E. HOHMANN.

HORIZONTAL COKE OVEN.

APPLICATION FILED MAY 24, 1910.

1,047,635.

Patented Dec. 17, 1912.

2 SHEETS—SHEET 1.

Fig. 2.

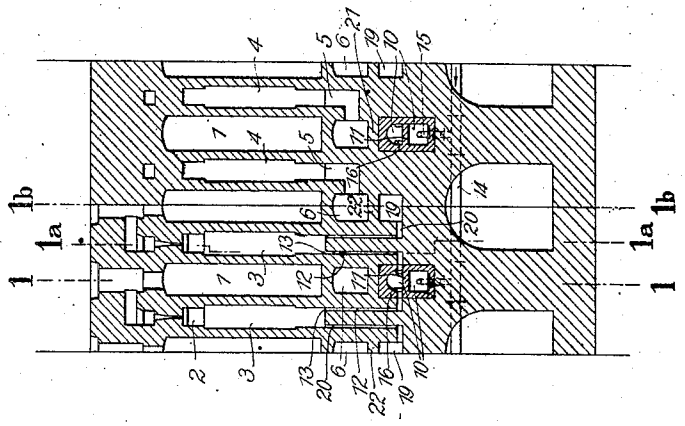
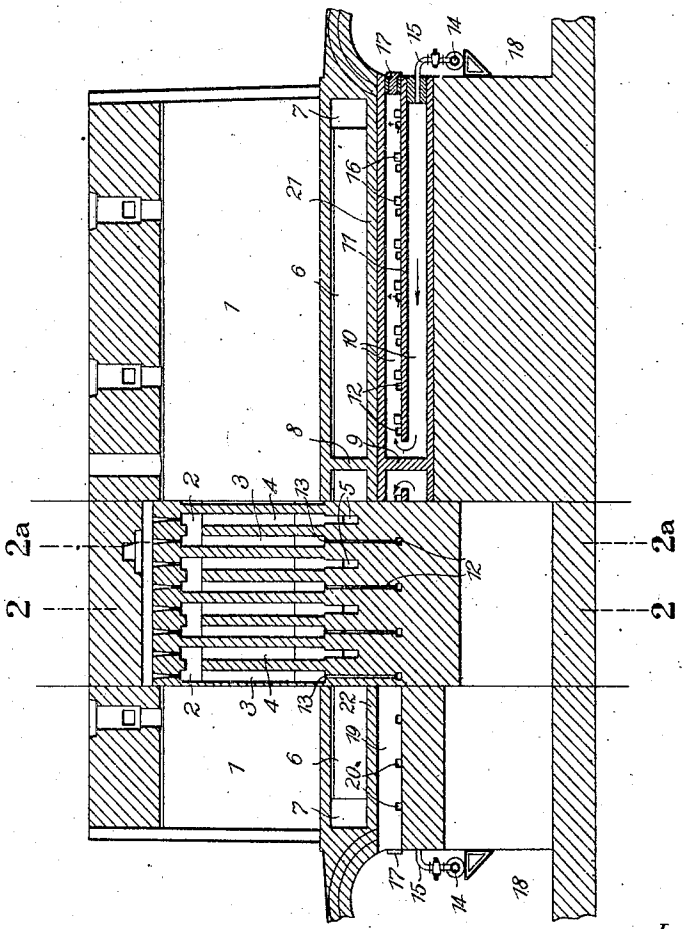


