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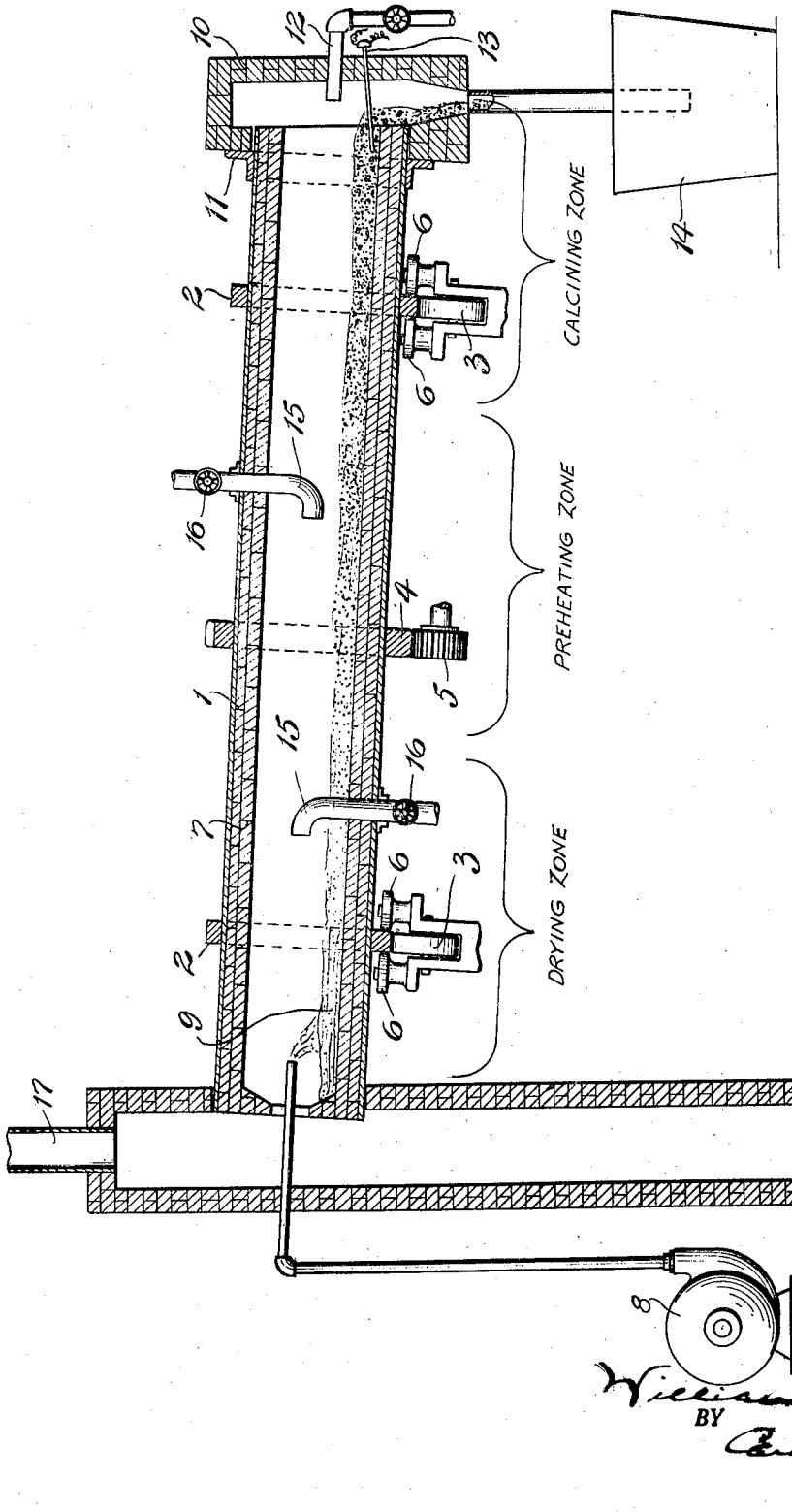

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MANUFACTURE OF LITHOPONE.

