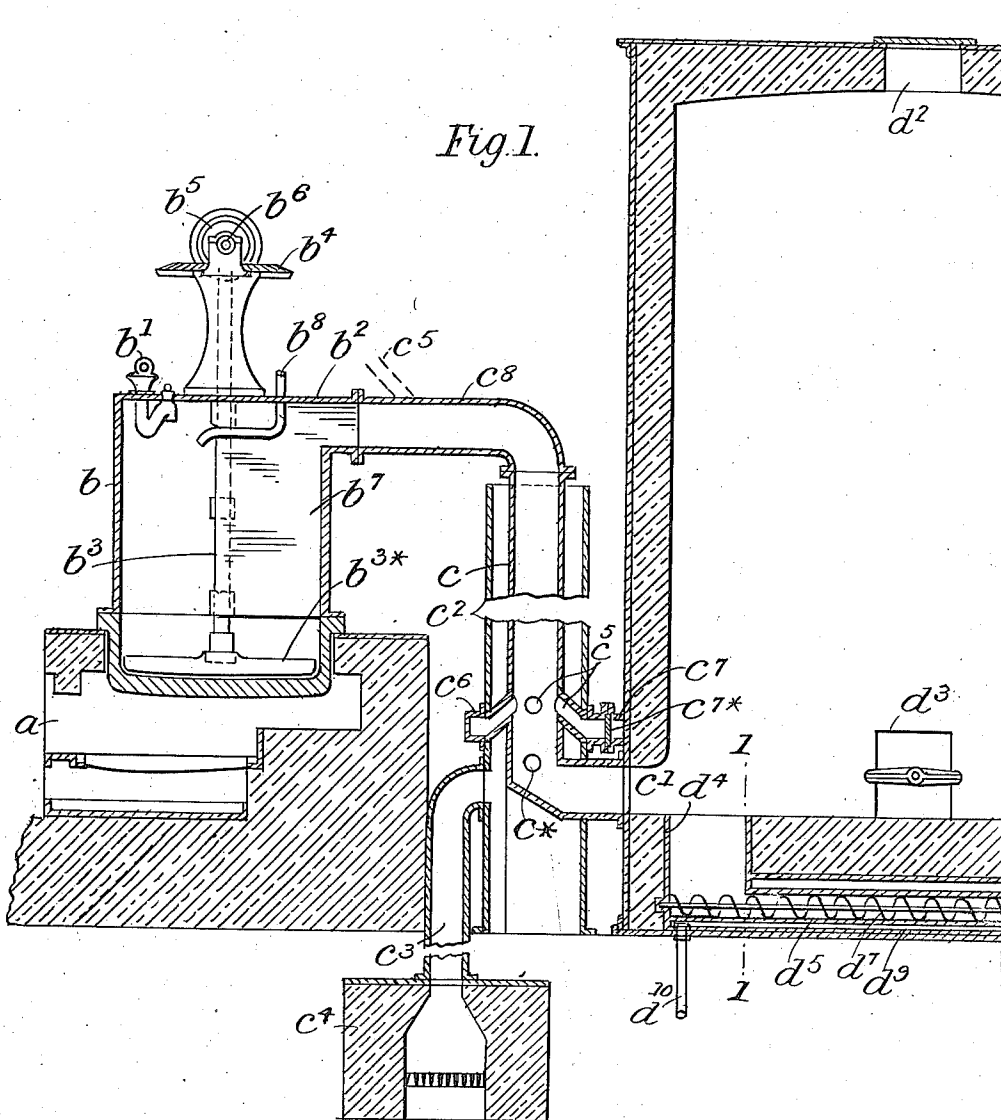


G. V. BARTON.
MANUFACTURE OF LEAD OXID.
APPLICATION FILED JUNE 3, 1911.

1,060,153.

Patented Apr. 29, 1913.

