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ORE BURNER.

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1,038,408.

Patented Sept. 10, 1912.

2 SHEETS—SHEET 1.

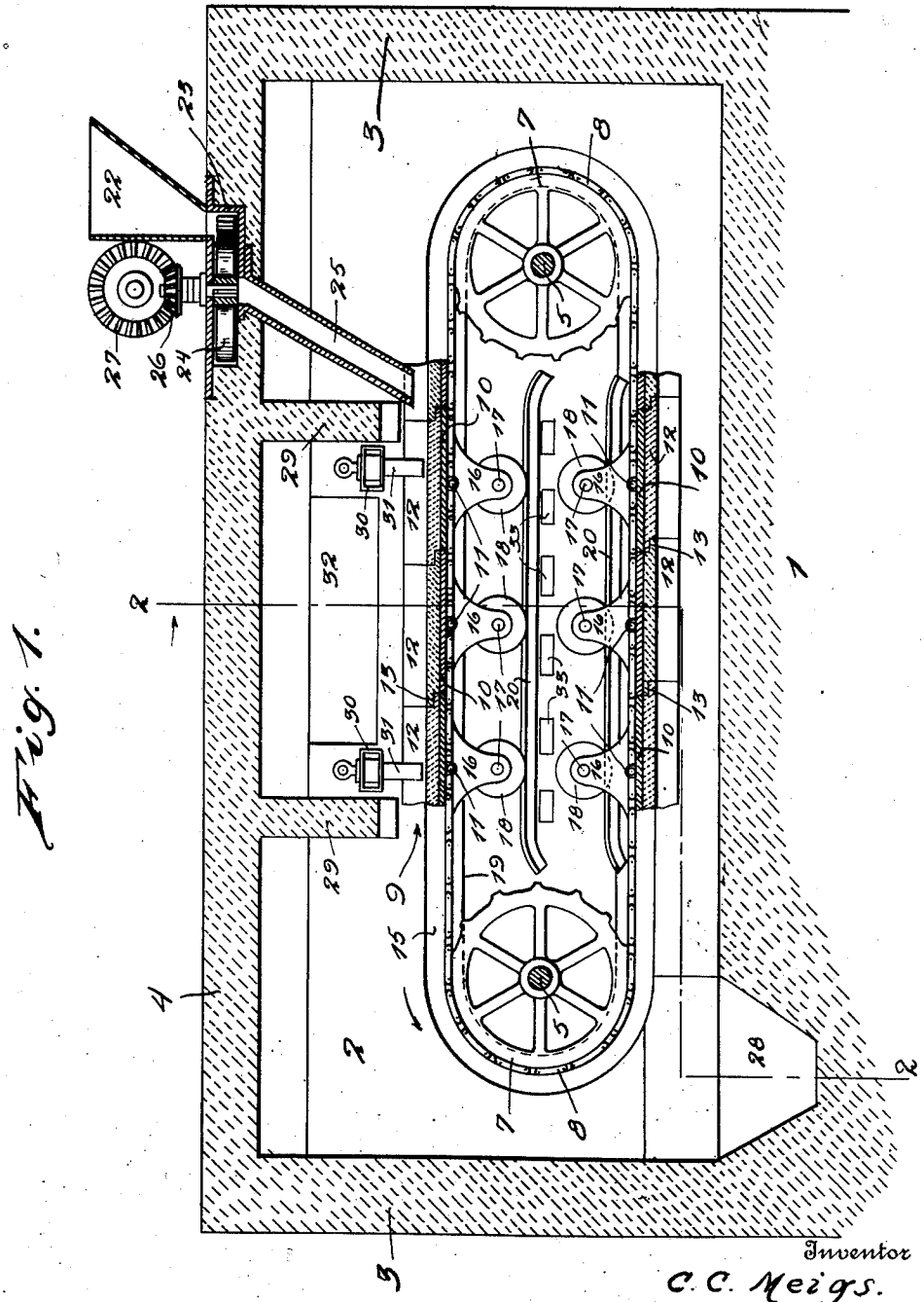

Fig. 1.

