E. HOHMANN.

HORIZONTAL COKE OVEN OF THE REGENERATIVE TYPE.

APPLICATION FILED FEB. 24, 1910.

1,034,709.

Patented Aug. 6, 1912.

3 SHEETS—SHEET 1.

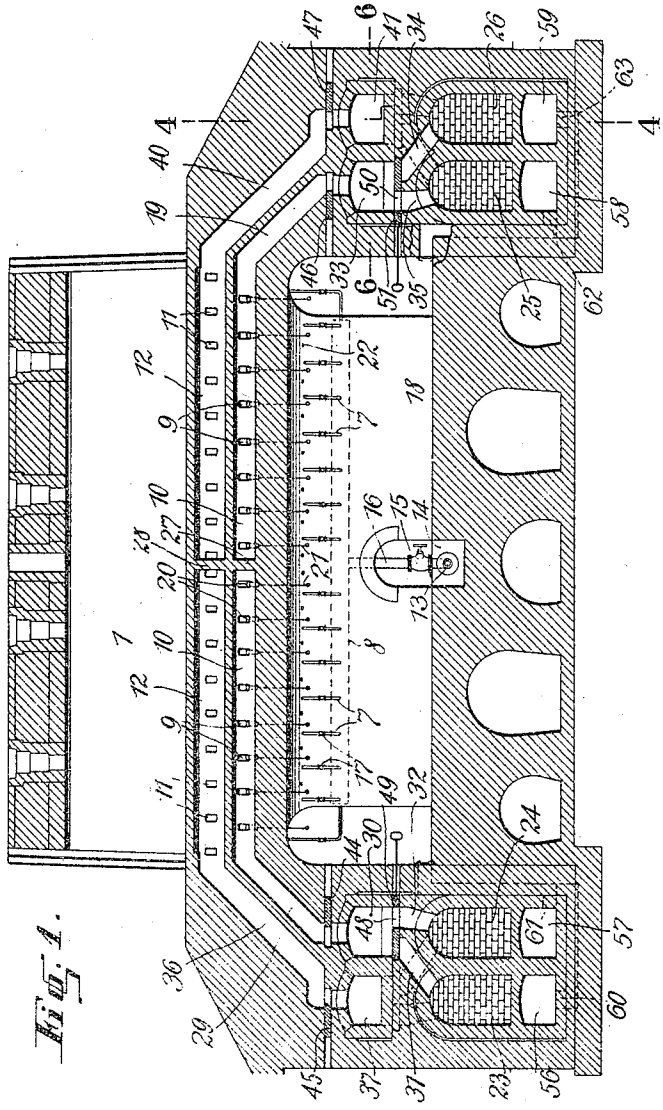

FIG. 1.

Witnesses:
Victor Cumberson
L. B. Beavis

Inventor
Edmund Hohmann
by John Lotka
Attorney.

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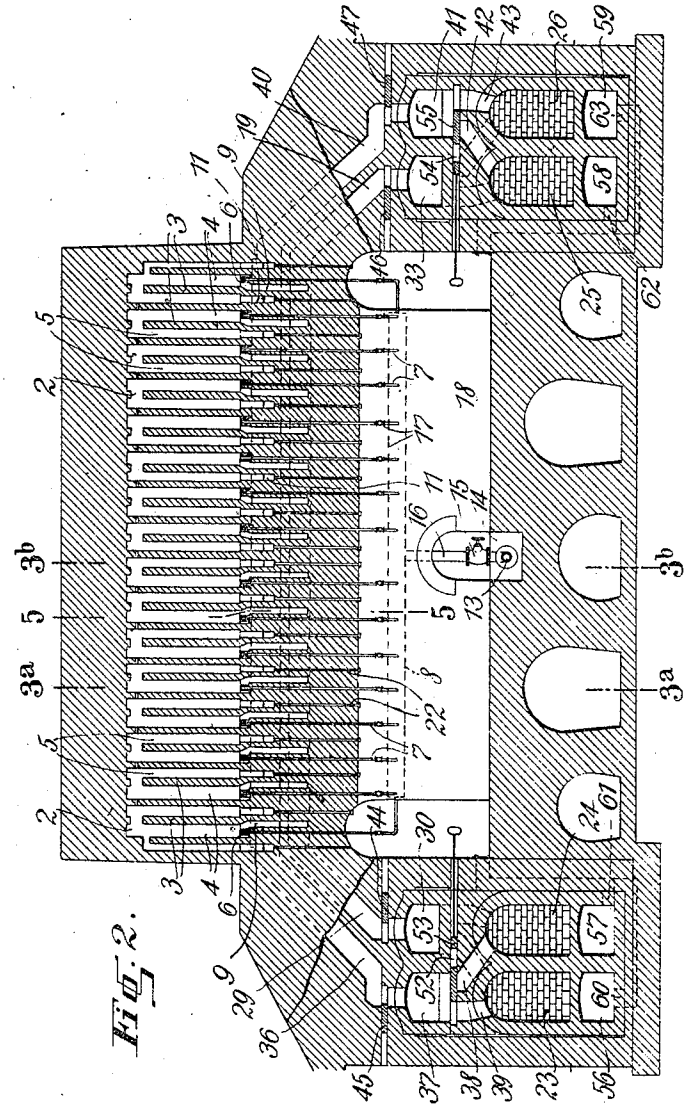

