

No. 612,104.

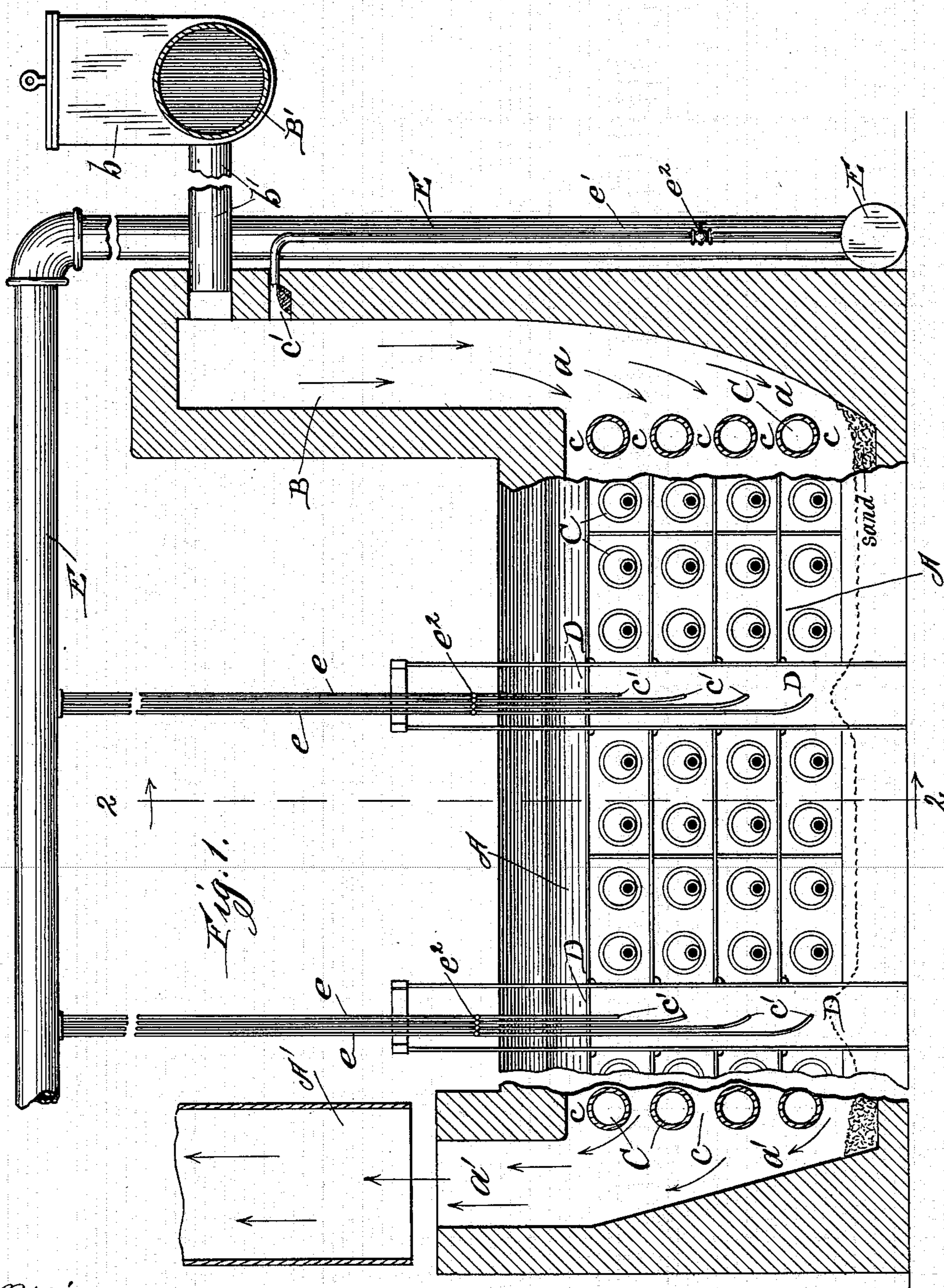
Patented Oct. 11, 1898.

E. C. HEGELER.
ZINC SMELTING FURNACE.

(Application filed May 9, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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By

