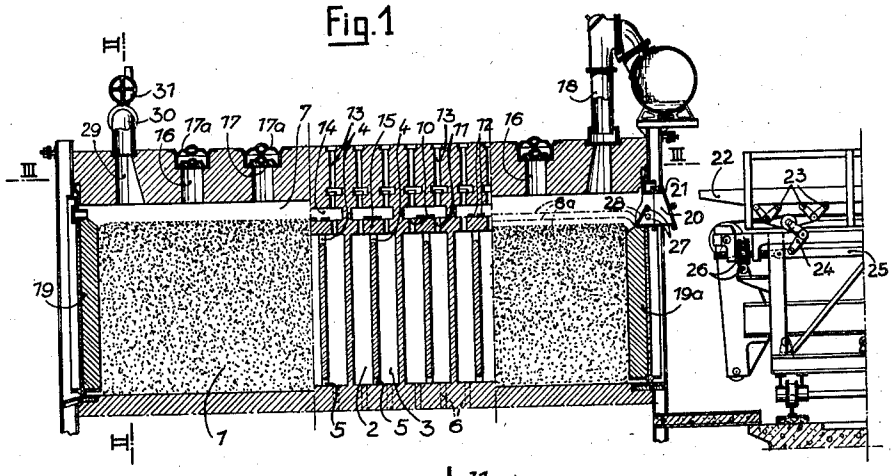
Sept. 13, 1938. H. DREHSCHMIDT 2,129,658

COKING RETORT OVEN

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Fig.1



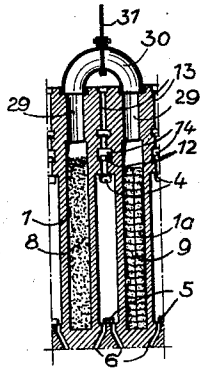


Fig. 2

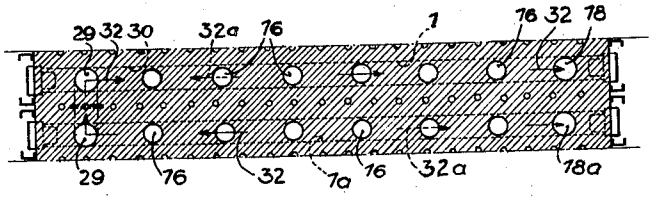


Fig. 3

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COKING RETORT OVEN

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Fig. 4

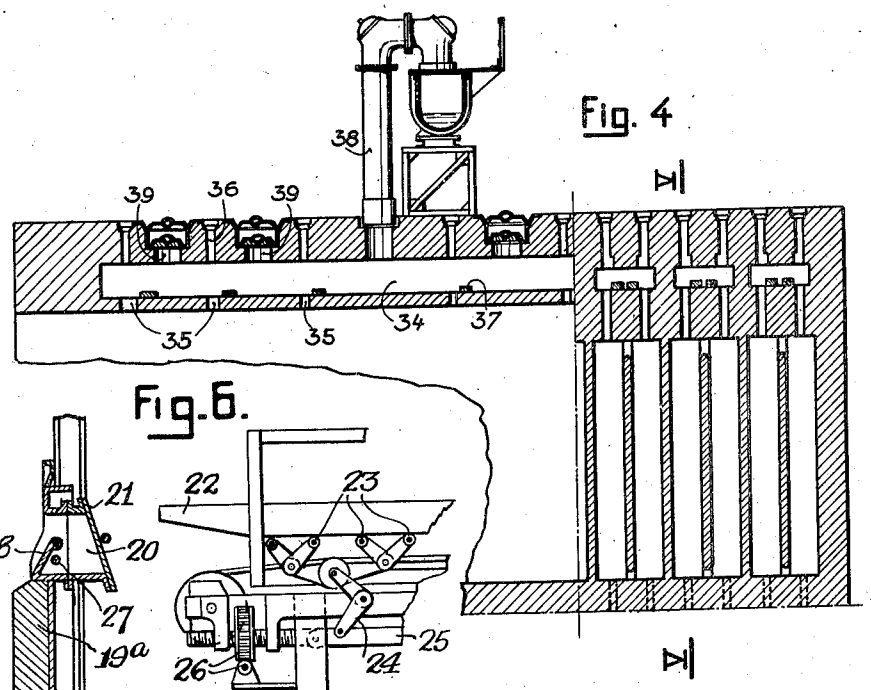


Fig. 6.

