

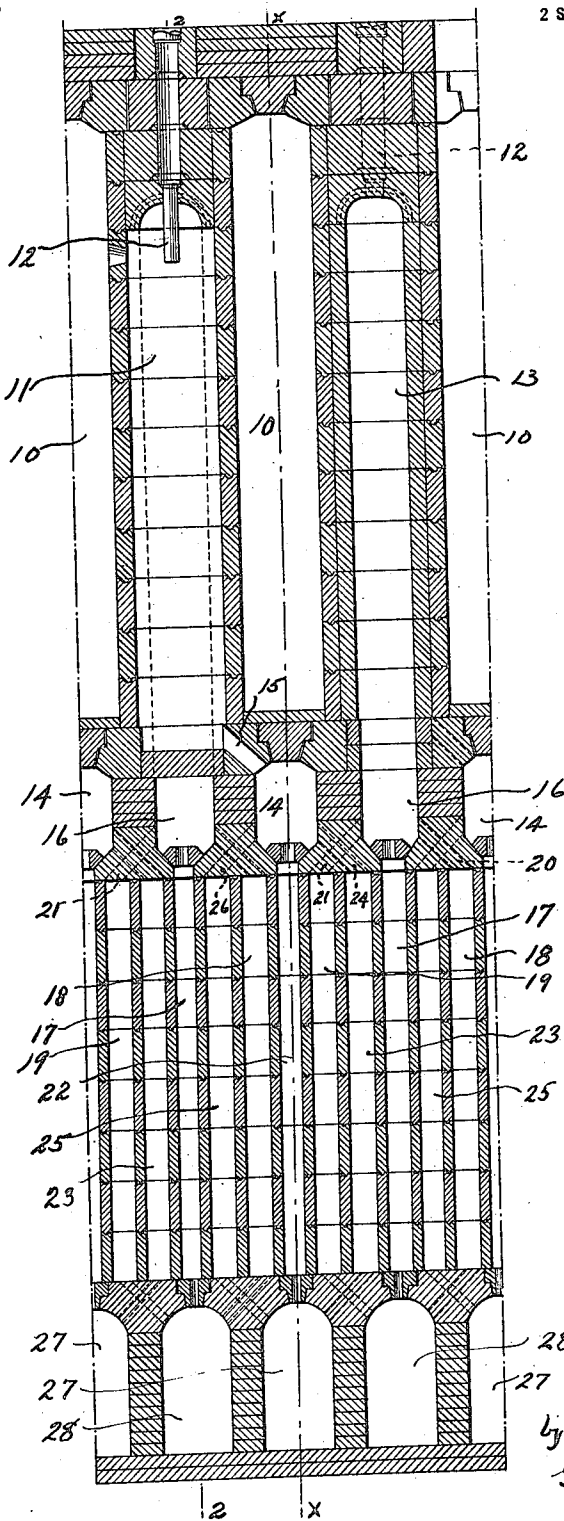
E. PIRON.
OVEN HEATING SYSTEM.
APPLICATION FILED MAY 8, 1920.

Patented July 12, 1921.

2 SHEETS—SHEET 1.

1,384,149.

Fig. 1.



Inventor
EMILE PIRON
by his Attorneys,
Gifford & Bull

E. PIRON.
OVEN HEATING SYSTEM.
APPLICATION FILED MAY 8, 1920.

Patented July 12, 1921.
2 SHEETS—SHEET 2.

1,384,149.

Fig. 2.

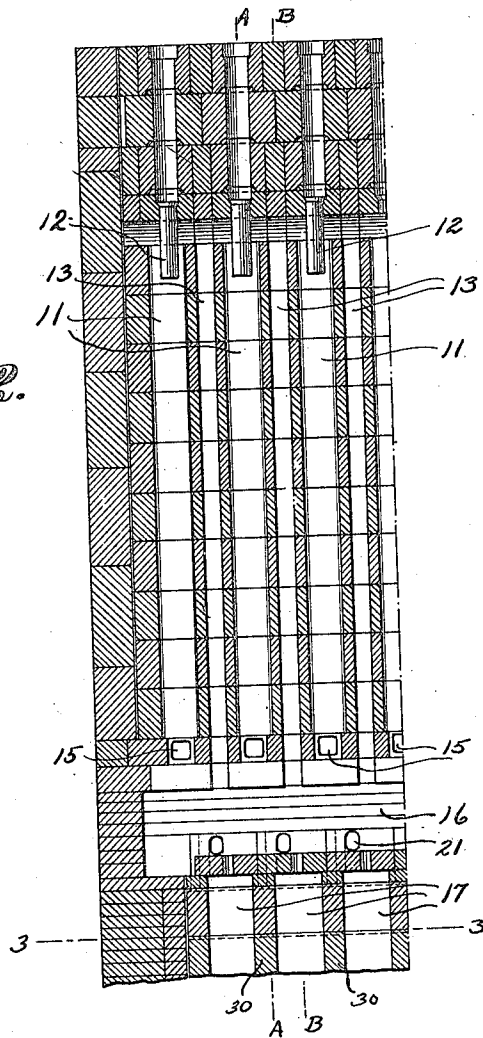
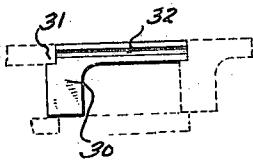