Witnesses

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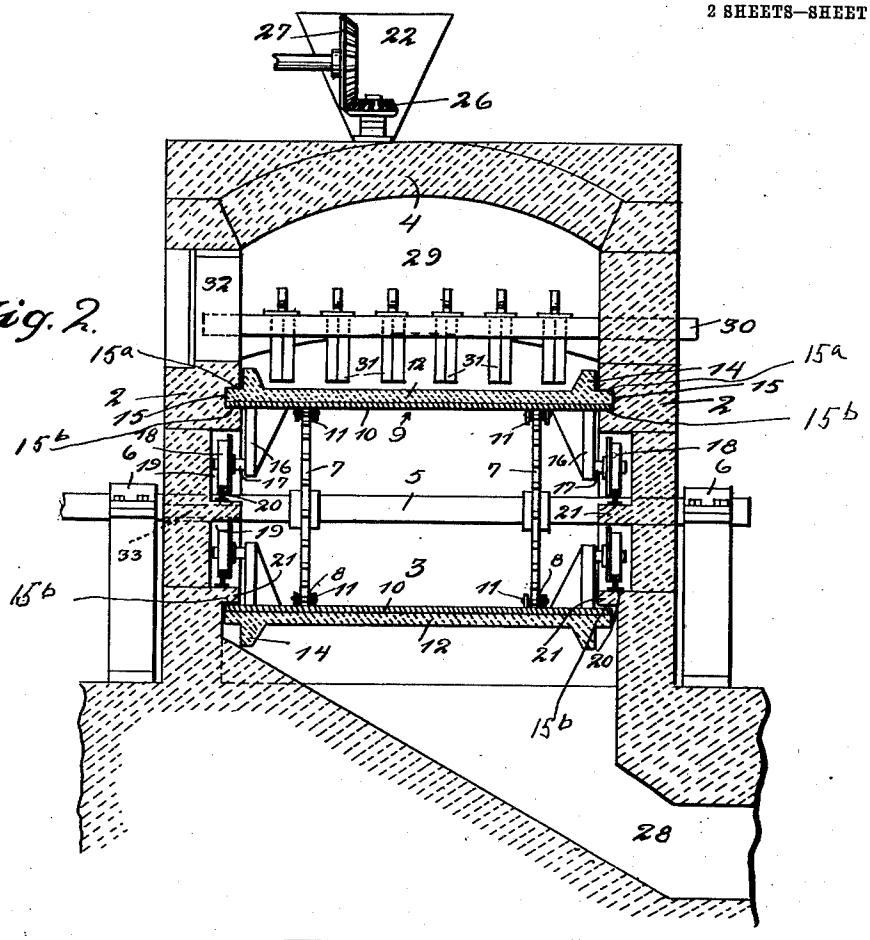
2 SHEETS—SHEET 2.

Fig. 2.



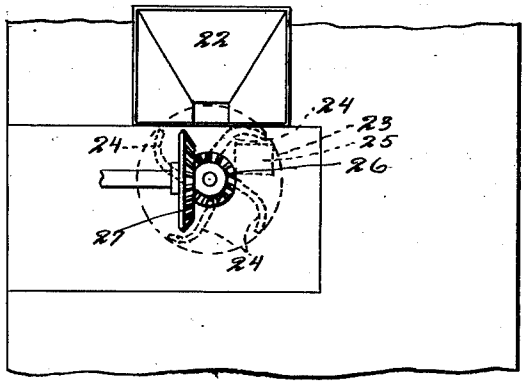


Fig. 3

Witnesses

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UNITED STATES PATENT OFFICE.

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ORE-BURNER.

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To all whom it may concern:

Be it known that I, CURTIS C. MEIGS, a citizen of the United States, residing at Woodbury, in the county of Gloucester and State of New Jersey, have invented certain new and useful Improvements in Ore-Burners, of which the following is a specification.

The present invention relates to a machine for use in the art of roasting sulfur bearing ores, particularly those commonly used in the manufacture of sulfuric acid, as pyrites, copper sulfid, zinc-blende, etc.

An important object of this invention is to provide apparatus of the above mentioned character, which operates automatically and continuously for supplying the ores to the heating chamber, breaking up the ores so that complete oxidation is had, discharging the waste product from the heating chamber, and supplying the gases obtained from the treatment of the ore to suitable acid making apparatus.

A further object of this invention is to provide apparatus of the above mentioned character so constructed that the working parts thereof are protected from the action of the gases and the heat which is generated in their formation.