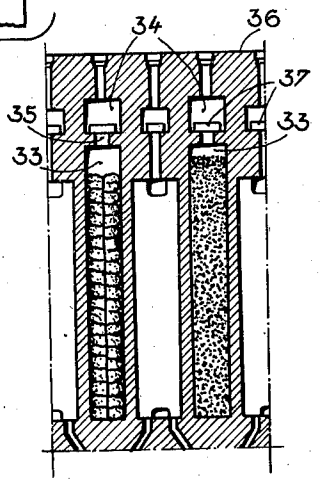


Fig. 5

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UNITED STATES PATENT OFFICE

2,129,658

COKING RETORT OVEN

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Application August 8, 1935, Serial No. 35,256
In Germany December 12, 1933

10 Claims. (Cl. 202—139)

This invention relates to the distillation (coking) of bituminous fuels in ovens of the known type illustrated on the drawings for the production of gas and coke, and has for its object to improve the quantity and type of by-products arising from the distillation of such fuels in such ovens.

The invention consists in maintaining the hot distillation gases, arising from the distillation of bituminous fuels, for a definite time at such a temperature, or heating or cooling them to such a temperature, before cooling or condensation that the hydrocarbons in the gases are converted to valuable products, and independently of the temperature which the gases acquired in the coking zone of the coking chamber.

The technical advantage obtained from the application of the foregoing briefly described main technical rule, is best illustrated in the so-called middle temperature coking of bituminous fuels, i. e. coking in which the coking charge is brought to a maximum temperature of preferably 600–700° C. With such low coking temperatures a tar is obtained in the by-products, whose properties deviate considerably from those of the tar usually obtained in coking. If the vaporous and gaseous products discharging from the coking charge during the middle temperature carbonization are subsequently heated in a cracking chamber, arranged for example, above the coking chamber, to temperatures of about 650–750° C., the hydrocarbons change to compounds such as are normally found in high temperature coking. In this way by-products are obtained during middle temperature coking, which have great economic advantages with respect to the quality of the coke produced, and are of high value.

Similar conditions sometimes exist in the known high temperature coking, especially if the coking oven is operated with a considerably longer working period. In this case the temperature in the gas collecting chamber decreases to a large extent so that there are no longer any changes in the hydrocarbons in which event the high yield of valuable by-products is reduced during the high temperature carbonization.

On the other hand the use of the fundamental technical rule of the present invention, even with high temperature coking, with a normal or shortened operative coking time results in considerable technical advantages. In the modern high-duty ovens the temperature of the heating walls is as a rule very high and on this account the gas collecting chamber is sometimes heated excessively. The too extensive and unfavourable decomposition of the hydrocarbons resulting therefrom, which can lead to the separation of graphite, is counteracted according to the invention through the fact that the gas collecting crown-space of the coking chamber of the oven or the cracking chamber, into which the distillation gases pass from the coking zone of the chamber, is maintained at a temperature lower than that of the heating walls of the coking chamber.

It is obvious from the above that the fundamental rule of the invention makes possible a further step in the development of a carbonization oven, in which it is possible to obtain by suitably adjusting the heating of the coking zone of the chamber and the gas collecting space of the chamber receiving the distillation gases, an extensive alteration in the quality and quantity of all products obtained from the coke ovens, i. e. coke as well as by-products, varying in accordance with the conditions and possibilities obtaining. It is obvious what importance the introduction of such a coke oven will have to the coking industry with the present day economic conditions all over the world.

