E. LECOCQ.

REGENERATOR COKE OVEN.

APPLICATION FILED MAY 6, 1913.

1,265,684.

Patented May 7, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

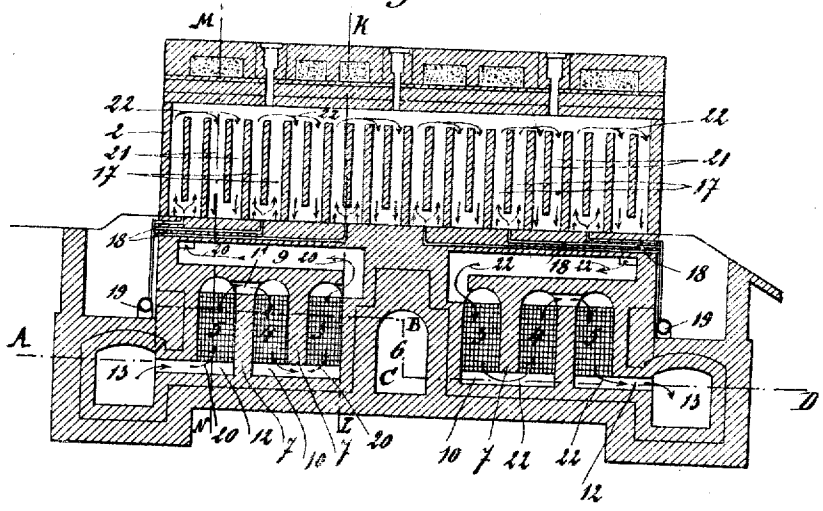
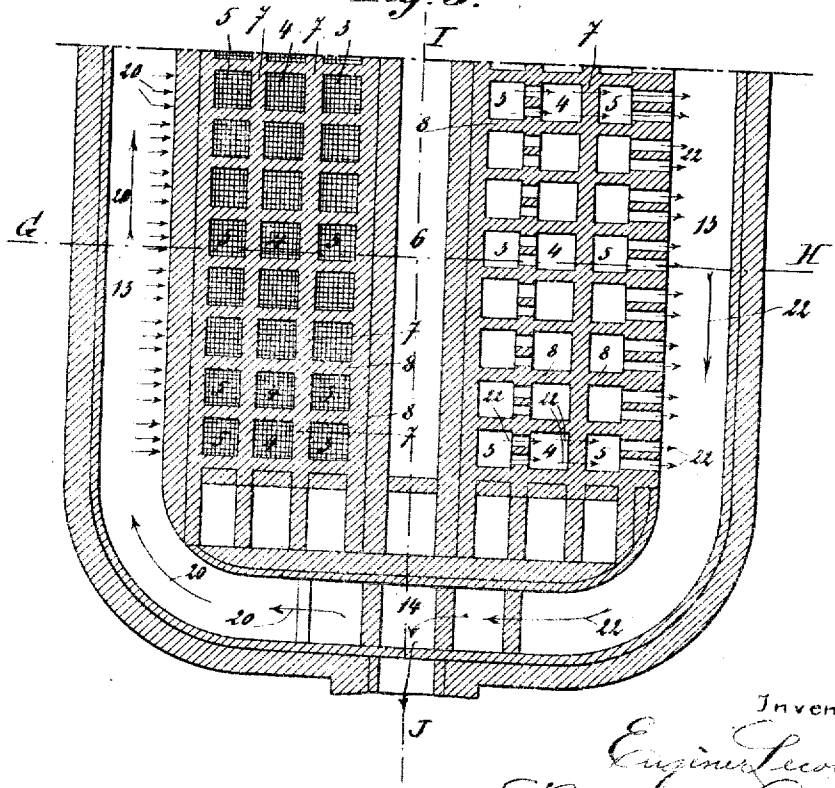