A further object of the invention is to provide an ore heating apparatus of the above mentioned character, which is simple in construction, cheap to manufacture, and reliable in operation.

A further object of the invention is to provide means for treating sulfur bearing ores for the formation of sulfuric acid, which is adapted to render the process continuous and expeditious and hence cheapen the production of the acid.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a vertical longitudinal sectional view through the apparatus, Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1, and, Fig. 3 is a fragmentary plan view of a portion of the apparatus, showing the ore feeding means.

In the drawings wherein is illustrated a preferred embodiment of my invention, the numeral 1 designates a foundation or base upon which are disposed side and end walls 2 and 3 of the shell or body portion of a furnace. These walls support a top wall 4, as shown. The furnace may be constructed of any suitable heat resisting material, such as fire-brick or the like. The top wall 4 is preferably in the form of an arch, as shown.

Extending through the side walls 2 are horizontal shafts 5, journaled through suitable bearings 6. Interiorly of the furnace, spaced sprocket wheels 7 are rigidly mounted upon the shafts 5. These sprocket wheels are engaged by sprocket chains 8, to which is attached the endless belt conveyer 9. This conveyer is formed of a plurality of inner sections or plates 10, preferably formed of cast iron or other suitable metal. Each of the plates 10 is secured to the chains 8, as shown at 11, so that these plates can travel with the chains about the sprocket wheels. Secured upon each of the plates 10 is an outer protecting plate or strip 12, formed of a suitable heat resisting material, such as fire-brick. The protecting strips 12 have their adjacent longitudinal edges shaped to interfit or overlap, as shown at 13. Each of the protecting strips 12 is provided near its ends with upstanding flanges 14, disposed adjacent the side walls 2. The ends of the plates 10 and the outer protecting strip 12 fit snugly within and operate through grooves 15, formed on the inner faces of the side walls 2 and conform generally to the shape of the endless conveyer 9.

The function of the grooves 15 is to provide means for preventing the heated gases or products of combustion generated exteriorly of the conveyer from passing to the interior thereof. These endless grooves have outer and inner walls 15^a and 15^b, as shown.

Each of the plates 10 is provided near its ends with inwardly extending brackets 16, carrying outwardly extending stub shafts or axles 17, which in turn carry wheels 18. The side walls 2 are provided on their inner faces with openings or recesses 19, for receiving the wheels 18, which travel on fixed horizontal rails 20, having their ends bent or curved downwardly, as shown. These rails are secured upon flanges or portions 21 of the side walls 2. It is thus seen that the greater part of weight of the endless conveyer is transferred to and supported by the rails 20 through the medium of the wheels 18 and associated elements. Attention is

called to the fact that the operating elements employed to effect the travel of the endless conveyer 9 are all disposed in this conveyer and hence will be properly protected from heat generated within the furnace.

Material to be fed into the apparatus is first placed in a hopper 22, which discharges into a horizontal shell or casing 23, preferably counter-sunk in the top wall 4 near one end thereof, as shown. Disposed within this horizontal casing is a rotatable valve or feeder comprising curved arms 24, adapted to discharge material from the hopper 22 to a chute 25, which discharges upon the upper surface of the endless conveyer 9, preferably near one end thereof, as shown. Suitable means are employed to rotate this feeder, comprising a bevel gear 26 which is driven by a bevel gear 27. Any suitable means may be employed to drive the bevel gear 27 and the shaft 5. At its opposite end the conveyer 9 discharges the waste products into a chute 28, shaped as shown, for conducting such products from proximity to the furnace, where the same may preferably be taken up by a suitable conveyer.

Depending from the top wall or arch 4 are arched walls or webs 29, terminating near and spaced from the endless conveyer 9, as shown. Arranged between these depending walls or webs are rakes, to break up the lumps of ore, whereby the oxidation of the ore will be more complete. These rakes are preferably removable, and comprise horizontal body portions or beams 30 formed of suitable material and having spaced openings formed therethrough for receiving depending breaker-teeth 31, which are preferably removable. These breaker-teeth extend downwardly to terminate near and spaced from the conveyer 9 and are preferably substantially triangular shaped in horizontal cross-section. The supporting bars are hollow and may be either air or water cooled.

