J. G. KROS.

REGENERATIVE COKE OVEN.

APPLICATION FILED FEB. 11, 1910.

1,015,964.

Patented Jan. 30, 1912

Fig. 1.

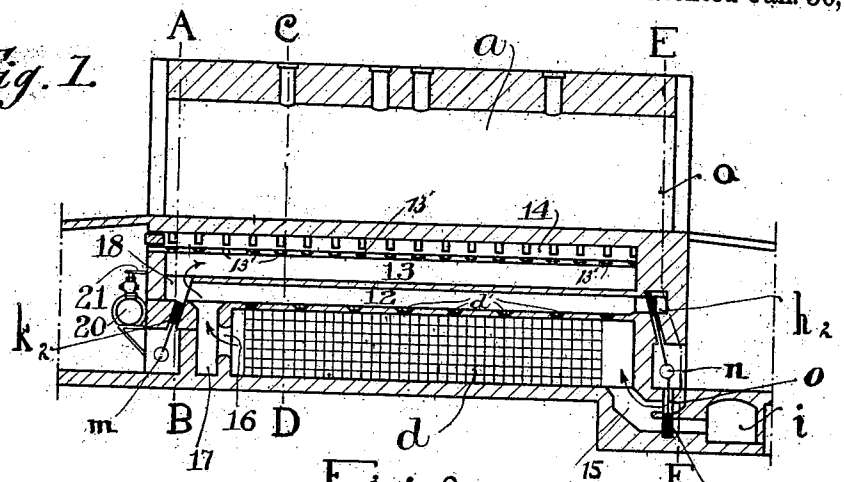



Fig. 2.

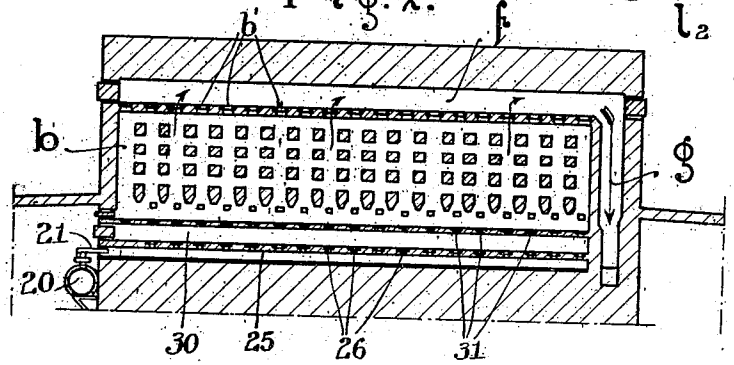
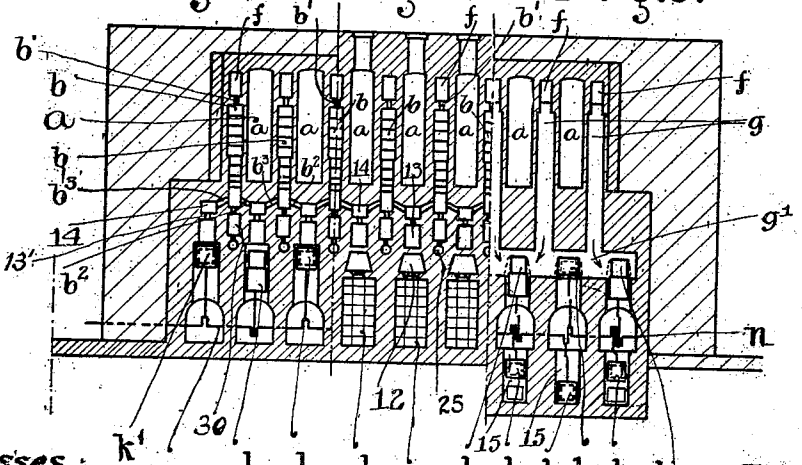



Fig. 3. Fig. 4. Fig. 5.

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# UNITED STATES PATENT OFFICE.

JEAN GERARD KROS, OF ESSEN-RUHR, GERMANY.

## REGENERATIVE COKE-OVEN.

1,015,964. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed February 11, 1910. Serial No. 543,235.

*To all whom it may concern:*

Be it known that I, JEAN GERARD KROS, a subject of the Dutch Queen, and residing at Essen-Ruhr, Germany, have invented certain new and useful Improvements in Regenerative Coke-Ovens, of which the following is a specification.