The fundamental idea of the invention is preferably realized by subjecting the gaseous and vaporous distillation products, after their discharge from the fuel charge of the coking oven, but before cooling and condensing, to a heat treatment in a cracking chamber connected with the coking chamber, and whose wall temperature can be adjusted higher or lower independent of that of the carbonization chamber, preferably at temperatures between 600 and 800° C.

The coking oven serving to carry out the process according to the invention exhibits the fundamental peculiarity that the walls of the gas collecting crown-space of the chamber, i. e. of the chamber zone above the zone for the coking charge, even after shrinkage of the same during coking, are not traversed by the main heating passages serving to heat the coking zone of the chamber and the gas collecting chamber may be connected to the cracking zone of an adjacent chamber by a conducting pipe and which latter zone is heated or cooled by its wall passages, which can be regulated independently of heating wall passages of the coking zone of its chamber oven, according to the temperature which arises in the oven during a definite state of operation.

In horizontal chamber coke ovens this basis arrangement is preferably and most simply arranged somewhat as follows:

The cooking chamber of the horizontal chambers is heated by vertical heating passages which

are connected in pairs according to the known circulation principle. The upper connecting opening between the two co-operating heating passages of each pair of heating passages is arranged at such a height below the top level for coked charges that even after the shrinkage of the coal charge during the coking process there is no excess heating of the gas collecting space chamber by the heating passages for the coking zone of the chamber. The upper connecting opening of the pair of heating passages is then in such a position that the caked lump of coke, with simultaneous pressure on its upper edge, becomes a thin dark layer. In this position of the upper connecting opening of the heating passages the gaseous distillation products are protected from too extensive heating and dispersion.

In order to heat the gas collecting crown-space of the chamber serving as a cracking chamber, or a special cracking chamber connected with the gas collecting chamber, vertical passages controlled by valves, are provided above the vertical passages of the heating walls and are connected at their upper ends forming the so-called hair pin heating passages. In this arrangement it is possible to supply one part of the fuel gases from the heating passages of the coking zone of the chamber to the heating channels of the cracking chamber, and in a quantity sufficient for the optimum heating of the cracking chamber.

In order to cool the cracking chamber of the horizontal chamber coke oven, vertical cooling shafts are provided in the top of the oven and are cut off from the cracking chamber passage by means of a comparatively thin cover plate, and are closed from the outside by means of a removable cover, provided if necessary with adjustable openings.

In horizontal chamber coke ovens which are operated with a poured-in chamber load the gas collecting crown-space of the coking chamber is preferably combined with the cracking chamber. It is however also possible to provide a special cover passage, above the special gas collecting chamber, to be constructed below, which would preferably be connected by means of calibrated openings to the gas collecting chamber on the one hand and with the ascension pipe on the other hand, in such a way that the distillation gases escape into the ascension pipe by means of the cover passage acting as a cracking chamber. The cover passage in these forms of construction must obviously lie in reach of the heating passages for the cracking chamber.

The arrangement of the cracking chamber in the form of a special cover passage has in addition the advantage that by means of a suitable adjustment of the valve controlling the openings in the gas collecting chamber the distillation gases can be drawn off first of all through the gas collecting space in its entire length and then through the cover passage over its whole extent. On this account, the time during which the distillation gases are submitted to the heat treatment is, under the circumstances, increased with advantage.

In such horizontal chamber coke ovens which are supplied with preformed charges of coal pressed into the shape of a cake fitting the coking zone of the chamber oven prior to the charge being introduced into the oven, a special cover passage which can be connected with the real gas collecting chamber, of a special low construction, is preferably provided regularly as a cracking chamber.

It has in addition been found that the height to which the chambers are adapted for being charged with coal, or in other words, the flow of heat from the heating wall passages of the carbonization zone of the chamber to the surface of the coked charge, which accordingly limits the gas collecting space of the chamber, determines the temperature of the gas collecting space of the chamber as well as the heating of the gas collecting zone walls by their wall passages.

