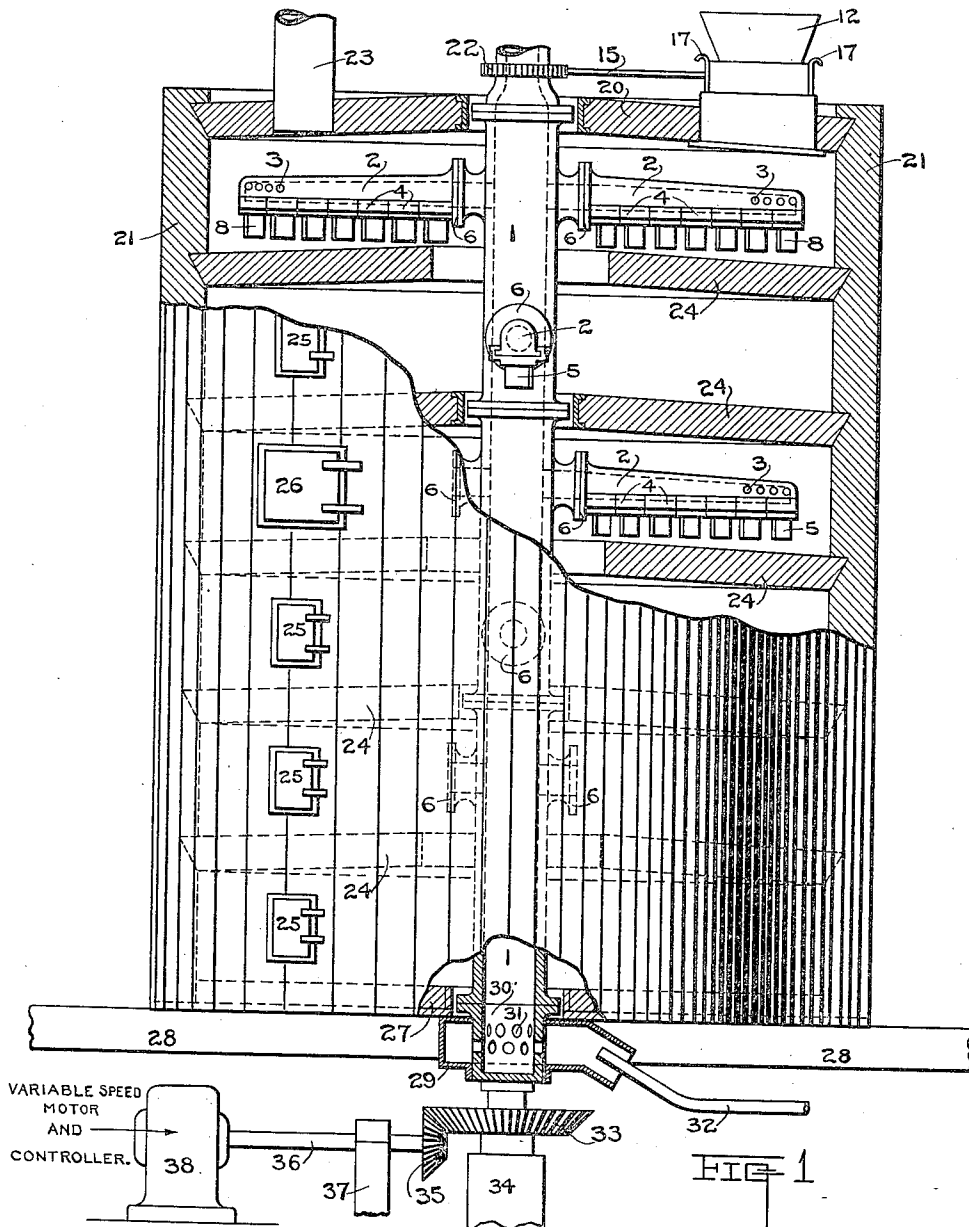


W. M. BARKER.
 SELF HEATING HOT BLAST ROASTING FURNACE.
 APPLICATION FILED MAR. 12, 1909.

961,081.

Patented June 7, 1910.

3 SHEETS—SHEET 1.



WITNESSES.

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2 SHEETS—SHEET 2.