This invention relates to coke ovens of the regenerative type, in which the waste gases are utilized to heat the air supplied for fuel combustion.

The objects of the invention are simplicity of construction, economy of heat and saving in labor of manipulation.

One illustrative embodiment of the invention is represented by way of example in the acompanying drawing, wherein:—

Figure 1 is a longitudinal section through a retort or coking chamber; and Fig. 2 is a like section through a heating wall of the same, whereas Fig. 3 is a cross-section on the plane A—B, Fig. 4 a cross-section on the plane C—D, and Fig. 5 a cross-section on the plane E—F in Fig. 1.

Figs. 3, 4, 5 taken together represent a longitudinal vertical section on different vertical planes of a bench or battery of regenerative coke ovens having a series of seven coking chambers and a series of nine regenerators operative in connection with said coking chambers.

The same reference characters indicate corresponding parts in the different figures.

The drawings represent a bench or battery of coke ovens embodying this invention. This bench contains seven coking chambers or retorts *a* in parallel relation, inclosed and separated by heating side walls as usual in this class of ovens. The heating side walls are provided with combustion chambers *b* and with horizontal flues *f* above said combustion chambers, each flue being connected with the combustion chamber below it by openings *b'* in the top of the said chamber. Descending flues *g* connect the flues *f* with horizontal flues *g'* which extend along the bench at one side thereof.

A single regenerator is disposed beneath each coking chamber *a* and connected by lateral channels extending in opposite directions to the combustion chambers of the opposite sidewalls of said coking chamber. This regenerator has a regenerating chamber *d* through which the waste gases from the various combustion chambers *b* and *c* pass in one direction for heating up the regenerator and through which air for the support of combustion is passed in the other direction for heating preparatory to feeding it to said combustion chambers. Alternate regenerators are being heated by the combustion gases while other alternate regenerators are heating the air supply, and the connections are such that the coking operation goes on continuously in the different coking chambers and without change in the direction of draft through the combustion chambers. A horizontal waste gas flue 12 extends along the top of the regenerating chamber and is connected at one end with the exhaust flues of the combustion chambers and at the other end with such regenerating chamber. A horizontal hot air distributing flue 13 is disposed over the heating flue 12 and connected at one end with the regenerating chamber and provided with a series of exit openings 13' along its top. A hot air feed chamber 14 is disposed over said distributing flue 13 and underneath the coking chamber. The exit openings 13' extend from the top of the distributing flue 13 into the bottom of the feed chamber 14. This feed chamber 14 is provided with lateral channels $b^2$ connecting with the combustion chamber *b* in the heating wall to the left and with lateral channels $b^3$ connecting the corresponding combustion chamber *c* in the heating wall at the right. The openings 13' into the feed chamber 14 are disposed at intervals preferably opposite the spaces between the lateral exhaust channels $b^2$ and $b^3$. This arrangement of the flues and their connecting channels tends to an even feeding of the heated air to the several combustion chambers, and secures a continuous operation without reversal of draft. A channel 15 connects one end of the regenerating chamber *d* with an outlet flue *i* leading to the chimney and a channel *o*, a branch of the channel 15, serves as an air inlet for said chamber. A valve $l^2$, serves to open the channel *o* and close the channel 15 or the reverse. The regenerating chamber *d* is in communication at its opposite end through an opening 16 and vertical passage 17 with the horizontal flue 12 and through the end of said flue and the opening 18 with the horizontal flue 13 above said flue 12.

The regenerative chamber *d* is provided at intervals along its top with covered openings *d'* which permit access for cleaning. The horizontal flue 12 connects at one end

with the horizontal flue $g'$ which serves as an inlet for hot gases for heating the regenerating chamber. The valve $h^2$ controls communication between said flues $g'$ and 12. This valve is operated in conjunction with the valve $l^2$. The valve $k^2$ serves to control communication at the opposite end of the flue 12 with the flue 13. As shown in Fig. 1 the valves $k^2$, $l^2$ and $h^2$ are arranged for utilizing the regenerating chamber which has been previously omitted, for heating the fresh air admitted through the inlet $o$, the current thereof taking the direction of the arrows in the third figure. When this regenerating chamber is to be heated the valve $h^2$ is opened, the valve $l^2$ is shifted to close the inlet $o^2$ and to open the channels 15 and the valve $k^2$ closes the communication between the horizontal flues 12 and 13. In such case the products of combustion from the heating walls pass along the flue $f$ at the top thereof, thence downward through the vertical flue $g$, thence into the horizontal channel $g'$, thence through the valves $h^2$ into the horizontal flue 12, thence downward through the vertical channel 17 and opening 16 into the regenerating chamber $d$. In passing through this chamber $d$ the gases heat said chamber to the proper temperature and pass out through the channel 15 to the large flue $i$ leading to the chimney.

