Apr. 3, 1923. 1,450,900

H. C. HOLTHOFF

ROASTING FURNACE

Filed Apr. 7, 1921

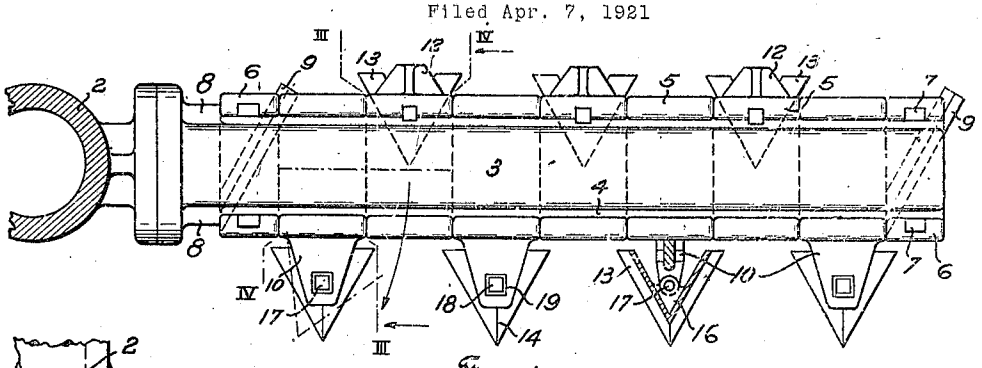


Fig. 1

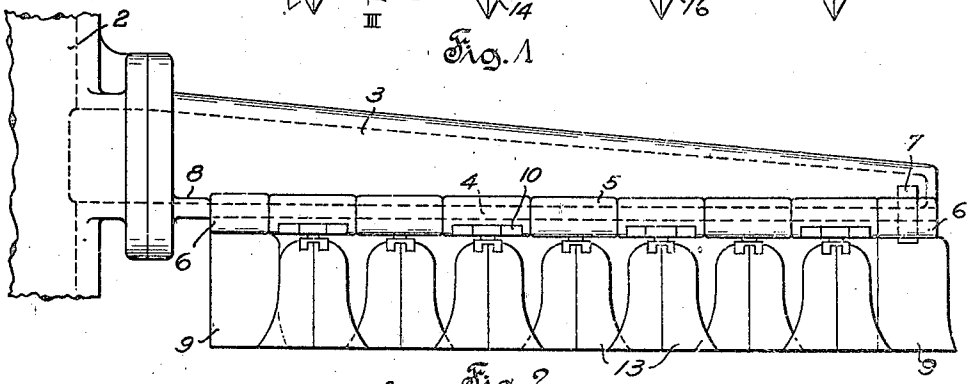


Fig. 2

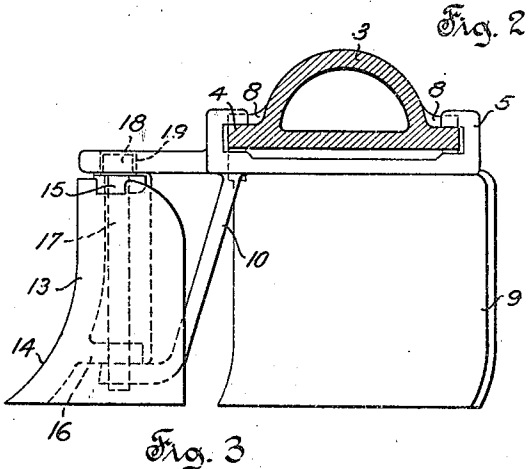


Fig. 3

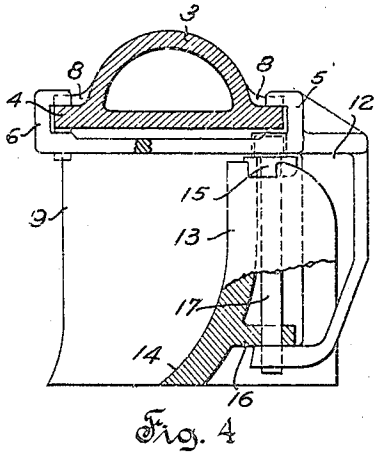


Fig. 4

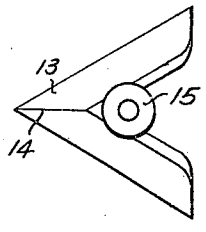


Fig. 5

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UNITED STATES PATENT OFFICE.

