

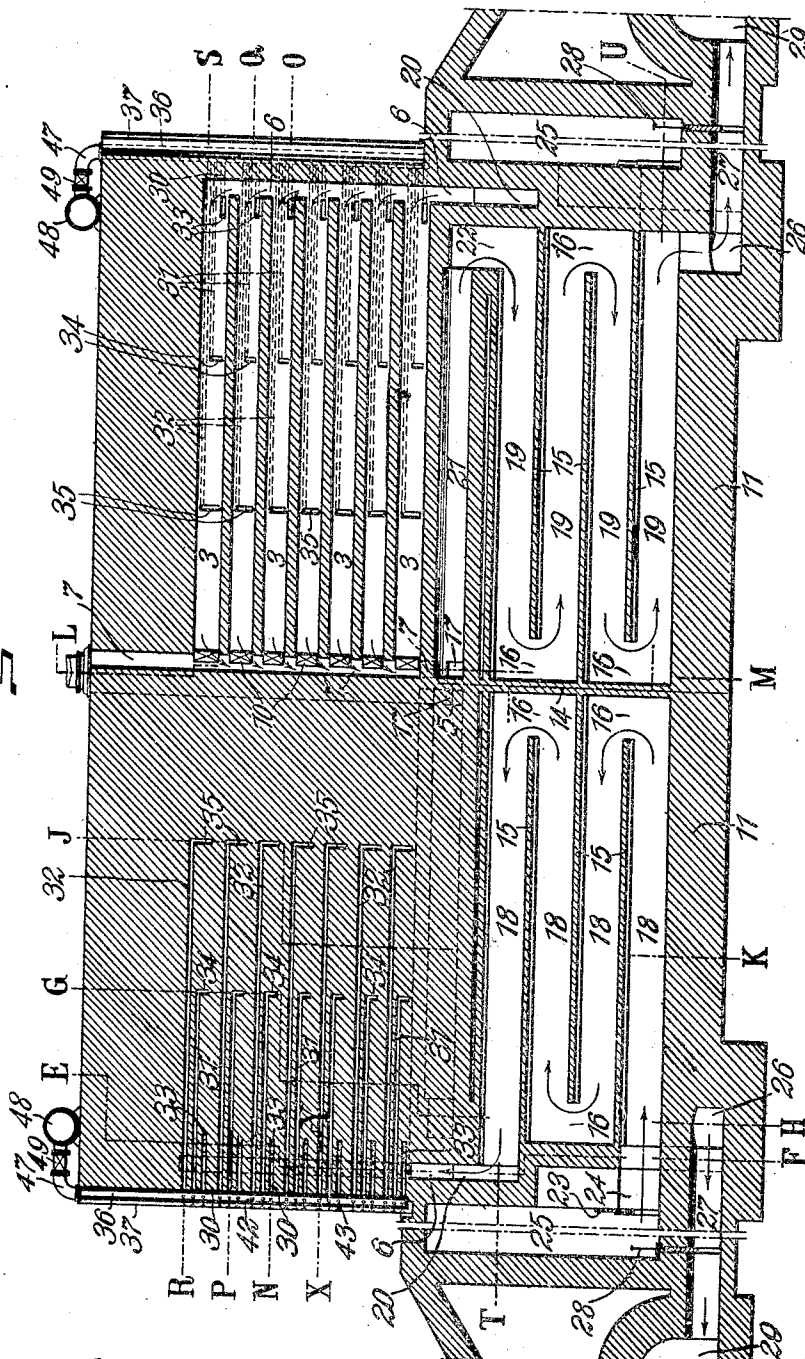
A. GOHMANN.
GAS PRODUCING OVEN.
APPLICATION FILED NOV. 15, 1910.

1,060,837.

Patented May 6, 1913

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Julius H. H. H.
Ch. H. H.