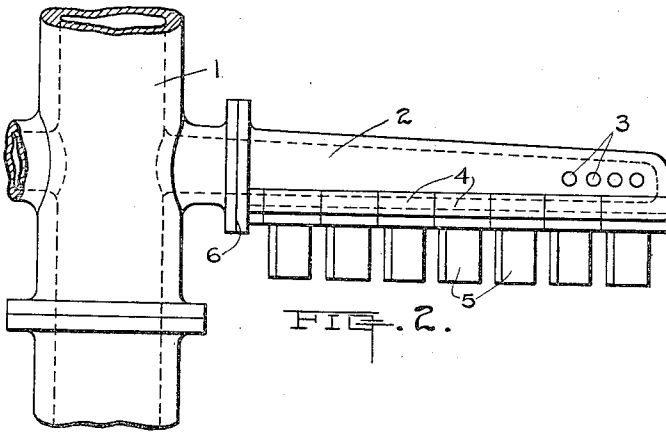


FIG. 2.

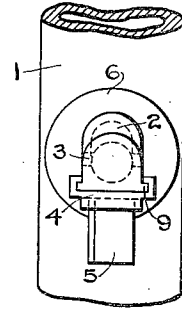


FIG. 3.

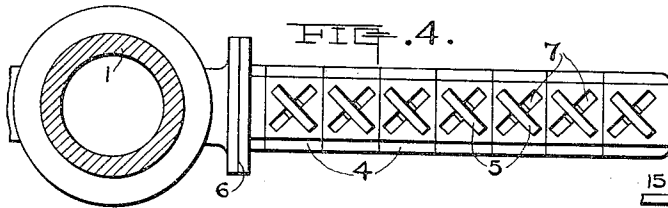


FIG. 4.

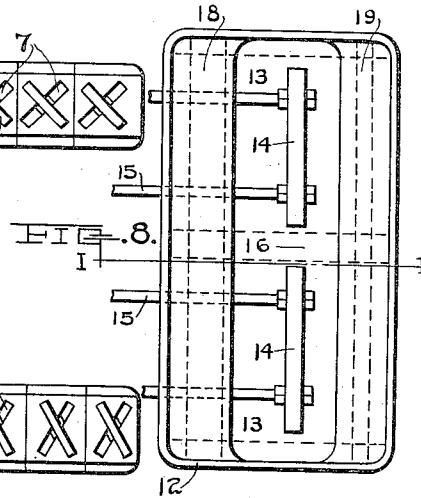


FIG. 8.

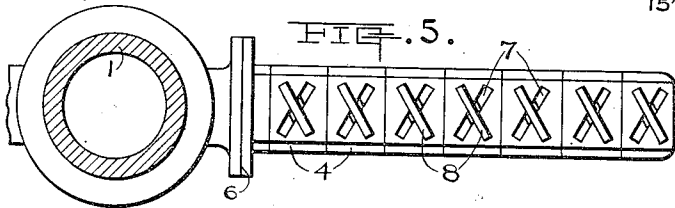


FIG. 5.

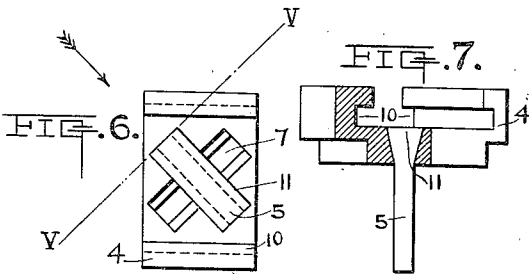


FIG. 6.

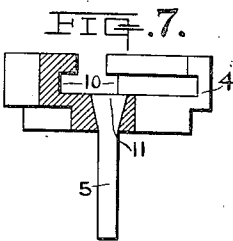


FIG. 7.

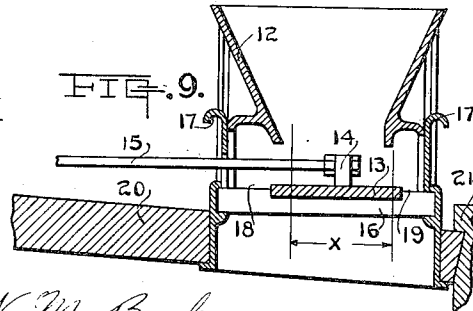


FIG. 9.

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WILLIAM M. BARKER, OF MCGILL, NEVADA, ASSIGNOR TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

SELF-HEATING HOT-BLAST ROASTING-FURNACE.

961,081.

Specification of Letters Patent.

Patented June 7, 1910.

Application filed March 12, 1909. Serial No. 482,879.

To all whom it may concern:

Be it known that I, WILLIAM M. BARKER, a citizen of the United States, residing at McGill, in the county of White Pine and State of Nevada, have invented certain new and useful Improvements in Self-Heating Hot-Blast Roasting-Furnaces, of which the following is a specification.

This invention relates to improvements in the construction of self-heating hot blast roasting furnaces for ores, that is, where the blast of air is heated by the furnace itself.

