March 16, 1937. A. L. J. QUENEAU 2,073,994

METALLURGICAL METHOD

Filed Oct. 9, 1935 3 Sheets-Sheet 1

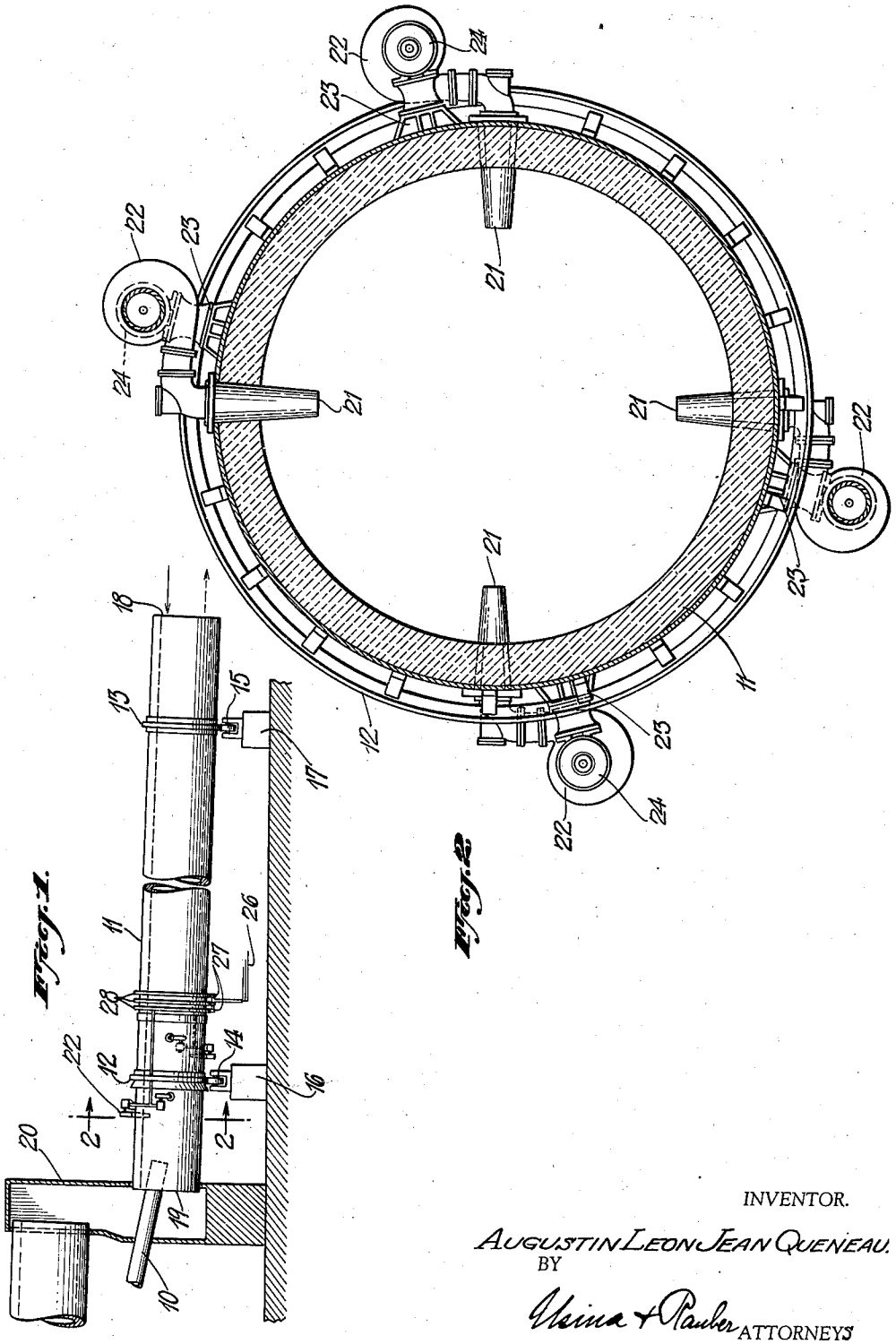


Fig. 1.

Fig. 2.

