(No Model.) 2 Sheets—Sheet 1.

S. C. ROWELL.

LITHARGE FURNACE.

No. 370,892. Patented Oct. 4, 1887.

Fig: 1.

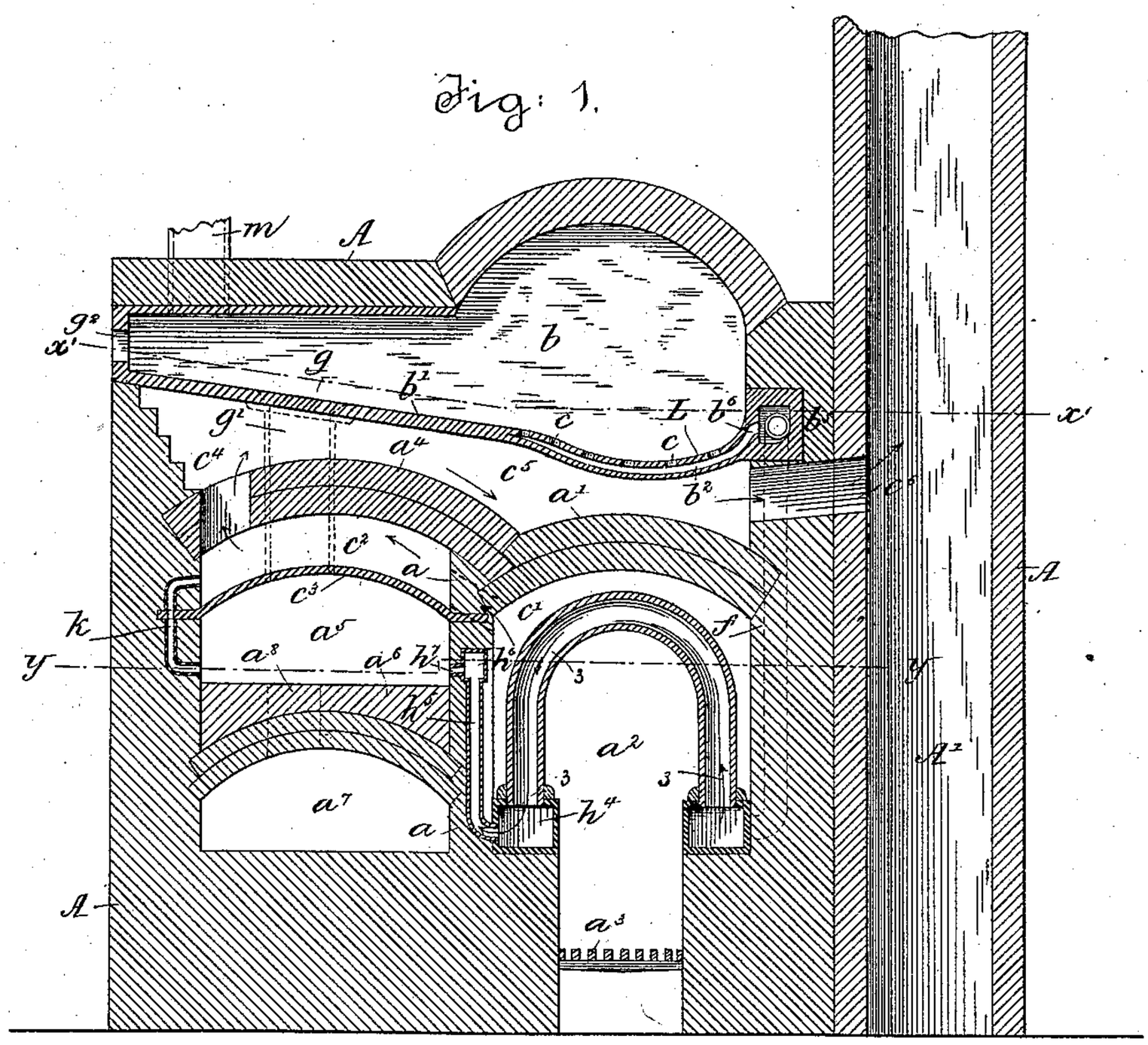
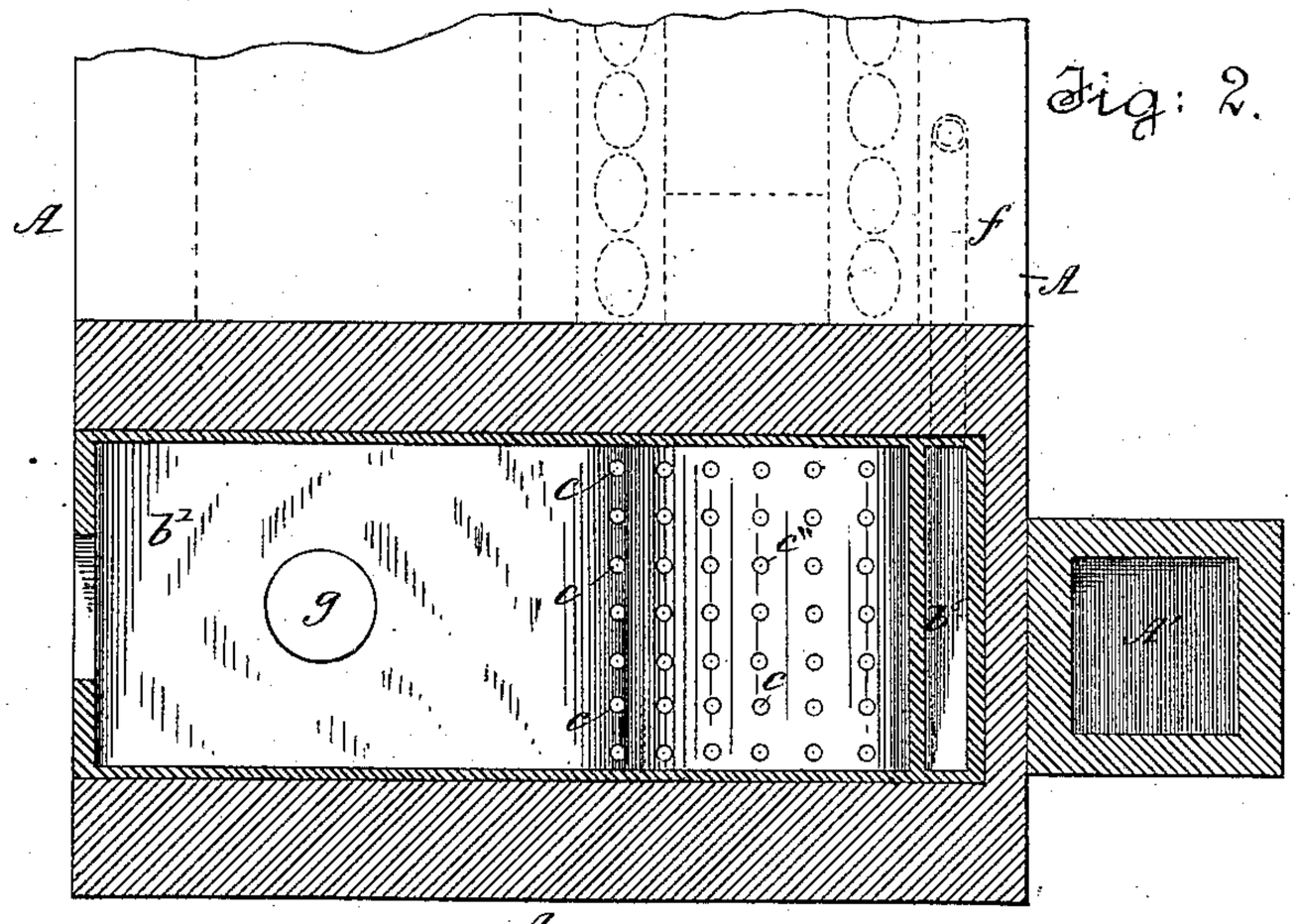