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

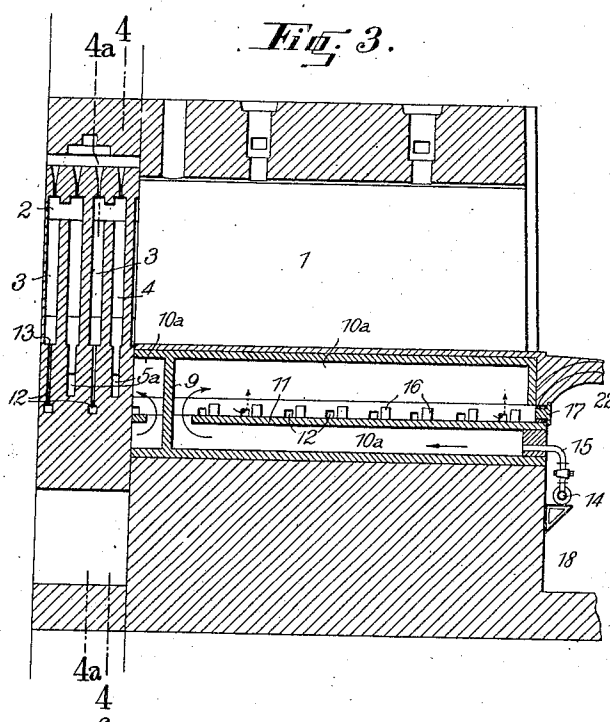


Fig. 4.

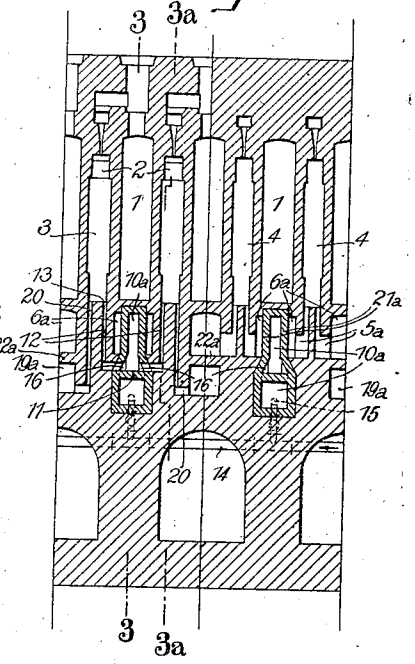


Fig. 5.

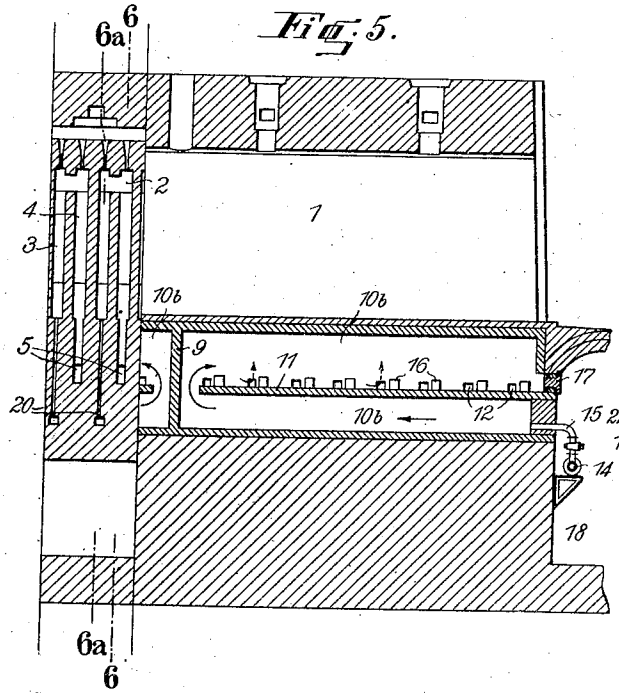
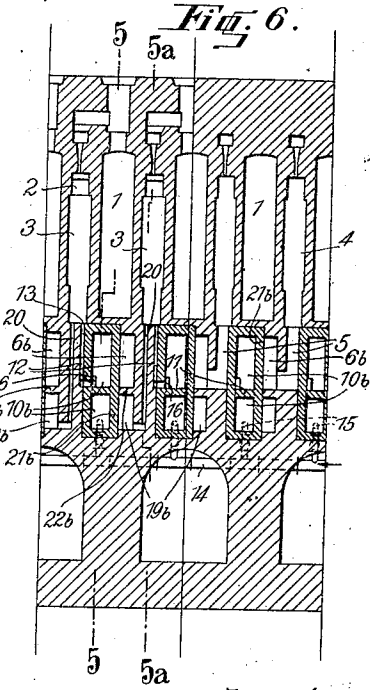


Fig. 6.