Inventor

Arthur Gohmann

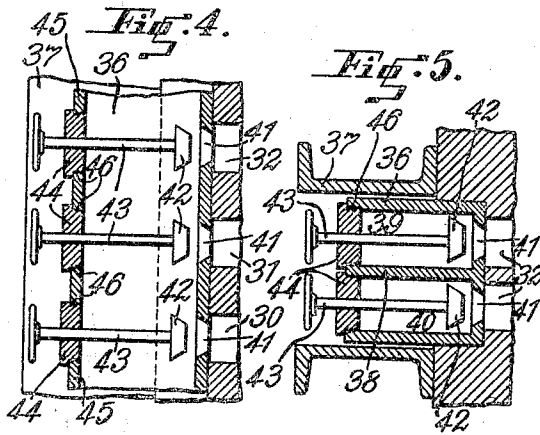
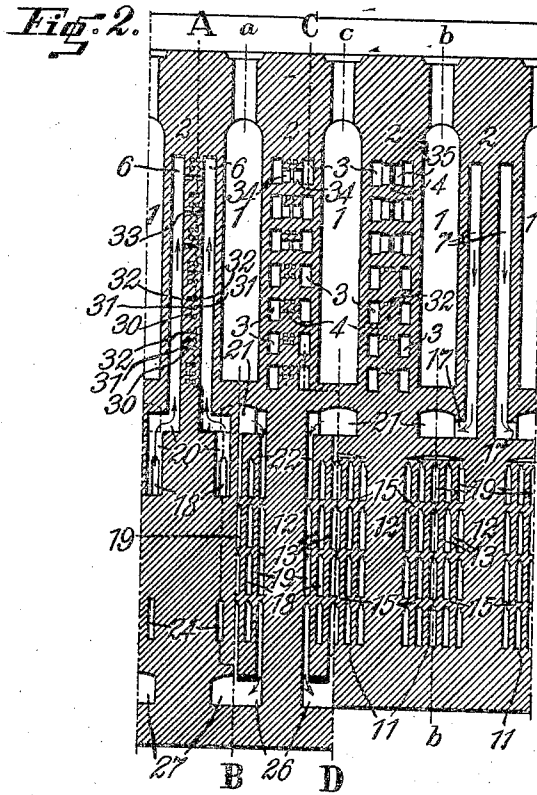
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3 SHEETS-SHEET 2.



Witnesses:

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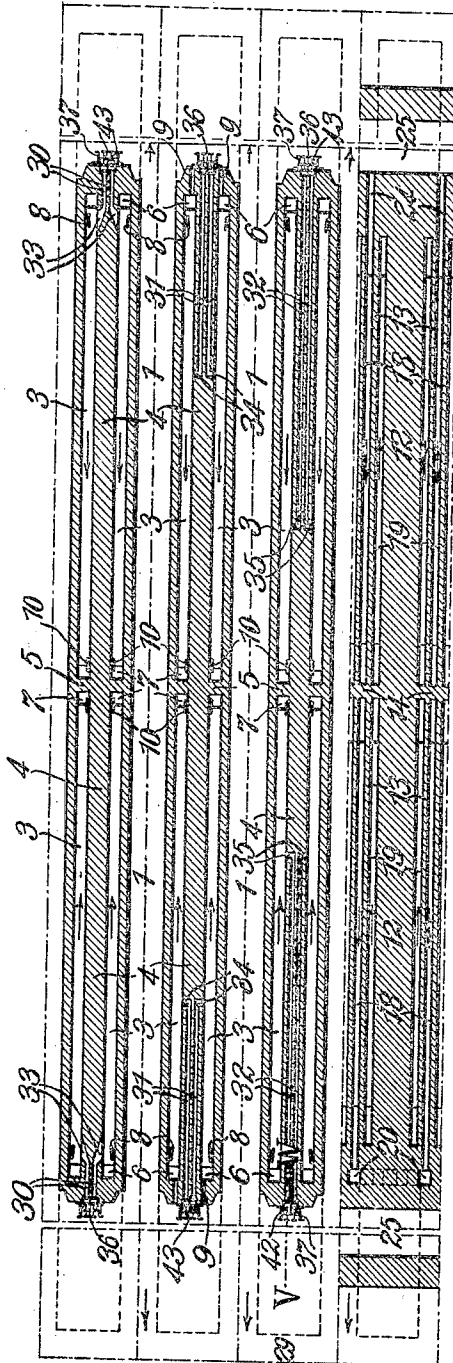
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3 SHEETS-SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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GAS-PRODUCING OVEN.