5 SHEETS—SHEET 1.



Attest.
Bert M. Stahl
R. E. Ourand

By

Inventor,
George V. Barton.
Wm Wallace White

Atty

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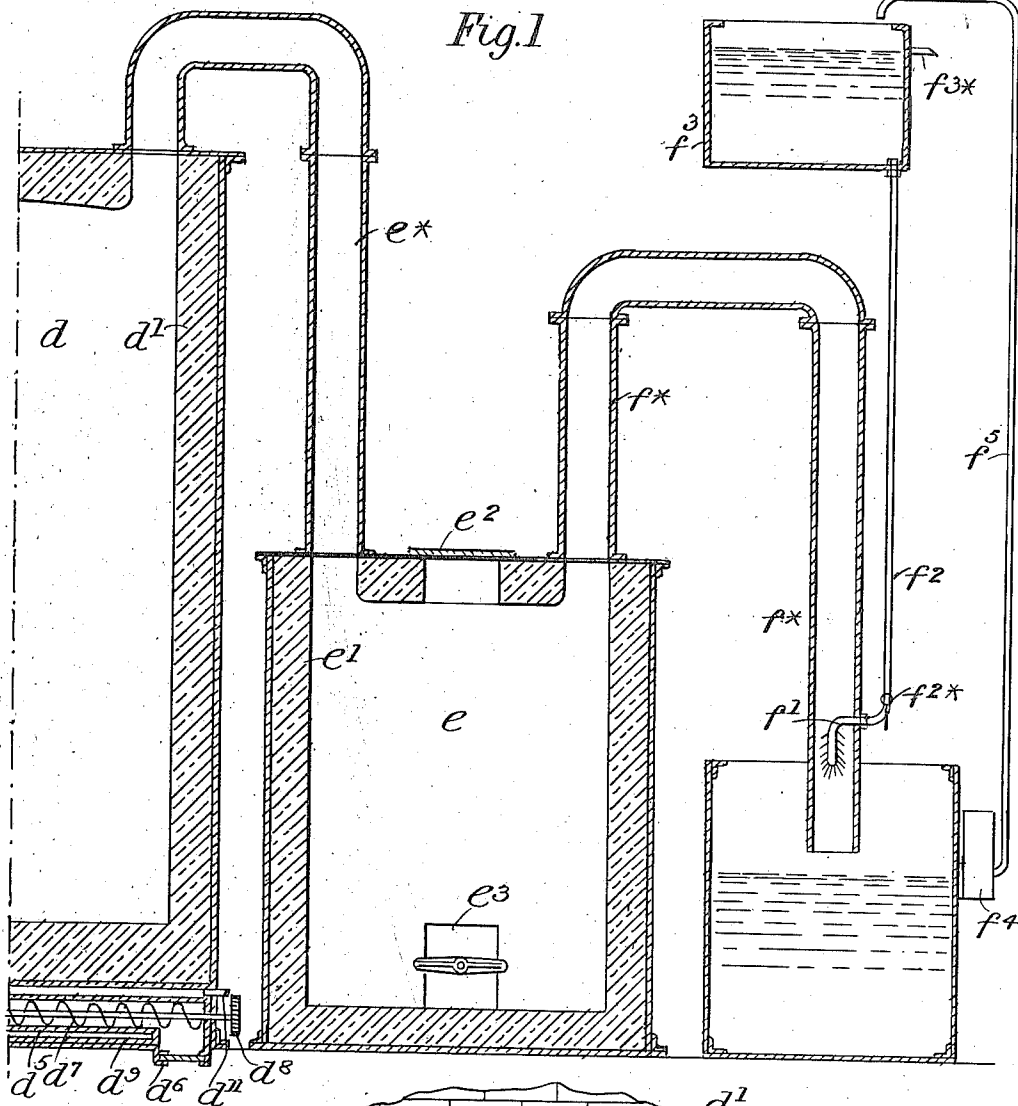
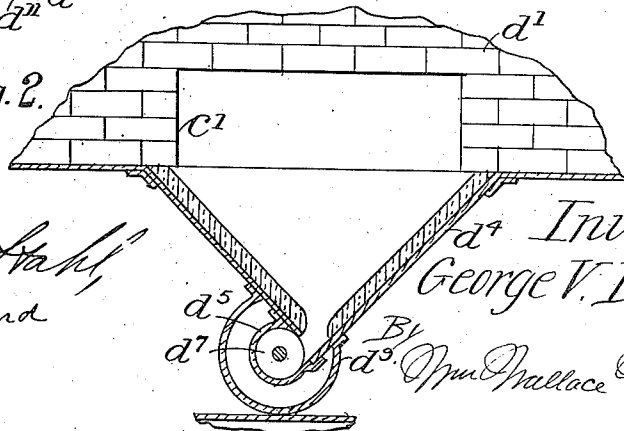


Fig. 2.