Fig. 2.

Witnesses:
Victor Lumberson
C. B. Beavis.

Inventor
Edmund Hohmann
by John Lotka
Attorney.

E. HOHMANN.

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3 SHEETS—SHEET 3.

Fig. 4.

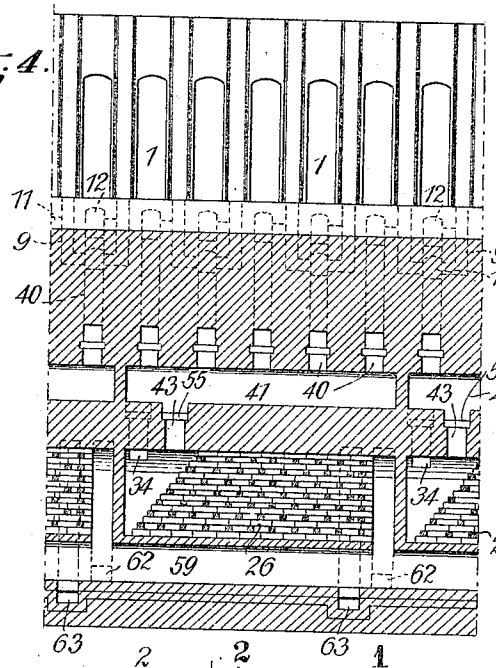


Fig. 5.

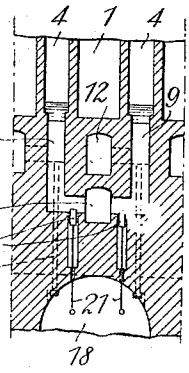


Fig. 3.

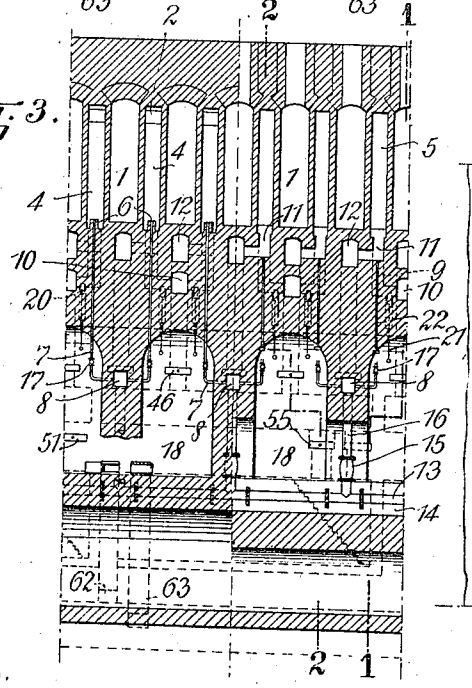
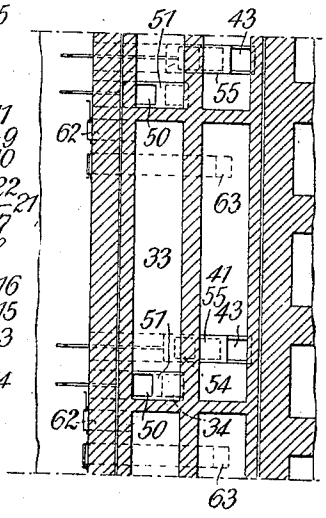


Fig. 6.