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My invention relates to the manufacture of lithopone and has for its principal object the provision of an improved apparatus for and method of drying and calcining lithopone.

In the manufacture of lithopone, the precipitate of zinc sulfide and barium sulfate resulting from the interaction of solutions of zinc sulfate and barium sulfide is usually filter-pressed, is dried in any suitable apparatus, and after the drying operation, is heated or calcined and the hot product plunged directly from the heating chamber into cold water. Heretofore emphasis has been placed on the necessity of drying the raw material prior to calcination and very low percentages, say from 3% to 10% have been considered as the maximum limits for the residual moisture in the lithopone when ready for calcination; and the present invention eliminates this drying operation heretofore thought necessary prior to calcining. According to my invention, undried lithopone, either the wet precipitate or slurry as it comes from the precipitating tank, or the very moist cake resulting from a filtering operation is introduced into a furnace without the drying operation heretofore considered essential. The lithopone gradually works its way toward the discharge end of the furnace, being first dried, then preheated, then calcined and finally discharged into cold water. Preferably the furnace is heated internally by means of gas that is supplied with an insufficient amount of air to completely consume the gas in the calcining zone of the furnace.

A further development of the invention relates to the burning of the unconsumed fuel gas at such points in the furnace or muffle as are maintained at a temperature lower than that at which the zinc sulfide will be oxidized, the necessary air being admitted in carefully controlled quantities through the walls of the furnace. The extra heat thus generated is used to more quickly and economically dry or preheat the material before it is advanced to the zone of higher or calcining temperatures. The extra heat gained in this manner is secured at little or no additional cost, because, as has been stated, it is necessary to have the gas in the calcining portion of the furnace in excess of the air sufficient to completely burn it, and this excess gas is ordinarily wasted and by using said excess gas, the capacity of the furnace is greatly increased.

The accompanying drawing which forms part of this specification, is a longitudinal sectional view of a furnace embodying my invention.

In carrying out my invention, I prefer to use a revolving cylinder 1 slightly inclined from the receiving toward the discharge end and of sufficient length and diameter to give the capacity desired. The furnace 1 is provided with rings 2 that rest on anti-friction rollers 3 and suitable means for rotating it are provided, as a ring gear 4 on the furnace that meshes with a gear 5 driven in any suitable manner. Preferably thrust rollers 6 are mounted on either side of the rings 2.

The cylinder 1 is lined with brick 7 or other insulating or refractory material in such portions as are subjected to high temperature or as are necessary to protect the crude or raw lithopone from contact with the metallic walls of the cylinder and consequent discoloration of the lithopone. At the feed end is illustrated a pump 8 for feeding lithopone in the form of a slurry 9 into the furnace. Any other suitable device for feeding slurry or moist filter cake into the furnace may be used.

The kiln or furnace thus described is provided with a closure plate 10 and a closure ring 11 constituting an air seal at the discharge or firing end to prevent the entrance of air other than that mixed with the fuel. A gas burner 12 preferably of the Bunsen type, extends into the furnace at the discharge end; and as has been stated, the burner is supplied with air in insufficient quantities to completely burn the gas. Thus the gas burns with a reducing flame in the calcining portion of the furnace and there is no tendency to oxidize any part of the lithopone. A pyrometer 13 may be mounted in the closure plate, extending into the furnace to measure the temperature in the calcining zone thereof. A suitable tank 14 filled with cold water is provided to receive the red-hot lithopone from the furnace.

At one or more points between the discharge end and the feed end, air vents or inlet pipes 15 may be provided. These open-

ings are equipped with valves 16 or other air controlling devices to permit careful control of the amount of air to be admitted. A considerable amount of unconsumed fuel gas reaches the immediate vicinity of one or more of the auxiliary air vents 15 described above because of the insufficient air supply at the burner 12. This unconsumed gas unites with the oxygen entering through the air vents 15 and assists in drying the raw lithopone. The temperature thus created is not high enough to oxidize any part of the raw lithopone. The exhaust gases pass out through a stack 17 at the feed end of the furnace.