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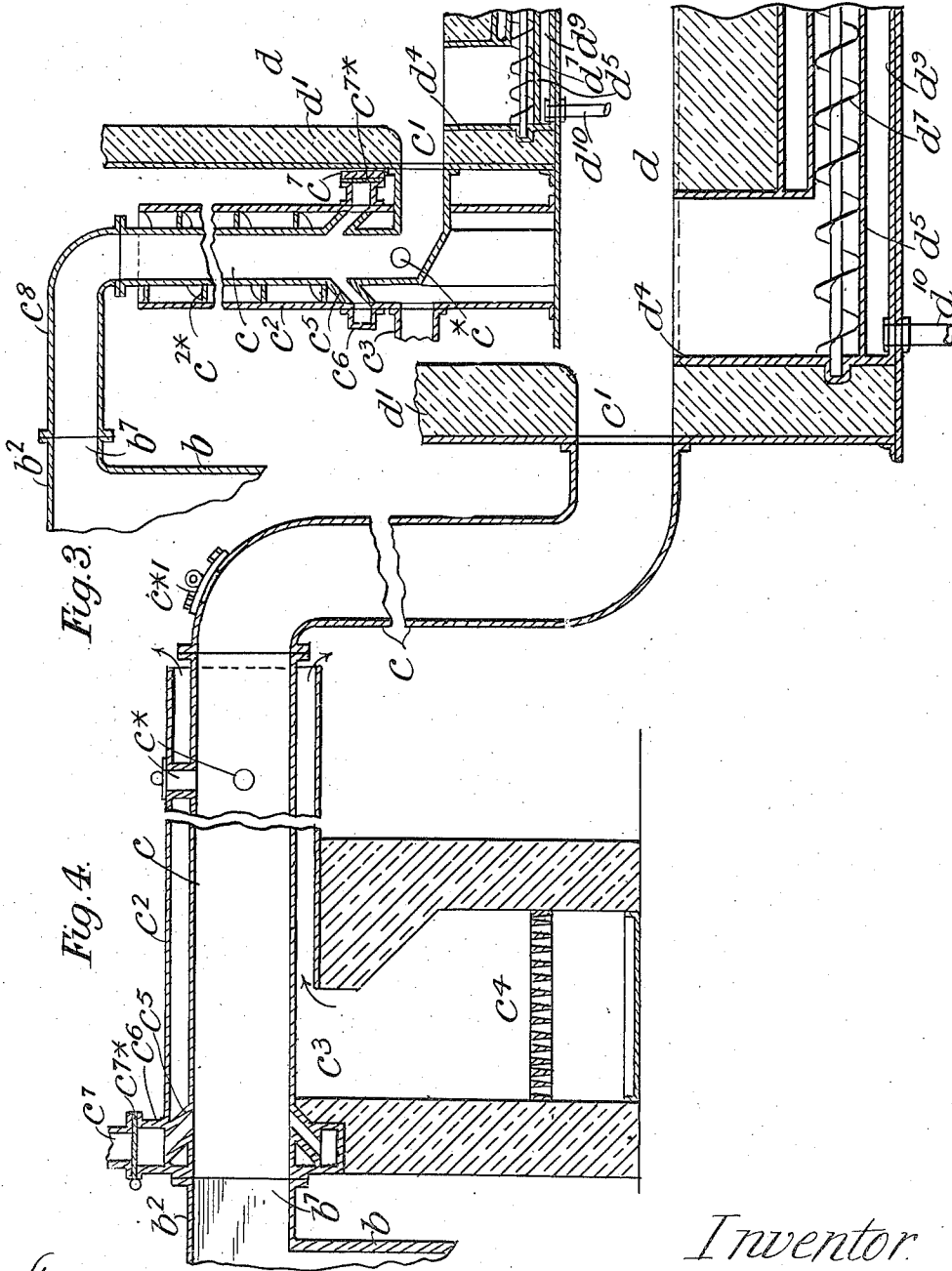
By *Wm. Wallace White*
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By