Fig. 4.

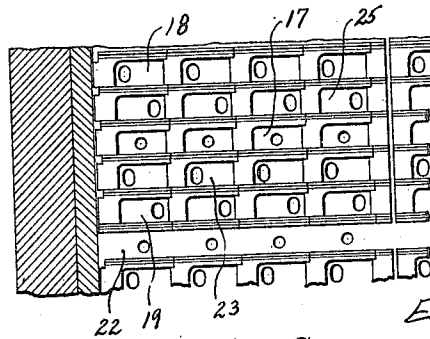


Fig. 3.

Inventor
EMILE PIRON
By his Attorneys
Sifford & Bull

UNITED STATES PATENT OFFICE.

EMILE PIRON, OF NEW YORK, N. Y.

OVEN-HEATING SYSTEM.

1,384,149.

Specification of Letters Patent. Patented July 12, 1921.

Application filed May 3, 1920. Serial No. 379,771.

To all whom it may concern:

Be it known that I, EMILE PIRON, a subject of the King of the Belgians, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Oven-Heating Systems, of which the following is a specification.

My present invention relates to improvements in heating arrangements for ovens or other receptacles, in which materials to be heated are placed, such as coke ovens, kilns or the like, and particularly to improvements in the arrangements disclosed in my prior Patent No. 1,306,023, granted June 10, 1919.

One of the objects of my present invention is to provide a heating system of the continuous recuperating type which will be highly efficient, particularly in connection with the heat interchange between the incoming air and the outgoing waste gases.

Another object of my invention is to provide an arrangement by which the air supplied to the various heating chambers in a set of ovens will be uniformly heated, so that there will be substantially no inequality in the temperature of the air supplied to the several heating chambers.

With these and other objects in view, my invention consists of the novel arrangement of parts herein described and pointed out in the appended claims.

In the drawings, Figure 1 is a vertical section of a portion of a set of ovens embodying my invention, the portion of Fig. 1 to the left of the line $x-x$ being taken on the line A-A of Fig. 2, and the portion to the right of the line $x-x$ being taken on the line B-B of Fig. 2; Fig. 2 is a vertical section taken on the line 2-2 of Fig. 1; Fig. 3 is a section taken on the line 3-3 of Fig. 2 looking from below; Fig. 4 is a detail.

The corresponding parts are referred to both in the specification and in the drawings by similar reference characters.

In the illustrative form of my invention, 10 is one of the ovens which may be charged from openings above, in the usual manner. Adjacent the walls of the oven 10 are a series of combustion chambers 11, each provided with a burner 12 connected to any suitable source of supply of fuel, which in this instance is gas.

Interposed between the combustion chambers 11 are air ducts 13 communicating at

the top with the combustion chambers 11 adjacent the burners therein.

Beneath the floor of the oven 10 is a horizontal duct 14 communicating with the combustion chambers 11, through the ducts 15, to receive the waste gases from the combustion chambers.

Extending horizontally beneath the series of combustion chambers and vertical air ducts 13 are horizontal air ducts 16, with which the lower end of each of one of the series of air ducts 13 communicates.

Beneath the ducts 14 and 16 is a continuous recuperator made up of a series of vertical ducts of relatively small cross section, the ducts 17 communicating directly with the horizontal air ducts 16, and the ducts 18 communicating with the horizontal air ducts 16 by oblique ducts 20, and the ducts 19 communicating through the ducts 21. Alternate vertical ducts of the recuperator are connected to the waste gas horizontal ducts 14, the ducts 22 communicating directly with the ducts 14, and the ducts 23 communicating through the oblique ducts 24, and the ducts 25 communicating through the oblique ducts 26.

