

W. & H. SIMM.
 APPARATUS FOR PRODUCTION OF ZINC OXID.
 APPLICATION FILED OCT. 1, 1907.

946,688.

Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.

FIG. 1

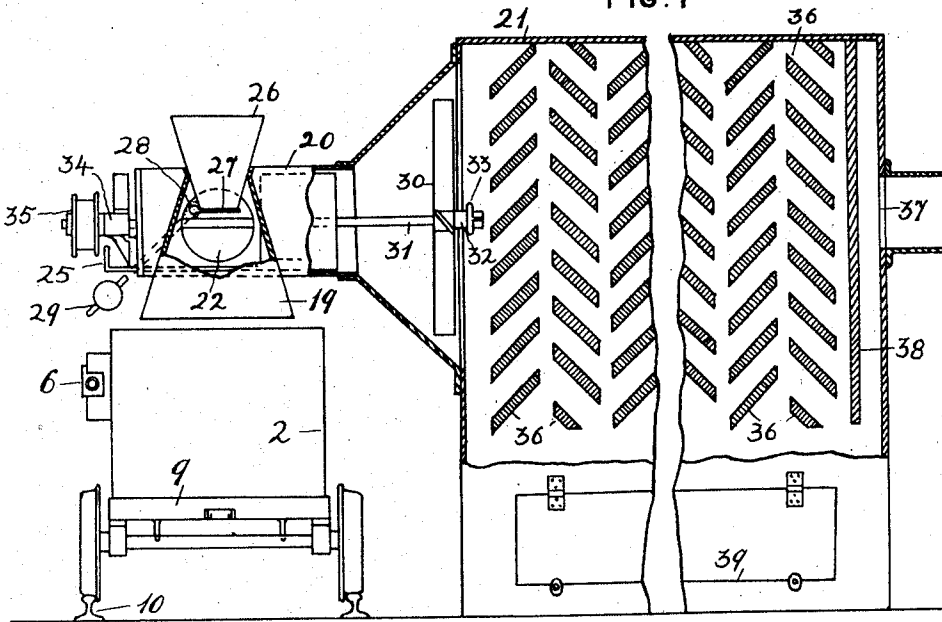
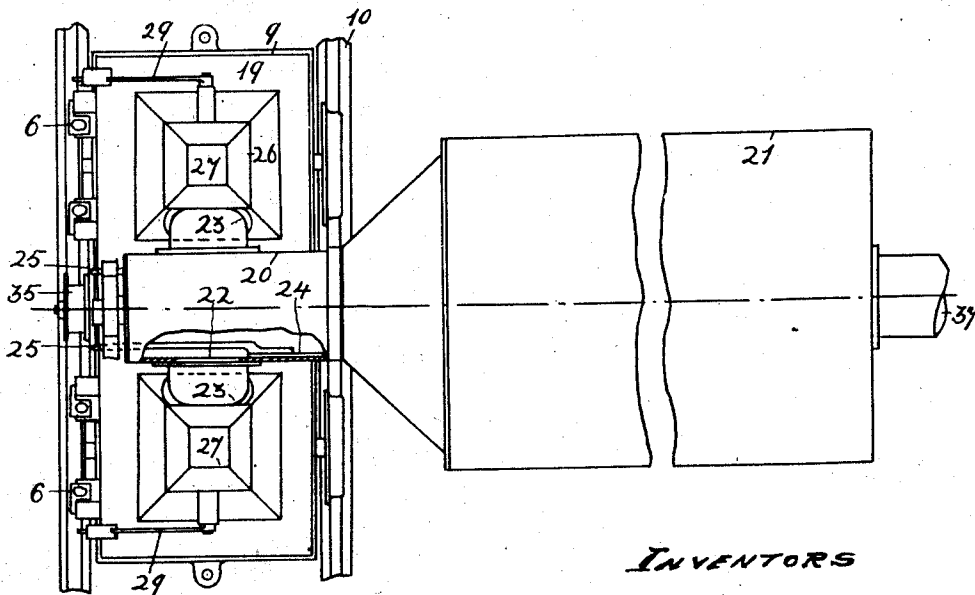


FIG. 2



WITNESSES
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2 SHEETS—SHEET 2.