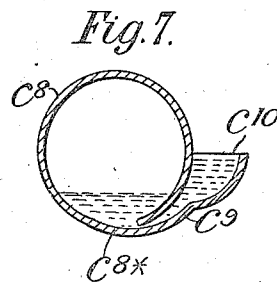
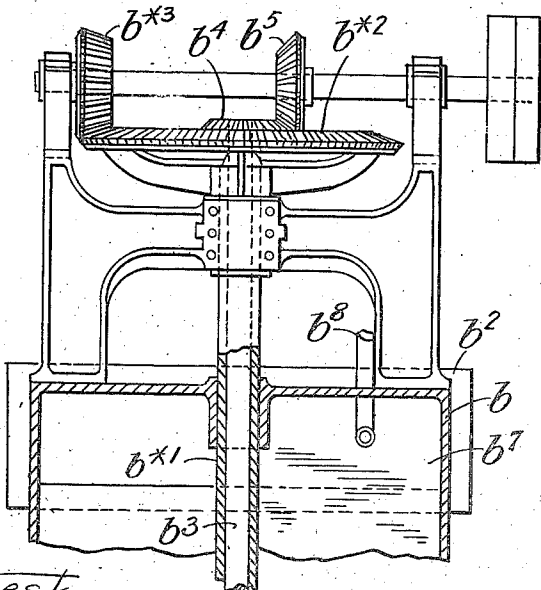
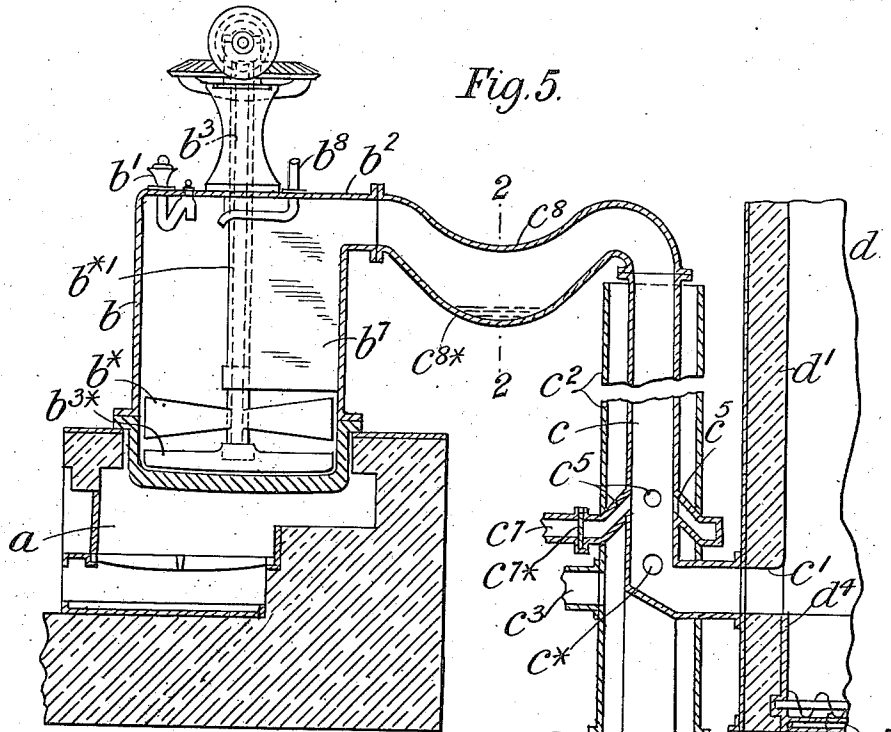
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5 SHEETS—SHEET 4.

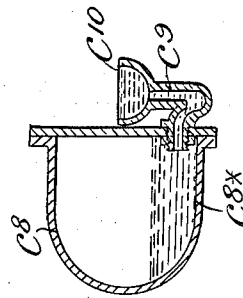
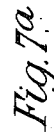
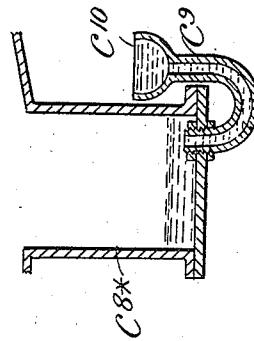
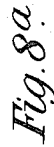


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1,060,153.

5 SHEETS—SHEET 5.



Inventor:

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UNITED STATES PATENT OFFICE.

GEORGE VINCENT BARTON, OF LIVERPOOL, ENGLAND.

MANUFACTURE OF LEAD OXID.

1,060,153.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed June 3, 1911. Serial No. 631,127.

