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L. MICHELAT

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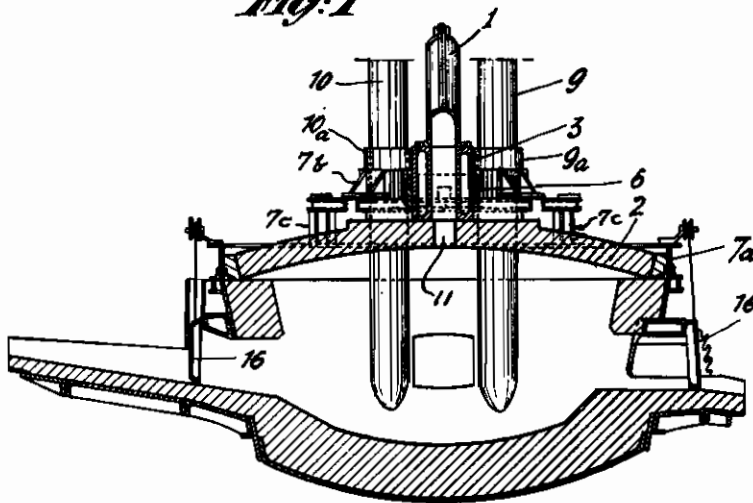
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BY A. P. C.

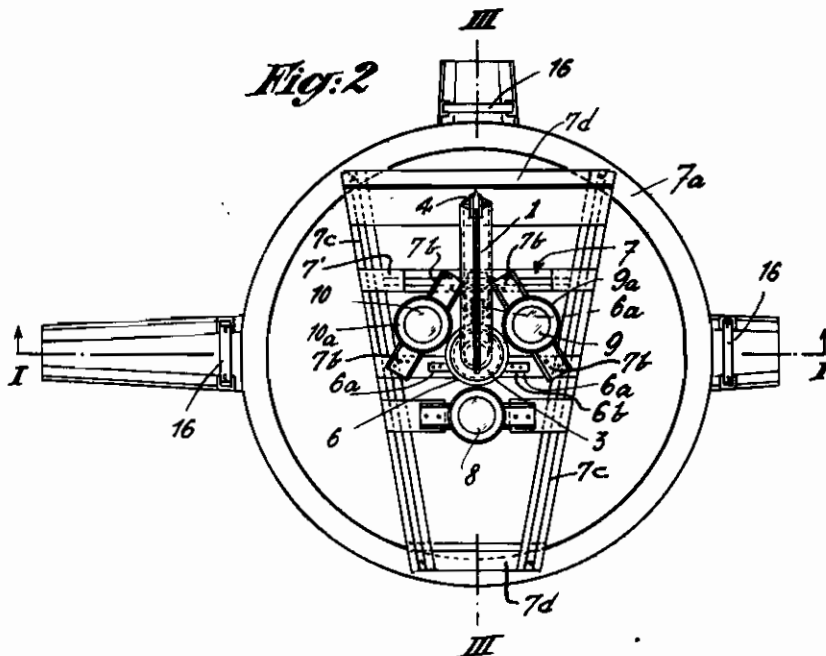
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2 Sheets-Sheet 1

*Fig:1*



*Fig:2*



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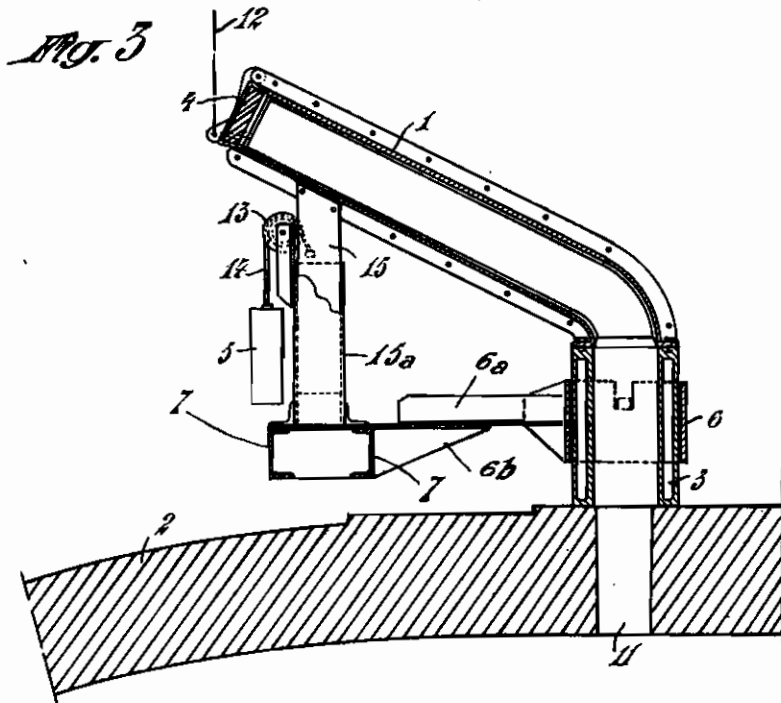
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# ALIEN PROPERTY CUSTODIAN

## GAS REMOVING DEVICE FOR ELECTRIC FURNACES

Léon Michelat, Pamiers, France; vested in the  
Alien Property Custodian

Application filed October 28, 1941

One of the principal characteristics of electric arc furnaces utilized in the manufacture of steel is to constitute an hermetically closed enclosure. In opposition to the Siemens-Martin type of furnace, where the gases resulting from the reactions during the processing of the metal go off through chimney-stacks, these gases have no other issue in the electric arc furnace than the charging doors and the openings in the roof for the electrodes.

