

A. PETERSSON.
ELECTRIC RESISTANCE FURNACE.
APPLICATION FILED MAY 25, 1910.

1,002,444.

Patented Sept. 5, 1911

3 SHEETS—SHEET 1.

Fig. 1.

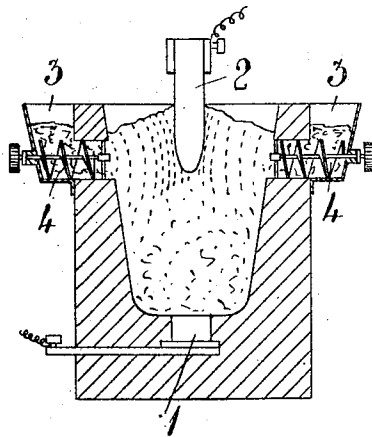


Fig. 3.

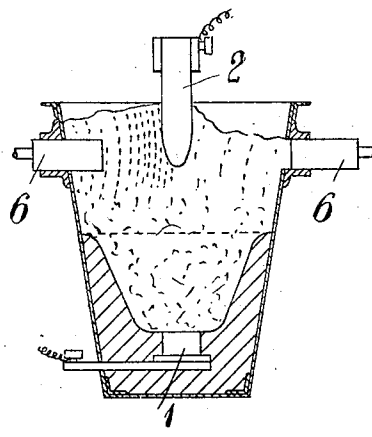


Fig. 2.

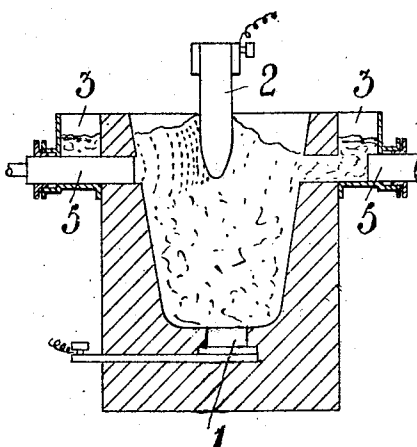
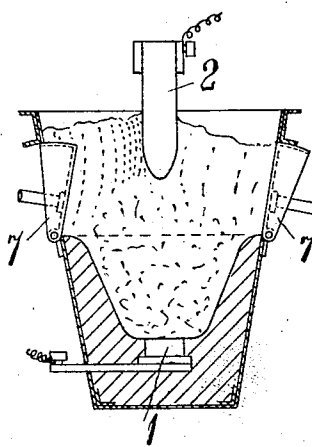


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 5.

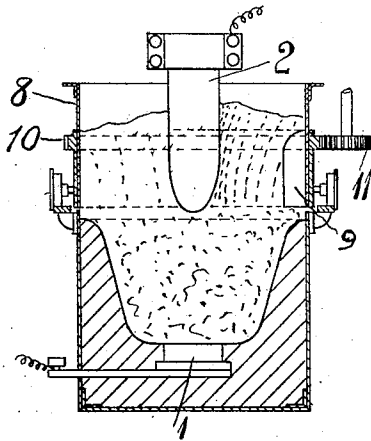


Fig. 7.

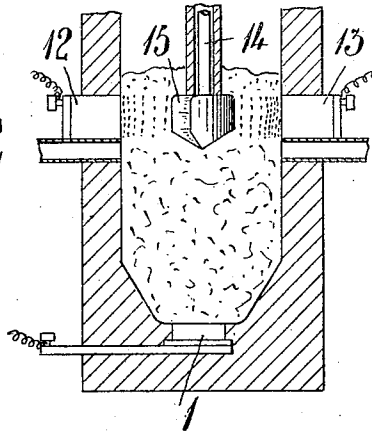


Fig. 6.