Witnesses.

Victor Cumberson

L. B. Bearce

Inventor

Edmund Hohmann

by John Lotka

Attorney.

UNITED STATES PATENT OFFICE.

EDMUND HOHMANN, OF STETTIN, GERMANY, ASSIGNOR TO STETTINER CHAMOTTE-FABRIK ACTIEN-GESELLSCHAFT VORM. DIDIER, OF STETTIN, GERMANY, A CORPORATION OF GERMANY.

HORIZONTAL COKE-OVEN OF THE REGENERATIVE TYPE.

1,034,709. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed February 24, 1910. Serial No. 545,633.

To all whom it may concern:

Be it known that I, EDMUND HOHMANN, director, 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 of the Regenerative Type; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in horizontal coke ovens of the regenerative type and more particularly to that class of coke ovens in which the direction of the flow of the air and gases within the heating passages or flues remains the same from the beginning of the coking operation to the end thereof, and in which the air for supporting combustion is admitted to the individual heating passages or flues of a plurality of coking chambers located one beside the other through longitudinally-arranged channels which are located beneath the coking chambers, and in which the combustion gases flowing downward through the flues escape through longitudinally-arranged channels which are located beneath the coking chambers and above the air inlet channels.

The object of the improvements is to provide an oven of this class in which the draft within the flues of the oven is as far as possible the same during the coking operation and in which therefore coking is effected in uniform way. For this purpose, the coke oven is so constructed, that the air admitted to the flues and the combustion gases escaping therefrom pass through the said channels below the coking chamber in the same direction independent of the regenerators which are connected to the said channels.

With this object in view my invention consists in closing said channels at one of their ends and providing two regenerators at the opposite ends, which regenerators can alternately be connected with said channels. In the preferred form both of said channels are divided into two sections by partition walls, and the sections of both sides are connected to pairs of regenerators. By thus constructing the oven, the direction of the flow of the air passing through the lower channels, and the direction of the flow of the combustion gases escaping through the upper channels remains the same throughout the coking operation.

For the purpose of explaining the invention an example embodying the same has 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 cross-section of the coke oven taken on a plane passing through the center of a coking chamber of the oven on the line 1—1 of Fig. 3, Fig. 2, is a like section taken on a plane passing through the heating passages or flues of the oven on the line 2—2 of Fig. 3, Fig. 3, is a vertical cross-section of the coke oven, the left hand part of the said section being taken on the line 3^a—3^a and the right hand part on the line 3^b—3^b of Fig. 2, Fig. 4, is a vertical cross-section taken on the line 4—4 of Fig. 1, Fig. 5, is a partial vertical cross-section taken on the line 5—5 of Fig. 2, and Fig. 6, is a horizontal cross-section taken on the line 6—6 of Fig. 1.

The coke oven illustrated in the accompanying drawings is provided with a series of horizontal coking chambers 1, 1, 1, which are arranged side by side as is common in coke ovens. In the walls of the oven which separate from each other the coking chambers vertical flues or heating passages 2, 2, 2 are formed. By a vertical partition wall 3 each of the flues 2 is divided into two separate sections 4 and 5, one for the ascending gases and one for the descending gases, which sections communicate with each other at their upper ends. At the lower part of the flues 4 through which the gases move upward nozzles 6 of gas inlet pipes 7 are located which are connected with horizontal gas distributing passages 8. Through angular ducts 9 the sections 4 are connected with longitudinal channels 10 located beneath the coking chambers. By angular ducts 11 the lower ends of the flue sections 5 through which the combustion gases move

downward are connected to channels 12 located above the channels 10. The channels 10 and 12 communicate with regenerators provided at both ends of the oven, as will be described hereinafter.

The heating gases are supplied to the flues 2 from a main duct or pipe 13 which is located within a transverse passage 14 provided in the base of the oven. The pipe 13 is connected with a suitable gas supply. By a branch pipe 16 provided with a valve 15 the duct 13 is connected with the horizontal gas distributing passages 8. From the said passages 8 the gas is supplied through the pipes 7 to the nozzles 6 provided at the bottom parts of the sections 4 of the flues 2. The gas inlet pipes 7 are provided with valves 17 which can be set according to the requirements of the coking operation from passages 18.