1,060,837.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed November 15, 1910. Serial No. 592,475.

To all whom it may concern:

Be it known that I, ARTHUR GOHMANN, a subject of the German Emperor, and a resident of Stettin, Germany, have invented certain new and useful Improvements in Gas-Producing Ovens, of which the following is a specification.

My invention relates to gas-producing ovens, particularly of the type having coking chambers and longitudinal heating flues, such oven serving for the simultaneous production of coke and of illuminating gas.

According to my present invention, I provide the heating walls or partitions interposed between adjacent coking chambers, with gas channels which are arranged to discharge into the heating flues contained within said partitions, at different distances from the end of the oven at which air is admitted into said flues. With this arrangement of gas channels, a portion of the gas supplied for heating enters the heating flues in the vicinity of the air inlet and is burned in the presence of an excess of air. The combustion products give off part of their heat during their passage through the heating flues, and thus become cooler. In order to compensate for this loss of temperature, the resulting mixture of air and combustion products receives additional amounts of gas at certain intervals, to be burned with the remaining excess of air. In this manner I insure a uniform heating of the oven chambers and thereby an economical operation of the oven. This arrangement of gas channels may be used in longitudinal or in upright coke ovens having heating channels ranging lengthwise of the oven structure, said ovens being used to convert coke into gas, or to extract gas therefrom.

A typical embodiment of my invention is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of the oven the left-hand portion on the line A—B, and the right-hand portion on the line C—D of Fig. 2; Fig. 2 is a vertical cross section, the portion from the left-hand end to the line a—B being taken on the line E—F of Fig. 1, the portion between the lines a—B and c—D being taken on the line G—H, the portion between the lines c—D and b—b on the line J—K, and the portion to the right of the line b—b, on the line L—M of Fig. 1; Fig. 3 is a composite hori-

zontal section of the oven in four portions, the uppermost portion of Fig. 3 being a section taken on line N—O of Fig. 1, the second on line P—Q, the third on line R—S, and the lowermost on line T—U of Fig. 1; Fig. 4 is a vertical section on line V—W of Fig. 3, showing, upon an enlarged scale, one of the gas-distributor chests; and Fig. 5 is a horizontal section of one of the gas-distributor chests, drawn upon an enlarged scale, and taken on line X—Y of Fig. 1.

In the particular example of my invention illustrated herein, the oven is a longitudinal coke oven heated at both ends of the coking chambers. These coking chambers 1 extend from one end of the oven to the other and are separated from one another by heating partitions 2 which contain, at each half of the oven, parallel longitudinal heating flues 3, arranged in pairs side by side and in two vertical sets separated by central partitions 4. At the central portion of the oven dividing walls 5 are provided between the sets of heating flues of the two oven halves (Fig. 3). The heating flues 3 of the two vertical sets are connected at the outer ends, for each half of the oven, with an upright air-distributing channel 6, and at their inner ends, adjacent to the dividing walls 5, with an upright channel 7 for carrying away the waste gases. At those ends of the heating flues where air enters I arrange regulating valves 8 consisting of upright stone slabs mounted to turn about vertical axes. These valves are adjusted from the ends of the oven through channels 9 capable of being closed by plugs or otherwise, said channels also serving as sights through which the combustion process in each heating flue 3 may be observed. At those ends of the heating flues where the combustion gases escape, I arrange regulating valves 10 likewise consisting of upright stone slabs pivoted about vertical axes. The regulating valves 10 may be adjusted from the top of the oven through the vertical outlet channels 7 which may be closed at their upper ends.