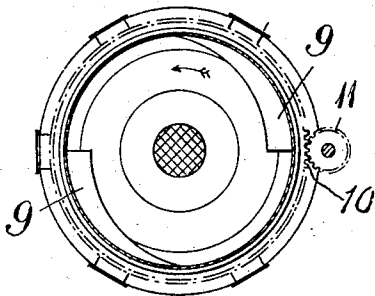
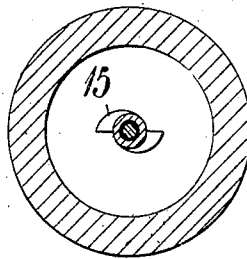


Fig. 8.



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3 SHEETS-SHEET 3.

Fig. 9.

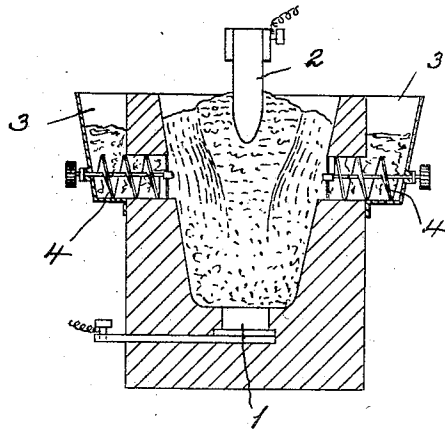
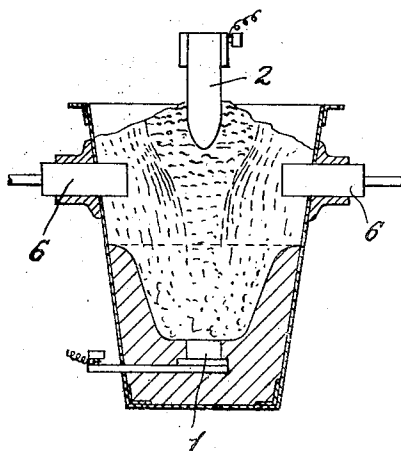


Fig. 10.



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UNITED STATES PATENT OFFICE.

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ELECTRIC-RESISTANCE FURNACE.

1,002,444.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed May 25, 1910. Serial No. 563,312.

To all whom it may concern:

Be it known that I, ALBERT PETERSSON, a citizen of the Kingdom of Sweden, residing at Odda, Norway, have invented new and useful Improvements in Electric-Resistance Furnaces, of which the following is a specification.

This invention relates to improvements in electric resistance furnaces. In such furnaces heretofore known, in which the current flows into the charge from electrodes disposed in the upper part of the furnace in direct contact with the charge electric arcs may be formed at the ends of the upper electrodes when the charge sinks down in the furnace or is melted in proximity to the said electrodes. By these arcs the resistance of the furnace is increased causing a high reduction of the electric energy taken up by the furnace. At the same time the distribution of heat in the charge will be unfavorable, the strongest heat being developed in the upper part of the furnace in proximity of the upper electrode or electrodes whereby the charge is caused to melt too early and to be partly gasified and the molten material is thrown out from the furnace. The wear of the electrodes will also be increased when arcs are formed, while the consumption of the electrodes is unessential when the current flows directly to the charge from the electrodes without forming arcs.

The object of the present invention is to remove the said disadvantages and it consists, briefly, in the provision in an electric resistance furnace of means in the upper part of the furnace for forcing continuously or intermittently the charge in a substantially horizontal direction toward the upper electrode or electrodes of the furnace. Hereby the material charged will be pressed against the said electrode or electrodes preventing the formation of arcs.

In the accompanying drawings I have shown some embodiments of my invention.

Figures 1-4 show vertical sections of different melting furnaces embodying the invention. Fig. 5 is a vertical section and Fig. 6 a horizontal section of a fifth construction form. Fig. 7 shows a vertical section and Fig. 8 a horizontal section of a sixth construction form. Figs. 9 and 10 show vertical sections of modifications of the furnaces shown in Figs. 1 and 3 respectively.