A further object of the present invention is to make adjustable the flow of heat from the heating wall passages of the coking chamber over the coal charge to the gas collecting chamber. This object is fundamentally obtained according to the invention by means of the fact that the coal charge is smoothed out at such a height that the desired flow of heat takes place from the heating wall passages of the coking chamber to the surface of the coal charge. It is clear that with a different height of the coal layer above the heating wall passages it is also possible to effect an increase or decrease of the fall of temperature between the upper end of the heating wall passages (in the so-called twin heating passages the said upper return point also) and the upper side of the coal charge terminating below the gas collecting space of the chamber.

The practical operation of the process according to the invention is preferably carried out in the known horizontal chamber coke ovens for the production of gas and coke in such a way that the levelling bars for levelling the coal charge can be operated at different heights according to the kind of coal charge and that the levelling opening provided in the coking chamber door is of such a size that the coal charge can at any time be levelled at the desired height. As a variation in height of coal charge is contemplated, the levelling bar opening lies more or less underneath the top level for some coal charges, means are provided, according to the invention, for example, removable supporting shields, in order to support the coal in the chamber with high levelling by the levelling bars and to prevent the coal falling out through the widened levelling opening underneath.

The present invention produces a further improvement over the main fundamental idea of the application, in that the gas collecting space of each chamber is joined to neighbouring chambers, at the end opposite the ascension tube connection by means of a tubular connection through which the distillation gases can flow out from one chamber into the next. This arrangement assures that the distillation gases are maintained for a longer time at a definite temperature, which is a great advantage for carrying out definite changes in the hydrocarbons in certain cases.

Figure 1 of the drawings shows a vertical longitudinal section through a horizontal chamber coke oven constructed according to the invention and adapted for chute-operation.

Figure 2 shows a vertical section on the line II—II of Fig. 1.

Figure 3 shows a horizontal section on the line III—III of Fig. 1.

Figure 4 shows a vertical longitudinal section through a horizontal chamber coke oven supplied with preformed pressed coal charges.

Figure 5 merely shows a vertical cross section on the line V—V of Figure 4.

Fig. 6 is a vertical cross-sectional view illustrating the leveler door structure upon an enlarged scale.

In the coke oven illustrated in Fig. 1, horizontal coking chambers 1 alternate in the known manner with walls in which vertical heating passages 2, 3 are provided. A heating passage 2 and a heating passage 3 are connected with each other in pairs at the upper ends through the opening 4 and at the lower end through the opening 5. In this way the known circulating heat passage is formed in the wall. Gas and air for combustion are supplied to the lower end through passages 6, which are connected in the known manner with the regenerators (not shown).

As can be seen from the drawings the upper connecting opening 4 of the heating passages lies at such a height that even after the chamber load has settled down, during or towards the end of the coking the gas collecting chamber space 7 does not lie within reach of the heating passages 2. In Fig. 2, the charge of coal is indicated in the left chamber 8 shortly after filling with coal and in the right chamber 9 after the termination of the coking process. It is quite obvious that there is a strong discharge during the coking process. The amount of vertical shrinkage varies. With some types of coked coal a subsidence in the coked charge of coal of 500 mm. has been recorded. This should be taken into account in the selection of the height of the upper connecting opening 4.

Small vertical passages 10, 11 are provided above each of the heating passages 2, 3 and are controlled by valves 12 which may be reached through closable cover openings 13, by means of positioning bars. The passages 10 and 11 are connected to each other by cross passages 14, forming hair pin heating passages.

The gas collecting chamber space 7, which also serves as a cracking chamber in the oven illustrated, lies in the plane of the upper passage system formed by the passages 10, 11 and 14. It is obvious that by adjusting the valve suitably a sufficient quantity of heating gas can be supplied from the heating passages 2, 3, through the upper passage system to heat the walls of the cracking chamber space 7 as required. If it is a question of an oven for the middle temperature coking of fuels, in which low coking temperatures and therefore, as a rule, comparatively low heating passage temperatures are used, it is advantageous, under the circumstances, to make the dividing wall between the cracking chamber space and the upper heating passage system thinner than the dividing wall between the coking zone of the chamber and the vertical circulatory heating passages 2, 3. In this way the cracking chamber space, in exceptional cases, is well heated to temperatures which lie above that of the coking zone of the chamber wall.

