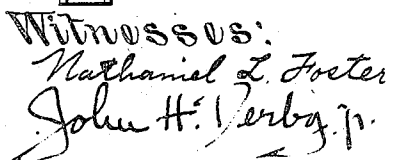


CONTINUOUS PROCESS OF MAKING WHITE LEAD AND APPARATUS THEREFOR.
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To all whom it may concern:

Be it known that I, CARLETON ELLIS, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Continuous Processes of Making White Lead and Apparatus Therefor, of which the following is a specification.

This invention relates to the process of and apparatus for making white lead, and relates in particular to a process of and apparatus for manufacturing white lead in a continuous or non-cumulative manner.

The manufacture of white lead by the old Dutch process involves treatment of the metallic lead for a space of two or three months with corroding agents, and on account of the protracted period of time required for the complete corrosion of the lead, together with the labor involved in handling the raw and finished product, the cost of manufacture of white lead by this process is relatively high. For this reason numerous processes have come into existence which involve the preliminary comminution of the molten metallic lead in some way, and subsequent treatment of the comminuted product with air, carbon dioxide and moisture; sometimes in the presence of acetic acid or other similar chemical reagents. These so called rapid processes are of intermittent operation, and because of this discontinuity in the processes of manufacture much time is lost in the treatment, unnecessary labor is involved in handling the product, and in the care of the various individual steps of operation required, and because of the fact that the material is handled in batches, uniformity of the product is a difficult thing to attain.

The present invention has for its object the making of white lead in a continuous or non-cumulative manner, which makes the operation an automatic one from the time the lead is introduced into the melting pot up to the time when the finished white lead is ready to be packed for shipment, and because of this automatic method of procedure, labor costs are greatly reduced, wear and tear of apparatus is minimized, and a product of uniform quality is secured.

My invention involves melting the lead, preferably in a tank equipped with a melt-

ing pot and molten lead reservoir, in comminuting the molten lead by means of a jet of compressed air, inert gas, steam or water, collecting the comminuted product, and maintaining it by such means as an extensive conveying system, in contact with air and carbon dioxide and water or steam or both, until the lead has become converted into basic carbonate of lead or hydrated carbonate of lead, corresponding to the accepted formula for white lead, and finally freeing the product from its moisture.

The accompanying drawing will make clear the manner in which I carry out the present invention, as it illustrates in a diagrammatic way the essential features of operation. These drawings show in section a melting pot and furnace, conveying means, and inlets and outlets for the various reagents employed.

In the drawing, 1 is a reservoir for the molten lead integral with the melting pot 2 partitioned by the wall or dam 3.

4 is a conveying means suitable for transferring pig lead from the stock room to the melting tank 2.

5 is a fire box or combustion chamber having the ash pit 6.

7 is a flue leading from the housing of this furnace to a stack.

8 is an outlet pipe for the lead reservoir 1, and is equipped with the plug and lever opening and closing means 9.

10 is a shell surrounding the outlet pipe 8 opening into the heating chamber at one end and having the outlet pipe 11 at the other end, which may be connected with the stack or a suction fan. The outlet pipe 8 narrows at its lower end to form a flattened aperture.

13 is an atomizing pipe-feed with the valve 14. Although shown in the drawing as directed downward it may be placed in any other suitable position with reference to the aperture 12.

15 is a receiving bin and 16, 17, 18, 19, 20 and 21 are troughs carrying conveying paddles mounted on the shafting 20, 21, 22 and 23 are inlet pipes connected with the conveyer 16, while 24, 25, 26, 27, 28 and 29 are similar inlet pipes arranged on the conveyer troughs 17 and 18 respectively.

30 and 31 are exhaust pipes.

32 is a steam jacket attached to the con-

veyer 19, having the steam inlet pipe 33 and outlet pipe 34. The trough 20 is similarly equipped with the jacket 35, inlet 36 and outlet 37.

5 38 is an outlet for the finished product.

The operation of the process is as follows:—Pig lead is fed into the melting pot 2, and by means of fire directly beneath this pot, is rapidly melted and flows into
10 the lead reservoir 1 where the lead is maintained in a molten condition due to the products of combustion circulating in the space between the reservoir and the housing. The lead in the reservoir is preferably
15 maintained in a supermolten condition *i.e.* at a temperature of 400 or 500 degrees above the melting point. A portion of the hot products of combustion are shunted through the annular passage formed by pipe 8 and
20 shell 10 and pass away through the outlet 11. The passage of this hot gas along the exterior of the pipe 8 serves to keep the latter hot and thus to maintain the lead at the desired degree of fluidity essential for
25 proper comminution or filamentation. The plug attached to the lever 9 is adjusted to allow a flow of molten lead through the pipe 8. The lead flows out at the aperture 12, where it comes into contact with the
30 filamenting jet produced by the atomizer 13. The atomizing medium which may be employed depends to some extent upon the character of the lead. A hard lead ordinarily requires treatment differing from that
35 needed for soft lead. As stated, compressed air, steam, superheated steam, inert gas or waste products of combustion or water may be employed in the atomizing process. Water tends to produce a rather coarsely
40 granulated lead, while gases or superheated steam more readily yield a finely divided or filamentous product. Ordinarily I prefer to use compressed heated air to produce a filamentous product carrying a coating of
45 catalytic oxid of such a character that the subsequent conversion is rendered very rapid.

Heretofore it has been customary in manufacturing white lead simply by the use
50 of air, water and carbon dioxid, to oxidize and hydrate the lead in one operation, and subsequently to carbonate in a second operation, these operations being of course of an intermittent character. By the present invention it becomes possible to simultaneously hydrate and carbonate, thereby securing a marked diminution in the total time required for the complete conversion of the lead.