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

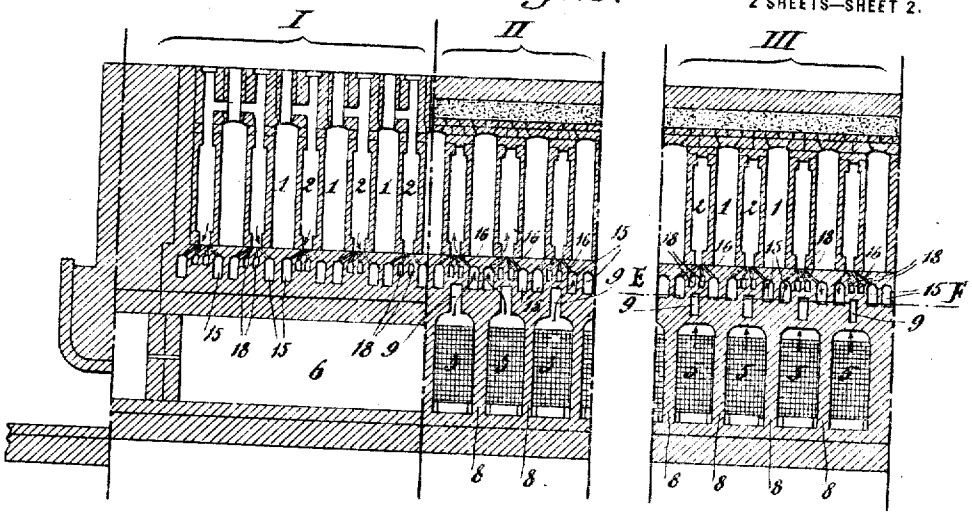
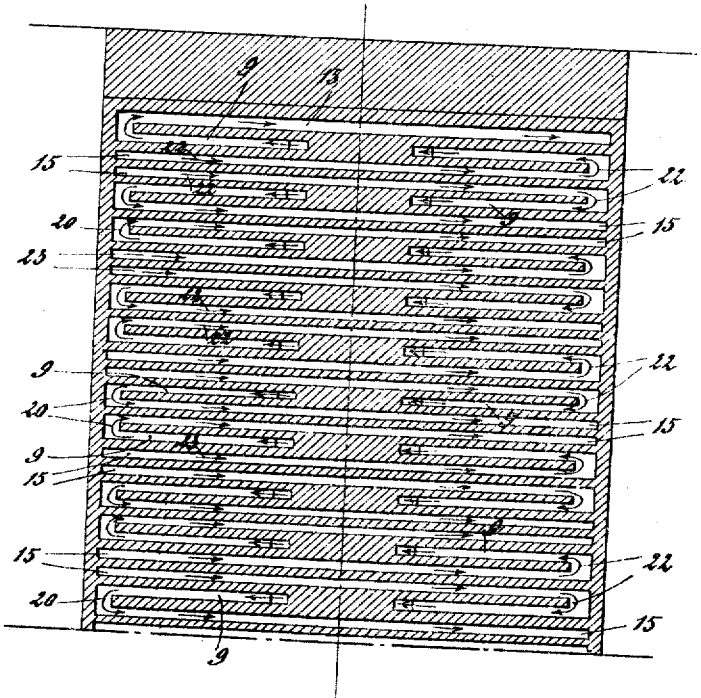


Fig. 4.



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UNITED STATES PATENT OFFICE.

EUGÈNE LECOCQ, OF BRUSSELS, BELGIUM.

REGENERATOR COKE-OVEN.

1,265,684. Specification of Letters Patent. Patented May 7, 1918.

Application filed May 6, 1913. Serial No. 765,972.

To all whom it may concern:

Be it known that I, EUGÈNE LECOCQ, a subject of the King of Belgium, residing at Brussels, in the Kingdom of Belgium, have invented certain new and useful Improvements in Regenerator Coke-Ovens, of which the following is a specification.

My invention relates to a regenerator coke oven of the type in which the axes of the regenerators coöperating with a single oven are parallel to the axis of the oven.

In coke ovens of this type as is known, a very favorable sub-division of the refractory material can be obtained on a large scale underneath the level of the furnaces and a height less great is given to the whole structure than in the ovens in which the regenerators are arranged longitudinally, *i. e.*, have their axes parallel to the axis of the battery and at right angles to the axes of the ovens and obtain a more complete recovery of the heat. On the other hand in this system, that is to say in a system in which the axes of the regenerators are parallel to the axis of the oven, the stability and the solidity of the structure of the ovens are less than in the system with longitudinal regenerators, a system in which the whole of the structure comprises series of galleries at right angles to each other, the channels constituting the ovens being perpendicular to the channels constituting the regenerators.