Fig: 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig: 4.

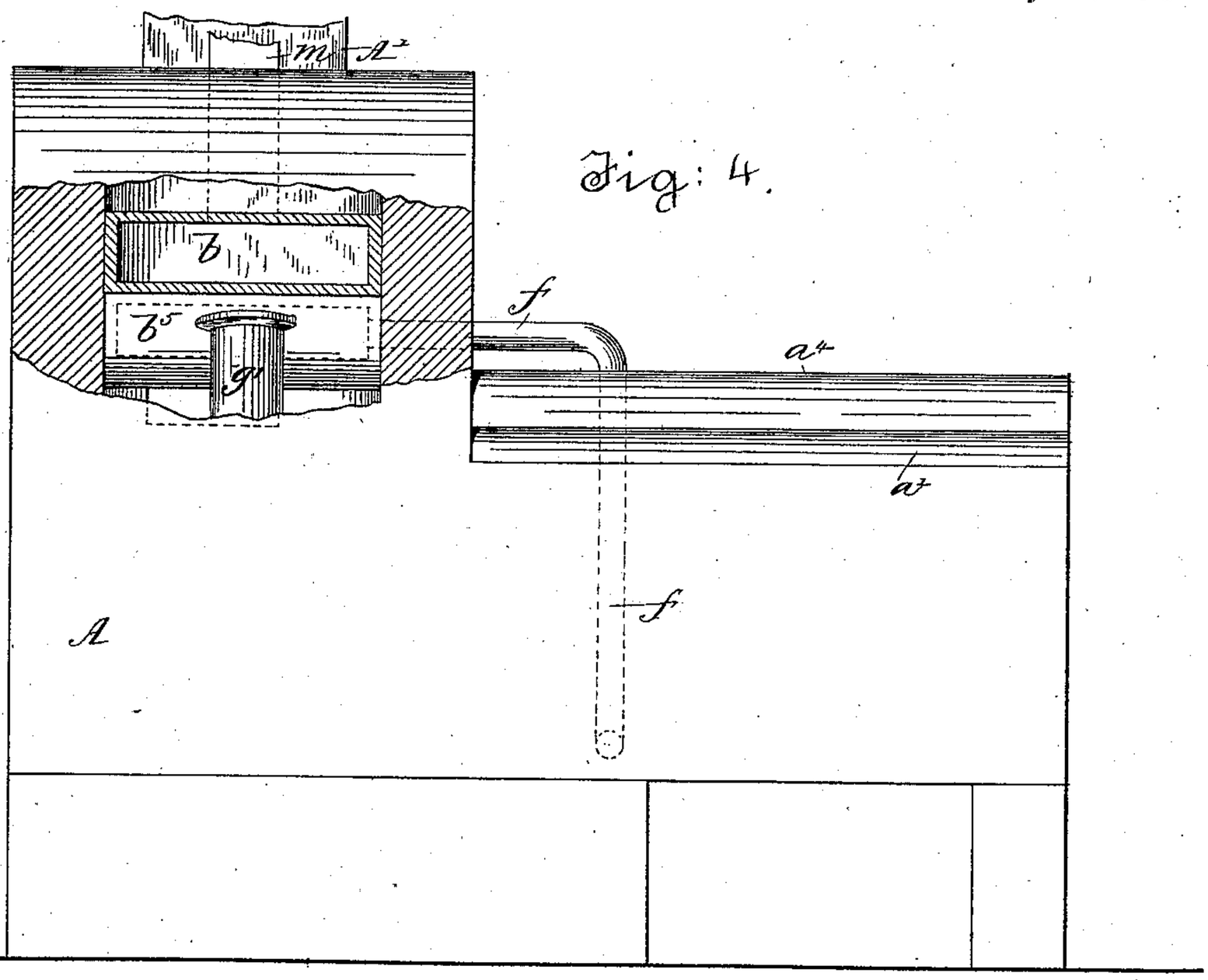
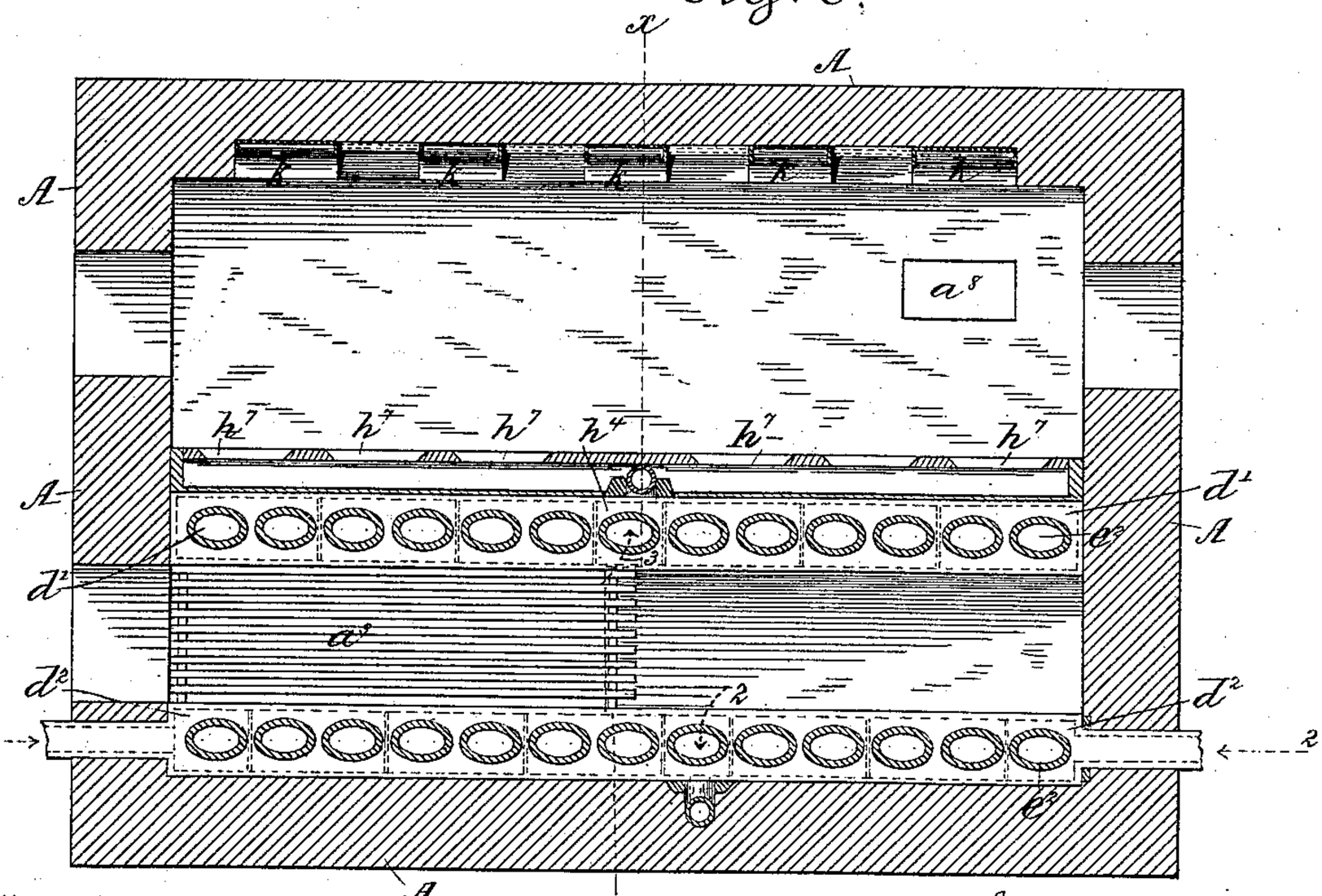