In addition, according to the invention a layer of brickwork 15 separating the cross passage 14 from the heating passages 2, 3, is arranged at such a height that it is impossible for too much heat to flow from the heating passages 2, 3, into the part of the brickwork forming the gas collecting chamber space.

Cooling shafts 16, which also serve as filling openings are provided in the cover in the oven according to Fig. 1 in order to cool the gas collecting chamber space or cracking chamber, and are cut off from the gas collecting chamber space through a comparatively thin walled covering piece 17 and which can be closed on top by means of a cover 17a. By removing the cover 17 it is possible to lower the temperature of the entire cracking chamber space or definite parts of the same to the desired temperature.

An opening for the connection to the ascension pipe 18 is provided at one end of the oven chambers in the usual manner.

The chambers 1, 1a which receive the coal charge to be coked is closed on both faces, during the coking process, by means of doors 19, 19a.

In order to regulate the temperature of the gas collecting chamber space, the charge of coal is levelled out at different levels as indicated by the dotted lines 8a. For this purpose a longitudinal opening 20 is provided in the chamber door 19a, and can be closed by means of a cover 21. The opening permits of the introduction of the levelling bar 22 whose roller support rests on elbow levers 24 which can be rotated by means of a bar 25 and driving gear 26. As can be seen from Fig. 1 it is possible, by means of suitable adjustment of the elbow lever 24, to allow the levelling bar to run at different levels with regard to the oven chamber.

Projections, or pintles, or cut out portions or pintle bearings, 27 in which a supporting shield 28 may be interchangeably fixed are provided in the levelling bar opening 20. These cut out portions 27 are at various levels, so that it is possible to support the upper border of the coal at different levels in comparison to the downwardly directed levelling bar openings.

An opening 29 to which is joined a U-tube 30 is provided in the cover of the oven at the end lying opposite the ascension tube connection. As can be seen from Fig. 2 the U-tube is constructed in such a manner that the openings 29 of two neighbouring chambers are connected with each other. The U-tube 30 is preferably surrounded with a heat insulating material. In addition it is constructed with a cut-off device, preferably with a gland 31.

The path of the distillation gases in the coke oven can be seen from Fig. 3. The ascension pipe 18 of the oven chamber 1 is, for example, closed, whilst the ascension pipe 18a of the adjacent oven chamber 1a remains opened and in addition the U-tube 30 is opened between both coking chambers. The distillation gases then pass out of the chamber 1 through the U-tube 30 into the gas collecting chamber of the oven chamber 1a and from thence through the ascension pipe 18a.

It is generally preferable to supply and discharge the chambers in such a way that the operative condition of both chambers connected to each other always differs by about half the operative coking period. In this way it is always possible to subject the distillation gases to the same heat treatment, whilst for example after filling coal in the chamber 1 (see Fig. 3) the distillation gases flow first of all in the direction of the arrow 32a and after filling coal in the chamber 1a the gases go the opposite way in the direction of the arrow 32, according to a corresponding alteration of the cut-off device of the ascension pipe and of the U-tube 30.

The coke oven illustrated in Figs. 4 and 5 is adapted to be supplied with preformed coal-charge cakes. The heating system of the coking chamber and the cracking chamber is fundamentally the same as in the oven according to Figs. 1 and 2.

The gas collecting chamber space 33 is constructed lower in the oven according to Figs. 4

and 5. An upper cracking chamber **34** is arranged in the cover of the oven, within the gas collecting chamber space, and is connected with the lower gas collecting chamber space through the calibrated openings **35**. The openings **35** lie underneath the cover openings **36** and can if desired be controlled by valve plates **37**.