The object of the invention is to provide various improvements in ore roasting furnaces of the McDougall or similar type, which will reduce the cost of construction and increase the efficiency of the furnace.

A clear conception of the invention can be obtained by referring to the accompanying drawings in which like reference characters designate the same parts in different views.

Figure 1 is a front view, partly in section, of a roasting furnace with the invention applied thereto. Fig. 2 is an enlarged side view of one of the rabble arms showing its attachment to the hollow driving shaft. Fig. 3 is an end view of the device shown in Fig. 2. Fig. 4 is a bottom view of same. Fig. 5 is an enlarged bottom view of a rabble arm and rabbles as applied in the upper hearth of the furnace. Fig. 6 is an enlarged bottom view of one of the rabbles and rabble holder as applied in the lower hearths of the furnace. Fig. 7 is a section of same taken on the line V, V, of Fig. 6. Fig. 8 is an enlarged plan view of the hopper. Fig. 9 is a section of same taken on the line I, I, of Fig. 8.

The roasting furnace, see Fig. 1, consists essentially of a series of hearth surfaces 24, one above the other, which are inclosed by the cylindrical side wall 21, the top 20, and the bottom 27, the walls 21 and bottom 27 being supported by suitable beams 28. The hollow upright shaft 1 is centrally located within the furnace and is supported by the bearing 34 at its lower end and in any suitable manner, not shown, at its upper end.

The driving gear 33 which is attached to the lower part of the hollow shaft 1 meshes with a gear 35 which is fastened to the drive shaft 36. This drive shaft 36 is supported near the gear 35 by a bearing 37 and is connected to a variable speed source of power,

such as a variable speed motor 38 and controller, at its other end.

The lower end 30 of the hollow shaft 1 is in the form of a cap and has a series of perforations 31 passing through its sides, thus forming a connection between the chamber 29, which surrounds the end 30 of the shaft 1, and the interior of the hollow shaft 1. An air jet 32 extending from any suitable air supply terminates in the chamber 29.

The top 20 of the furnace supports the feed hopper 12 and has a flue 23 for waste gases passing through it. The upper end of the hollow shaft 1 also passes through the top 20 and is supported thereon in suitable bearings. The top 20 also supports the actuating mechanism, (not shown,) for the feed rakes 14 driven by the rake rods 15, which rods 15 are connected by a system of levers and gears (not shown) to the gear 22. The gear 22 is connected concentrically to the hollow shaft 1.

The cylindrical side walls 21 are perforated by a series of passages covered by the small doors 25, which passages allow access to the interior of the furnace for placing or replacing rabbles. The third hearth from the top 20 is provided with large passages covered by the doors 26, which passages are sufficiently large to permit the addition of fuel through them if necessary.

Each hearth surface 24 has a number of rakes or rabble arms 2 over it, these rabble arms 2 being suspended radially from the hollow shaft 1 and attached to the flanges 6, see Figs. 2, 3, 4, 5. The rabble arms 2 are hollow throughout their length and have their interiors connected with the interior of the hollow shaft 1. The ends of the rabble arms 2 are perforated by a series of holes 3 which may pass either horizontally through the side walls of the arms 2 or may be inclined upwardly and outwardly.

The rabble holders 4, see Figs. 6, 7, are suspended from the rabble arms 2 by the flanges 9 on which slide holders 4 having grooves 10 coacting with said flanges 9. Each rabble holder 4 has two wedge shaped slots 7 passing through it, the two slots 7 intersecting near their centers. The rabbles 5 having dovetail shaped ends 11 are dropped into either of these intersecting slots 7, depending upon the direction of rotation of the rabble arms 2 upon which they

are to be placed and the particular hearth over which they rotate. The pitch or inclination of the rabbles 5 in the lower hearths is greater than that of the rabbles 8 in the upper hearth, the angles between the planes of the rabbles and the vertical planes passing through the arms, these angles corresponding to the inclinations to the arms of the two sets of rabbles, being about 45 and 60 degrees respectively. The rabbles 5 of the lower hearths are not so wide as the rabbles 8 in the upper hearth.

The hopper 12, see Figs. 8 and 9, which is located above the furnace, has a plate 13 suspended by braces 16 directly below its opening. The rakes 14, actuated by rods 15, rest upon the plate 13, the limits of motion of the rakes 14 being designated by the distance X and this travel being located slightly nearer to the side walls 21 of the furnace than the center as compared to the discharge opening from the hopper 12. The opening 18 nearer the center of the furnace, is wider than the opening 19 near the outer wall 21. The doors 17 are slidingly connected with the hopper 12 and permit of easy access to the interior of the hopper 12.