The air distributing channels 6 and the outlet channels 7 are connected with recuperators 11 (Fig. 2) located underneath the oven chambers 1 and parallel thereto. The several recuperators of each oven half are separated from one another by walls 12

which also serve to support the heating walls 2, while the recuperators of one oven half are separated from those of the other half by cross walls 14 (Fig. 1). Each recuperator is subdivided by vertical partitions 13 (Fig. 2) ranging lengthwise of the oven, into five chambers or compartments located side by side, of which the outer and the central compartments receive the combustion gases, while the other two receive the air for supporting combustion. The recuperator chambers through which the air passes on its way to the heating flues and the recuperator chambers through which the combustion products flow are divided into channels 18 and 19 respectively by means of horizontal partitions 15 (Fig. 1) arranged to leave passages 16 alternately at opposite ends. In passing through these channels the air and the combustion gases are compelled to change their direction repeatedly. The air channels 18 of each recuperator 11 are connected at their upper ends by means of angular channels 20 (Fig. 2) with the upright air-distributing channels 6 of the two vertical sets of heating flues 3 adjacent to the chamber 1 situated above this particular recuperator. The discharge channels 19 of each recuperator 11 communicate at their upper ends by channels 22 with a base channel 21 to which are connected by means of short branch channels 17 (Fig. 2) the upright outlet channels 7 of the two vertical sets of heating flues 3 adjoining the oven chamber 1 situated above this particular recuperator. At their lower ends, the air channels 18 of each recuperator 11 are connected by means of a channel 24, provided with a regulating valve or damper 23 (Fig. 1), to a tunnel 25 located under the ground line of the oven and arranged in front of the recuperators 11 of the respective oven half, these tunnels being of a size sufficient to allow an attendant to walk therein. The outlet channels 19 of each recuperator are connected at their lower ends by means of a transverse channel 26, with a flue 27 containing a regulating valve 28. The flues 27 of the respective oven halves are connected with a smoke flue 29 leading to the stack.

The following arrangement is provided for admitting gas to the heating flues 3: In the partitions 4 between the pairs of juxtaposed heating channels 3 of each oven half, gas channels 30, 31, 32 are disposed in pairs side by side, in two vertical sets, said channels being horizontal and parallel with the heating flues 3. All the gas channels 30, 31, 32 of one oven half have their gas inlet ends at the front or exposed ends of the corresponding heating walls 2, while their gas outlet ends 33, 34, 35 (Figs. 1 and 3) lead transversely into the adjacent heating flues 3. The outlets 33, 34, 35 of the individual superposed pairs of gas channels 30, 31, 32

are located at different distances from the air inlets of the corresponding heating flues 3, which air inlets are at the ends of the oven. The lowermost gas channels 30 of the three superposed gas channel pairs have their outlets to the corresponding heating flues 3 immediately adjacent to the air inlets of these flues. The outlets 33 of the gas channels 30 are disposed obliquely and flare horizontally toward the heating flues 3. The middle gas channels 31 terminate at a greater distance from the end of the oven and from the air inlets of the corresponding heating flues than the gas channels 30. The outlets 34 of these gas channels 31 are widened downwardly (Fig. 1) to the level of the bottom of the corresponding channels 30, said outlets 34 thus forming slots of a height greater than that of the outlets 33 of the gas channels 30. Finally the upper gas channels 32 discharge into the heating flues 3 at a still greater distance from the end of the oven and from the air inlets of said flues than the gas channels 31. The outlets 35 of the gas channels 32 are also extended downwardly to the level of the bottom of the corresponding channels 30 and thus form vertical slots of a height still greater than that of the outlets 34 of the gas channels 31.

The introduction of gas into the gas channels 30, 31, 32 of the several heating walls 2 is accomplished at each half of the oven by means of upright distributing chests 36 (Figs. 1 and 2), preferably made of cast iron, which are located at the ends of the walls 2 in a protected position between the anchoring posts 37 of the bench of ovens. These distributing chests are of rectangular cross section and are divided by vertical partitions 38 (Fig. 5) into chambers 39, 40 each communicating through openings 41 with the gas channels 30, 31, 32 of one of the two vertical sets of gas channels which correspond to the respective half of the oven. The effective cross section may be regulated at the openings 41 by means of valves 42 (Figs. 4 and 5) which are secured to spindles 43 and located adjacent to said openings, said valves being adjustable manually. The spindles 43 extend lengthwise of the gas channels 30, 31, 32 and are mounted to move in plugs 44 screwed into openings 46 in the front wall 45 of each distributing chest 36. After unscrewing the plugs 44, the valves 42 may be removed from the gas-distributing chests 36 so as to render the gas channels 30, 31, 32 accessible for cleaning through the openings 46, 41. At their upper ends the gas-distributing chests 36 communicate with pipes 47 (Fig. 1) branched off from gas mains 48 arranged adjacent to each end of the oven structure, the connection of said mains with the branch pipes 47 being controlled by valves 49.

