L. S. HUGHES.
METHOD OF MANUFACTURING LITHARGE.
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METHOD OF MANUFACTURING LITHARGE.

No. 920,333.


To all whom it may concern:

Be it known that I, LOUIS S. HUGHES, a citizen of the United States of America, residing in Joplin, in the county of Jasper, in the State of Missouri, have invented a certain new and improved Method of Manufacturing Litharge, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the manufacture of litharge from lead carbonate and has for its object to provide for the economical manufacture of very pure litharge in a state of fine division which adds materially to its commercial value.

Broadly speaking, my process consists in finely dividing the lead carbonate, usually in the form of native ores, and injecting such finely divided material into the furnace having a substantially non-reducing temperature and maintained at a temperature sufficient to decompose the carbonate and form litharge PbO and carbonic acid CO₂ and finally separating the litharge from the furnace gases and impurities, this separation being effected in two stages, first, by the subsidence of the heavy impurities, separating them from both the gases and litharge and, second, by the separation of the litharge from the gases by screening. Owing to the very fine state of division of the particles of litharge resulting from the described treatment impurities of even less specific gravity can be effectively separated by subsidence owing to their greater mass. And my invention consists in maintaining the walls of the furnace at a temperature below that at which the litharge will adhere there to and I have found that no injurious adherence occurs where the walls of the furnace do not materially exceed 1200° F, and by far the best results are secured by constructing the furnace of thin unlined walls of sheet iron fully exposed to atmospheric conditions which will by radiation and contact with the air be maintained at a sufficiently low temperature. Also for the best practical operation of my process I find it advisable to construct the furnace in the form of a vertical cylinder having thin unlined walls of sheet iron and heated by gas burners entering the furnace somewhat above the bottom thereof. A jet of air is caused to move upward from the bottom of the furnace into the heat zone therein and the pulverized lead carbonate is passed to this jet and by the jet into the heated portion of the furnace, in this way entering the effective portion in the state of separation as well as division, the litharge and furnace gases passing out of the furnace through the top thereof to the separating system.

In the drawing forming part of this application, I have illustrated a furnace wall adapted for the practice of my process, the furnace having characteristic features described and claimed in my copending applications, one filed March 20th, 1906. Serial Number 506,954 and the other filed October 22, 1906. Serial Number 593,904.

In the drawing, Figure 1 is a side elevation, partly in central section of the furnace and the connected separating and screen mechanism, and Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1.

A indicates the cylindrical walls of the furnace formed of thin unlined sheet metal and provided with a hopper shaped bottom A' of the same material having one or more openings indicated at A² for the admission of air and the outlet of unburned particles which settle in the furnace; A² indicating the normally closed opening by which access is had to the interior of the furnace.

B is an air jet pipe directed axially upward from the bottom of the furnace and supplied by an air pipe B'.

C is a flue leading from the top of the furnace provided with settling chambers C' C' and connected, as shown, by a draft fan D, with the flues C₂ C₃, the latter flue having hoppers C₃ C₄ opening into its bottom for the reception of the litharge and connecting at top with screen bags indicated at E, E₃ through which the furnace gases escape.

F indicates a gas pipe supplying an annular gas ring F₃ having projecting from it a series of burner nozzles F₂ F₃, these burner nozzles projecting into the burner tubes G, G₃ which extend through the walls of the furnace and beyond the same, the inner ends of the burner tubes having overhangs, as indicated at G'.

H is a hopper in which the finely divided ore is placed and which communicates with the interior of the furnace through a chute H' having a trough like end H₂ which pro-
jects to or nearly to the center of the furnace so as to deliver the ore directly into the upwardly moving air jet from the jet pipe. I is a gate for regulating the feed and J a rapping or vibrating device acting on the hopper and chute so as to keep the metal of which they are made in vibration and insure a constant and even feed of ore.