Similarly, the lower end of the vertical ducts of the recuperator, which are connected to the horizontal air ducts 16, are also connected to horizontal air inlet ducts 28, and the lower ends of the waste gas ducts of the recuperator, which are connected to the horizontal waste gas ducts 14, are connected to the horizontal waste gas ducts 27.

Preferably, I make up the vertical ducts of the recuperator by means of a special brick 30, a detail of which is shown in Fig. 4. As shown, this brick is substantially L-shaped with a recess 31 at one end adapted to have fitted into it the opposite end of one of the bricks 30. Preferably, the brick is grooved, as at 32, to receive a corresponding tongue on the bottom of the next adjacent brick. As shown best in Fig. 3, with this one form of brick I am enabled to build up a series of vertical ducts which are interlocked so as to provide a substantial support for the oven structure above. Preferably, the whole structure for the recuperator is made independent of the side walls of the kiln so as to permit expansion and contraction without injury to the supporting structure.

In operation, air is supplied through the

ducts 28 to the vertical ducts 17, 18 and 19 of the recuperator, the walls of which are heated by the waste gases coming from the combustion chamber 11 in the manner hereinafter described. The heated air passes to the horizontal ducts 16 by which it is distributed to the several vertical air ducts 13 between the respective combustion chambers, and from thence the air passes into the combustion chamber adjacent the burners. The burnt gases pass downward in the combustion chambers 11 through the ducts 15 into the horizontal ducts 14, by which it is distributed to the several vertical, waste gas ducts 22, 23 and 25 of the recuperator and from thence to the horizontal waste gas ducts 27. As the heated gases pass through the recuperator, the walls thereof are heated and this heat is transmitted to the air passing upwardly in the corresponding air ducts.

As will be seen by an inspection, particularly of Fig. 1, by my present arrangement I provide a means by which a multiple effect may be obtained from the gases passing through the recuperator, these gases being sub-divided in their passage, so that to a maximum degree the incoming air and the outgoing gases are brought substantially side by side, so that the heat from the one may be more readily transmitted to the other. By my arrangement of ducts I have also provided a means by which the incoming air supplied to any combustion chamber receives its heat, not only from the immediate combustion chamber with which such air duct coöperates, but also from combustion chambers of adjacent ovens. The heating of the air is thereby equalized so that substantially uniform conditions will prevail throughout a given set of ovens. Moreover, by supplying the air from the recuperator to the horizontal air ducts, there is a further equalization of the supply of heated air to the several combustion chambers.

I claim:

1. A horizontal oven, a series of vertical combustion chambers adjacent the side wall of the oven, a burner at the upper end of each combustion chamber, a series of vertical air ducts adjacent the side wall of the oven, each air duct being located between a

pair of the combustion chambers and communicating with the upper end of one of the combustion chambers, a horizontal waste gas flue extending beneath the floor of the oven and communicating with the lower ends of the combustion chambers, a horizontal air duct beneath the lower ends of the combustion chambers and communicating with the lower ends of the vertical air ducts, and a recuperator located beneath said horizontal flues, and comprising a plurality of vertical ducts, each relatively high and narrow in cross section, a plurality of alternate ducts of said recuperator crosswise of the axis of the oven being connected to said horizontal air duct and the remaining ducts of said recuperator being connected to said horizontal waste gas flue.

2. A plurality of horizontal ovens spaced apart, a series of vertical combustion chambers between each pair of ovens, a burner at the upper end of each combustion chamber, a series of vertical air ducts between each pair of ovens, each air duct being located between a pair of the combustion chambers, and communicating with the upper end of one of said chambers, a plurality of horizontal waste gas flues and a plurality of horizontal air ducts beneath the level of the floors of the ovens, each horizontal waste gas flue being located between a pair of horizontal air ducts, and communicating with the lower ends of one series of combustion chambers, the lower ends of the corresponding series of vertical air ducts communicating with the adjacent horizontal air duct, and a recuperator located beneath said horizontal ducts and flues comprising a plurality of vertical ducts, each relatively high and narrow in cross section, there being at least four times as many of such ducts in a plane at right angles to the axes of the ovens as there are ovens, a plurality of alternate ducts of said recuperator crosswise of the axes of the ovens being connected to each of said horizontal waste gas flues and a plurality of the remaining ducts being connected to each of said horizontal air ducts.

E. PIRON.