Fig: 3

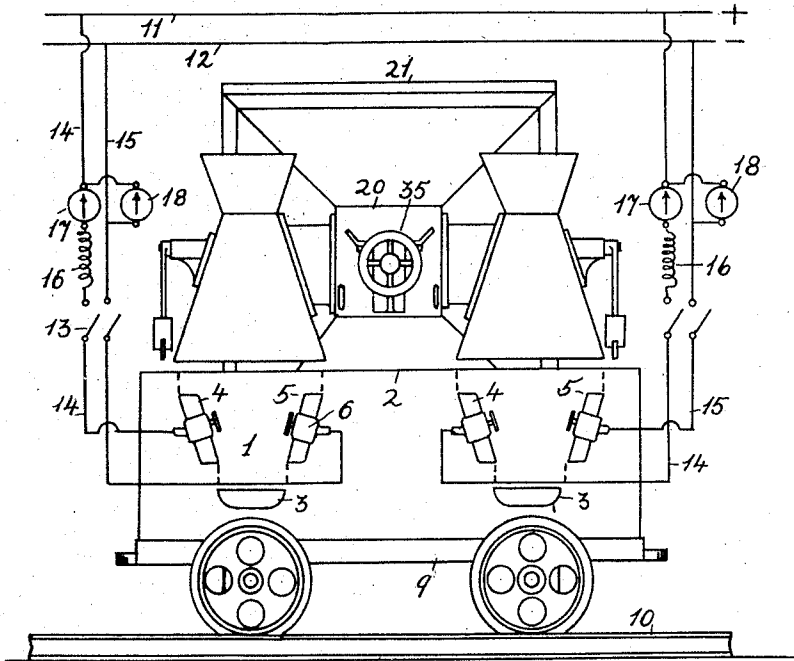


Fig: 4

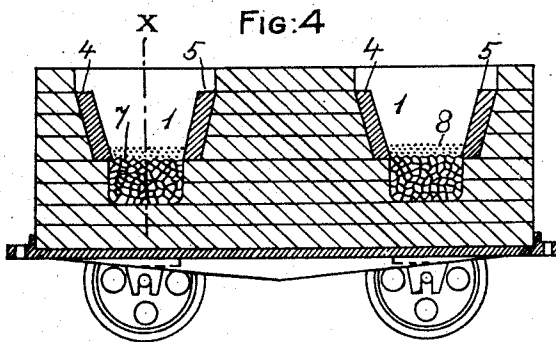
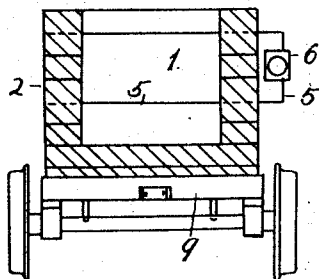


Fig: 5



WITNESSES

W. P. Bunk
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UNITED STATES PATENT OFFICE.

WILLIAM SIMM AND HENRY SIMM, OF PORTICO, NEAR PRESCOT, ENGLAND.

APPARATUS FOR PRODUCTION OF ZINC OXID.

946,688.

Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed October 1, 1907. Serial No. 395,381.

To all whom it may concern:

Be it known that we, WILLIAM SIMM and HENRY SIMM, subjects of the King of Great Britain and Ireland, residing at Portico, near Prescott, in the county of Lancaster, England, have invented certain new and useful Apparatus for the Production of Zinc Oxid (for which a patent has been applied for in Great Britain, No. 21,787, bearing date October 3, 1906), of which the following is a specification.

This invention consists in an improved apparatus for the rapid and cheap production of zinc oxid from zinc ores such as calamines and metallic substances containing zinc.

In the drawing attached hereunto, Figure 1 represents a side elevation of our improved apparatus, partly in section; Fig. 2 represents a plan partly in section; Fig. 3 represents a front elevation; Fig. 4 represents a longitudinal section of the furnace and Fig. 5 a cross section of the same at line *x* on Fig. 4.

The apparatus illustrated is designed for two furnaces which may be worked together or separately. Each furnace consists of a well 1 formed in a fire-brick setting 2 one side or end of which is provided with a vent for the purpose of cleaning out the well. This vent is normally closed by a plug 3 which may consist of a firebrick luted in. Across the setting are fixed two carbon slabs 4 and 5 which form the electrodes and also form the sides of the furnace proper. These slabs are set in brickwork at their ends and these ends protrude at one end of the furnace so as to enable clamp connections or terminals 6 to be fixed to them for the purpose of securing the ends of the electric conductors to the carbon slabs. The slabs 4 and 5 are preferably inclined from the vertical as shown in Figs. 3 and 4. The lower part of the well is filled with silica represented by 7, up to the lower edges of the carbon slabs. On top of the silica is placed a layer of granulated or powdered carbon represented by 8, which connects the carbon slabs together at their lower edges. The two furnaces shown in the drawing are formed in one setting. The setting is carried upon a wheel truck such as 9. Preferably a railed track 10 as illustrated is used in order to facilitate the changing and setting in position of the furnaces in relation

to the other part of the apparatus herein-after described.

The electrical connections and necessary electrical instruments for each furnace are diagrammatically illustrated in Fig. 3. The current used is an alternating one.