In practice, the lead carbonate ore is charged into the hopper H in a fine state of division, the furnace started by admitting and igniting gas and air through the burners G forming a central flame K, preferably surrounded by an air jacket indicated at L and coming from the opening A² at the bottom of the furnace. The central upper part of the furnace is at once raised to a sufficient temperature to decompose lead carbonate, a temperature of or above 1000° F. being sufficient for this purpose. The lead carbonate is then fed to the furnace through the chute H¹, H², and is carried in a fine state of separation and division into the heated portion of the furnace by the air jet, the carbonate being promptly decomposed and the litharge and carbonic acid being in an exceedingly fine state of division adherence of the litharge to the walls of the furnace is avoided by maintaining said walls at a temperature of about 1900° F. or below, the heavy impurities, unburned particles of ore etc., will separate from the furnace gases and the light particles of litharge by subsidence in the furnace and will ultimately escape through the opening A². The litharge and furnace gases passing from the top of the furnace, ponderable impurities will be largely separated therefrom by subsidence in the flue C and finally the litharge will be separated from the furnace gases by the screens E and collected in the hoppers C².

It will readily be apparent that my process of manufacture is rapid and cheap, that my litharge will be entirely free from contamination by lead particles and may be made practically free from contamination of any harmful character and further that the finely divided litharge resulting from my furnace is in a peculiarly valuable commercial form.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is—

1. The process of manufacturing litharge from lead carbonate which consists in finely dividing the carbonate, maintaining a furnace at a temperature sufficient to decompose the carbonate into litharge and carbonic acid and with a substantially non-reducing atmosphere, injecting the finely divided carbonate into the heated portion of the furnace and separating the litharge and gases from solid impurities by the subsidence of such impurities and finally separating the litharge from the gases.

3. The process of manufacturing litharge from lead carbonate which consists in finely dividing the carbonate, maintaining an unlined iron walled furnace at an internal temperature sufficient to decompose the carbonate into litharge and carbonic acid and with a substantially non-reducing atmosphere, cooling the walls of the furnace so as to maintain them at a temperature below that at which litharge will adhere thereto, injecting the finely divided carbonate into the heated portion of the furnace and separating the litharge from impurities.

4. The process of manufacturing litharge from lead carbonate which consists in finely dividing the carbonate, maintaining a thin unlined sheet iron furnace at an internal temperature sufficient to decompose the carbonate into litharge and carbonic acid and with a substantially non-reducing atmosphere while maintaining the thin walls of the furnace by conduction and radiation at a temperature below that at which the litharge will adhere thereto, injecting the finely divided carbonate into the heated portion of the furnace, and separating the litharge formed from impurities.

5. The process of manufacturing litharge from lead carbonate which consists in finely dividing the carbonate, maintaining a vertically unlined iron walled furnace at an internal temperature sufficient to decompose the carbonate into litharge and carbonic acid and with a substantially non-reducing atmosphere while maintaining the furnace walls at a temperature below that at which litharge will adhere thereto, injecting the finely divided carbonate into the heated portion of the furnace, carrying the litharge formed therein and lighter impurities from the top of the furnace, separating the ponderable impurities from the litharge and gases by subsidence and finally separating the litharge from the gases.

6. The process of manufacturing litharge from lead carbonate which consists in finely dividing the carbonate, heating the upper portion of a vertical iron walled furnace by gas burners to a temperature at which the carbonate is decomposed into litharge and carbonic acid while leaving the bottom of the furnace unheated, maintaining the walls of the furnace at a temperature below that at which litharge will adhere thereto, maintaining a substantial non-re-
ducing atmosphere in the furnace, directing a jet of gas or vapor from the bottom upward into the heated zone of the furnace, feeding the finely divided carbonate into said jet and with the jet to the heated furnace zone, drawing the litharge formed from the top of the furnace with the furnace gases and separating the litharge from gases and impurities.

LOUIS S. HUGHES.

Witnesses:

BELLE SPARKS,

JERE. CHARLOW.