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ROASTING FURNACE.

Application filed April 7, 1921. Serial No. 459,306.

To all whom it may concern:

Be it known that HENRY C. HOLTHOFF, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, has invented a certain new and useful Improvement in Roasting Furnaces, of which the following is a specification.

This invention relates to improvements in rabble arms which form part of the agitating or raking mechanism common to certain types of roasting furnaces where crushed ore is heated progressively in traveling through superposed hearths to release the sulphurous content and other chemical elements that pass off in the form of gases whose presence, if retained, would retard the processes which finally extracts the more valuable minerals.

It is the exposure of the ore to the heat generated in these furnaces that expels the products to be eliminated. The necessary exposure to said heat is obtained by raking the crushed ore over floors, inwardly and outwardly in a radial direction with respect to a vertical rabble shaft, and in this wise turn the crushed charge over and over so that every possible amount of undesirable matter will be driven off before the final discharge point of the furnace is arrived at.

It is obvious, therefore, that a thorough stirring, raking or plowing of the charge in transit will heighten the efficiency of the gas expelling operation and facilitate the ore reduction, while incidentally releasing greater quantities of sulphuric gas which is entrained and stored, thereby increasing the quantity of an element recovered, while of chemical value, that holds a profitable place in the list of by-products produced in modern mining operations; besides reducing, to a minimum, the liability of atmospheric contamination which destroys vegetation and frequently raises objectionable protests that restrict the development of mining operations in certain localities.

An object of this invention is to present the ore products to rows of rabbles that furrow, as in plowing, having their rakes or rabbles staggered to form overlapping sets of share-like elements which keep the ore charge turning over while following a couse towards the discharge outlet, directed thereto by the fixed angular pitch of inner and outer rabble rakes, respectively forming, the first and last unit which comprises the quota of rabbles carried by a revolving arm.

Another feature is the mounting of raking elements or rabbles so as to leave wearing parts pivotally free while acting as plow shares drawn through the crushed ore and able to right themselves after contact with obstructions that may momentarily deflect them; also, in providing a construction that will allow the positioning of rabble units in staggered relationship to each other without requiring any departure from the form of rabble arms now largely employed in this field of endeavor.

Noticeable in this improvement is a phase of construction which provides a rabble comprised of separate members, one of which being designed to encounter the abuse resulting from frictional contact with the ore charge. This contacting member is fashioned so as to offer the advantage of replacing worn out parts at less cost than formerly, while permitting the retention of other parts to be used indefinitely instead of discarding same as was the practice heretofore, this latter feature being of economical importance in fields of operations distantly removed from centers of supply.

The accompanying drawing illustrates how these objects are obtained and discloses the applicability of this improvement to rabble arms, of accepted design, employed in this art, in which:—

Fig. 1 is a plan view of a rabble arm equipped with this improvement; Fig. 2, a side elevation of Fig. 1; Fig. 3, a section on line III—III of Fig. 1; Fig. 4, a section on line IV—IV of Fig. 1 and Fig. 5 is a plan view of a plow share member detached.

Referring more particularly to the drawing, the following detailed description applies similar characters of reference to like parts throughout the several views.

A hollow rabble shaft 2 supports a radially extending hollow arm 3, the latter provided with the fins 4 over which is slidably mounted rabble shoes 5, 6, that are maintained in position upon the arm 3 by virtue of the outer shoe 6 being keyed to the fins 4 by the dowels 7, and a limiting fin enlargement or shoulder 8 against which the inner shoe 6 abuts. The shoes 6, in this manner, maintain a plurality of the shoes 5 between

them. Integral with the shoe 6 is a rabble blade 9, angularly disposed, to correspond to the direction imparted to the ore, the blades 9, disclosed in the drawing, apply to an outward direction of ore travel.