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METALLURGICAL METHOD

Filed Oct. 9, 1935 3 Sheets-Sheet 2

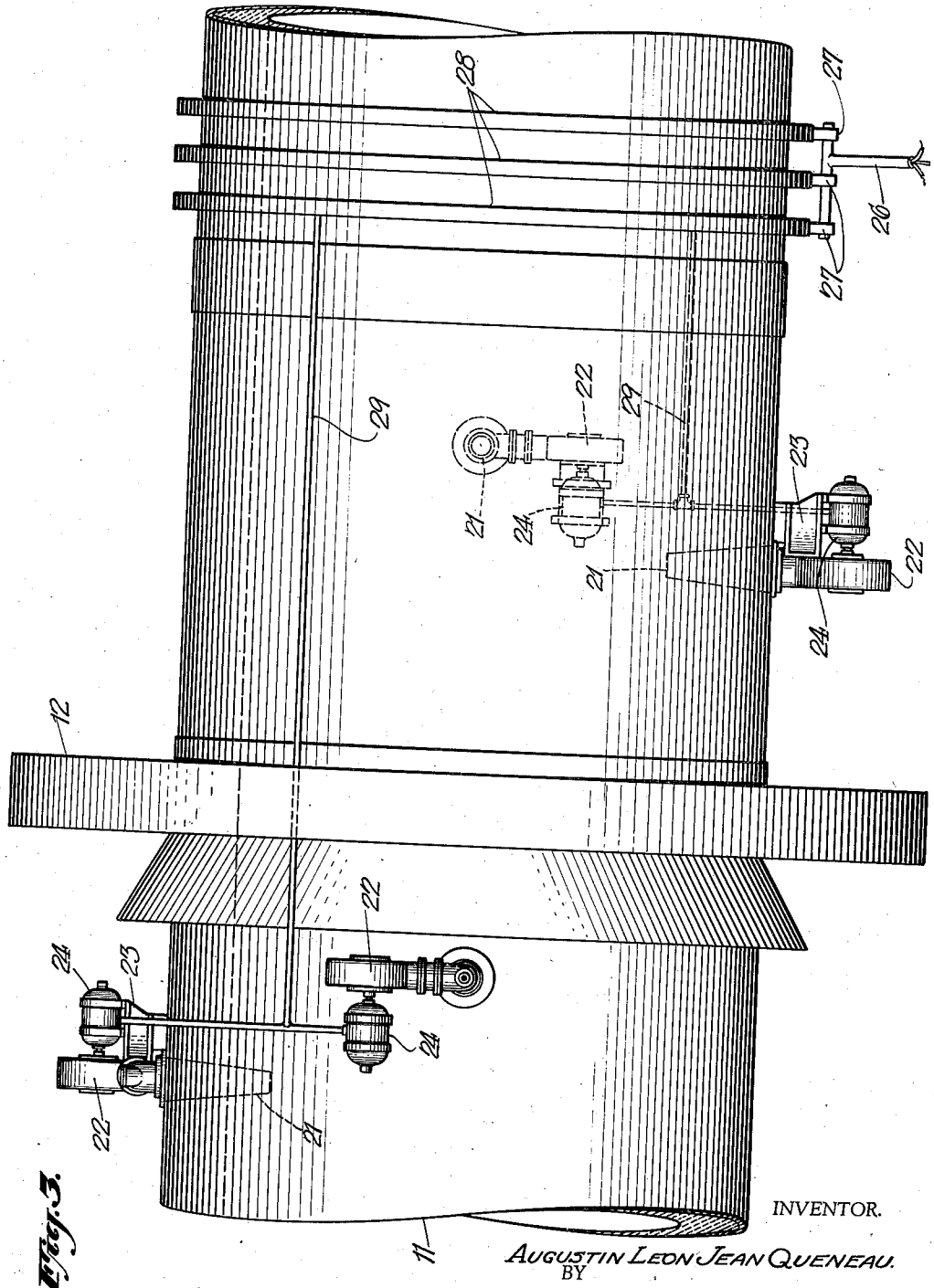


Fig. 3.