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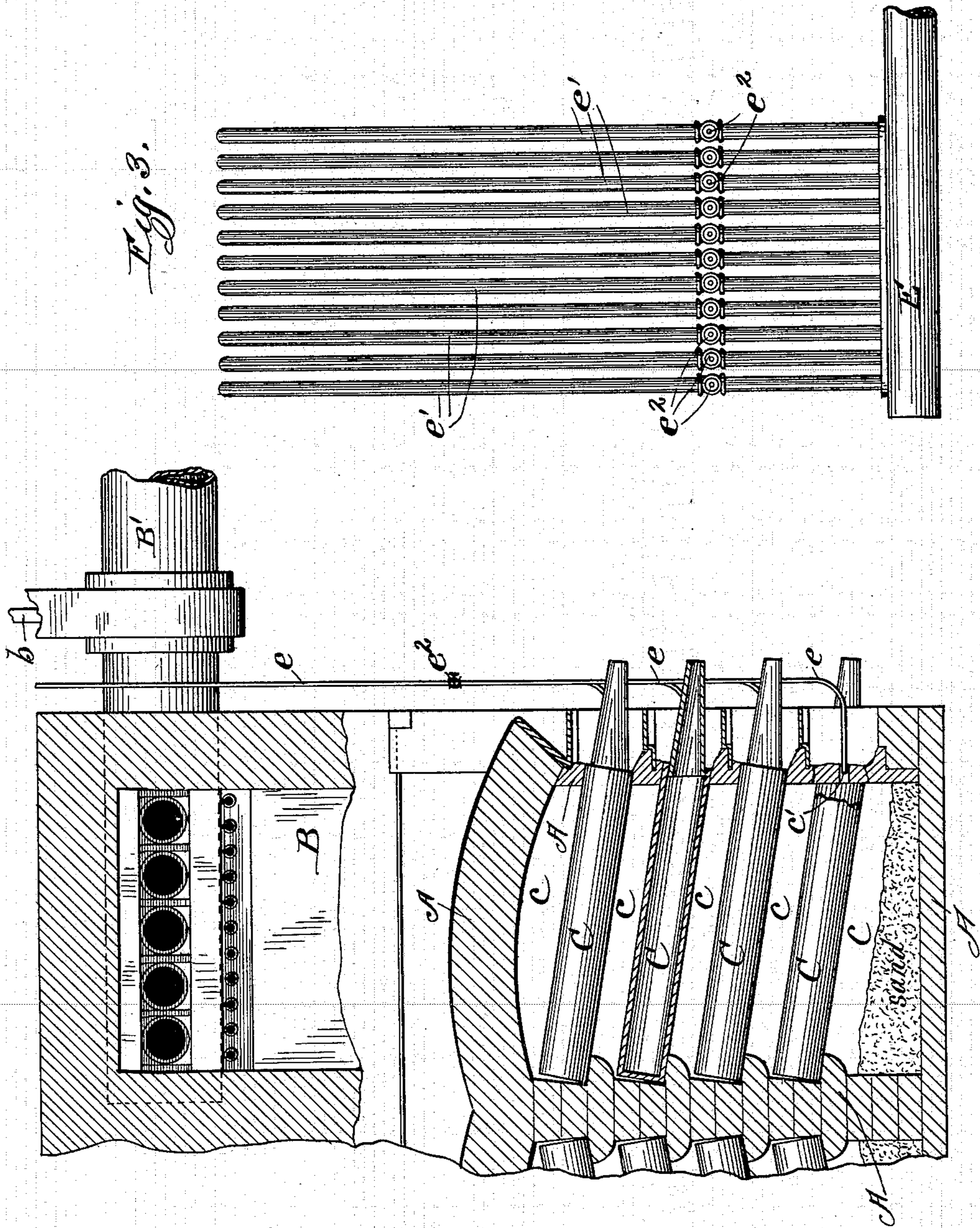
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2 Sheets—Sheet 2.



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Fig. 2.

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UNITED STATES PATENT OFFICE.

EDWARD C. HEGELER, OF LA SALLE, ILLINOIS.

ZINC-SMELTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 612,104, dated October 11, 1898.

Application filed May 9, 1898. Serial No. 680,122. (No model.)

To all whom it may concern:

Be it known that I, EDWARD C. HEGELER, of La Salle, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Zinc-Smelting Furnaces, of which the following is a specification.

This invention relates to zinc-furnaces of the Belgian type, in which the fire-gases pass successively through between a large number of retorts and the heat is regulated throughout the furnace by the gradual mixture of the constituent parts of the fire-gases and the regulation of the forward movement of the draft through between the retorts is effected by the resistance of the retorts or other means, as walls or dams, adapted thereto. In these furnaces the fire-gases entering between the retorts come either from a direct coal-fire or are producer-gases already partially burned through the introduction of air in the flue coming from the producer, so as to have the needed temperature for zinc distillation when they reach the first retorts, and when they enter between and pass the first retorts contain still a large amount of combustible gases, and further on air is repeatedly let into the furnace to burn the combustible parts of the fire-gases. If now a concentrated combustible gas, as natural gas, is used for heating the furnace, the regulation of the draft becomes difficult in consequence of the smaller volume of the fire-gases, and, further, another difficulty arises in this: that soot is formed and deposited on the retorts, obstructing the draft between them and making them less permeable to the heat. It is the object of my improvement to overcome these difficulties, and to this end I provide a retort-chamber with a large entrance-opening in order to introduce through a flue of some length the whole or the principal amount of air which is to be consumed in the furnace in one body at the place where heretofore the whole amount of the fire-gases usually enter the same and introduce and burn in this flue so much gas as is required to raise the temperature to the required height at the first retorts and further on introduce additional supplies of gas at different points of the retort-chamber to keep the temperature up as wanted in all parts thereof. The resulting

fire-gases of the first burning in the flue contain still a large amount of free oxygen, and after they have passed a number of retorts and given off part of their heat the additional supplies of gas are introduced into them to increase the temperature, and this I can repeat until all the oxygen of the fire-gases is consumed. It can be determined when the oxygen is all consumed by observing that the escaping gases at the exit end of the retort-chamber show signs of burning (in consequence of their containing some combustible gas which did not meet with oxygen in the fire-gases) as they come in contact with the outer atmosphere.