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UNITED STATES PATENT OFFICE.

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HORIZONTAL COKE-OVEN.

1,047,635. Specification of Letters Patent. Patented Dec. 17, 1912.

Application filed May 24, 1910. Serial No. 563,051.

To all whom it may concern:

Be it known that I, EDMUND HOHMANN, a citizen of the German Empire, and a resident of Stettin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Horizontal Coke-Ovens; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in horizontal coke ovens, and more particularly to coke ovens of the regenerative type in which the direction of the flow of the heating gases in the flues remains the same during the whole coking operation. In coke ovens of this class vertical flues are provided in the partition walls of adjacent coking chambers, and to the said flues heating gases are supplied from below through suitable passages. In coke ovens of this class such as are now in use the passages for admitting and distributing the gas to the flues are disposed in the same plane below the flues, and various means are provided whereby the heating gas is uniformly supplied to the gas nozzles in the flues.

The object of my improvements is to construct the passages through which the heating gases or the air for supporting combustion are supplied to the flues in the form of recuperators, for which purpose the said passages are arranged longitudinally of the passages through which the products of combustion escape from the flues, and the said passages are separated from each other by partitions through which the heat of the outgoing products of combustion can be transmitted to the heating gases or to the air for supporting combustion. Thereby the heating gases or the air for supporting combustion are preheated by the outgoing products of combustion. In the preferred form one gas passage is used for supplying gas to two sets of flues, whereby the oven becomes particularly simple in construction.

Preferably each gas admitting passage is divided into two sections by a vertical partition provided centrally of the oven, and each section is subdivided into two or more chambers located one above the other. When providing two chambers the heating gas flows at first through the lower chamber from the outer end to the inner end thereof, whereupon it passes to the upper chamber, or vice versa. From the gas admitting passage the gas is supplied to the gas nozzles provided within the flues through branch passages communicating with the said passages at both sides thereof. The amount of the gas supplied to the flues can be regulated by means of regulating devices provided before or within the said branch passages.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawings in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawings—Figure 1, is a vertical longitudinal section of an oven, taken partly (at the extreme left) through a coking chamber, on the line 1^b—1^b of Fig. 2, partly (toward the center of Fig. 1) through the flues, on the line 1^a—1^a of Fig. 2, and partly (at the right) through a coking chamber on the line 1—1 of Fig. 2, Fig. 2, is a vertical cross-section of the oven taken at the left hand part on the line 2^a—2^a, and at the right hand part on the line 2—2 of Fig. 1, Fig. 3, is a vertical longitudinal section of another construction of the oven, the left hand part of the figure being a section taken on the line 3^a—3^a of Fig. 4, and the right hand part of the figure being a section on the line 3—3 of Fig. 4, the oven being partly broken away at the left hand part, Fig. 4, is a vertical cross-section of a part of the oven shown in Fig. 3, the left hand part of the figure being a section on the line 4^a—4^a, and the right hand part on the line 4—4 of Fig. 3, Fig. 5, is a vertical longitudinal section of a further example of the oven, the left hand part of the figure being a section on the line 5^a—5^a, and the right hand part on the line 5—5 of Fig. 6, the oven being partly broken away at the left hand part, and Fig. 6, is a vertical cross-section of the oven shown in Fig. 5, the left hand part of the figure being a section on the line 6^a—6^a, and the right hand part a section on the line 6—6 of Fig. 5.