Into the feed or cold end of this furnace is fed the crude lithopone from the precipitating vats, either without previous dewatering or after filtering, without other drying in the form of a slurry or wet filter cake. This can be introduced by a pump, as illustrated, or by a jet, screw conveyor or other means, avoiding the necessity of providing separate drying apparatus with its attendant cost and possible injury to the crude lithopone. The crude lithopone is caused by the design of the furnace to travel towards the calcining or high temperature zone, and is successively dried, preheated, calcined and finally discharged at a red heat into the quench box. At all stages of this operation the amount of heat, proportion of air and reactivity of the fuel gas are under control resulting in a calcined lithopone of superior color and opacity, and greatly reducing the cost of making lithopone without impairing its desirable qualities. If the temperature of the furnace outside of the calcining zone becomes too high, the amount of air introduced through the auxiliary vents can be increased, thus cooling the furnace.

It will be understood that the furnace may be made and used without the auxiliary air inlet pipes hereinbefore described. As has been stated, if air inlets are used, care must be taken that, in the calcining zone, there is insufficient air to completely consume the fuel.

Obviously numerous changes may be made without departing from the invention and I do not wish to be limited to the precise embodiments of the invention hereinbefore set forth.

What I claim is:

1. The improvement in the process of making lithopone, which comprises carrying on the entire drying and calcining thereof as one continuous operation in one vessel by burning fuel inside of said vessel in the same chamber with the lithopone, said fuel being supplied with an insufficient amount of air to completely consume the combustible matter thereof in the calcining zone.

2. The improvement in the process of making lithopone, which comprises carrying on the entire drying and calcining thereof as one continuous operation in one vessel by burning fuel inside of said vessel in the same chamber with the lithopone, and regulating the temperature of the furnace outside of the calcining zone by the admission of air into the furnace.

3. The process of treating undried raw lithopone which consists in passing such lithopone through an elongated combustion chamber in one direction, burning fuel in the lithopone discharge end portion of said chamber, and passing the products of combustion through said chamber in the opposite direction, the fuel for such combustion being fed into said lithopone discharge end portion with insufficient air to effect complete combustion in such end portion whereby the raw lithopone is dried and calcined.

4. The process of treating undried raw lithopone which consists in passing such lithopone through an elongated combustion chamber in one direction, burning fuel in the lithopone discharge end portion of said chamber, and passing the products of combustion through said chamber in the opposite direction, the fuel for such combustion being fed into said lithopone discharge end portion with insufficient air to effect complete combustion in such end portion whereby the raw lithopone is dried and calcined, and additional air being fed into said chamber back from said discharge end for burning the combustible matter in said products of the main combustion.

5. The improvement in the process of making lithopone, which comprises feeding undried lithopone into one end of an elongated slightly inclined furnace, rotating said furnace to cause the lithopone to move toward the other end of the furnace, introducing combustible gas into said furnace at the end opposite that at which the lithopone is introduced and burning said gas in the presence of air in insufficient quantity to completely consume the gas.

6. The improvement in the process of making lithopone, which comprises feeding undried lithopone into one end of an elongated slightly inclined furnace, rotating said furnace to cause the lithopone to move toward the other end of the furnace, introducing combustible gas into said furnace at the end opposite that at which the lithopone is introduced, burning said gas in the presence of air in insufficient quantity to completely consume the gas, whereby the lithopone is first dried, then preheated and finally calcined, and introducing air into the furnace between the calcining portion and the feed end thereof.

7. The process of making lithopone which comprises feeding into the upper end of an elongated inclined furnace, lithopone containing in excess of 10% moisture, heating

the lower end of said furnace by burning fuel therein in the presence of an insufficient amount of air to completely consume the fuel, thereby calcining the lithopone in the lower end of the furnace and drying the moist lithopone in the upper end of the furnace, the lithopone passing gradually from the upper end of the furnace to the lower end thereof, to be first dried and then calcined.

Signed at Collinsville, Illinois, this 22nd day of January, 1925.

WILLIAM H. LANDERS.