The air for supporting combustion flows through the channels 10 in the same direction throughout the coking operation, and it is supplied to the said channels 10 after being heated in the regenerators as will be described hereafter. At the lower ends of the angular ducts 9 connecting the channels 10 with the sections 4 of the flues 2 gates or valves 20 are provided which can be set from the passages 18 by means of rods 21. Below the descending sections 5 of the flues 2 and in line therewith peep holes 22 are formed in the wall of the coking chambers through which the combustion can be observed in each of the said sections, so that the supply of gas and air to the individual flues can be regulated as required. It will be observed that the combustion gases rising in any particular ascending flue sections 4 can reach only one of the descending flue sections 5 from which they pass directly to the respective outlet channel 12. In other words, the gases reaching the upper ends of the flue sections 4 are compelled to take direct paths to the outlet channel 12.

At both ends of the oven two regenerators 23, 24 and 25, 26 are located, and the said regenerators are connected with the air inlet channels 10 and with the outlet channels 12 for the combustion gases. The said connections are made as follows: By vertical portions 27 and 28 the channels 10 and 12 are each divided into two sections. Through an inclined passage 29 the left hand section of each of the channels 10 communicates with a chamber 30 which is connected to the regenerators 23 and 24 by passages 31 and 32 respectively. In a similar way the right hand section of each of the channels 10 communicates with a chamber 33 through an inclined passage 19, and the said chamber is connected with the regenerators 26 and 25 by passages 34 and 35 respectively. The left hand part of each of the channels 12 communicates through an inclined passage 36 with a chamber 37. The latter is connected with the regenerators 24 and 23 through passages 38 and 39 respectively. In a similar way the right hand section of each of the channels 12 communicates with a chamber 41 through an inclined passage 40, and the said chamber is connected with the regenerators 25 and 26 by passages 42 and 43 respectively. Above the chambers 30 and 37 located at the left hand end of the oven, and above the chambers 33 and 41 disposed at the right hand end of the oven regulating valves or gates 44, 45 and 46, 47 are provided in the passages 29, 36 and 19, 40. By means of the said regulating valves or gates the flow of the gas or air through the said passages can be regulated at will. Furthermore, the passages 31, 32 can be closed by means of a slide valve or gate 49 formed with an aperture 48, and the passages 34, 35 can be closed by means of a slide valve or gate 51 formed with an aperture 50. In a similar way the passages 38, 39 can be closed by a slide valve or gate 53 provided with an aperture 52 and the passages 42, 43 can be closed by a slide valve or gate 55 provided with an aperture 54.

In the position of the slide valves shown in Fig. 1 air is supplied from the regenerator 24 located at the left hand part of the oven and it passes through the passage 32, the chamber 30 and the inclined passage 29 into the left hand part of the channels 10, from whence it is supplied to the flues 2 of the coking chamber, as has been described above. In the meantime the combustion gases of the left hand section of the oven are discharged through the ducts 11 into the left hand sections of the channels 12, from whence they pass through the inclined passage 36, the chamber 37, and the passage 39 into the regenerator 23. On the right hand side of the oven air passes through the regenerator 25, the passage 35, the chamber 33 and the passage 19 into the right hand section of the channels 10, while the combustion gases escape from the right hand section of the channels 12 through the passages 11, from whence they pass through the inclined passage 40, the chamber 41, and the passage 43 into the regenerator 26. If now the slide valves 49, 53, 51 and 55 are reversed, the flow of the gases and air is altered in this respect only, that the air is supplied from the regenerators 23, 26, and the combustion gases are discharged through the regenerators 24, 25. The direction of the air entering the two sections of the channels 10 and the direction of the flow of the combustion gases discharged from the sections of the channels 12 are not altered.

