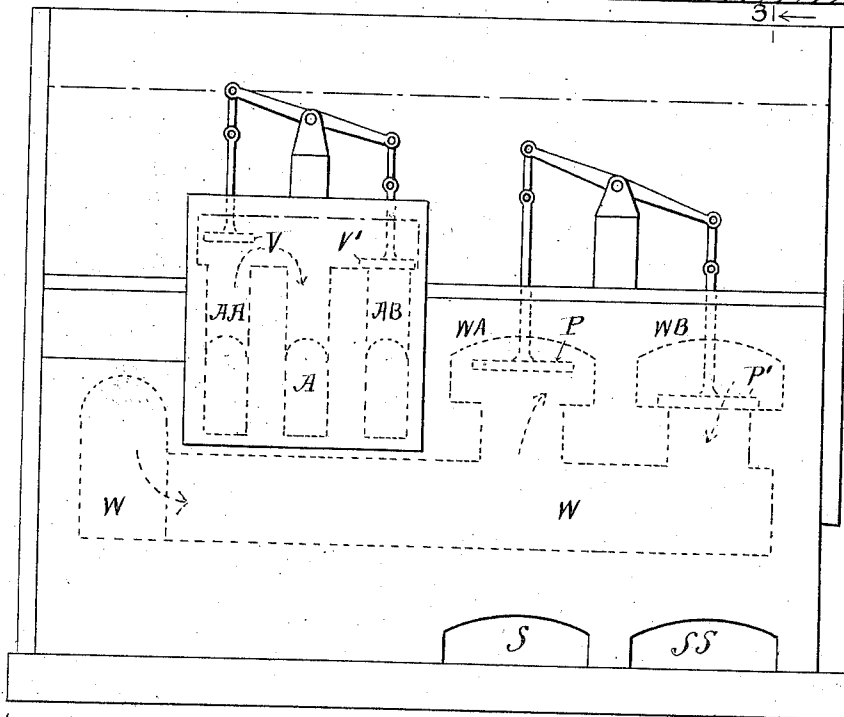
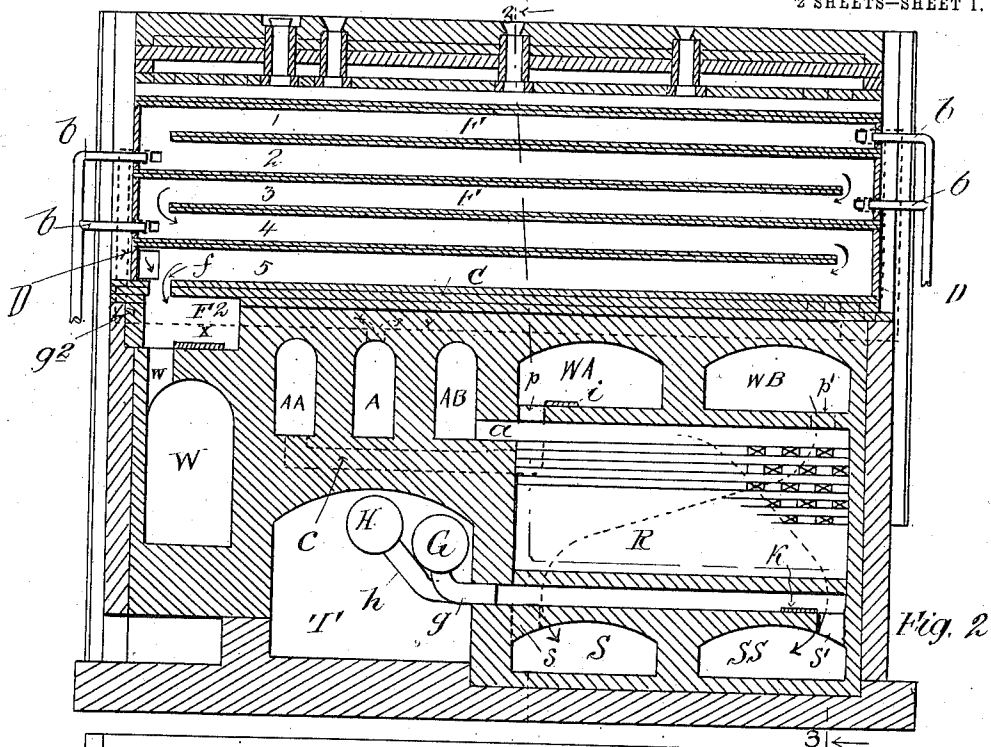


E. W. KING.
RETORT COKE OVEN SYSTEM.
APPLICATION FILED JAN. 12, 1910.

1,038,762.

