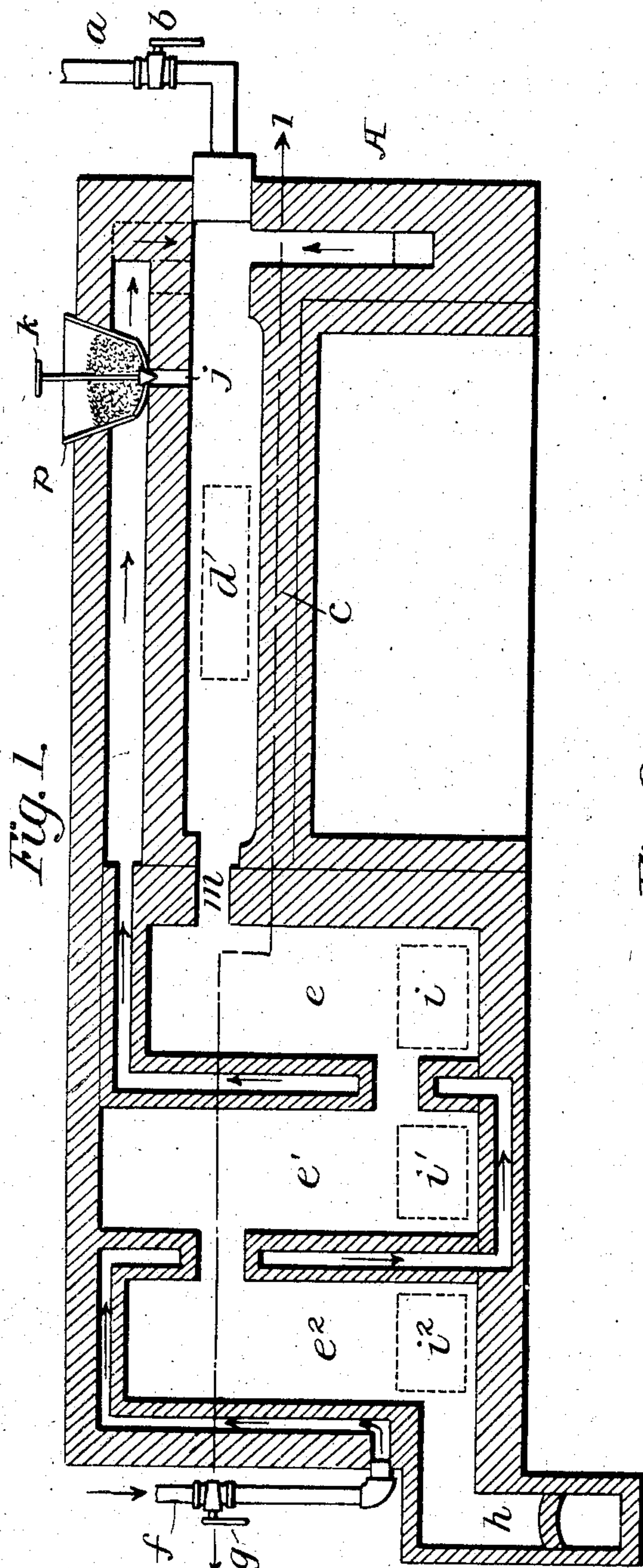


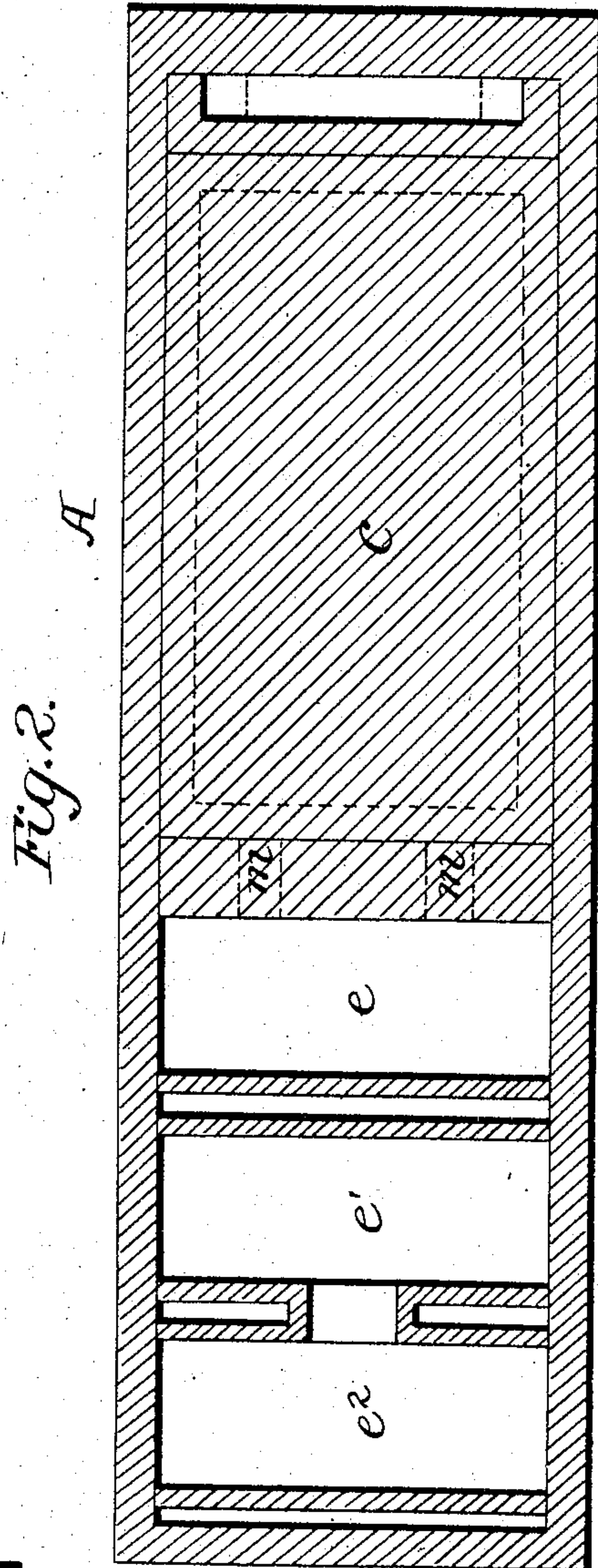
No. 780,984.

PATENTED JAN. 31, 1905.

H. FOERSTERLING.
PROCESS OF MAKING TIN OXID.
APPLICATION FILED MAY 6, 1903.



Witnesses
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PROCESS OF MAKING TIN OXID.

SPECIFICATION forming part of Letters Patent No. 780,984, dated January 31, 1905.

Application filed May 6, 1903. Serial No. 155,890.

To all whom it may concern:

Be it known that I, HANS FOERSTERLING, a subject of the Emperor of Germany, and a resident of Perth Amboy, in the State of New Jersey, have invented certain new and useful Improvements in Processes for the Manufacture of Tin Oxid, of which the following is a specification accompanied by drawings.

This invention relates to a certain improvement in the manufacture of tin oxid, (SnO_2), and has for its object to obtain a perfectly white product which is suitable for enameling purposes. This oxid has been produced by heating metallic tin in the presence of air; but the product thus obtained is off color, due to the formation of lower discoloring-oxids formed at the low temperatures, and tin oxid has been produced by the wet process—that is, by dissolving tin by means of nitric acid. The oxid has been made by heating metallic tin to a high temperature (approximately $1,200^\circ$ centigrade) in the absence of air and then when at said high temperature admitting abundance of air to the molten metal and finally removing the tin oxid formed, and tin oxid has also been made by first pulverizing tin metal to a very fine powder and then by bringing this finely-divided powder in contact with air in a heated retort and collecting the tin oxid thus formed in chambers. A by-product is also formed, so-called “tin glass,” as described in the *Zeitschrift für Angewandte Chemie*, 1903, page 195.