In the operation the material to be roasted is fed into the hopper 12 and falls upon the plate 13. The variable speed motor 38 is operated, thus actuating the shaft 1 and rotating the rabble arms 2 and the operating gear 22 of the rakes 14. The motion of the rakes 14, within the limits X, causes the material to be precipitated upon the first or upper hearth surface 24, most of the material being precipitated nearer the center of the furnace due to the larger opening 18 being so located and also due to the travel being nearer the wall of the furnace. As the rabble arms 2 rotate, carrying the rabbles 8 with them, the material is gradually conveyed toward the opening between the hearth surface 24 and the shaft 1, being precipitated to the next hearth 24 upon reaching this opening. The small corresponding pitch and increased width of the rabbles 8 in the upper hearth will tend to more readily chop up any wet or sticky ore which is admitted through the hopper 12. Upon reaching the second hearth surface 24, the material is conveyed in an opposite direction by the rabbles 5 upon the rabble arm 2, due to the opposite inclination of the rabbles 5 above this hearth surface 24. The direction of conveyance is toward the outer wall 21, upon reaching which the material is precipitated through openings, not shown, near this outer wall 21, upon the next hearth surface 24. The direction of conveyance and the location of openings alternate in this way throughout the furnace. The advantage of having the cross slots 7 in the rabble holders 4 will be easily seen since the same holder can be used in any of the hearths.

Any holder 4 can be made either right or left hand by displacing the rabble 5, 8, therein and replacing same in the other slot.

Since the heat in the furnace is very intense, the arms 2 must be cooled in some way. This is done by admitting air under pressure through the pipe or nozzle 32 into the chamber 29, and into the hollow shaft 1 through the openings 31. While passing to the chamber 29, the compressed air from pipe 32 induces and mingles with atmospheric air taken in at the inlet to chamber 29. It may be undesirable to use compressed air for this purpose, in which case natural draft can be used. The air is distributed from the hollow shaft 1 through the interiors of the rabble arms 2, thus cooling them. Upon becoming heated in the rabble arms 2, the air passes into the furnace through the openings 3, thus introducing a hot blast into the hearth. The heat removed from the arms to cool the same is thereby utilized in promoting combustion and consequent roasting of the ore. The even distribution of the air can be effected by making the openings 3 of varying sizes.

If it should be found necessary to add fuel to that already contained in the ore, this can easily be done by passing same through the hopper or through the openings covered by the fire doors 26. It may also be desirable to vary the speed of the hollow shaft 1, which may be effected by controlling the motor 38.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In a roasting furnace, a hearth, a hollow rotatable shaft having an air inlet, a hollow arm extending therefrom over said hearth and having perforations to its interior near the outer end only of that portion of the arm extending over said hearth, and a compressed air pipe extending into said inlet whereby said pipe and arm are cooled and a hot blast introduced into said hearth through said perforations.

2. In a roasting furnace, a hearth, an arm extending over said hearth, a rabble holder supported from said arm and having right and left sockets, and a rabble adapted to be supported in either of said sockets, said rabble being locked in its supported position by said arm.

3. In a roasting furnace, a hearth surface, a second hearth surface receiving ore from said first hearth surface, supporting means extending over each of said hearth surfaces, and a plurality of rabbles supported from said means, said rabbles located over said first hearth surface being at less pitch than

said rabbles located over said second hearth surface.

4. In a roasting furnace, a hearth surface, means for introducing ore upon said surface, 5 supporting means extending over said hearth surface, and a plurality of rabbles supported from said means, said rabbles adjacent said introducing means being wider than said rabbles more remote therefrom.

10 5. In a roasting furnace, a hearth surface, means for introducing ore upon said surface, supporting means extending over said hearth surface, and a plurality of rabbles supported from said means, said rabbles adjacent said 15 introducing means being at less pitch and wider than said rabbles more remote therefrom.

6. In a roasting furnace, a plurality of superposed hearths, supporting arms ex- 20 tending over said hearths, rabbles supported from said arms, said rabbles over an upper

one of said hearths being at less pitch than said rabbles over a lower hearth.

7. In a roasting furnace, a plurality of superposed hearths, supporting arms ex- 25 tending over said hearths, rabbles supported from said arms, said rabbles over an upper one of said hearths being wider than said rabbles over a lower hearth.

8. In a roasting furnace, a plurality of 30 superposed hearths, supporting arms extending over said hearths, rabbles supported from said arms, said rabbles over an upper one of said hearths being at less pitch and wider than said rabbles over a lower hearth. 35

In testimony whereof, I affix my signature in the presence of two witnesses.

WILLIAM M. BARKER.

Witnesses:

C. E. RORK,

E. D. BURLINGAME, Jr.