The ascension pipe **36** is connected to the upper cracking chamber **34** at the middle of the coking chamber, and is lined inside with fire brick and as it were forms an extension of the upper cracking chamber **34**.

Cooling shafts **39** which are arranged in the cover of the oven also serve to cool the upper cracking chamber.

The foregoing has described the application of the invention for horizontal chamber coke ovens with vertical circulatory heating passages. The invention is however not limited to such ovens but can be used with equal advantage in all coking ovens.

Finally the width of the coking chambers between the heating walls may be briefly discussed. In order to obtain a high yield of by-products and to maintain a relatively low coking temperature necessary for the same, it is advantageous to select coking chambers not broader than about 350 mm. This width of chamber is also favourable insofar as it enables middle temperature coking to be carried out economically without this width of chamber unfavourably influencing with regard to the particle size, the high temperature coke, produced if necessary in the same oven.

I wish it to be understood that the invention is disclosed in the foregoing merely by way of example and that it is of course not limited to this example. On the contrary, I expressly reserve the right to carry into effect my invention in any desired manner coming within the scope of the appended claims.

I claim:

1. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein and also being adapted for having a top level for cоked charges therein; each of said heating walls having main combustion flues comprising individual hairpin flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable auxiliary individual hairpin heating flues, individual to the respective main hairpin flues, alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues.

2. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which the main heating passages are vertical combustion flues which terminate at their upper parts sufficiently below the top level for coked charges so that the top layer of the coked charge next to the gas collecting crown-space may be less highly heated than the portion of the coking charge immediately below its top surface whereby at the end of the coking operation the top of the coking charge may be heated to a temperature to form but a thin dark layer rather than an incandescent layer which would crack gases flowing thereover through the gas collecting crown-space.

3. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein and also being adapted for having a top level for coked charges therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers and communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of heating gases from the main heating flues to the separately regulable heating flues and in which the main heating passages are constituted of vertical hairpin flues and in which the separately regulable heating passages and their ports are constituted as supplemental but smaller hairpin flues individual to the main hairpin flues for flow in series of a portion of the heating gas from one of the limbs of the main hairpin flues into one of the smaller hairpin flue limbs and thence from the other limb of the smaller hairpin flue limbs to the other of the limbs of the main hairpin flue.

4. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable

heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which an ascension pipe is provided at one end of each coking chamber for communication with its gas collecting space and a port is provided at the opposite end of each of said coking chambers in communication with the gas collecting space thereof, and means are provided for communicably connecting the latter mentioned port of each of said coking chambers with the similar port of another of said chambers for flow of distillate gas from the crown-space of each coking chamber into and through the crown-space of another coking chamber and thence to the ascension pipe of the latter.

5. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which vertical cooling shafts are provided in the top of each coking chamber for cooling gas flowing through the gas collecting space of each coking chamber, said shafts communicating at their lower parts with the gas collecting space of the coking chamber to provide a relatively cool zone for radiation of heat to the atmosphere from gas flowing through the gas collecting space, said shafts being cut-off from gas flow into the surrounding atmosphere by a comparatively thin cover plate and having at the upper parts a removable cover at the upper extremity of the shaft and exposed to the atmosphere, the thin coverplate being disposed intermediate the upper and lower extremities of the shaft and spaced from the removable cover at the top and the lower terminus of the shaft at the bottom so as to provide a lower heat accumulating pocket chamber in the shaft below the thin cover and an upper radiant-heat retarding-chamber in the shaft above the thin cover and below the removable cover for controlling the cooling of the crown-space gases, the removable cover being removable for exposing the thin cover plate to direct cooling action of the surrounding atmosphere.

6. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers; the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which vertical cooling shafts are provided in the top of each coking chamber for cooling gas flowing through the gas collecting space of each coking chamber, said shafts communicating at their lower parts with the gas collecting space of the coking chamber to provide a relatively cool zone for radiation of heat to the atmosphere from gas flowing through the gas collecting space, said shafts being cut-off from gas flow into the surrounding atmosphere by a comparatively thin cover plate and having at the upper parts a removable cover at the upper extremity of the shaft and exposed to the atmosphere, the thin coverplate being disposed intermediate the upper and lower extremities of the shaft and spaced from the removable cover at the top and the lower terminus of the shaft at the bottom so as to provide a lower heat accumulating pocket chamber in the shaft below the thin cover and an upper radiant-heat retarding-chamber in the shaft above the thin cover and below the removable cover for controlling the cooling of the crown-space gases, the removable cover being provided with adjustable ports for influx of air into contact with the thin cover plate from the surrounding atmosphere to cool the same either through the covering plate or upon removal of the same.

7. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which a ported horizontal partition is provided in the gas collecting space of each of said coking chambers between the upper and lower levels for such gas collecting space so as to provide a lower gas collecting space at a level above the tops of the main heating flues and their waste gas off-flow means but below the bottoms of the separately regulable heating flues, and a separate upper cracking chamber within each of said coking chambers in communication

with the lower gas collecting space and in the same plane as the separately regulable heating passages in the adjoining heating walls.

8. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein and also being adapted for having a top level for coked charges therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers and communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of heating gases from the main heating flues to the separately regulable heating flues and in which a ported horizontal partition is provided in the gas collecting space of each of said coking chambers between the upper and lower levels for such gas collecting space so as to provide a lower gas collecting space and a separate upper cracking chamber within each of said coking chambers in communication with the lower gas collecting space and in the same plane as the separately regulable heating passages in the adjoining heating walls and in which the ported horizontal partition comprises calibrated ports distributed along the length of the partition and provided with dampers and in which an ascension pipe communicates with each of said cracking chambers at one end thereof.

9. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which a ported horizontal partition is provided in the gas collecting space of each of said coking chambers between the upper and lower levels for such gas collecting space so as to provide a lower gas collecting space at a level above the tops of the main heating flues and their waste gas off-flow means but below the bottoms of the separately regulable heating flues, and a separate upper cracking chamber within each of said coking chambers in communication with the lower gas collecting space and in the same plane as the separately regulable heating passages in the adjoining heating walls and in which an ascension pipe is communicably connected at one end of the upper cracking chamber of each of said coking chambers and communicable means are provided for connecting the opposite end of the cracking chambers of each of said coking chambers with the end of the cracking chamber of another of said coking chambers opposite its ascension pipe.

10. In a coking retort oven, in combination: a series of alternate horizontal coking chambers and heating walls therefor arranged side-by-side in a row, each of said coking chambers being adapted for being charged full of coal save for a gas space in the crown-space thereof left for collecting gas above the coal charge therein; each of said heating walls having main combustion flues extending nearly up to but terminating below the aforesaid top level for coked charges and having separately regulable heating flues alongside the aforesaid gas collecting spaces of the adjoining coking chambers, the main heating flues being provided with means at their upper parts for off-flow therefrom at their upper parts of waste gas so as to by-pass the separately regulable heating flues, and the separately regulable heating flues being communicably connected by regulable ports having regulating means therefor with the main heating flues below the separately regulable heating flues for regulable flow of some of the waste heating gases from the main heating flues to the separately regulable heating flues and in which each of said coking chambers is provided with a coking chamber door at one end thereof, each of said doors having at its upper part a leveler door adapted for receiving a cool leveling bar at varying heights above the tops of the main heating flues and their waste gas off-flow means for varying the height to which the coal charge may be leveled, and each of said leveler doors having adjustable means for forming an adjustable auxiliary bottom level for the leveler door for supporting the leveled coal at said leveler door in various heights above the normal bottom of the leveler door, said means being displaceable in the leveler door by the leveler bar upon reciprocation of the leveler bar for leveling coal at levels at and below the normal bottom of the leveler door.

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