

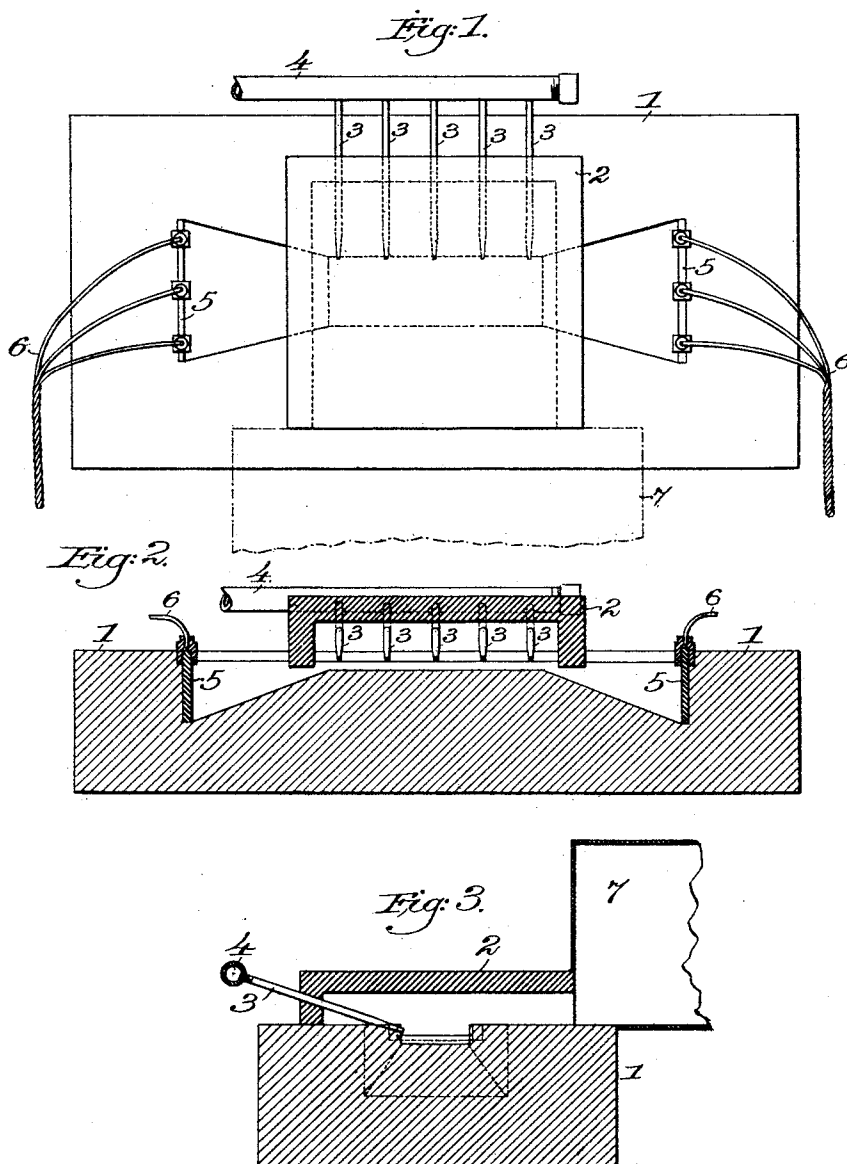
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C. S. LOMAX.
METHOD OF MAKING OXIDS OF TIN AND LEAD.

(Application filed July 24, 1901.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

CLARENCE S. LOMAX, OF EVERETT, MASSACHUSETTS.

METHOD OF MAKING OXIDS OF TIN AND LEAD.

SPECIFICATION forming part of Letters Patent No. 695,939, dated March 25, 1902.

Application filed July 24, 1901. Serial No. 69,537. (No specimens.)

To all whom it may concern:

Be it known that I, CLARENCE S. LOMAX, a subject of the King of Great Britain, residing at Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Methods of Making the Oxids of Tin and Lead; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as it will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improved method of making oxids of tin and lead.

15 The object of my invention is to produce a method of making the oxids of tin and lead which shall be inexpensive, rapid, continuous in operation, and capable of producing a pure product.

20 To the above end the present invention consists in the method of making the oxids of tin and lead hereinafter described, and particularly defined in the claim.