Patented Sept. 17, 1912.

2 SHEETS—SHEET 1.



Witnesses:
L. W. Benjamin
William J. Kingdon

Fig. 1, Eugene W. King Inventor

By his Attorney
Clarkson A. Collins

1,038,762.

Patented Sept. 17, 1912

2 SHEETS—SHEET 2.

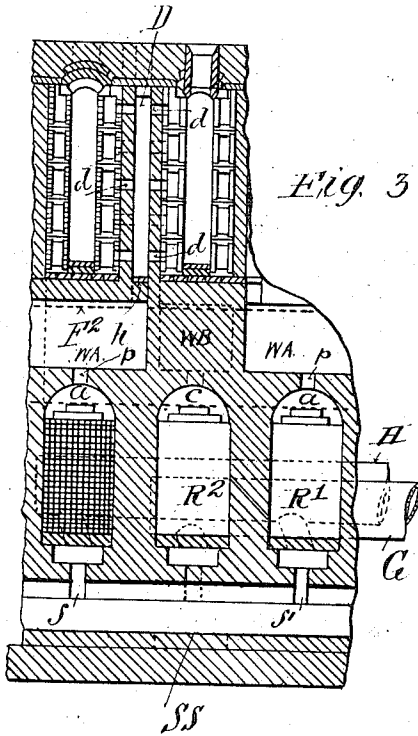


Fig. 3

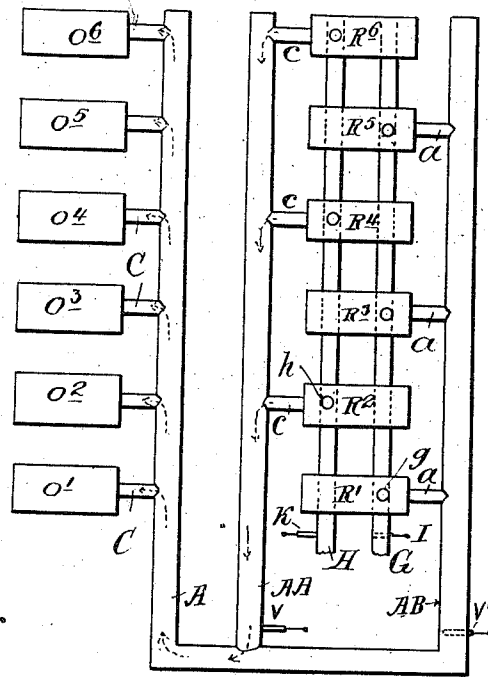


Fig. 4

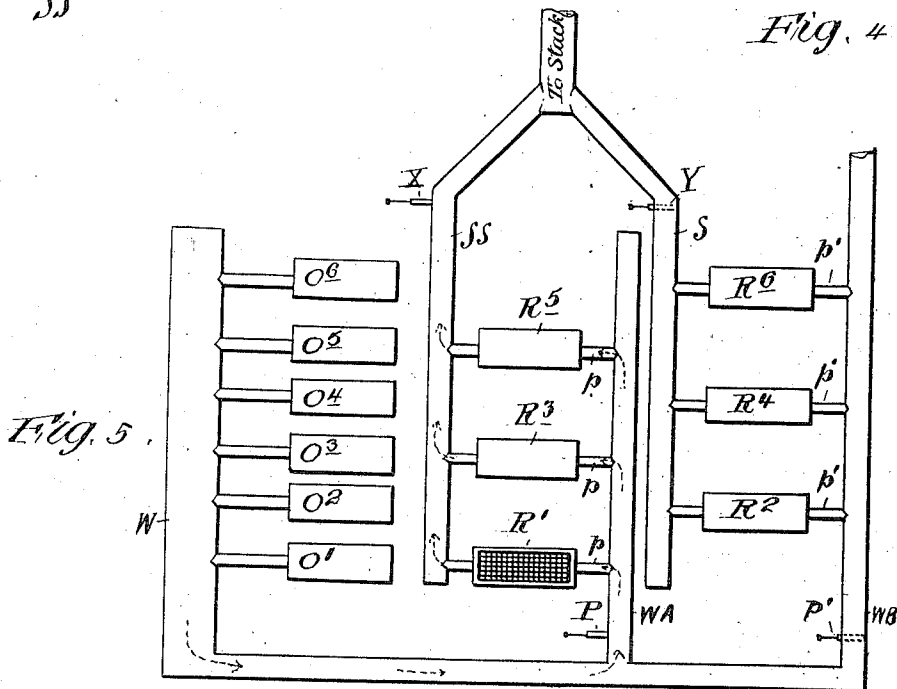


Fig. 5

Witnesses:
Benjamin
William J. Kindgen

Eugene N. King Inventor

By his Attorney
Clarkson A. Collins

UNITED STATES PATENT OFFICE.

EUGENE W. KING, OF SYRACUSE, NEW YORK, ASSIGNOR TO SEMET-SOLVAY COMPANY,
OF SYRACUSE, NEW YORK, A CORPORATION OF PENNSYLVANIA.

RETORT-COKE-OVEN SYSTEM.

1,038,762.

Specification of Letters Patent.

Patented Sept. 17, 1912.

Application filed January 12, 1910. Serial No. 537,619.

To all whom it may concern:

Be it known that I, EUGENE W. KING, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Retort-Coke-Oven Systems, of which the following is a specification.

My invention relates particularly to retort coke ovens which are heated from horizontally disposed flues extending the length of the oven and connected in series, so that the gases of combustion from any burner traverse the subsequent successive flues before passing out of the flue system.

Heretofore it has been usual to preheat the air required for the combustion of the gas in such a system of flues by means of recuperators in which the incoming air and the outgoing gases of combustion flow at the same time through adjacent passages, and always in one direction. Hence the gas current in the heating flues flows always in one direction, without reversal, which adds largely to the efficiency of such ovens. Regenerators, through which the incoming air and the outgoing gases of combustion flow alternately in opposite directions, are also employed to preheat the air. These have the advantage of preheating the air to a high degree, but as usually employed involve the necessity of reversing the direction of flow of the current of gases through the heating flues with each reversal through the regenerators, thus distributing the equilibrium of the heat as applied to the ovens.

The object of my present improvements is to provide such a combination of series heating flues with regenerators that the reversal of the flow of air and gas through the regenerators may be effected without changing the direction of flow of the gas current through the heating flues, thus uniting the advantages of the unreversed gaseous current and the high heating efficiency of the regenerators.

Another object of my improvements is to provide such an arrangement of parts as shall effect the foregoing result by the use of as few valves as possible, thus preventing leakage and securing simplicity of construction and economy of labor.

My invention will be best understood by reference to the accompanying drawings, illustrating an embodiment thereof, Figure

1 of which shows an end elevation of a block of ovens, Fig. 2 shows a longitudinal section through the heating flues, Fig. 3 a cross section on line 3—3, Fig. 2; Fig. 4 is a diagrammatic representation of the air supply system, and Fig. 5 a similar representation of the waste gas system.