Referring to Fig. 1, 1 indicates a bottom electrode and 2 an upper central electrode around which the material is charged. The disadvantage to be removed by the present invention consists in that air gaps are formed around the lower end of the electrode 2 when the charge sinks. In order to obviate this disadvantage, hoppers 3, 3 are provided at the sides of the furnace at the top of the latter, in which are arranged feed screws 4 which force the material in a substantially horizontal direction toward the end of the electrode 2. Air-gaps that eventually are formed around the electrode 2 on account of the charge sinking down will hereby be filled immediately so that the formation of arcs and the development of a too high heat in the upper part of the furnace will be prevented.

The construction form shown in Fig. 2 differs from that shown in Fig. 1 only in that instead of the feed screws pistons 5 are used, which force the material from the hoppers 3 into the furnace. The working is substantially the same as that described with reference to Fig. 1.

Referring to Fig. 3, pistons 6 are provided near to the upper edge of the furnace wall, which may be operated by hydraulic devices or suitable mechanical movements and serve to force the material introduced into the upper part of the furnace from the furnace wall toward the central electrode 2. This device works substantially in the same manner as those described above.

In the form shown in Fig. 4 pivoted doors 7 are used instead of the pistons 6 in Fig. 3, said doors when being pressed inward by suitable means forcing the material from the side-walls of the furnace toward the center thereof, so that eventual air-gaps around the electrode 2 will be filled with the charged material.

In the construction form shown in Figs. 5 and 6 the upper portion 8 of the furnace wall is rotatable and provided at the inner side with cams 9 or the like. When the portion 8 is rotated in the direction indicated by the arrow in Fig. 6, the said cams will force the charge toward the central electrode so that the latter continuously will be closely surrounded by the charge. The upper portion 8 of the furnace may be provided with teeth 10 in which engage a toothed wheel 11 by means of which the said upper portion can be rotated. For this

driving device obviously other equivalent means may be substituted.

In the construction form shown in Figs. 7 and 8 the furnace is provided with a bottom electrode 1 and two lateral electrodes 12 and 13 mounted in the upper part of the furnace wall. In this form the material is forced toward the said lateral electrodes 12 and 13 by means of a central rotatable shaft 14 reaching into the furnace and having a cam 15 or the like which when the shaft is rotated, acts on the surrounding material and forces the same toward the furnace wall and maintains the contact between the charge and the lateral electrodes.

In the modifications shown in Figs. 9 and 10 the feeding devices 4 and 6 respectively are disposed somewhat lower than in Figs. 1 and 3. The horizontal displacement of the charge, therefore, will take place toward a point below the ends of the electrode 2 so that the material only indirectly will be pressed against the said electrode. By this arrangement air-gaps below the end of the electrode 2 will be very easily filled up by the charge. Further, if the carbon and the material to be reduced, for instance lime, are charged unmixed into the furnace and the carbon is placed in the next proximity of the electrode, the said latter material can more easily sink down in the furnace, than if the horizontal pressure is exerted directly toward the electrode. It is evident that the forms shown in Figs. 2 and 4-7 may also be modified in the same manner, if desir-

able. It is further obvious that the devices described above are only constructional forms of the invention, which may be varied in many ways without departing from the principle of the invention.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. An electric smelting furnace having a lower electrode and an upper electrode and in which the charge forms a vertical resistance conductor between the electrodes, in combination with means in the said upper part of the furnace for forcing the charge in a substantially horizontal direction toward said upper electrode, for the purpose of avoiding electric arcs at the end of the said upper electrode.

2. An electric smelting furnace having an upper electrode and a lower electrode and in which the charge forms a vertical resistance conductor between the electrodes, in combination with plungers in the upper part of the furnace for forcing the charge in a substantially horizontal direction toward said upper electrode for the purpose of avoiding electric arcs at the end of the said upper electrode.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ALBERT PETERSSON.

Witnesses:

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JÖRGEN FAYE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."