To all whom it may concern:

Be it known that I, GEORGE VINCENT BARTON, of "Shirley," Queens Drive, Mossley Hill, Liverpool, in the county of Lancaster, England, manufacturing chemist, have invented certain new and useful Improvements in the Manufacture of Lead Oxid, of which the following is a specification, reference being had to the drawing hereunto annexed and to the figures and letters marked thereon—that is to say:

The invention relates to certain improvements primarily in that class of process and apparatus in respect of which several Letters Patent have been granted to me namely Nos. 17178 of 1898, 21830 of 1898, 4660 of 1902 13458 of 1908 and 4465 of 1909. In the production of lead oxid by the process and apparatus according to my said former patents the resulting oxid was of different shades of color dependent upon the degree of heat in the pot which was difficult to regulate while a small percentage of metallic lead was carried over from the pot together with the oxid in a pulverulent cloud. This was to some extent modified by the apparatus the subject matter of my former Patent No. 13458 of 1908 according to which the oxid and pulverulent lead was carried through a heated upcast flue on its way to the collecting chamber but although this lessened the percentage of metallic lead finally carried away it did not altogether prevent it and the primary objects of the present invention are to further reduce said percentage, to obtain oxid of the required color with a greater degree of certainty and in some cases to provide means to intercept any more solid portions of metallic lead which pass over from the pot and more especially when a low pot is employed.

In the accompanying drawings Figure 1 is a vertical longitudinal section of an apparatus designed for carrying into effect the present invention. Fig. 2 is a vertical transverse section taken on the line 1—1 of Fig. 1. Fig. 3 represents part of Fig. 1 but illustrates a slight modification in connection with the downcast flue or channel. Fig. 4 is a part vertical longitudinal section of a modified form of apparatus. Fig. 5 is a similar view illustrating a further modification. Fig. 6 is a part vertical transverse section thereof. Fig. 7 is a

vertical transverse section taken on the line 2—2 of Fig. 5. Fig. 7^a is a similar view illustrating a slight modification. Fig. 8 is a similar view to Fig. 5 illustrating a further modification and Fig. 8^a is a detail view thereof.

In the several figures like parts are indicated by similar letters of reference and Figs. 2, 4 and 6 to 8^a, are drawn to an increased scale with respect to the other figures of the drawings.

Referring to Figs. 1 and 2 *a* represents a furnace of any usual construction and *b* represents a covered pot mounted over the furnace and designed to contain the lead to be treated and a quantity of molten lead is from time to time fed into the pot through a siphon *b*¹ such as that shown and described in the specification of said Letters Patent No. 4465 of 1909 or in other suitable manner, and by the furnace *a* or it might be by any other suitable source of heat maintained in the necessary fluid state. It is however found in practice that little or no extraneous heat is required after the pot is once started inasmuch as the chemical action of the oxidation of the lead itself generates all or nearly all the requisite heat. The pot *b* is provided with an outlet *b*² at one side and at or near the top thereof and it is furnished with a central shaft *b*³ driven at the required speed by gearing *b*⁴, *b*⁵ from a horizontal shaft *b*⁶ and the vertical shaft *b*³ is furnished with a horizontal paddle or stirrer *b*⁷ located at or near the bottom of the pot. A baffle plate or curtain *b*⁸ is arranged at one side of the outlet *b*² and extends nearly down to the paddle or stirrer. Entering the top of the pot *b* is a pipe *b*⁹ supplied with air and steam preferably superheated steam under pressure and this pipe is curved or arranged at a suitable angle in such manner that the issuing blast acts upon the surface of the molten metal within the pot *b*. The parts hereinbefore described and their action are substantially the same as those shown and described in the specifications of my said former patents and will therefore be fully understood upon reference thereto. The pot *b* shown in the accompanying drawings is however differently proportioned in that its height exceeds its width but that does not form part of the present invention and although that is the preferred form any other of the forms illustrated in my said