In order to reduce as far as possible the number of the slide valves required for closing the channels 10 and 12 against the regenerators, a plurality of channels 10 and

12 belonging to several coking chambers 1 are connected to the same chambers 37, 30, 35, and 41 communicating with the regenerators 23, 24, 25 and 26, as appears from Fig. 4 of the drawings. By passages or flues 56, 57, 58 and 59 the regenerators are connected to a chimney or stack, and through air inlet ducts 60, 61, 62 and 63 the regenerators communicate with the atmosphere. The said passages and ducts are provided with valves or gates, as is common in ovens of the class described. In the example illustrated, the air inlet ducts are connected to the bottom parts of the passages 18, so as to draw in the heated air from the latter. Thereby the preheated air is made use of, and at the same time the said passages 18 are cooled. In the particular construction shown there is a separate air inlet duct 60, 61, 62, 63 for each of the chambers 37, 30, 33 and 41 respectively (see Figs. 4 and 6), so that each of these ducts corresponds to one of the passages 31, 32, 35 and 34 respectively.

The coking chambers have herein been described as horizontal in order to distinguish the oven from those in which upright coking chambers are provided, but it is to be understood that by the use of such term I do not limit my invention to a coke oven in which the coking chambers are strictly horizontal, but intend to cover coke ovens in which the coking chambers are substantially horizontal.

What I claim is:—

1. In a horizontal coke oven of the regenerative type, the combination with the coking chambers and heating flues adapted to be supplied with fuel, of channels for the admission of air to said flues, channels for the outlet of combustion gases from said flues, the said channels extending lengthwise of the oven and being closed midway of the oven's length, two regenerators, a transverse chamber having connections with both regenerators and with a plurality of said air-admission channels at the ends of the oven, another transverse chamber also having connections with both regenerators and further with a plurality of said outlet channels at the ends of the oven, and means for controlling the alternate connection of said chambers with the regenerators.

2. In a horizontal coke oven of the regenerative type, the combination with the coking chambers and heating flues adapted to be supplied with fuel, of channels for the admission of air to said flues, channels for the outlet of combustion gases from said flues, the said channels extending lengthwise of the oven and being closed midway of the oven's length, two sets of regenerators, one such set at each side of the oven, a transverse chamber communicating with a plurality of said air-admission channels at the ends of the oven and connected by passages with two of said regenerators, another transverse chamber communicating with a plurality of said outlet channels at the ends of the oven and connected by passages with said two regenerators, and valves for alternately closing and opening said passages.

3. In a horizontal coke oven of the regenerative type, the combination of the coking chambers, upright heating flues arranged between said coking chambers and comprising ascending sections provided with transverse ducts at their lower ends and descending sections provided with transverse ducts at their lower ends and each communicating at its upper end with one of said ascending sections, air-supply channels extending lengthwise of the oven and each communicating with a plurality of the ducts at the lower ends of the ascending flue sections, gas outlet channels extending lengthwise of the oven and each communicating with a plurality of the ducts at the lower ends of the descending flue sections, two sets of regenarators, and means for controlling the alternate connection of the air-supply and gas outlet channels with the regenerators.

4. In a horizontal coke oven of the regenerative type, the combination of the coking chambers, upright heating flues arranged between said coking chambers and comprising ascending sections provided with transverse ducts at their lower ends and descending sections provided with transverse ducts at their lower ends and each communicating at its upper end with one of said ascending sections, the ducts connected with the ascending sections being at a level different from that of the other ducts, air-supply channels and gas outlet channels superposed in pairs and extending lengthwise of the oven, each channel communicating with a plurality of the ducts at the same level, two sets of regenerators, and means for controlling the alternate connection of the air-supply and gas outlet channels with the regenerators.

5 In a horizontal coke oven of the regenerative type, the combination of the coking chambers, upright heating flues arranged between said coking chambers and comprising ascending sections provided with transverse ducts at their lower ends and descending sections provided with transverse ducts at their lower ends and each communicating at its upper end with one of said ascending sections, the ducts connected with the ascending sections being located below the ducts connected with the descending sections, air-supply channels extending lengthwise of the oven and separated by a transverse partition, and each communicating with a plurality of the lower ducts, gas outlet channels extending lengthwise of the

oven and also separated by a transverse partition, and each communicating with a plurality of the upper ducts, two sets of regenerators, one set at each end of the oven, and means for controlling the alternate connection of the regenerators with the supply and outlet channels.

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

EDMUND HOHMANN.

Witnesses:
GEORGE LILIEQUIST,
EMIL SCHMIDT.