The bus-bars are represented by 11 and 12. The connections are so arranged that either or both the furnaces can be rendered inoperative at will. For this purpose each furnace has a separate circuit which can be opened or closed by means of its switch 13, which is preferably of the double pole type. Each circuit is represented by the lines 14 and 15. The ends of the electric conductors of the circuit are attached to the carbon slabs 4 and 5 respectively by means of the clamps 6 as before stated. In the circuit 14 is placed a choking coil or its equivalent represented by the spiral 16, also an ammeter represented by 17. A voltmeter represented by 18 is arranged in each circuit by a shunt. In the other part of the apparatus is arranged a hood 19 for each furnace, which is suspended so as to leave sufficient clearance between its lower edge and the furnace top when the latter is beneath it, for a liberal supply of air all around. Each hood is carried by a trunk flue 20 which is fixed at one end to a chamber 21 forming the condenser and collector of the zinc oxid. Each hood has an opening such as 22 Fig. 1 therein which leads into a branch flue 23 Figs. 2 and 3, connected to the main flue 20. Each flue 23 is fitted with a door or damper such as 24 Figs. 1 and 2 provided with a handle 25 by which the opening 22 may be closed at will. Above each hood is formed a hopper 26 for feeding the furnace with the charge to be reduced, the hopper being provided with a valve or door such as 27 which is preferably hinged at 28 and kept closed normally by means of the weighted arm 29.

At the junction of the trunk 20 with the chamber 21 there is mounted a fan 30 preferably in the manner illustrated in Fig. 1. It is fixed upon the shaft 31 which is carried in a bearing 32 fixed by a cross bar 33 at one end and at the other in a bearing bracket 34 shown fixed to the end of the trunk 20. The outer end of this shaft may carry a belt pulley such as 35 for driving the fan or alternatively an electric motor may be fixed so as to drive it directly.

The fan 30 is for the purpose of drawing the zinc vapor from the furnace when the latter is in operation and for regulating the draft. The condensing chamber 21 is fitted with baffle screens facing the fan. In the drawing these screens are shown as consisting of flat-surfaced bars 36 spaced apart in vertical rows, the bars being inclined transversely and run from one side to the other of the chamber. These bars may be made of any suitable material or materials, roughened wood, frames covered with muslin or the like being suitable. The chamber is provided with an outlet orifice 37 between which and the screens is preferably fixed a partition 38 somewhat as illustrated. Another suction fan may be fixed at the outlet orifice. The door for discharging the condenser of the oxid collected is represented by 39.

In operating the apparatus, a furnace setting is first wheeled into position under the hoods 19 and the necessary electrical connections made. The carbon electrodes of the furnace are then connected together by a layer of powdered charcoal preparatory to starting the furnace, as hereinbefore stated. The effect of this is to obtain an incandescent bed immediately the current is switched on and the charcoal slightly pressed down. The charge can then be fed directly into a live furnace by which the efficiency of the apparatus is increased. The charge is prepared by mixing the ore or other substances containing the zinc in a broken up state with such materials as salt cake or common salt and slaked lime or with borate of lime. The mixture comes into the furnace through the hopper 26 and immediately comes into contact with a large surface of incandescent carbon by which the zinc is immediately volatilized. The volatilization of the zinc is quickened by suitably varying the proportions of the ingredients of the flux used and the greatest efficiency is thus more evenly maintained. The relative proportions of the salt cake or common salt to the lime can be advantageously varied from five to two to about equal proportions according

to the quality of the material to be treated and with a given strength of current the voltage can be advantageously kept as high as possible. The proportions of the flux to the material treated will vary from two and a half to twenty-five per cent. according to the character of the said material. The fan 30 projects the zinc vapor against the baffles or bars 36 by which it is thrown down and it can then be collected at the door 39. Any other vapors resulting from the reduction of the material containing the zinc are blown out at the orifice 37 and the clearing out of the condenser of such foreign vapors can be facilitated by the use of a suction fan at the outlet orifice as before stated.

We claim as our invention:—

1. In apparatus for producing zinc oxid electrically, the combination of a condensing chamber having suitable baffles, a hood connected therewith, and a suction fan for drawing the fumes into the hood and discharging them into the condenser, with an electrical furnace removably located beneath the hood and suitable detachable electric connections for the furnace, said connections including a choking coil.

2. In apparatus for producing zinc oxid electrically, the combination of a condensing chamber having suitable baffles, a hood connected therewith, and a suction fan for drawing the fumes into the hood and discharging them into the condenser, with an electric furnace removably located beneath the hood, a space being provided between the bottom of the hood and the top of the furnace whereby air for the supplying of oxygen is freely admitted on a level with the heating material carried by the furnace.

In testimony of which we hereunto set our hands and seals in the presence of two witnesses.

WILLIAM SIMM. [L. s.]
HENRY SIMM. [L. s.]

Witnesses:

WALTER H. BARTON,
RIDLEY Y. URQUHART.