former specifications may be substituted therefor. Connected by an elbow or neck c^8 with the outlet b^2 from the pot b is a downcast flue or chamber c which may be of any
 5 suitable length to effectually carry out the process of conversion and this flue c is by a way c^1 connected with a collecting chamber d and the oxid is by the blast of air and steam issuing from the tube b^8 carried
 10 through said way c^1 . Surrounding the downcast flue c is a casing or jacket c^2 constituting a flue which is open at the top or may by a suitable connection be carried to the open air or led to some other device requiring to be heated. The casing or flue c^2
 15 is by a flue c^3 connected with a furnace c^4 the products of combustion from which pass into the flue c^2 and serve to highly heat the downcast flue c . Or the flue c^3 might be connected with the flue of the furnace of a lead melting pot (not shown) being a necessary
 20 part of a plant of this description so as to conduct the products of combustion from said furnace to the flue c^2 after fulfilling their function in the melting of the lead; for the flue c^2 might be heated by any other
 25 suitable means provided said means are adequate to produce the necessary high temperature in the flue c^2 surrounding the downcast flue c . The downcast flue c is thus maintained in a highly heated condition and the material is carried therinto by the air and steam blast in the pot b in the form of a fine
 30 pulverulent dusty cloud which is thus exposed to the intense heat emanating from the walls of the flue c which acts upon any metallic lead carried over with the oxid from the pot and assists to bring the same to lead
 35 oxid and the oxid to the necessary uniform color. In order however to insure this action currents of superheated air are introduced into the downcast flue c so as to assist the oxidizing process and said currents are preferably directed upwardly so as to mingle
 40 with the particles of material and more or less retard the gravitation thereof so that said material may be exposed to the intense heat and the action of the superheated air for the period of time necessary to convert
 45 the whole of the pulverulent metallic lead and bring the oxid to the requisite color. The introduction of the superheated air into the downcast flue c is preferably accomplished by means of upwardly inclined ways
 50 c^5 connected with a box c^6 surrounding the case c^2 and supplied with a blast of superheated air by a pipe c^7 from any suitable source but said blast is capable of regulation by means of a slide valve c^{7*} so that by regulating
 55 said blast of heated air and the blast of air and steam b^8 in the pot b the period during which the material is exposed to the influence of the intense heat of the downcast flue c and the currents of heated air may
 60 be varied as circumstances may require. If

necessary superheated air may also be introduced into the neck or elbow c^8 of the highly heated downcast flue c as shown by the dotted lines in Fig. 1. Sight holes c^8
 70 are provided by means of which the action can be watched and the apparatus regulated so as to produce oxid of the required color. The oxid coming over from the pot and more especially from a shallow pot such as is described and illustrated in the specifications
 75 of my said former patents is usually of very varied colors but under the influence of intense heat and heated air as hereinbefore described it gradually changes to colors ranging from brown through buff to lemon yellow
 80 dependent upon the period of time that it is exposed to the intense heat and heated air in the downcast flue c . Any fine particles of metallic lead coming over from the pot with the oxid are at the same time changed
 85 into oxid and if the heating process is carried on for a sufficiently long period of time it results in the production of the same oxid which is obtained when red or orange lead is highly heated for a long period. The col-
 90 lecting chamber d is provided with a brick lining d^1 and has a ventilating opening d^2 at the top furnished with a removable cover and a manhole d^3 near the bottom by means of which a workman may enter said chamber
 95 and clean out or repair the same when required. In the bottom of the collecting chamber d immediately beyond the way c^1 leading from the highly heated downcast flue c , and through which way the finished
 100 oxid is carried by the blast from the pot b , is provided a hopper like opening or depression d^4 into which the greater part of said material falls and in order to assist this action a deflecting plate (not shown) might if
 105 desired be arranged on the rear side of the opening d^4 but this is thought not to be necessary. The hopper like depression d^4 which may be of any desired length or width leads into a long tubular chamber d^5 fitted with a
 110 screw conveyer d^7 of a known character and provided with a delivery opening d^6 furnished with a valve or shutter and the conveyer d^7 is driven at a suitable speed made capable of regulation by any known means
 115 through a spur wheel d^8 from any convenient source of power. The tubular chamber d^5 is surrounded by a jacket d^9 in which a circulation of water is maintained through pipes d^{10} d^{11} from any suitable source and
 120 thus the finished oxid carried through the tubular chamber d^5 by the screw conveyer d^7 and delivered at the outlet d^6 is very rapidly cooled and further oxidizing action arrested. A small proportion of the oxid will be carried
 125 on by the blast beyond the hopper like opening d^4 and if any of this material settles in the collecting chamber d it may be removed from time to time through the manhole d^3 as hereinbefore explained. Beyond
 130

the collecting chamber *d* is another but smaller collecting chamber *e* also provided with a brick lining *e*¹ a ventilating opening *e*² and a manhole *e*³ for the same purposes and this chamber is connected with that *d* by a pipe *e*^{*} and any floating particles of oxid carried beyond the chamber *d* by the blast are received in the chamber *e* and any material which settles therein is removed from time to time as described with respect to the chamber *d*. Beyond the collecting chamber *e* is an open topped tank *f* which is filled to a given level with water and which level is maintained in any suitable and well known manner and leading from the top of the collecting chamber *e* is a pipe *f*^{*} which opens into the tank *f* but terminates at a short distance above the level of the water therein and any particles of oxid carried by the blast beyond the collecting chamber *e* are blown on to the surface of the water in the tank *f* so that none of the material gets free and said material is ultimately precipitated, collected, dried and made marketable. In order to assist this action a water spray *f*¹ is provided in the pipe *f*^{*} and is supplied by a pipe *f*² fitted with a regulating cock *f*^{2*} from a tank *f*³ provided with an overflow *f*^{3*} and the water issuing from the spray *f*¹ and falling into the tank *f* is raised by a pump *f*⁴, driven by any suitable means, and a pipe *f*⁵ into the tank *f*³ so that the same water is used over and over again.