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METALLURGICAL METHOD

Filed Oct. 9, 1935 3 Sheets-Sheet 3

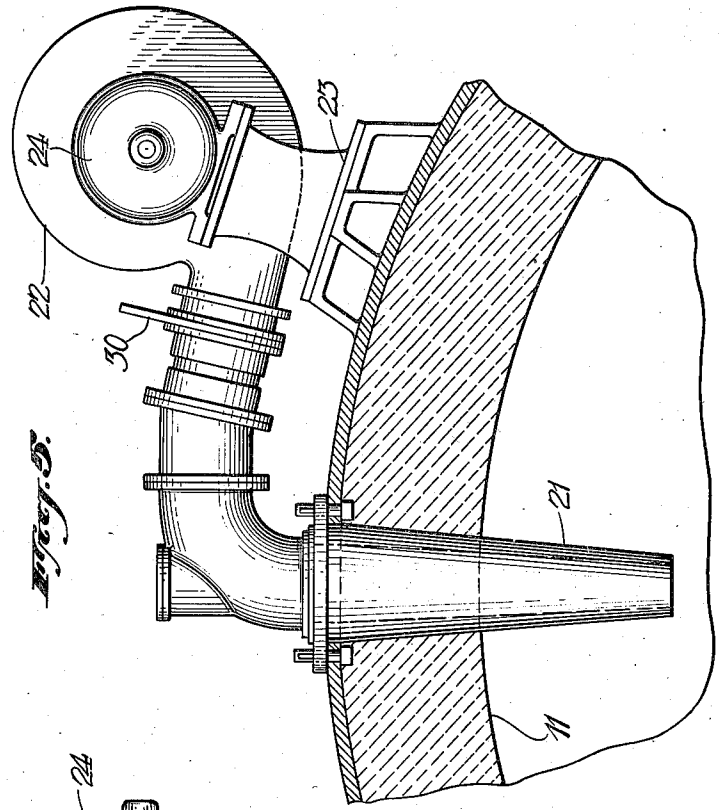


Fig. 5.

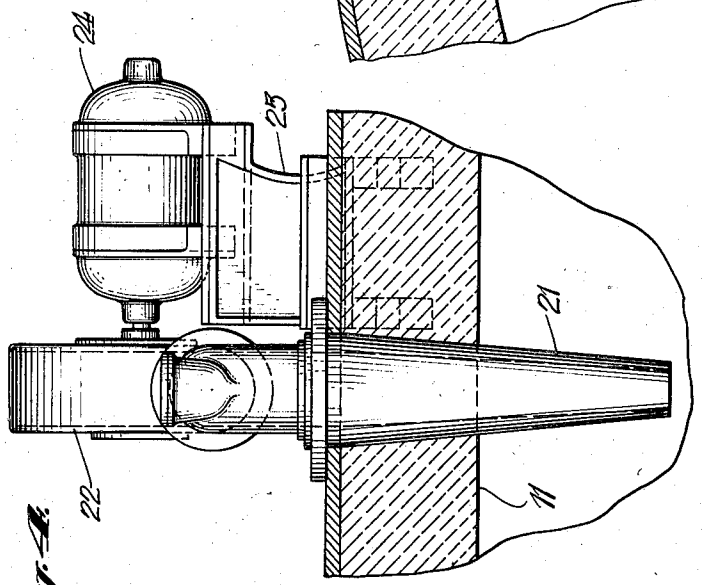


Fig. 4.

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UNITED STATES PATENT OFFICE

2,073,994

METALLURGICAL METHOD

Augustin Leon Jean Queneau, Bernardsville, N. J.

Application October 9, 1935, Serial No. 44,274

4 Claims. (Cl. 75—87)

My invention relates to a method and apparatus for roasting certain materials such as residues of zinc distilling furnaces for the recuperation of zinc and lead values. The recuperation of these values by roasting is very frequently done by a process known as the "Waelz process" various forms and modifications of which are described in the following patents: Nos. 1,618,204, 1,705,128, 1,725,865, 1,728,681, 1,731,898, 1,736,665, 1,754,169, 1,754,170, 1,755,712, 1,762,867, 1,921,825 and 1,541,561.

In roasting materials of the above type they are fed admixed with fuel into the upper end of a slightly inclined rotating tubular shaft through which a blast of hot air is supplied in the opposite direction. As the mixture of residues and fuel passes downwardly towards the lower or discharge end, the air passed in the opposite direction burns the fuel and heats the material to the required temperature. As the air passes toward the feed end, it loses its oxygen by combination with the fuel, and combustion therefore stops at a considerable distance from the upper end of the kiln. As a result, the temperature at the upper end of the kiln into which the material to be roasted is fed, drops to such an extent that the material tends to form a ring of slag at a short distance below the point where it is fed into the kiln. As this slag ring increases progressively, it eventually attains a thickness as, for example, after ten to fourteen days operation, sufficient to prevent the feeding of material into the kiln. This slag formation is apparently due to a difference in temperature between the material fed into the kiln and the kiln lining at the point of formation.

In my present invention the formation of a slag ring is avoided and the fed material is rapidly heated, thereby enabling the kiln to be operated for a long or indefinite period of time.