The operation of the above described oven

is as follows: The air for supporting combustion enters at each half of the oven from the tunnel 25 (Fig. 1) below the base of the oven into the inlets 24 of the recuperators

11. The amount of air thus admitted may be regulated by the valves or dampers 23. The withdrawal of the air from the tunnels 25 causes an inrush of fresh air into them, so that they are cooled efficiently. From the inlet channels 24 the air intended to support combustion passes to the superposed channels 18 of the several recuperators, traveling through them in the direction of the arrows and becoming heated during such passage. The air then enters the upright air-distributing channels 6 at the ends of the structure, by way of the angular channels 20 (Fig. 2). From these channels 6 the air flows into the several heating flues 3 in amounts governed by the position of the adjustable dampers or valves 8 (Fig. 3). The main body of gas required for each heating flue 3 enters into it through the lowermost channel 30 of the superposed channels belonging to such flue, that is to say, through the channel discharging gas into the heating flue next to its air inlet. The gas issuing from the outlet 33 is burned in the heating flue 3 in the presence of an excess of air. The combustion products, in passing through the heating flue 3 toward the center of the oven, give off part of their heat to the coking chambers 1 and thus become cooler. If only these gradually cooling combustion products were used for heating the coking chambers, the latter would be heated unevenly, that is to say progressively less toward the center of the oven, so that the conversion of coal into coke would be completed at different times for different portions of the oven, thereby preventing a truly economic operation. To compensate for the heat lost by the combustion products, I supply additional amounts of gas to each heating flue 3 at different distances from the end of the oven and from the air inlet, by means of the gas channels 31, 32 located above the channel 30, and these additional amounts of gas combine with the excess of air still contained in the flues. By this arrangement I secure a maximum of uniformity in the heating of the oven chambers throughout the entire length of the heating flues 3.

As will be seen in Fig. 1, the height of the outlets 33, 34, 35 of the gas channels 30, 31, 32 increases toward the center of the oven, that is, toward the outlet of each heating flue 3. This promotes the mixture of the unconsumed gas with the gradually diminishing excess of air admixed to the combustion products traveling through the heating flues, and the smaller the excess of air, the better is this mixture promoted.

A uniform distribution of the gas to be

consumed, between the two vertical sets of gas channels 30, 31, 32 of each half of a heating wall, is made possible by the provision of the vertical partition 38 (Fig. 5) in each of the gas-distributing chests 36. The amount of gas passing from each gas-distributing chest 36 to the several gas channels 30, 31, 32 may be regulated accurately by means of the valves 42 located at the ends of the oven structure.

As will be understood from the foregoing description, the combustion gases travel always in the same direction through the heating flues 3 from each end of the oven structure toward the center thereof. By virtue of the arrangement of the gas channel outlets 33, 34, 35 at different distances from the air inlets of the gas channels 30, 31, 32, the valves 42 will permit the heating of the oven to be regulated readily according to requirements, not only as regards the height of the coking chambers 1, but also as regards their length. An economical operation is thus attainable.

The combustion products upon leaving the heating flues 3 travel past the valves 10 (Fig. 3) by means of which I may regulate the draft exerted by the stack in the heating flues 3. From the latter the combustion gases pass to the upright channels 7 located at the center of the oven structure and from thence into the horizontal base channels 21 (Fig. 1) located beneath the oven chambers 1. The purpose of conducting the combustion gases through these base channels 21 is simply to maintain the temperature at the bottom of the oven, but not to produce a coking action from below. From the base channels 21 the combustion gases flow into the recuperator channels 19. In passing through these recuperator channels, the combustion gases give off heat to the fresh air traveling in the opposite direction through the adjacent recuperator channels 18. Finally the combustion gases travel from the recuperator channels 19 through the flues 27 and from thence to the stack through the smoke flues 29.