I attain the object by means of a retort-chamber adapted to take in a large volume of air at the entrance end of the chamber and cause it pass through the chamber to the outer or exit end thereof, an air-flue communicating with the entrance-opening of the chamber, and a system of gas-pipes in combination therewith arranged to introduce gas into the air-flue near the entrance-opening of the chamber, and to distribute gas to the various parts of the chamber where it is to be burned for producing the desired temperature throughout the chamber at all points.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a fragmentary side elevation, partly in section, showing the entrance-opening in connection with the air-flue, and the exit-opening, some of the intermediate portions being broken away. Fig. 2 is a transverse section on the line 2 2 of Fig. 1. Fig. 3 is an elevation showing the arrangement of gas-pipes for admitting gas to the air-flue.

In the drawings, A is the retort-chamber, provided with a large opening at *a*.

B is the air-flue, that portion of it which immediately joins the retort-chamber being made of brickwork and the other portion B' being made of sheet-iron and provided with a regulating-valve *b*, the sheet-iron portion being preferably connected with the brick portion by means of a series of smaller sheet-iron pipes *b'* entering through separate openings in the brickwork, as shown in Fig. 2.

At the opposite end of the retort-chamber is the exit-opening *a'*, which discharges into a chimney or pipe A', suspended over the exit,

with intervening open space which allows the escaping flame from the exit to be seen.

C C are the retorts, which are arranged with open spaces *c* between them for the passage of air around and between the retorts. The retorts are preferably arranged in groups with open spaces at D between them.

E is a large gas-pipe connected with a source of gas-supply (not shown) and under suitable pressure. This pipe is connected with the retort-chamber by means of small pipes *e*, which enter through holes *c'* in the wall of the retort-chamber into the open spaces at D between the groups of retorts, and *e'* are similar small pipes (but somewhat larger than the pipes *e*) which enter the brick portion B of the air-flue, as shown in Fig. 1. Each of the small pipes *e e'* is provided with a cock *e²* or shut-off, by which the amount of gas entering the air-flue and retort-chamber may be regulated. The openings *c'* through the walls of the air-flue and of the chamber are built somewhat larger than the diameter of the gas-pipes *e e'*, and their size is regulated with plastic fire-clay, and said gas-pipes are sufficiently flexible so that they may be pulled out of the said openings and turned to one side for looking in and regulating the opening in the wall when necessary, the joints between the pipes and their openings being closed tight with plastic fire-clay filled in around the pipes. The cross-sectional area of the fire-brick part of the air-flue should not be much less than the cross-sectional area of all the open spaces *c* of the retort-chamber between the retorts. Only the requisite amount of gas is admitted into each of the open spaces in the brick portion of the air-flue and the spaces at D between the groups of retorts which will produce heat sufficient to supply the group of retorts immediately in advance of said several open spaces, so that free oxygen will be met at all

of said spaces to mix with the combustible gas entering there and complete combustion of the gas will occur at all points through the combustion-chamber. In this manner the entire space within the retort-chamber can be heated uniformly, the lowermost retorts being heated as easily as the upper ones. Either hot or cold air may be used. The means for forcing the air may be a fan (not shown) or any of the well-known means in connection with the air-flue for forcing the air therefrom into the combustion-chamber, and it is contemplated that the main pipe is to be connected with a supply-tank containing gas under sufficient pressure to deliver the gas through all of the small pipes into the air-flue just before the entrance-opening of the retort-chamber and into the open spaces between the group of retorts in the chamber.

It is obvious that some air might be introduced with the gas by means of Bunsen burners at the various points where gas is to be introduced into the combustion-chamber without departing from the principle of my invention.

Having thus fully described my invention, what I claim is—

In a zinc-furnace of the class mentioned, the combination with a retort-chamber having a large entrance-opening at one end and an exit-opening at the other end, of a large air-flue connected with the entrance-opening of the chamber, a system of gas-pipes arranged and adapted to distribute the requisite supply of gas severally to the air-flue near the entrance-opening of the chamber and to the different parts of the chamber, and means for forcing the air and gas through the air-flue, gas-pipes and chamber as specified.

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Witnesses:

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