Fig: 3.



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UNITED STATES PATENT OFFICE.

SAMUEL C. ROWELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF FIVE-EIGHTHS TO JAMES W. NEWELL AND JAS. W. NEWELL, TRUSTEE, OF SAME PLACE.

LITHARGE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 370,892, dated October 4, 1887.

Application filed February 2, 1886. Serial No. 190,719. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL C. ROWELL, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Litharge-Furnaces, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to provide a method whereby plumbic oxide or, as it is commercially known, "litharge" may be produced from metallic lead more quickly and in a purer state than has been heretofore accomplished.

I have by experiment discovered that litharge of pure quality may be rapidly and economically produced by placing the lead in a retorting furnace or chamber the outside of which is heated to the required degree, the retorting-chamber being supplied by air preferably heated and preferably supplied at the bottom of the said chamber or in such manner as to pass upward through and over the molten lead, thus keeping the said lead in agitation, the preferably-heated air forced into the said chamber thus agitating the lead, which results in exposing to the oxygen of the heated air a greater surface of lead than otherwise, thus more thoroughly and rapidly oxidizing the lead.

In the practice of my invention I prefer to divide the process into two steps—*i. e.*, first, heating the metallic lead in a retorting-chamber to or a little above its melting point, and when raised to such heat forcing preferably heated atmospheric air over or through the molten mass of metal, whereby the lead is converted into impure litharge, the impurity of the litharge consisting chiefly of metallic lead, the impure litharge appearing in the form of a dross, which, removed from the retorting-chamber, is, secondly, submitted in a calcining-chamber, maintained at a heat preferably higher than that at which the retorting-chamber is maintained, to the influence of air preferably more highly heated than the air in the retorting-chamber in which the lead was first placed.

