H. FOERSTERLING.

PROCESS OF MAKING METAL OXIDS.

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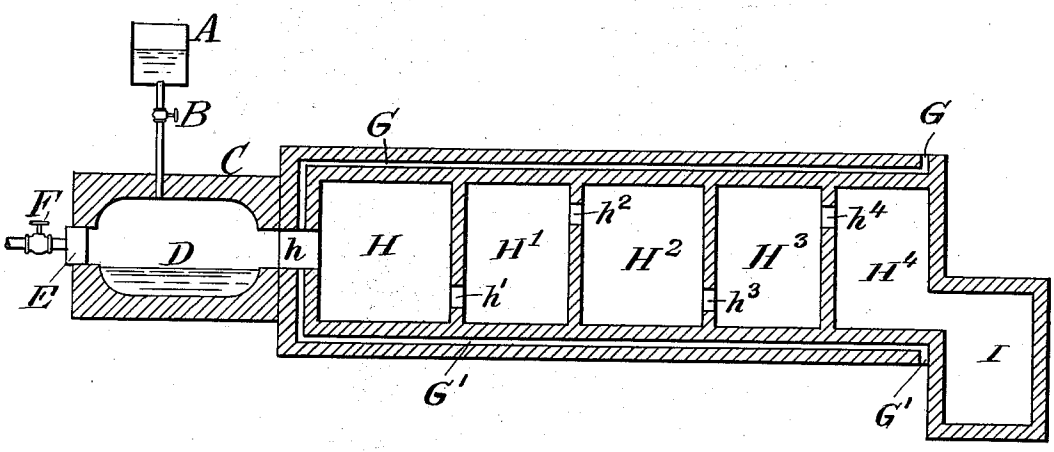
1,019,004. Patented Feb. 27, 1912.



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PROCESS OF MAKING METAL OXIDS.

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To all whom it may concern:

Be it known that I, HANS FOERSTERLING, residing in the city and State of New York, a subject of the German Emperor, have invented a certain new and useful Process of Making Metal Oxids, of which the following is a specification.

The present invention consists in a process of making metal oxids especially tin oxid and it relates to the well known manner of bringing the metal to be oxidized in direct contact with an oxidizing agent, the metal being in a molten state and I do not generally claim this well known process but the object of my invention is to carry out this process in a manner by which a uniform and pure oxid is formed.

I will now proceed to describe my invention with respect to the manufacture of tin oxid as an example. I bring the tin to a temperature which is above its melting point (232.7° C.) and near to its boiling point (1600° to 1808° C.) the vapors of the tin escaping at temperatures from 1450° to 1600°. These vapors are brought into contact with air or any other gaseous oxidizing agent (which may or may not be heated previously). By coming into contact with this oxidizing agent the tin vapors undergo a further heating in consequence of the heat of formation so that their temperature raises to and over the boiling point of the tin itself. In this condition of temperature and in contact with an excess of the oxidizing agent the vapors are completely and uniformly converted into tin oxid thus avoiding the formation of lower oxids of tin. In order that this formation of lower oxids of tin be avoided it is necessary that the oxidizing agent does as well as possible not come into contact with the molten metal but only with the highly heated vapors. The oxid thus formed is carried away by the current of the excess of the oxidizing agent and suitably collected. Thus a tin oxid is obtained which is practically free from impurities which would diminish its quality.

The drawing represents diagrammatically a cross section of an apparatus showing one means of carrying out the process.

In the drawing A represents a melting pot for the metal to be oxidized. B a valve regulating the flow of metal from melting pot A into furnace C.

D represents a bath of molten metal in furnace C adapted to be further heated to near but below the boiling point of the metal by any convenient means as by a gas burner E, the amount of gas required to heat the metal bath being regulated by a valve F. The metallic vapors generated in furnace C pass through an opening h into chamber H, being met in said opening before entering chamber H by blasts of hot air coming through air-ducts G G′ supplied from any convenient source (not shown). The chamber H together with chambers H′, H², H³ and H⁴ are condensing chambers for the oxid and I represents a flue. The chambers H, H′, H², H³ and H⁴ are in communication with each other through opening h', h^2, h^3, and h^4, preferably arranged at the bottom and top of the respective chambers, as shown in the drawing.

In carrying out the process in connection with the apparatus shown, the metal to be oxidized, for example tin, is charged into melting pot A, being kept molten therein by any convenient heating means (not shown). The molten tin passes from melting pot A into furnace C, the flow of the metal being regulated by means of valve B. The molten tin metal is further heated up to near but below its boiling point in the furnace C by means of the gas burner E. It is important that no excess of air be permitted to enter furnace C so that the metal is heated substantially in a reducing atmosphere. The tin vapors generated in furnace C pass through opening h where they meet the hot air from ducts G G′ which oxidizes the tin vapors completely into tin oxid the heat of reaction raising the temperature of the tin up to and beyond its boiling point, the vapors passing into chamber H and the connecting chambers, said chambers serving not only for the completion of oxidation by the action of hot air, but also for the condensing and collecting of the tin oxid vapors. The tin oxid collected in the chambers may be removed by any suitable means not shown.

The practice of the process is not limited to the use of the apparatus described as it is obvious for example, that there may be variations in the manner of heating the metal in the furnace C as by the electric current instead of by gas. The air blasts may be heated or not. The construction of the feeding arrangements may be different and other details may be varied, the apparatus shown being only one way of practicing the process.

Having now described my process and in

which manner it has carried out in practice I wish it to be understood that I do not claim broadly the manufacture of metal oxid by bringing an oxidizing agent into contact with the molten metal as many of such processes are already known but

What I claim is as follows:

1. A process of making metal oxids consisting in heating the metal to be oxidized in the absence of an excess of a gaseous oxidizing agent to a temperature which is above its melting point and near but below its boiling point, bringing the escaping vapors of the metal into contact with a current of an excess of a gaseous oxidizing agent and raising the temperature of the vapors by the heat of reaction to the boiling point of the metal.

2. A process of making metal oxids consisting in heating the metal to be oxidized in the absence of an excess of gaseous oxidizing agent to a temperature which is above its melting point and near but below its boiling point, bringing the escaping vapors of the metal into contact with a current of an excess of a heated gaseous oxidizing agent and raising the temperature of the vapors by the heat of said oxidizing agent and the heat of reaction to the boiling point of the metal.

3. A process of making tin oxid consisting in heating the tin in absence of an excess of air to a temperature which is above its melting point and near but below its boiling point, bringing the escaping vapors of the tin into contact with a current of an excess of air and raising the temperature of the vapors by the heat of reaction to the boiling point of tin.

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

HANS FOERSTERLING.

Witnesses:

PAUL ARRAS,

CLÄRE SIMON.