In the example given at Fig. 3 is shown a slight modification in connection with the highly heated downcast flue *c* and which consists in the arrangement of a spiral partition *c*^{2*} or impedance in the hot air flue *c*² and which has for its object to render said flue circuitous and thus retain the heated air passing into said flue by the pipe or flue *c*³ for a longer period in contact with the downcast flue *c* and thus augment the efficiency of the heating arrangement. A similar impedance might be arranged in the highly heated downcast flue *c* but it is not thought to be necessary or desirable.

In the example given at Fig. 4 is shown an arrangement in which the highly heated flue *c* instead of being carried downward as in the previous cases is arranged horizontally. In this case the flue *c*² surrounding that *c* is shown to be heated by a furnace *c*⁴ as described and illustrated with respect to the previous figures but similarly it might be otherwise heated if desired. Instead of the inclined ways *c*⁵ introducing heated air into the flue *c* being directed against the course of the material carried along by the blast from the pot *b* they are inclined in a direction to assist the travel of the material along the flue *c* for the reason that said material is somewhat immobile and the horizontal disposition of the flue *c* renders it unnecessary to retard the passage of the

material therethrough but it is deemed advisable to aid the blast from the pot *b*. The blast of hot air entering by the inclined ways *c*⁵ may be regulated according to the action of the process and as in the former arrangement sight holes *c*^{*} are provided to enable the condition of the material to be ascertained from time to time. A hand hole *c*^{*1} is provided at the end of the flue *c* through which a rake may be introduced to rake forward any of the material that settles and becomes inert. A helical impedance such as that shown and described with respect to Fig. 3 might be employed in the flue *c* with this arrangement but it is thought not to be necessary or desirable and doors would be needed for clearing away the material in case it settled. In other respects the apparatus and its action are identical with those described with respect to Figs. 1 and 2.

In the example given at Figs. 5, 6, and 7 a means is shown of trapping any considerable quantity of metallic lead which may be carried or spilled over from the pot *b*. In the rotation of the paddle or stirrer *b*^{3*} in the molten lead a wave is created which is liable to lap over the edge of the outlet *b*² from the pot *b* and detach portions of metallic lead and the object of said device is to trap said lead and prevent its being carried into the highly heated flue or chamber *c* whether it be arranged vertically or horizontally. The device consists of a trap like dip or depression *c*^{8*} (or there might be several) formed in the neck connecting the outlet *b*² from the pot *b* with the flue *c* but said neck is of scroll like section and is formed with a pocket *c*¹⁰ at one side to which it is open at *c*⁹ so that the molten lead may be removed from time to time but said opening *c*¹⁰ is sealed against the blast by the lead contained in the pocket a sufficient quantity of lead being placed in the dip prior to starting the apparatus. In this example the pot is shown to be provided with two paddles or stirrers, one *b*^{3*} arranged near to the bottom of the pot and fixed upon a solid shaft as shown and described in the previous examples and another *b*^{*} located at a short distance above that *b*^{3*} and carried by a hollow shaft *b*^{*1} surrounding the shaft *b*³. The central shaft *b*³ is driven from the shaft *b*⁶ by means of beveled gearing *b*⁵ *b*⁴ while the hollow shaft *b*^{*1} of the paddle *b*^{*} is driven at a speed of revolution equal to about one third of that of the shaft *b*³ and in the opposite direction by a spur wheel *b*^{*3} upon the shaft which engages a crown wheel *b*^{*2} upon the hollow shaft *b*^{*1} of the paddle or stirrer *b*^{*}. The paddle *b*^{*} is somewhat differently shaped to that *b*^{3*} that is to say it broadens toward its extremities and the object of the two paddles differentially shaped and driven is to produce a more ac-

tive turbulence of the lead in the pot *b* and thereby increase the oxidizing action of the steam and air blast thereon, or the paddle *b*^{*} might be of any other suitable shape than that shown.