My invention consists in a furnace having certain novelties of construction, as will be hereinafter described, and also in a new method of forming litharge.

Figure 1 is a vertical section of a furnace with which to practice my invention, the section being taken on the irregular line $x\,x$, Fig. 3, and also showing the chimney in section. Fig. 2 is a transverse section of Fig. 1 on line $x'\,x'$; Fig. 3, a transverse section of Fig. 1 on line $y\,y$, with the chimney removed; and Fig. 4, a side elevation of Fig. 1, partially broken out to show the hot-air tuyere.

Referring to the drawings, A represents the brick-work of a furnace provided with a chimney or flue, A′, herein shown as extended to the bottom of said furnace. The interior of the furnace referred to is divided centrally by a wall, a, supporting one end of the arched roof a' of a combustion-chamber, a^2, containing the fire-grate a^3, upon which is placed fuel, preferably coke, which furnishes the heat to melt the lead, said heat being directed through said furnace in a manner to be hereinafter fully described and designated by full arrows. The central wall, a, also supports one end of the arched roof a^4, forming part of a flue, c^2.

The brick-work a^6, suitably laid, forms the bottom of a calcining-chamber, a^5, and also the roof of a receiving-chamber, a^7, said chambers being connected by a chute, a^8, preferably located near one end of said chambers, as shown in Fig. 3.

Above the arched roofs a' a^4, referred to, and which constitute the top of the greater part of the furnace, (see Fig. 4,) the walls of the furnace are extended upward to form the main or retorting chamber b.

The bottom of the retorting-chamber b is herein shown as composed of a metal plate, b', supported in the side walls of the furnace, said plate being preferably inclined and concaved at one end, as shown in the drawings, to form a pan to receive and hold the metal lead.

The concaved portion of the plate b' is herein shown as separated or divided to leave a passage, b^2, as shown in Fig. 1.

The tuyere b^5 is herein shown as an integral part of the plate b', the tuyere communicating with the passage b^2 by the port b^6.

The plate c^3, preferably of metal, constitutes the roof of the calcining-chamber a^5, and also the floor or under part of the flue c^2.

The upper portion of the plate b', and upon which the lead is placed, is herein shown as provided with perforations c for the passage of air, which is forced up through the molten lead, said lead being melted by heat which escapes from the fire-chamber a^2 through passage c', the flue c^2, thence through the flue-passages c^4 c^5, as indicated by the full-line arrows, the latter passage being between the arched roofs a' a^4 and the plate b', and thence through the passage c^6 into the chimney or flue A'. The air by which the molten lead is oxidized is preferably forced by an air-pump (not shown) through a series of connected pipes located in the fire-chamber a^2, and shown in plan view, Fig. 3, the said pipes being herein shown as of arch shape and erected upon and communicating with boxes d' d^2, having partitions at suitable intervals, to compel the air entering the boxes to traverse the arched pipes one after the other, after the manner of a coil.

The boxes d' d^2 are supported upon the brick-work, as shown in Figs. 1 and 3, and extend throughout the length of the chamber a^2. The boxes referred to and their attached arched pipes are so divided at or near the center of the length of the chamber a^2 as to form two batteries, one of which, as hereinafter described, is made to receive atmospheric air and supply it in more or less heated condition to the retorting-chamber b, the other battery furnishing air more or less heated to the calcining-chamber a^5, the direction of flow of the heated air being designated by the dotted arrows 2 and 3, the arrow 2 showing the course of the air which enters the chamber b and the arrow 3 that which enters the chamber a^5. The pipe f, which connects one of the said batteries with the tuyere b^5, is shown partially in dotted lines in Figs. 1 and 2, and completely in full and dotted lines, Fig. 4. From the tuyere b^5 the heated air passes through the port b^6, passage b^2, and perforations c up through the molten lead, said lead being oxidized by said air, chiefly, to litharge. The litharge, being of less specific gravity than metallic lead, rises to the surface of the molten mass. As the litharge is formed, it is raked or scraped up onto the inclined part of the plate b', and when a sufficient quantity has thus been accumulated a cover, g, of a chute or hopper, g', extended through the arch a^4 and leading into the calcining-chamber a^5, (see dotted lines, Fig. 1,) is raised, and the litharge and its impurities, chiefly metallic lead, are raked into the hopper or chute g', through which it falls into the chamber a^5, the metallic lead being acquired by the scraping of the litharge up on the inclined plate b'. Access to the chamber b is obtained through a door, g^2, in the side of the furnace. The litharge and its impurities in the calcining-chamber a^5 are still further subjected to the oxidizing influence of heated air, the cover g being replaced upon the chute g'.