The shoes 5 are provided, in one instance, with depending and integral brackets 10 that extend forwardly of their respective shoes and alternate upon the rabble arm with similar shoes having like brackets 12 that depend, in another instance, rearwardly of their respective shoes. The said brackets are of similar design in both forward and rearward instances and offer means for the pivotally mounting of rabble shares 13, the latter having a V shaped cross-section whose flared wings are spread to accommodate the brackets 10, 12 aforesaid. Immediately behind, and integrally with the forwardly inclined points 14 of the rabble shares 13, are fashioned the pivotal bosses 15 that are centrally bored in alinement with lower disposed lugs having openings 16, for the reception of fixed spindles 17, the latter loosely passing through the said bosses and lugs, but restrained against revolving in having squared heads 18 that insures against their turning by virtue of rectangular openings 19 in which the heads 18 rest. This construction leaves the rabble shares free to rock, as shown dotted in Fig. 1, about their respective spindles and also positions the said shares forward of their respective brackets, which arrangement protects the said brackets from the wearing effects of the passing charge and furthermore offers a two part unit that permits of the ready removal or installation of rabble shares when replenishing of these parts become necessary.

During the operation of the furnaces, to which this invention applies, the rabble arms 3 revolve in the direction indicated by the arrow in Fig. 1. The crushed ore, not shown in the drawing, is plowed or stirred by the shares 13, exposing the charge to the action of the heat present in the hearths through which the said charge is being swept. The communicating passages that connect the separated hearths, here referred to, and through which the ore charge progresses, are arranged alternately; one opening being adjacent the outer radius line described by the revolving arm 3, serves as an outlet and inlet for adjoining hearths; the other opening is formed concentric about the central rabble shaft 2, similarly functioning. These features being well known in the art will require no further description here.

The direction in which the charge travels, outward or inward, is determined by the angularity of the blades 7 of the rabble shoes 6. The function of the intermediate shoes 5 with their shares 13, is that of a thorough mixing or stirring of the crushed ore by furrowing said ore. The plow-like features of the shares 13 allows them to deflect and turn over the products to be roasted; also the pivoted provision which permits of the shares swinging to allow for the retarded passage of oversized lumps that form obstructions encountered by the points 14, thereby avoiding a pushing action that would shove along the said lumps which in turn encounters other lumps that serve to bring together a mass that would form an objectionable barrier which would prevent the ore from passing freely between the rabble shares. This objection is eliminated by the pivoting of the rabble shares 13 so as to allow large particles to be deflected to either side of the shares. The said shares being pivotally mounted adjacent their points 14 leaves their greater area behind their respective pivots where the action of the charge, diverging at the points 14, tends to right the shares after same have been deflected or rocked by the obstructions referred to above; thus, making the shares 13 self adjustable for resuming and maintaining their normal positions.

It will 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 combination, a rabble support, and a rabble associated with and automatically adjustable relatively to said support.

2. In combination, a rabble support, and a rabble carried by and automatically horizontally adjustable relatively to said support.

3. In combination, a rabble support, and a self-adjusting rabble carried by said support.

4. In combination, a rabble support, and a rabble loosely pivotally associated with said support.

5. In combination, a rabble support, and a rabble loosely pivotally associated with said support by means of a substantially vertical pivot.

6. In combination, a rabble support, a V-shaped rabble carried by said support, and a pivot associated with said support and located within said rabble.

7. In combination, a rabble support, a rabble carried by said support and comprising two intersecting walls forming a wedge, and a substantially vertical pivot depending from said support and located rearwardly of said walls near the intersection thereof.

8. In combination, a rabble arm, a shoe carried by said arm, and a rabble associated with and automatically adjustable relatively to said shoe.

9. In combination, a rabble arm, a shoe detachably connected to said arm, and a self-adjusting rabble carried by said shoe.

10. In combination, a rabble arm, a shoe carried by said arm and having a depending pivot, and a rabble carried by and freely movable about said pivot.

11. In combination, a shoe having a depending pivot, and a rabble carried forwardly of and freely movable about said pivot.

12. In combination, a rabble arm, a plurality of rabble shoes detachably associated with said arm, each of said shoes having a depending pivot, and a rabble carried by and located in front of each of said pivots.

13. In combination, a rabble arm, a plurality of rabble shoes detachably connected to said arm, each of said shoes having a depending bracket and a substantially vertical pivot carried by said bracket, and a wedge-shaped rabble carried by and located in front of each of said pivots.

14. In combination, a rabble arm, and a plurality of rabbles carried by said arm, said rabbles being arranged in two substantially horizontal rows located in different vertical planes.

15. In combination, a rabble arm, and a plurality of rabbles carried by said arm, said rabbles being arranged in two horizontal rows located in parallel vertical planes, and the rabbles of one row being staggered relatively to those of the other row.

In testimony whereof, the signature of the inventor is affixed hereto.

HENRY C. HOLTHOFF.