The dampers $k'$ and $k^3$ correspond with the dampers $k^2$ above described, the dampers $h'$ and $h^3$ correspond with the dampers $h^2$ above described; and the dampers $l'$ and $l^3$ correspond with the damper $l^2$ above described. The dampers $k'$, $k^2$ and $k^3$ are preferably connected with a shaft $m$ at one end of the bench, and the dampers $h'$, $h^2$, $h^3$, $l^2$ and $l^3$ are preferably connected with a shaft $n$ at the opposite end of the bench, these shafts being located longitudinally of the bench but transversely of the furnaces therein and when operative to open and close simultaneously the valves connected with them respectively. The regenerators at opposite ends of the bench have connections with one coking chamber only as shown in the aggregated Figs. 3–5. The gas may be supplied through a pipe 20 having jets 21 entering channels 25 having openings 26 into channels 30 having openings 31 into the combustion chamber $d$. This construction secures a continuous passage of the heating gases through the heating walls in the same direction avoiding reversal of the drafts and complexity of regenerators.

I claim as my invention:

1. In a coking oven, the combination of coking chambers, combustion chambers in the sidewalls thereof, horizontal flues in said sidewalls above said combustion chambers and connected therewith, single regenerators disposed beneath said coking chambers respectively, each comprising a regenerative chamber having an air inlet at one end, a horizontal waste gas flue above said regenerative chamber and connectible at one end with said combustion chamber flues and at the other end with said regenerative chamber, a horizontal hot air feed flue disposed above said regenerative chamber and connectible at one end therewith and means connecting said hot air feed flue with the combustion chambers in opposite sidewalls of a coking chamber, a valve mechanism for alternately shifting said regenerators into connection with said waste gas flues and said air inlet, and means for supplying gas to said combustion chambers.

2. In a coking oven, the combination of coking chambers, combustion chambers in the sidewalls thereof, horizontal flues in said sidewalls above said combustion chambers and connected therewith, single regenerators disposed beneath said coking chambers respectively, each comprising a regenerative chamber having an air inlet at one end, a horizontal waste gas flue above said regenerative chamber and connectible at one end with said combustion chamber flues and at the other end with said regenerative chamber, a horizontal hot air feed flue disposed above said regenerative chamber and connectible at one end therewith and provided with openings in its top and a horizontal distributing chamber disposed above said hot air feed flue and connected therewith by the top openings thereof and provided with lateral channels connected with the combustion chambers of opposite sidewalls of a coking chamber, a valve mechanism for alternately shifting said regenerators into connection with said waste gas flues and said air inlet, and means for supplying gas to said combustion chambers.

3. In a coking oven, the combination of coking chambers, combustion chambers in the sidewalls thereof, horizontal flues in said sidewalls above said combustion chambers and connected therewith, single regenerators disposed beneath said coking chambers respectively, each comprising a regenerative chamber, a horizontal waste gas flue above said regenerative chamber and connectible at one end with said combustion chamber flues and at the other end with said regenerative chamber, a vertical channel connecting one end of said regenerative chamber with said waste gas flue, a horizontal hot air feed flue disposed above said regenerative chamber and connectible at one end therewith and provided with openings in its top, a horizontal distributing chamber disposed above said hot air feed flue and connected therewith by the top openings thereof and provided with lateral channels connected with the combustion chambers of opposite sidewalls of a coking chamber, an air inlet

connected with said regenerative chamber, a chimney outlet also connected with said regenerative chamber, a valve mechanism for alternately shifting said regenerators into connection with said waste gas flues and said air inlet, and means for supplying gas to said combustion chambers.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JEAN GERARD KROS.

Witnesses:
ADOLF PIEPER,
WERNER EPER.