My invention has for its object to maintain the inherent advantages of that type of regenerators in which the axes are parallel to the axes of the furnaces with which they coöperate, and at the same time to remedy all the disadvantages of this system, *i. e.*, to give to the whole structure a stability and solidity greater than hitherto obtained, greater even than obtained in the construction with longitudinal regenerators.

My invention has the further object of diminishing the height of the whole structure and consequently the quantity of refractory material necessary, also to facilitate the regulation of the air in each vertical channel and obtain a methodical regeneration assuring the maximum economy and diminishing the heat lost by radiation and conduction.

With these objects in view my invention essentially consists in the special arrangements and combinations of parts as will be hereinafter fully described and pointed out in the appended claims.

The annexed drawings show by way of example a coke oven constructed according to my invention. Figure 1 is a vertical section on line G—H of Fig. 3, of one of the combustion chambers of the ovens and shows by way of example the arrangement of the regenerators connected in series. Fig. 2 is a vertical section, part I being taken through the axis of the battery, on the line I—J of Fig. 3, part II through the first regenerators on the line H—L of Fig. 1 and part III through the third regenerators on the line M—N of Fig. 1. Fig. 3 is a horizontal section, the left-hand part being a section through the center of the regenerators and through the collecting flues on the line A—B of Fig. 1, and the right hand part being a section through the lower part of the regenerators and collecting flue on the line C—D of Fig. 1. Fig. 4 is a longitudinal section on the line E—F of Fig. 2—III.

As shown in the drawings the battery comprises for each oven 1 coöperating with the combustion chambers 2 a number of regenerators 3, 4 and 5 divided into groups quite distinct and separate by one or more galleries 6 or by a single wall. These regenerators 3, 4 and 5 are in the shape of towers with a vertical axis and can be obtained either by constructing the longitudinal galleries with walls 7 and connecting these walls by the cross walls 8 or by constructing squares of masonry surmounted by an arch.

In the example shown the regenerators 3 of each group are connected near the top to ducts 9 and are connected near the bottom by a duct 10 with the regenerators 4, and the latter are connected at the top to the top of the regenerators 5 by a passage 11. The regenerators 5 are connected at the bottom by the duct 12 to the main flue 13 surrounding the structure and connected at 14 to a suitable reversing apparatus. This arrangement shows the operations carried on with regenerators in series. It is evident that the number of regenerators provided in a single group and for each oven can be varied. The two ducts 9 of two groups of regenerators coöperating with a single furnace, ducts which are arranged in the same axis as that of the corresponding combustion chamber 2,

are in communication with the under conduit 15 arranged parallel in the floor of the oven and extending the length thereof. Two of these adjacent conduits are connected (as shown in Fig. 4) to the ducts 9 connected to the regenerators of the same group, *i. e.*, situated at the same side of the gallery 6 and also two adjacent conduits 15 are connected to the ducts 9 in communication with the group of regenerators situated on the other side of the gallery 6. The conduits 15 as required distribute the air to or collect the burnt gases from the chambers 2 by the ducts 16 connected to the combustion compartments 17 in the chambers 2. The gas is distributed to each chamber by a series of ducts 18 connected to a gas pipe 19.

The working of the furnace can be readily understood. By way of example the passage of the air and of the burnt gases is indicated in the arrangement described. The air coming from the gallery 6, Figs. 1 and 3, and having passed through the reversing apparatus 14, Fig. 3, passes into the collecting flue 13, Figs. 1 and 3 in the direction indicated by the arrows 20, Fig. 3, and is distributed into the various regenerators 5, Fig. 1, corresponding to the heating chambers 17, Fig. 1, of the ovens; it is heated up in the three regenerators 5, 4, 3, arranged in series and then passes to the corresponding duct 9 and to one of the two underneath conduits 15, Figs. 2 and 4, from which it is distributed by the ducts 16 to the various compartments 17 of the combustion chambers. The heated air combines in the compartments 17 with the gas distributed by the pipes 18. The burnt gas passes down the vertical compartments 21, Fig. 1, into the neighboring conduits 15 underneath the chamber by the corresponding duct 16 and thence to the regenerators 3, 4, 5 of the second group by the course indicated by the arrows 22, Figs. 1 and 4. After passing through these regenerators the gas enters the second collecting flue 13, Figs. 1 and 3, and through the reversing apparatus 14 to the chimney. The passage of the air and gases is then reversed, the air passing in the opposite direction through all the ducts and compartments previously traversed by the burnt gases.

