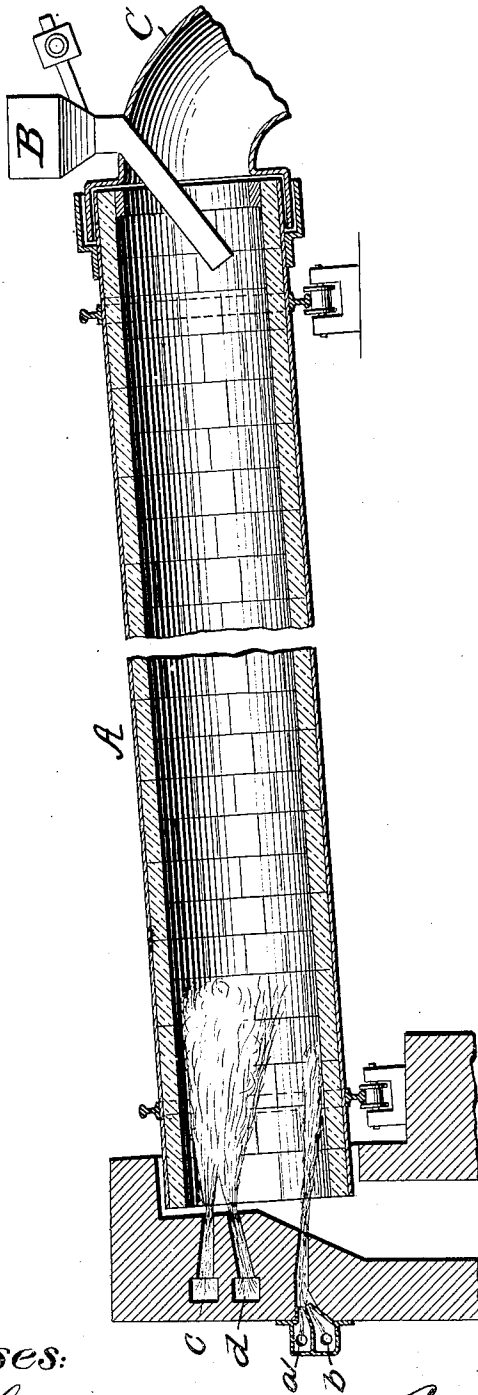


BEST AVAILABLE COPY

No. 822,929.

PATENTED JUNE 12, 1906.

C. DELLWIK.
NODULIZING ORES, &c.
APPLICATION FILED MAR. 22, 1906.



Witnesses:
A. W. Edlin,
R. E. Gunt.

Inventor:
Carl Dellwik,
by Lemmie & Goldsborough,
Attorneys.

UNITED STATES PATENT OFFICE.

CARL DELLWIK, OF LONDON, ENGLAND, ASSIGNOR TO J. EDUARD
GOLDSCHMID, OF FRANKFORT-ON-THE-MAIN, GERMANY.

NODULIZING ORES, &c.

No. 822,929.

Specification of Letters Patent.

Patented June 12, 1906.

Application filed March 22, 1906. Serial No. 307,367.

To all whom it may concern:

Be it known that I, CARL DELLWIK, a subject of the King of Sweden, residing in London, England, have invented certain new and useful Improvements in Nodulizing Ores and the Like; 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.

My invention relates to certain new and useful improvements in the nodulizing of ores, metalliferous residues, and the like.

According to the prevailing practice the ores, flue-dust, blue billy, or the like are charged into the upper end of an inclined rotating kiln traversed by products of combustion and issues at the lower end of said kiln in the form of nodules or small lumps of irregular rounded contour sufficiently hard and sufficiently porous to be charged to advantage in the blast-furnace. In those instances where the products of combustion for heating the interior of the kiln are derived from a grate fire or from the combustion of pulverized fuel or of blast-furnace gas or Siemens gas or other like fuel of low calorific power the rotary kiln employed is usually of very considerable length in order finally to bring the particles to the high temperature required for the formation of the nodulized product. In these long kilns thus heated the slagging or scorification of the particles begins at a very considerable distance from the lower or discharge end, and it is found that highly-refractory rings or bands of scoria form upon the interior lining of the kiln remote from the discharge end. These rings or bands interfere with the proper functioning of the kiln and are difficult of access and of removal.

My present invention involves a nodulizing operation which has for its purpose the production of a short sharp flame of great calorific power and of comparatively small volume located at a point in relatively close proximity to the lower or discharge end of the rotary kiln, such flame being produced by the combustion of water-gas and the employment of a supplementary flame of larger volume and of a cheaper combustible—as, for instance, blast-furnace gas, producer-gas, or pulverized fuel—for the purpose of supplying

the main body of heat used in the upper portions of the rotary kiln. By this expedient I localize the sintering or fritting stage of the nodulizing operation to a zone of the kiln in near vicinity to its discharge end, so that it may proceed under conditions peculiarly appropriate to the effects desired, and at the same time I supply the great body of heat for the preliminary stage of the operation—as, for instance, driving off moisture from the ore, desulfurizing, or otherwise purifying it—by the combustion of a relatively cheap combustible in the upper portions of the furnace, where it is of less importance that the combustible employed should be of the same quality as the sintering-flame.

In the accompanying drawing I have illustrated in longitudinal section a form of rotary kiln appropriate to the practice of my invention.

Referring to the drawing, A indicates the body portion of the kiln, supported in an inclined position in any suitable manner, as shown, and adapted to be rotated at a suitable speed of revolution by appropriate gearing. (Not shown.)

B represents the feed-hopper for the admission of the ore, flue-dust, or the like to be nodulized, and C represents any suitable exit-flue for the escape of the waste gases.

a indicates a discharge-port for the admission of a body of water-gas, and b represents a port for the admission of air in proximity to the water-gas discharge, so that the resultant water-gas flame may, as indicated, be projected against the bottom of the kiln at a point in near proximity to the outlet end thereof.

c indicates a port for the admission of the cheaper combustible—as, for instance, blast-furnace gas, Siemens gas, pulverized fuel, or the like—and d represents the corresponding air-admission port for the combustion of said cheaper fuel, the resultant flame taking its course upwardly through the kiln in such manner as to heat its contents mainly by radiation. The air is supplied either under pressure or by induced draft, and by the manipulation of appropriate valves I am enabled to regulate the flame from each of these sources to produce the effects desired quite independently of the surrounding atmosphere in the kiln. The flame from the

cheaper fuel passes above the intense lower flame, filling the kiln, and the products of combustion of both flames eventually mix and pass through the kiln, gradually heating the material moving in the opposite and downward direction.

I do not restrict myself to introducing the flame of cheaper fuel at the extreme lower end of the kiln. It may to advantage be introduced higher up in the kiln, or, if preferred, the apparatus may consist of two kilns, in one of which the preliminary heating by the cheaper gas takes place, the lower one being heated by the nodulizing flame of water-gas. It is also obvious that instead of a revolving kiln an inclined kiln rocking upon its longitudinal axis may be employed, and in this case also the flame of lower grade may be introduced at any desired distance from the lower end.

Having thus described my invention, what I claim is—

The method of heating kilns for the nodulizing of ores, metalliferous residues, and the like, which consists in limiting the nodulizing or sinterizing zone to a relatively short distance from the discharge end by the employment of a flame of intense calorific power at said discharge end, and supplying the additional heat necessary for the preliminary stages of the operation by a flame of lower-grade fuel and of relatively inferior temperature of combustion; substantially as described.

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

CARL DELLWIK.

Witnesses:

H. C. TUXBURY,
WILLIAM H. DAVIS.