Now, in electric arc furnaces, as perfect gas-tight conditions as possible are sought after, and to this end, it is advisable to obturate the openings for the electrodes by means of flame screens and to render the charging doors as hermetic as possible. It consequently seemed contrary to the principles laid down by electric furnace technicians to provide a chimney stack for the leading out of the gases which are given off in this type of furnaces, the evacuation of the said gases then taking place more or less well through the fissures in the various joints.

These conditions special to the electric arc furnace offer a serious disadvantage when the processing results in the giving off of a large quantity of gases, especially when molten cast iron is to be charged. The quantity of gases given off is then so important that personnel employed is not allowed to approach the furnace.

Moreover, the applicant has noted that even when the charge is entirely solid, it is profitable, at certain times during the processing, to facilitate the leading out of the gases and fumes.

Finally, the applicant has also found that a clarification of the atmosphere about the furnace and inside of it, allows a more constant and active supervision of the roof.

The improvement to electric furnaces which constitutes the object of my invention consists therefore in boring a hole in the top of the roof and in setting over the said hole a chimney-stack preferably bent in such a direction with respect to the electrodes that the fumes may be led away from the space occupied by the said electrodes, which stack is provided with a clack valve or obturator that may be opened when it is desired to let off the gases and fumes.

It is important that this stack does not prevent the movements of the roof caused by its thermic dilatation or contraction. To this effect, the stack is rigidly fixed only to the roof, and to balance the weight of the bent portion, the latter may be connected to a suitable counterweight by means of a cable attached at one end to the frame-work.

The diameter of the stack hole in the roof must

be large enough to allow an easy evacuation of the fumes and gases when the obturator is open and sufficiently small to ensure that, during this period of evacuation, there subsists at the bottom of the charging doors, a slight excess pressure preventing the entrance of air.

For example, a diameter of about 250 mm. is suitable for a furnace capable of melting 17 tons of solid charges.

The following description, in connection with the appending drawings, given by way of example not inclusive of all cases will allow a thorough understanding of how my invention can be embodied.

Figure 1 is a vertical sectional view, in diagrammatic form, of an electric furnace provided with the evacuation device.

Figure 2 is a plan view, in diagram form, of this furnace and of the position of the stack with respect to the electrodes. On this figure, I—I shows where the sectional view represented in Figure 1 has been taken.

Figure 3 represents on a larger scale and as a partial vertical section taken at III—III in Figure 2 the device for the evacuation of the gases.

The device shown for the evacuation of the gases is constituted by a stack 1 placed at the key-stone of the furnace 2, above an orifice 11 especially bored to this effect in the roof. In the example shown on the drawings, this stack is bent in a direction opposite to the median electrode 8, as is indicated on Figure 2, so as to prevent the fumes from locking the electrodes 8, 9, 10 and their supports which they would corrode.

The chimney-stack 1, the inside of which is lined with refractory pise, rests on the roof of the furnace by means of an intermediate hollow ring or collar, water-filled, the object of which is to cool the base of the stack that is to say the portion of the said stack which is exposed to the highest temperature and where the risk of deterioration is the greatest. The stack is normally closed by a clack-valve 4 which may be opened at the proper time by operating a cable 12 or by any other means.

The cantilever end of the stack 1 is connected, by means of a balancing device ensuring equilibrium, to the fixed supports 7 of the economizers 8a, 9a, 10a of the electrodes, the said supports resting on small beams 7a which form the peripheral frame-work of the roof. A guide shoe 15, acting as an integral part of the stack can slide vertically in a guide 15a fixed to the support 7; a cable 14 fixed by one of its extrem-

ities to the guide shoe 15 and passing over a sheave 13 mounted on the guide shoe 15a carries at its other end a counterweight 5 balancing the weight of the bent portion of the stack. The said bent portion is thus upheld by the action of the counterweight 5 without the free movement of the stack and of the roof which carries it being in any way impeded by this arrangement.

In a further effort to allow free vertical movements of translation of the stack in the course of the dilatations and contractions of the roof 2, the base 3 of the stack slides freely in a fixed sleeve 6 acting as an integral part of the support 7.

The device for the leading out of the gases thus constituted offers the following advantages:

1. It allows the efficient evacuation of the gases through the key-stone, at the proper time, with-

out affecting the stability and the life of the roof.

2. It produces, in the furnace, favorable conditions for the supervision of the roof, thanks to the evacuation of the gases and the fumes which clouded the atmosphere of the furnace, prevented a clear vision of the roof by the charging doors 16 of the furnace and proved harmful to the preservation of the roof.

3. It does not hinder the free dilatation of the roof and does not affect the insulation between the electrodes.

It is obvious, that without thereby departing from the scope of my invention, it is possible to modify the embodiment which has been described, especially as concerns the shape of the stack and the manner in which it is mounted.

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