The gas channels 30, 31, 32 may be cleaned by means of suitable tools introduced through the openings 46, 41, after unscrewing the guide plugs 44 (Fig. 4) and removing the valves 42 which serve to regulate the admission of gas to said channels. Any deposits, impurities or other foreign matter contained in these channels will be pushed by the tools toward the center of the oven structure and will fall into the respective heating flues through the outlet openings 33, 34, 35 (Fig. 1) of the gas channels 30, 31, 32.

The improved oven is of simple construction, readily operated and embodies a thorough utilization of heat.

Various modifications may be made with-

out departing from the nature of my invention as defined in the appended claims.

I claim:

1. An oven provided with chambers and partitions separating them, said partitions containing superposed longitudinal heating flues provided with air inlets, each individual heating flue being also provided with a plurality of fuel inlets arranged at different distances from the respective air inlets and from the ends of the oven, the outlets of the products of combustion being farther away from the air inlets than the last fuel inlets, so that the combustion gases produced at the first fuel inlets are compelled to travel past all the other fuel inlets of the same heating flue before reaching the outlets, and upright collecting channels into which the combustion gases pass directly from each of the several superposed heating flues.

2. An oven provided with chambers and partitions separating them, each of said partitions containing two vertical series of heating flues provided with air inlets and two vertical series of adjoining gas supply channels in the wall between said heating flues, the outlets from said gas channels to the heating flues being located at different distances from the air inlets of said flues.

3. An oven provided with chambers and partitions separating them, each of said partitions containing two vertical series of heating flues and provided with air inlets and two vertical series of adjoining gas supply channels in the wall between said heating flues, the outlets from said gas channels to the heating flues being located at different distances from the air inlets of said flues, and being made of different heights, such height increasing toward the outlets of the heating flues so as to secure an increasingly better mixture of the gas supplied, with the excess of air admixed to the combustion products flowing through the heating flues, as the amount of the excess diminishes.

4. An oven provided with chambers and partitions separating them, said partitions containing heating flues and channels for supplying gas thereto, gas-distributing chests at the ends of said channels and of the oven, and gas-regulating valves removable from said chests lengthwise of the gas channels, so that the gas channels are accessible from the end of the oven after removal of the regulating valves.

5. An oven provided with chambers and

partitions separating them, each of said partitions containing two sets of heating flues and two sets of gas supply channels leading thereto, and a gas-distributing chest subdivided by a partition into two compartments each connected with one of the said sets of gas supply channels.

6. An oven provided with a chamber and a heating wall adjacent thereto containing a heating flue provided with an air inlet and with an outlet for combustion products and a plurality of channels for supplying gas to said flue at different distances from the air inlet, the outlets of said channels increasing in height from channel to channel toward the outlet of the flue.

7. An oven provided with a chamber and with a heating wall adjacent thereto containing a heating flue provided with an air inlet and with an outlet for combustion products and a plurality of channels for supplying gas to said flue between said inlet and said outlet at different distances from the end of the oven, and individual devices for separately regulating the flow of gas through the several channels.

8. An oven provided with chambers and partitions separating them, each partition containing longitudinal heating flues having inlets for the admission of air and outlets for the combustion products, a plurality of channels for supplying gas to each of said flues between its air inlet and its combustion gas outlet, at different distances from the ends of the oven, and individual devices for separately regulating the flow of gas through the several channels, whereby the oven may be heated uniformly throughout its length.

9. An oven provided with chambers and partitions separating them, each partition containing heating flues and longitudinal gas supply channels communicating with said flues and leading toward the middle of the oven, a gas-distributing chest at the outer end of said channels, valves controlling the connection of the respective channels with the said chest, and plugs carrying said valves and removable from said chest lengthwise of the gas channels.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

ARTHUR GOHMANN.

Witnesses:

G. LILIEQUIST,
EMIL SCHMIDT.