Referring particularly to the example illustrated in Figs. 1 and 2 of the drawings, my improved oven consists of a plurality of coking chambers 1 arranged side by side and having their partition walls provided

with flues 2 each of which consists of a section 3 for the ascending gases and a section 4 for the descending gases. By angular branch passages 5 the descending sections of the flues 2 communicate with a passage 6 for the outgoing products of combustion. The passage 6 is disposed below the coking chamber 1 and parallel to the longitudinal axis of the oven, and its outlet 7 communicates with a regenerator not shown in the drawings, but of the construction usual in ovens of the regenerative type. By a vertical partition 8 each passage 6 for the outgoing products of combustion is divided into two sections. Beneath alternate passages 6 gas admission passages 10 are provided which are divided into two sections by vertical partition walls 9, and which are arranged parallel to the adjacent passages 6 and are separated from the latter by partitions 21 through which the heat of the outgoing products of combustion is transmitted from the passages 6 to the passages 10.

In the example shown in Figs. 1 and 2 the gas admitting passages 10 are located below the passages 6. By a horizontal partition 11 each section of the gas inlet passage 10 is divided into two chambers located one above the other and communicating with each other at their inner ends. By branch passages 12 the upper chambers are connected with the nozzles 13 located within the ascending sections 3 of the flues 2. If desired each section of the gas inlet passages 10 may be divided into three or more superposed chambers by a plurality of horizontal partitions which are alternately connected with each other at their opposite ends, and in each case the aforesaid branch passages 12 communicate with the uppermost chamber.

In the operation of the coke oven, the heating gas (which may be taken from an apparatus for separating the by-products) is supplied at each side of the oven through a main 14 and branch pipes 15 to the lower chambers of the gas admitting passages 10, flows through the same in the direction of the arrow, and passes into the upper chambers of the channels 10 from whence it is supplied to the nozzles 13 of the flues 2 through the branch passages 12.

As the upper chambers of the gas admitting and distributing passages 10 are located directly below the passages 6 which are heated to a high temperature by the passage therethrough of the outgoing products of combustion, the heat of the outgoing products of combustion is transmitted to the heating gases so that the latter are preheated.

The amount of gas flowing through the branch passages 12 to the nozzles 13 can be controlled by regulating devices which are either located in the branch passages 12, or within the upper chambers of the channels 10. In the latter case the said regulating devices consist of slide valves or gates 16 formed of stone which are adapted to be pushed in front of the mouths of the branch passages 12. In the example illustrated the said valves which are preferably made of refractory material are adjusted from the outside through (normally closed) peep holes 17 by means of rods. The said peep holes are provided on either side of the oven, and they are accessible from longitudinal passages 18 provided on both sides of the oven.

If desired, the arrangement may be altered by connecting the branch pipe 15 with the upper chamber of the gas admitting passage 10, in which case the passages 12 connect the lower chamber of the said channel with the nozzles 13. In this construction of the oven the gas passes first through the upper chamber and thereupon through the lower chamber of the passage 10. Below those passages 6 for the outgoing products of combustion which are located between the alternate channels 6 disposed above the gas admission channels 10, air admission passages 19 are provided which are parallel to the passages 6, and which communicate with the flues 2 through branch passages 20. Each of the said air admission passages is separated from the passage 6 which is located above the same by a partition 22 which permits the transmission of the heat from the outgoing products of combustion to the air, so that the air for supporting combustion is preheated in a similar way to the heating gas.

The oven illustrated in Figs. 3 and 4 is similar in construction to that shown in Figs. 1 and 2. But it differs therefrom in this respect, that the upper chambers of the gas admission passages 10^a are located within alternate passages 6^a for the outgoing products of combustion. The air admission passages 19^a are disposed below those passages 6^a which alternate with the passages 6^a inclosing the upper chambers of the gas admission passages 10^a. The passages 6^a and 10^a are separated from each other by partition walls 21^a through which heat is transmitted from the passages 6^a to the passages 10^a, and the passages 6^a and 19^a are separated from each other by partition walls 22^a through which heat is transmitted from the passages 6^a to the passages 19^a. As shown in Fig. 4 the slide valves or gates 16^a are formed with inclined seating surfaces. Each flue 2 communicates with two passages 6^a for the outgoing products of combustion through branch passages 5^a.