My invention contemplates the manufacture of the oxids of tin and lead by simultaneously subjecting the metal to the action of an electric current of sufficient quantity to heat the metal to the proper temperature and to the action of an oxidizing reagent, such as air, so that the heated metal will be oxidized by the oxidizing reagent.

According to the preferred method of carrying out my invention the process is carried on continuously, the metal being heated by the continuous passage therethrough of the electric current and the oxidizing reagent being continuously applied to the metal so heated.

In carrying out my invention a suitable hearth or receptacle for the metal is employed, which is made of electrically non-conductive refractory material provided with circuit-terminals at its ends, by means of which the current may be caused to pass through the metal and to heat the same to a temperature suitable for the application thereto of the oxidizing reagent in order to secure the rapid oxidation of the metal. For this purpose I prefer to construct the hearth or receptacle for the metal so that large contact-surfaces may be provided for contact with the terminals of the electric circuit in order that such

terminals may be kept cool and not be injured by the action of the current or by the heat generated by the current in passing therethrough, with the consequent adulteration of the tin or lead contained therein. To the above end I make the hearth or receptacle with enlarged ends, which receive large terminal plates of copper attached to the terminals of the circuit, and gradually to taper the cross-section of the receptacle, so that the portion of the metal which is exposed to the action of the oxidizing reagent shall be the smallest and uniform in cross-sectional area, being thereby heated to the highest temperature. I employ this form of hearth or receptacle because it enables me to localize the heating of the metal contained therein at the place where I apply the oxidizing reagent. It is also to be observed in this connection that the cross-sectional area of the metal at the middle of the hearth or receptacle can be varied by increasing or diminishing the quantity of metal in the hearth or receptacle, so as to vary the resistance thereof, and thereby regulate the heat generated by a given current and the temperature of the portion of the metal subjected to the action of the oxidizing reagent. In this manner the product can be varied, as hereinafter described. The size of the circuit-terminals should be proportioned to the amount of current which is intended to be used, so that the terminals will not be unduly heated by the passage of the current at the point where they come in contact with the liquid metal in the receptacle. In order to maintain the level of the molten tin or lead at a constant height, a bar of tin or lead is gradually introduced into one end of the hearth or receptacle. The surface of the molten metal in the hearth or receptacle is exposed to the action of an oxidizing reagent, which by combining with the metal forms its oxids and is carried off in a fine powder. The chemical action is combustion, the heated metal burning in the atmosphere of the oxidizing reagent. I prefer to employ atmospheric air as the oxidizing reagent, although any other suitable oxidizing reagent may be employed without departure from my invention. My invention contemplates the use of the oxidizing reagent either in a hot or cold condition. It is immaterial to my in-

vention whether the oxidizing reagent be passed through the metal or applied to its surface, although I prefer to apply the oxidizing reagent to the surface of the metal, so as not to disturb the metal by the passage of the oxidizing reagent therethrough, as such disturbance would cause fluctuations of the cross-sectional area of the metal, and consequent irregularity in the temperature thereof, which for reasons apparent to those skilled in the art it is desirable to avoid. I apply the oxidizing reagent only to the central or hottest portion of the metal, so that the metal subjected to the oxidizing reagent is maintained at a substantially uniform temperature, which would not be the case if the whole surface were exposed. For this purpose I employ in connection with the hearth or receptacle an oxidizing-chamber of electrically non-conductive refractory material which is extended over the central portion of the hearth or receptacle, being the portion thereof which is smallest and uniform in cross-sectional area. This construction, in which the metal in the oxidizing-chamber is uniform in cross-section, secures uniformity of temperature of the metal exposed to the oxidizing reagent. The oxidizing reagent may be introduced into the oxidizing-chamber in any suitable manner, as by twyers which are extended through one of the side walls of the oxidizing-chamber into the same and which preferably discharge the oxidizing reagent upon the surface of the molten metal. I prefer to extend the walls of the oxidizing-chamber slightly below the surface of the molten metal to prevent the dross which accumulates on the surface of the metal outside of the oxidizing-chamber from entering the oxidizing-chamber and to permit only the pure metal to enter such chamber, whereby the purity of the product is conserved. The oxidizing-chamber discharges into a collecting-chamber of any suitable or preferred construction, and a collecting-chamber of any of the forms well known to those skilled in the art may be employed.