On examining the drawings it is seen that owing to the arrangement of the regenerators all the structure of the oven is conveniently supported by the masonry and moreover owing to the arrangement of the regenerators in the axis of the combustion chambers the height of the structure is considerably reduced as the lateral space necessary for the underneath conduits 15 is obtained without adding to the height of this part of the structure. The air and the burnt gases can be easily regulated at will in each combustion chamber as two adjacent underneath conduits are used for each oven, in which the air and the gases move in the same direction (see the direction of arrows 23 Fig. 4); thus allowing the possibility of creating an equal pressure for each compartment in the chamber and so regulating the quantity of air passing into each vertical compartment of the combustion chamber.

Finally the described construction with the regenerators arranged in series considerably decreases the heat lost by radiation and conduction.

It is evident that the invention is not limited by the construction described and shown and that the details can be varied. Thus for example the number of regenerators in each group and for each oven can be more or less than three and moreover they may be arranged in parallel instead of in series as described.

It will be observed that in subdividing each transverse regenerator or group of two transverse regenerators coöperating with a single oven into several separate regenerators the axes of which are vertical and which are formed by chambers of masonry forming towers of masonry the whole structure is extremely solid and allows of a construction much lighter than hitherto.

Having thus described my invention, what I claim is:

1. In a regenerator coke oven, the combination with a plurality of ovens and their combustion chambers having their major axes horizontally disposed, of a supporting structure for said ovens and combustion chambers, forming a plurality of chambers disposed directly beneath said ovens and having their major axes vertically disposed, and a regenerator formed in each of said last named chambers.

2. In a regenerator coke oven, the combination with a plurality of ovens and their combustion chambers having their major axes horizontally disposed, of a supporting masonry structure for each of said ovens, said supporting structures having a plurality of chambers formed therein with their major axes vertically disposed, a regenerator in each of said chambers, said supporting structures having ducts forming suitable connections between said regenerators.

3. In a regenerator coke oven, the combination with a plurality of ovens and their combustion chambers having their major axes horizontally disposed, of a supporting masonry structure for said ovens and combustion chambers comprising vertically disposed longitudinal and transverse walls forming towers of masonry and intermediate chambers, said intermediate chambers having their major axes vertically disposed and disposed directly beneath said ovens, a regenerator in each of said last named chambers, said supporting structures having

ducts therein having suitable connections between said regenerators.

4. In a regenerator coke oven, in combination with the ovens and combustion chambers, a supporting structure comprising longitudinal walls and cross-walls forming towers of masonry, each tower providing a chamber having its major axis vertical, a regenerator arranged in each of said chambers and ducts suitably connecting said regenerators to each other.

5. In a regenerator coke oven, in combination with the ovens and combustion chambers a supporting structure comprising longitudinal walls and cross walls forming towers of masonry, each tower providing a chamber having its major axis vertical, a regenerator arranged in each of said chambers, ducts connecting said regenerators to each other, to form two groups of regenerators for each oven, each group being arranged parallel to the corresponding combustion chamber.

6. In a regenerator coke oven, in combination with the ovens and combustion chambers a supporting structure for said ovens and combustion chambers, said supporting structure comprising longitudinal walls and cross walls forming towers of masonry, chambers providing in each of said towers, a regenerator arranged in each of said chambers, ducts connecting said regenerators in series to each other, whereby two groups of regenerators are formed for each oven, each group being arranged in the same axis as that of the corresponding combustion chamber, ducts arranged in the axes of the combustion chambers, each of said ducts being connected to a group of regenerators, underneath conduits extending the whole length of each oven and communicating with the ducts arranged in the axes of the combustion chambers and suitable ducts connecting the said underneath conduits with the combustion chambers.

In testimony whereof I have affixed my signature in presence of two witnesses.

EUGÈNE LECOCQ.

Witnesses:
CHAS. ROY NASMITH,
GEORGE BEDE.