In the example shown in Figs. 5 and 6, the upper chambers of the gas admission passages 10^b are provided, at the side of each passage 6^b for the outgoing products of combustion, and adjacent to the lower chambers of the said gas admission passages 10^b air admission passages 19^b are

located. From the passages 6^b heat is transmitted to the passages 10^b and 19^b through partition walls 21^b and 22^b respectively.

By arranging the passages for the admission of the heating gases and the air for supporting combustion in the manner described the heating gases and the air for supporting combustion are effectually preheated, whereby the efficiency of the coke oven is increased.

The subdivision of the gas supply passage (10, 10^a, or 10^b) into two compartments or chambers by the partition 11, is an important feature of my invention. It will be observed that the gas inlet 15 is located in one of said compartments, at the end opposite to that at which the two compartments communicate with each other. Except for this communicating channel at one end, the partition 11 is imperforate. The branch passages 12 lead from the compartment which has no direct connection with the inlet 15. Thus, in order to reach even the first of the branch passages 12, the gas must travel the full length of the supply passage (10, 10^a or 10^b), and in this manner I insure a thorough and practically uniform preheating of the gas.

While in the foregoing for the purpose of describing the invention the coke oven has been termed horizontal, I wish it to be understood that my invention is not limited to ovens which are strictly horizontal.

I claim herein as my invention:

1. In a coke oven, the combination with a coking chamber and upright heating flues located at different distances from the ends of the oven, of a fuel-supply passage having connections to the several flues, movable means, located in said passage at different distances from the ends of the oven for regulating said connections individually, means for supplying said flues with air to support combustion, and an outlet passage for the escape of the combustion gases from said flues.

2. In a coke oven, the combination with a coking chamber and the heating flues, of a passage for supplying heating gas to said flues, and consisting of superposed chambers connected only at one of their ends, means for supplying gas to one of said chambers at the opposite end, a passage for supplying air for supporting combustion to said flues, branch passages connecting said flues with the other chamber of the gas-supply passage, and a passage for the outgoing products of combustion, located adjacent to the passage for the supply of heating gas.

3. In a coke oven, the combination with a coking chamber and the heating flues, of a passage for supplying heating gas to said flues, and consisting of superposed chambers connected only at one of their ends, means for supplying gas to one of said chambers at the opposite end, a passage for supplying air for supporting combustion to said flues, branch passages connecting said flues with the other chamber of the gas-supply passage, and a passage for the outgoing products of combustion, said last-named passage being in heat-exchange relation to one of the chambers of the gas-supply passage.

4. In a coke oven, the combination with a coking chamber and the heating flues, of a passage for supplying fuel to said flues, and consisting of parallel adjacent chambers connected only at one end, means for supplying fuel to the opposite end of one of said chambers, connections for conveying the fuel from the other chamber to the heating flues, and an off-gas channel located adjacent to said passage to heat the fuel therein.

5. In a coke oven, the combination with a coking chamber and the heating flues, of a passage for supplying heating gas to said flues, and consisting of superposed chambers connected only at one of their ends, a passage for supplying air for supporting combustion to said flues, branch passages connecting said flues with the last chamber of the gas supply passage, individual regulating devices, located within said last chamber of the gas-supply passage, for controlling the flow of heating gas to each of said branch passages, and a passage for the outgoing products of combustion.

6. In a coke oven, the combination with a plurality of coking chambers located side by side and heating flues between said chambers, of outlet passages for the products of combustion from the heating flues, such outlet passages being arranged under all of the coking chambers, passages for supplying combustion air to the heating flues, such air-supply passages being located adjacent to the outlet passages located beneath alternate coking chambers, and passages for supplying heating gas to the heating flues, such gas-supply passages being located adjacent to the outlet passages located beneath the other coking chambers.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EDMUND HOHMANN.

Witnesses:
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L. C. FLARENS.