In the accompanying drawings I have illustrated an apparatus for carrying out my improved method; but it is to be understood that any suitable apparatus may be employed for the purpose and that the apparatus in and of itself forms no part of the present invention.

Figure 1 is a plan, Fig. 2 is a longitudinal sectional elevation, and Fig. 3 is a transverse sectional elevation, of said apparatus.

In the apparatus illustrated in the accompanying drawings the hearth or metal-receptacle (indicated by the reference character 1) is provided at opposite ends with enlargements which comprise basins in which the metal to be oxidized may be introduced. These basins taper toward the oxidizing-chamber 2, where the receptacle is smallest and uniform in cross-sectional area. Through the side of the oxidizing-chamber twyers 3 are introduced, supplied with air from the

pipe 4. Circuit-terminals 5 are provided at the opposite ends of the metal-receptacle 1, which terminals are preferably made of copper and provided with cables 6, which conduct the heavy current of electricity thereto. The collecting-chamber 7 collects the metallic oxids discharged into it from the oxidizing-chamber. The metal-receptacle or hearth and oxidizing-chamber are constructed of electrically non-conductive refractory material. The current passing through the metal heats the same in proportion inversely to the cross-sectional area thereof. Thus the metal in the central portion of the receptacle is heated highest and to a uniform temperature throughout, and the ends of the receptacle where the terminals of the circuit enter are comparatively cool, so that the terminals are uninjured and the metal melted by the current is not adulterated by the metal of the terminals. In the manufacture of the binoxid of tin I prefer to employ a current sufficient to maintain the tin at the smallest part of the receptacle at a temperature of about 1,200° centigrade and to apply the air at the temperature of about 400° centigrade, under which circumstances the product will be commercially pure binoxid of tin. If, however, it is desired to produce putty powder, which is a mixture of binoxid and protoxid of tin, the metal will be maintained at the same temperature, but the air introduced will be unheated. In the manufacture of the oxids of lead cold air may be employed.

It is to be noted that by making the oxidizing-chamber cover only that portion of the molten metal which is of the highest temperature the kind of product may be determined. Thus if the oxidizing-chamber were extended over the entire surface of the metal various oxids would be produced from the metal, dependent upon the temperature of the metal at the place where the oxid was formed. Therefore I employ an oxidizing-chamber which does not completely cover the metal-receptacle. Moreover, the level of the molten metal in the receptacle can be more easily governed by the introduction of metal when it is exposed to view throughout part of its surface than if it be entirely covered. As a consequence I prefer the construction illustrated in the accompanying drawings for use in carrying out my process, because it enables the operator to watch the level of the metal and to maintain it at the proper level by the introduction of metal without the inconvenience of watching it through peep-holes and with the added advantage of being able to regulate it to a considerable nicety. It is apparent to those skilled in the art that the level of the metal must be carefully regulated in order to maintain the cross-sectional area at the reduced part of the receptacle proportionate to the current employed.

It is to be noted that in the manufacture of the oxids of tin the strength of the current or the cross-sectional area at the smallest part

of the metal-receptacle should be so proportioned that the temperature of the metal at this point should not exceed 1,400° centigrade, because if the metal exceeds such temperature the vapor of tin will be generated, causing the metal to boil, in turn reducing the effective cross-sectional area and increasing the resistance, so that the metal will be heated to a still higher temperature by the current.

10 I do not confine myself to the particular apparatus illustrated in the accompanying drawings and described herein for carrying out my process, but the same is illustrated merely for the purpose of illustrating an apparatus by which my method may be advantageously carried out.

15 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The method of making the oxids of tin and lead which consists in maintaining a horizontal layer of the metal of uniform cross-sectional area throughout its length in an oxidizing-chamber in a molten condition and at a suitable temperature for rapid oxidation by the action of a current of electricity conducted thereto by bodies of the metal of larger cross-sectional area, and in subjecting the metal in the oxidizing-chamber to the action of a current of oxidizing reagent which oxidizes the metal and carries away the metallic oxid, substantially as described.

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

CLARENCE S. LOMAX.

Witnesses:

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HORACE VAN EVEREN.