In the example given at Fig. 7^a a slight modification of the trap like dip or depression *C*^{8*} is shown and which consists in providing the same with a side opening closed by a door which carries a short siphon shaped stand pipe *c*⁹ provided with a cup shaped opening *C*¹⁰ for the purpose described with respect to Fig. 7.

In the example given at Figs. 8 and 8^a a modified arrangement of parts for preventing the passage of any considerable body of metallic lead to the flue *c* is illustrated. In this case a low pot of similar character to those illustrated in my said former specifications is shown but to assist in preventing portions of lead breaking off from the wave produced by the stirring of the body of lead within the pot and being carried over the outlet *b*² an annular downwardly curved lip *b*^{4*} of a similar character to that described by me in my specification No. 21830 of 1898 is provided immediately below said outlet. In case however portions of lead should become detached in this manner and carried over the outlet *b*² by the blast a series of traps or pockets *c*^{8*} are provided in the neck *c*⁸ connecting the outlet with the highly heated flue or chamber *c* and said pockets are designed to trap any free lead carried over by the blast and they are provided with doors carrying short siphon shaped stand pipes *C*⁹ having cups *C*¹⁰ so that the lead collected therein may be removed from time to time the stand pipes being partially filled with lead on starting the apparatus as hereinbefore described with respect to Figs. 7 and 7^a.

The means hereinbefore shown and described for carrying my invention into effect are the best that are at present known to me, but it will be understood that the kind of apparatus and the process employed may be considerably varied without departing from the principle of the present invention.

The duration of the process will naturally depend upon the size and nature of the furnace or heating means and the degree of heat employed, the temperature of the heated air, the depth or body of material under treatment the speed at which it is passed through the heating means and other conditions.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed I declare that what I claim is:—

1. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from

said receptacle, means for highly heating said flue or chamber, and means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber.

2. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, a casing surrounding said flue or chamber and spaced therefrom, means for introducing a heated medium into the space between said casing and said flue or chamber to highly heat the latter, passages communicating with said flue or chamber, and means for feeding highly heated air under pressure through said passages and into said flue or chamber.

3. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, a casing surrounding said flue or chamber and spaced therefrom, means for introducing a heated medium into the space between said casing and said flue or chamber to highly heat the latter, passages communicating with said flue or chamber, and means for feeding highly heated air under pressure through said passages and into said flue or chamber, said passages being inclined with respect to said flue or chamber to cause the heated air to travel in a direction opposite to the direction of travel of the oxid in said flue or chamber.

4. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, means for highly heating said flue or chamber, means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber, a chamber communicating with said flue or chamber and into which the oxid is adapted to pass, a screw conveyer in said second chamber for conveying the oxid therethrough, said second chamber being provided with a delivery opening, and means for cooling said second chamber.

5. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, means for highly heating said flue or chamber, means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber, a chamber communicating with said flue or chamber and into which the oxid is adapted to pass, a screw conveyer in said second chamber for conveying the oxid therethrough, said second chamber being provided with a delivery opening, a water

jacket surrounding said second chamber, and means for maintaining a circulation of water in said jacket.

6. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, a casing surrounding said flue or chamber and spaced therefrom, means for introducing a heated medium into the space between said casing and said flue or chamber to highly heat the latter, a spiral partition positioned within the space between said casing and said flue or chamber, passages communicating with said flue or chamber, and means for feeding highly heated air under pressure through said passages and into said flue or chamber.

7. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a stirrer therein adjacent the bottom of the receptacle, a second stirrer within said receptacle positioned above said first stirrer, means for rotating said stirrers in opposite directions and at different speeds, a flue or chamber through which the oxid passes from said receptacle, means for highly heating said flue or chamber and means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber.

8. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, means for highly heating said flue or chamber, means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber, and means positioned between said receptacle and said flue or chamber for trapping any metallic lead which may be carried out of the receptacle.

9. In lead oxid manufacturing apparatus, in combination, a receptacle adapted to contain the lead to be treated, a flue or chamber through which the oxid passes from said receptacle, means for highly heating said flue or chamber, means for introducing currents of highly heated air under pressure into the oxid as it passes through said flue or chamber, and a neck connecting said receptacle with said flue or chamber, said neck being provided with a depression adapted to trap any metallic lead which may be carried out of the receptacle.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

GEORGE VINCENT BARTON.

Witnesses:

C. MELBOURNE WHITE,
C. H. WHITE.