60 The filamentous lead produced by the specified method, carrying a coating of catalytic oxid, goes into the bin 15, and the conveyers 20 being put into operation, the filamentous lead is carried with constant
65 and thorough agitation along the conveying

troughs 16, 17, 18, 19 and 20. Through the pipes 21, 22 and 23, air, water and carbon dioxid or air, water and steam may be admitted. Reaction takes place during the slow travel of the material along the conveyer 16, and the agitation produced by the
70 paddles of the conveyer insures a perfect mingling of the reacting materials. Hydration or hydration and carbonation, as the case may be, sets in. In the conveyer 17, air
75 and carbon dioxid may be introduced by the pipes 24 and 25 respectively, and if desired steam may be admitted by the pipe 26. A similar method of operation obtains with the inlet pipes 27, 28 and 29 of the conveyer
80 18. The waste gases are drawn out from the conveying system by means of the outlets 30 and 31 which are connected to suction fan-blowers.

In order to hasten the operation when
85 the lead has reached a certain degree of hydration and carbonation, heating of the traveling mass of material may be resorted to, and for this purpose steam is entered into the steam jacket 32 thereby heating the
90 trough 19 for a considerable portion of its length. The proportion of carbon dioxid admitted at this point may be very high and in fact air may be largely excluded.

The operation is so conducted that by the
95 time the product reaches the conveyer 20 it has become completely hydrated and carbonated, and during the last portion of its travel it is subjected to heat for the purpose of removing moisture. This is done by entering steam into the jacketed inclosure 35,
100 heated air at the same time if desired being passed through the trough. The dry material discharges at 38 and may be packed
105 for shipment.

With the employment of reagents, such as acetic acid, in connection with hydration and carbonation process above described the product may be washed after leaving the conveyers prior to drying.
110

It will be evident from the foregoing that the present process of continuous manufacture involves a great labor saving, and the opportunity to produce a product of
115 great uniformity. Furthermore it allows the changes taking place in the transformation of filamentous lead into white lead to be carefully watched at every stage and to permit of modification of the atmosphere
120 bathing the material to give rise to the most complete and rapid conversion.

Having described my invention, to the details of which I do not wish to limit myself, what I claim is:

1. The process of making white lead
125 which consists in melting lead, converting it into a finely divided product and subjecting a continuously, integrally and progressively advancing stream of said product to the action of air, moisture and carbon di-
130

oxid under substantially atmospheric pressure, whereby, said finely divided product is progressively converted into white lead.

2. The process of making white lead which comprises melting lead, raising it to a supermolten condition, comminuting by a pressure jet to make a comminuted lead product and subjecting a continuously, integrally and progressively advancing stream of said product to the action of air, moisture and carbon dioxid, under substantially atmospheric pressure, whereby said finely divided product is progressively converted into white lead.

3. The process of making white lead which comprises melting lead, raising it to a supermolten condition, comminuting by means of a pressure jet containing an oxidizing medium, whereby filamentous lead coated with a catalytic oxid is produced and subjecting a continuously, integrally and progressively advancing stream of said product to the action of air, moisture and carbon dioxid under substantially atmospheric pressure, whereby said finely divided product is progressively converted into white lead.

4. The process of making white lead which comprises raising lead to a temperature of about 400° above its melting point, comminuting by means of a jet of heated air under high pressure, whereby filamentous lead coated with a catalytic oxid is produced and in subjecting a continuously, integrally and progressively advancing stream of said product to a gaseous current containing oxygen under substantially atmospheric pressure in the presence of moisture to bring about hydration and in converting the product into basic carbonate of lead by the prolonged action of oxygen and carbon dioxid in the presence of moisture at a temperature above atmospheric, said process being conducted in a continuously-progressive and non-cumulative manner.

5. The process of making white lead, which comprises melting lead, raising it to a supermolten condition, comminuting by means of a pressure jet containing an oxidizing medium whereby filamentous lead

coated with a catalytic oxid is produced, treating the superficially oxidized lead as an integral progressively-advancing traveling stream by agitation in the presence of moisture, air and carbon dioxid; whereby the lead product is converted into white lead; and in drying the product.

6. The process of making white lead, which comprises melting lead, comminuting by means of an oxidizing fluid to make a filamented lead coated with catalytic oxid, treating such filamented lead as an integral-progressively advancing traveling stream with oxidizing and carbonating agents in the presence of moisture until carbonation is partially complete and in completing the carbonation while simultaneously increasing the temperature of the carbonating mass, said process being conducted in a continuous and non-cumulative manner.

7. The process of making white lead, which comprises melting lead and raising it to a supermolten condition, comminuting by the atomizing action of a pressure jet of heated air to make a filamented lead coated with catalytic oxid, in treating said filamented lead as an integral progressively-advancing traveling stream, with oxidizing and carbonating agents in the presence of moisture, in completing the carbonation while subjecting the traveling stream to an increase of temperature, and in drying the product, said process being conducted in a continuous and non-cumulative manner.

8. Apparatus for making white lead, comprising a kettle for melting metallic lead, means for discharging the molten lead therefrom as a thin stream, means for impinging thereon a comminuting fluid jet, a series of conveyers of great length for propelling the comminuted product as an integral progressively advancing stream and means for introducing into said conveyers a current of air and carbon dioxid.

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

CARLETON ELLIS.

Witnesses:

NATHANIEL L. FOSTER,
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