The heated air which passes through the calcining-chamber a^5 is forced therein from the battery through a compartment, h^4, in the box d', which compartment is connected by pipe h^5 (see Fig. 1) with a box or channel, h^6, said channel extending the length of the chamber a^5 and being provided with a series of ports or openings, h^7, (see Figs. 1 and 3,) which are connected with the calcining-chamber a^5, the air being forced into the battery from the front side of the furnace, as indicated by arrow 3, preferably by a fan. (Not shown.) The temperature of the calcining-chamber will preferably be somewhat higher than that of the retorting-chamber b, it being preferably between the fusing and volatilizing points of lead. The excess of heated air in the calcining-chamber a^5 finds an exit therefrom through the passages k, made at intervals in the wall of the furnace and throughout the length of said chamber, said passages being made continuous and preferably connected to the flue c^2. From the flue c^2 the hot air passes through the passages c^4 and c^5, and thence to the chimney A' by the passage c^6, the hot air on its way to the chimney imparting heat to the metal plate b', thus assisting in the melting of the lead supported in the concaved portion of said plate. The products of combustion passing from the combustion-chamber a^2 through the flue-passage c' and into the chamber c^2 heat the metal shield c^3, which radiates its heat into the chamber a^5 and down upon the litharge, thereby raising the temperature of said chamber. The impurities of the metallic lead which may be volatilized and the excess of air in the chamber b are carried off by the flue m. The litharge is permitted to remain in the chamber a^5 until it has acquired the desired color or tone, when it is scraped or raked through the chute a^8 into the receiving-chamber a^7, from whence it is taken ready for grinding.

Instead of dividing the plate b' and perforating the upper portion of said plate, I may employ a false bottom, which would rest upon the plate b', and would be provided with perforations, the false bottom forming part of the tuyere b^5.

It will be herein noticed that the products of combustion are prevented from coming in contact with the metallic lead, thereby preventing the formation of comparatively large quantities of carbonate of lead, which is formed when the products of combustion come in contact with the lead, and which exists as an impurity in litharge thus made.

I have herein shown a mechanism well adapted to economically heat air and introduce it into the retorting and calcining chambers, and I have also, as so far described, referred to the form of heat as coal or coke upon the grate; but I wish it to be understood that I do not desire to limit my invention to the employment of the exact means herein shown for heating the air to be discharged into the said chambers, for instead thereof I may employ any usual means or method of heating air

to be introduced into furnaces for industrial uses, and so, also, I may use, as the generator of heat, gas, oil, or any other usual fuel instead of coke, the use of gas or oil as the fuel necessitating the application to the furnace of usual means for burning the same.

I am aware that prior to my invention litharge has been formed by forcing air through a mass of melted lead ore; but litharge produced in this manner is of a poorer quality and does not have the desired tone or color, which latter is of vital importance, and which is obtained by me in the calcining-chamber.

I claim—

1. In a furnace for the manufacture of litharge, the combustion-chamber, the retorting-chamber to contain metallic lead and having a hollow bottom perforated to permit heated air to be forced up through the lead, and passages connecting said combustion-chamber with the chimney and made to cause the products of combustion to pass beneath and in contact with the bottom of the retorting-chamber to melt the lead, combined with a battery of pipes communicating with the retorting-chamber below its perforated bottom, substantially as described.

2. The combustion-chamber, the retorting-chamber, and a battery of pipes through which heated air may be forced into the retorting-chamber, combined with a calcining-chamber located below and communicating with the retorting-chamber and with a battery of pipes communicating with the calcining-chamber, to operate substantially as described.

3. That improvement in the process of manufacturing litharge from metallic lead which consists, first, in forcing air through the mass of lead in a molten state in one chamber, and, second, in transferring the impure litharge thus formed to a second chamber, and therein subjecting said impure litharge to the action of heated air in said second chamber, substantially as described.

4. The improvement in the art or method of manufacturing litharge, which consists in subjecting melted lead to the action of heated air in a retorting-chamber and thereafter subjecting the dross or impure litharge thus formed to the action of heated air in a calcining-chamber maintained at a higher temperature than the retorting-chamber, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL C. ROWELL.

Witnesses:
G. W. GREGORY,
F. L. EMERY.