In the operation of kilns of the above type, an excess of fuel is supplied with the material and is carried to the discharge end of the kiln. The heating effect attainable by the combustion of this fuel cannot be obtained in methods and apparatus heretofore used because it is impossible to supply sufficient air through the discharge end of the furnace to completely burn the fuel without disturbing the operation of the kiln, which requires an approximately balanced draft at the feed and leading to the waste heat boilers in which the exhaust gases pass. As a result, the oxygen of the blast is exhausted at a considerable distance from the charging end of the furnace.

In my invention additional blasts of air are blown into the kiln a short distance below the charging of materials into the kiln to burn the coke or fuel in the charge. An additional quantity of easily ignitable fuel, such as finely divided bituminous coal, may be added to the charge. As a result, the highly volatile fuel is ignited and burned upon reaching an ignition temperature and supplies sufficient heat to heat the charging materials rapidly in the upper part of the kiln. This additional air is supplied near the upper part of the kiln by means of blowers spaced at intervals about the circumference of the kiln and supplying blasts of air through nozzles directly into the kiln. The blowers may be driven by any suitable means as, for example, by electric motors receiving current from brushes bearing against take-off rings encircling the kiln.

The various features of the invention are illustrated in the accompanying drawings, in which—

Fig. 1 is a diagrammatic sketch of a rotary kiln embodying a preferred form of the invention.

Fig. 2 is a cross section of the kiln taken on line 2—2 of Fig. 1.

Fig. 3 is a side view of a portion of the kiln taken on a larger scale than that of Fig. 1, and

Figs. 4 and 5 are detail sections through the kiln wall taken endwise, respectively, of the blower and nozzle.

In the embodiment of the invention shown in the accompanying drawings, charging material is fed through a feeding chute 10 into the upper end of a rotary kiln 11 having supporting rings 12 and 13 rotatable on rollers 14 and 15, respectively, mounted on suitable bases 16 and 17. A blast of air is passed upwardly from the lower or discharge end 18 of the rotary kiln to the charging or upper end 19 and comes rapidly into contact with the charging material as the latter passes downwardly to the discharge end while the kiln is rotated. The exhaust gases leaving the upper end of the kiln pass through a flue 20 to waste heat boilers or other heat absorbing apparatus.

To maintain a temperature near the feed end sufficient to prevent the formation of a slag ring, a somewhat volatile fuel is supplied with the feed near the feeding chute 10. To ignite and burn this fuel, additional quantities of air are blown into the kiln a short distance below the feeding chute 10 through nozzles 21, four being shown by way of example, arranged at equal intervals about the circumference of the kiln. The nozzles, however, are preferably not arranged all in one zone but may also be spaced at longitudinal distances on the kiln. Blasts of air are supplied to the several nozzles 21 by means of blowers 22 mounted on pedestals 23 on the kiln and driven by individ-

ual motors 24 also mounted on pedestals 25 on the kiln. The motors 24 are driven by current supplied from a main 26 through brushes 27 to collector rings 28 encircling the kiln 11 and connected by suitable wiring 29 to the motors 24. The electrical connection has been shown as a three-phase system, but it will be understood that this is merely by way of example and that other arrangements of electric current may be used. By using several blowers and air blasts the air supplied near the charging end may be more readily distributed about the kiln. Each blower and nozzle may be provided with a regulating air gate or damper 30 to control the blast of air.

Through the above invention the temperature of the kiln at the charging end may be maintained sufficiently high to rapidly heat the charging material and prevent its becoming partly sintered and congealing on the kiln lining to form a slag ring. The roasting of the ores or residues and the operation of the kiln are thereby greatly facilitated.

What I claim is:

1. A method which comprises passing a mixture of fuel and zinc containing material countercurrent through a horizontally passing blast of oxidizing gases while agitating said fuel and material, and injecting additional air at intervals about said blast near the charging end of said blast.

2. A method which comprises passing a mixture of fuel and zinc containing material countercurrent through a horizontally passing blast of oxidizing gases, agitating said fuel and material while passing through said blast, and injecting additional air into said blast a short distance below the charging end of said material and fuel.

3. A method of treating zinc containing mineral material to recover zinc therefrom which comprises feeding said material admixed with fuel to the upper end of a slightly inclined rotating cylinder, supplying air for combustion to the opposite end of said cylinder, and supplying air to said cylinder at a short distance from said feeding end.

4. A method of treating zinc containing material to recover zinc therefrom which comprises feeding said material admixed with fuel to the upper end of a slightly inclined rotating cylinder, supplying air for combustion to the opposite end of said cylinder, and supplying air to said cylinder a short distance from said feeding end in jets spaced about the periphery of said cylinder.

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