The gases generated in the furnace pass through a flue 32, from which they pass to suitable apparatus (not shown). Oxygen or air is supplied into the furnace through openings 33, or through doors arranged above the moving hearth, which may be of any desired number and arrangement, or may be supplied by forced draft at any desired point in furnace walls. Suitable means may be provided for opening and closing these openings, as may be necessary.

I may construct the side wall of the furnace with an opening to allow a man to enter the interior of the furnace, to make repairs or the like, in which case a suitable door will be provided to close this opening.

The operation of the apparatus is as follows: The furnace is first heated to a desired temperature for causing the oxidation or combustion of the ores, which may be accomplished by building a fire in the furnace or by any other means. The sulfur bearing ores are now fed into the hopper 22 and supplied by the feeder in proper amounts through chute 25 onto the conveyer 9. The ores are now heated in the furnace in the presence of the air and become oxidized to form the gases, and this oxidation is continued without additional heating of the furnace. The conveyer is driven in the direction of the arrow, and by the time the ore has reached the left end of the conveyer, it is completely oxidized and is waste product. The waste product is now discharged into the chute 28. The gases generated pass through the flue 32 to suitable apparatus (not shown).

I wish it understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that certain changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. The combination with a furnace shell, comprising side walls provided on their inner faces with grooves, of an endless conveyer operating in the shell and comprising a plurality of inner sections and a plurality of outer sections secured thereto and formed of heat resisting material, each outer section being provided near its ends that extend into said grooves with outwardly extending flanges, sprocket wheels disposed within said endless conveyer, sprocket chains connecting the sprocket wheels and having connection with said inner sections, a discharge chute disposed near one end of the endless conveyer, and means disposed near the opposite end to feed material to the conveyer.

2. The combination with a furnace shell, of an endless conveyer operating therein, means to effect the travel of the conveyer, means to feed material to the conveyer, and rakes disposed near the conveyer including substantially horizontal tubular body portion carrying depending teeth, to permit of a cooling medium being freely circulated through said body portion.

3. The combination with a furnace shell having side walls provided upon their inner faces with endless grooves having inner and outer walls, an endless conveyer disposed within the furnace shell and having its longitudinal edges operating within the endless grooves to prevent the products of combustion generated in the furnace shell exteriorly of the endless conveyer from passing into the interior of the conveyer, driving mechanism to effect the travel of the endless conveyer disposed within such endless con-

veyer, means disposed within the endless conveyer for supporting the upper and lower portions thereof to prevent the upper portion from having undue frictional engagement with the inner walls of the endless grooves and the lower portion from having undue frictional engagement with the outer walls of the endless grooves, and means for feeding material upon the endless conveyer.

4. The combination with a furnace shell having side walls provided upon their inner faces with endless grooves having inner and outer walls, an endless conveyer disposed within the furnace and having its longitudinal edges operating within the endless grooves in close proximity to the outer and inner walls thereof to prevent the products of combustion generated in the furnace shell exteriorly of the endless conveyer from passing into the interior of such endless conveyer, mechanism disposed within the endless conveyer to effect its longitudinal travel, and means to feed material upon the endless conveyer.

5. The combination with a furnace shell having side walls provided upon their faces with approximately elliptical grooves, an endless conveyer disposed entirely within the furnace shell and having its longitudinal edges operating in the approximately elliptical grooves, the said endless conveyer comprising a plurality of pivoted sections, operating mechanism disposed within the endless conveyer comprising endless belts and pulleys, supporting wheels connected with the pivoted sections and extending inwardly to be disposed entirely interiorly of the endless conveyer, superposed spaced tracks disposed entirely within said endless conveyer to be engaged by said supporting wheels, means for feeding material to one end portion of the conveyer, and means for receiving such material discharged from the opposite end of the conveyer.

6. The combination with a furnace shell having side walls provided upon their inner faces with approximately elliptical grooves, an endless conveyer disposed entirely within the furnace shell and having its longitudinal edges extending into and operating within such approximately elliptical grooves, said endless conveyer being provided near and spaced from its longitudinal edges with endless outwardly extending flanges operating adjacent the side walls of the furnace shell, means disposed interiorly of the endless conveyer to effect its travel, and means to supply material to the conveyer.

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