I have found that it is possible to obtain a perfectly white oxid of tin by a continuous process if the tin metal is heated in the furnace in the presence of air heated previous to contacting with the tin to a temperature such that the temperature of the contacting tin and air is above that at which the lower discoloring-oxids are formed, and as the oxid is removed fresh tin is added at short intervals or supplied continuously.

In carrying out my invention I proceed as follows: The furnace in which the tin oxid is to be made may in this instance be a “flame-hearth,” in which the air and flames pass over the tin metal.

The accompanying drawings represent a suitable apparatus designed for the purpose of carrying my invention into effect.

In the drawings, Figure 1 is a longitudinal section of the apparatus. Fig. 2 is a horizontal section on the plane of the broken line 1 1 of Fig. 1.

Similar letters of reference designate corresponding parts in the figures.

A designates a furnace to which a pipe-line *a* is connected for conducting to the furnace producer-gas or any other suitable gas for heating purposes. The amount of gas to be used may be regulated by means of a valve *b*.

On the melting-pan *c*, access to which may be had through the opening *d*, the tin metal is heated and a molten bath formed. The opening *d* is used for removing the oxid. The aperture *m* connects the metal-furnace with a series of chambers *e e' e''*, and in these chambers all the tin oxid which may be carried away by the air and gas is collected. These chambers are shown constructed with double walls and serve, further, for the purpose of heating the air supplied to the furnace to a very high temperature. The air enters at *f* and follows the direction of the arrows and mixes with the gas coming from the pipe-line *a*, and the amount of air may be regulated by means of the valve *g*. The waste gas enters the flue at *h*.

On the top of the furnace is shown a vessel *p*, made of suitable material, as iron, and containing molten tin. The vessel has an outlet *j*, and by means of a valve *k* the tin may be charged into the furnace as required. As shown, the vessel *p* is heated by the heated air.

After the furnace has been charged with tin and is heated to the necessary temperature to form oxid of tin—about 900° to $1,100^\circ$ centigrade—the oxid is removed through the opening *d*, and new metal is charged into the furnace at short intervals, or the metal may be run down continuously through the opening *j* of the vessel *p*. Whatever tin oxid is carried away in the chambers *e e' e''* may be removed from time to time through the doors *i i' i''*.

It will be understood that the furnace may

be constructed in different ways. There may be more or less chambers. The air may be heated by means of a separate heater, and instead of heating the furnace with gas the furnace may be constructed with a regular fire-box and grate or as a so-called "regenerative" furnace, and instead of charging the furnace with tin metal from the top the metal may be brought into the furnace from the side, if desired.

The heated air aids in obtaining a white product, because it prevents the formation of the lower oxids of tin.

I claim and desire to obtain by Letters Patent the following:

1. The continuous process, substantially as herein described, of making tin oxid, which consists in gradually supplying tin to a suitable furnace, heating the tin thus supplied in the presence of air, said air having been heated previous to contacting with said tin to a temperature such that the temperature of the contacting air and tin is above that at which the lower discoloring-oxids are formed.

2. The continuous process, substantially as herein described, of making tin oxid, which consists in gradually supplying tin to a suitable furnace, heating the tin thus supplied in the presence of air, said air having been heated previously to contacting with the tin to a tem-

perature above that at which the lower discoloring-oxids are formed, and removing the oxid formed.

3. The continuous process, substantially as herein described, of making tin oxid, which consists in gradually supplying tin to a suitable furnace, heating air to a temperature above that at which the lower discoloring-oxids are formed, leading said air into contact with said tin, heating said tin in the presence of said air to a temperature suitable for the formation of tin oxid, and removing the oxid thus formed.

4. The continuous process, substantially as herein described, for producing tin oxid, which consists in maintaining a molten bath of tin in a suitable furnace by the gradual addition of tin as the bath is depleted, heating air to a temperature above that at which the lower discoloring-oxids are formed, passing said heated air into contact with the surface of said bath, and removing the tin oxid formed.

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

HANS FOERSTERLING.

Witnesses:

HUGO DU BOIS,
F. A. DEISLER.