Referring to the drawings, F, F indicate the horizontal heating flues on one side of one of a block of ovens, O, O, each one of which is heated from a similar system of flues on each side thereof, by means of gas burners, *b, b*. Below and parallel to each oven is located a regenerator, R, built of checkered brick work in any usual or suitable manner. Extending along below and at right angles to the ovens is the main waste gas flue, W, into which pass the waste gases from the several sets of heating flues, F, F, by an opening, *f*, from the bottom flue into a pocket, *F*², under each oven, and thence by a passage, *w*, into flue, W. The main waste gas flue, W, is extended across the end of the block of ovens, as shown in Fig. 1, and is connected through valve controlled ports indicated at P, P', with auxiliary waste gas flues, WA, and WB, which extend along under the ovens and immediately above the regenerators, R. One of the said auxiliary waste gas flues, as WA, is connected to one-half the regenerators, R, as the odd numbered regenerators, as shown in Fig. 5, by passages, *p, p*, opening directly into the open space above each regenerator and the other auxiliary waste gas flue, WB, is connected in the same manner by passages, *p', p'*, with the remainder of the regenerators.

The air for the combustion of the gas at the burners, *b, b*, enters primarily through flues, G, H, controlled by valves, I, K. One of these flues, as G, is connected by branch pipes, *g, g*, with the open spaces under half the regenerators; as the odd numbered regenerators, Fig. 4, and the other, H, by branch pipes, *h*, with the remaining alternate regenerators. Preferably the air supply pipes, G, H, are inclosed within a tunnel, T. If desired, the pipes, G, H, may be omitted and the air supplied to the regenerators, R, directly from the tunnel, T, through valve controlled passages therefrom, so arranged that when the passages leading to half the regenerators are open, those leading to the other half are closed. The air

from the flues, G, H, after passing through the regenerators enters one or the other of two auxiliary hot air flues, AA, and AB, one of which AB, is connected by passages, *a*, with the open space above one-half the regenerators, as the odd numbered regenerators, Fig. 4, and the other, AA, is connected by passages, *c*, with the open spaces above the other, as the even numbered regenerators.

The auxiliary hot air flues, AA, and AB, are arranged to be connected alternately through ports controlled by valves, V, V', with a main hot air flue, A, which extends along under the ovens. The main hot air flue, A, has a permanent open connection with a passage, *c*, under each oven, from which at each end vertical passages, D, D, in the ends of the division walls, lead by branches, *d*, *d*, to the air ports opening into the heating flues on each side of the oven.

The manner of operation is as follows: Assuming that the odd numbered regenerators are being heated by the waste gases of combustion, and that the stored up heat in the even numbered regenerators is being utilized to preheat the incoming air, the valves, P, K and V are open, while the valves P', I and V' are closed. The course of the gases is then as follows: The waste gases of combustion pass from the heating flues of each of the ovens in the block into the main waste gas flue, W, and thence through open valve, P, to auxiliary waste gas flue, WA, whence they pass downward to and through each of the odd numbered regenerators, and thence through the discharge waste gas flue, SS, through reversing valve, X, to the stack. At the same time air is entering through the open air supply pipe, H, whence it flows to and upwardly through each of the even numbered regenerators, thence to the auxiliary hot air flue, AA, and from this through valve, V, to main hot air flue, A, and thence by flues C and D, and branches, *d*, *d*, to the heating flues. When the bricks of the odd numbered regenerators are heated, and those of the even numbered regenerators are cooled to an extent that makes the reversing of the regenerators desirable, the valves, P, K, V, and X, are closed, and the valves P', I, V' and Y are opened. The waste gases of combustion then flow through from the main waste gas flue, W, to auxiliary waste gas flue, WB, and thence through the even numbered regenerators, and out through the discharge flue, S, by reversing valve, Y, to the stack. At the same time air is passing from air supply pipe, G, to the odd numbered regenerators, and from these to auxiliary hot air flue, AB, and from this to main hot air flue, A, and to the heating flues, as before.

From the foregoing it will be understood that whatever may be the direction of the gaseous flow through the several regenera-

tors, the heated air always flows to the heating flues, F, F, of the ovens from the main hot air flue, A, and in one direction only; the waste gases of combustion also flow from the heating flues in a constant direction to the main waste gas flue, W. Thus no reversal of the gas current through the heating flues takes place, but the reversed current through each regenerator is, so to say, rendered constant in direction in its relation to the heating flues by the operation of the auxiliary flues, WA, WB, and AA, AB, and the controlling valves.

The several flues for the waste gases and air may extend the entire length of the block of ovens, in which case there will be one set of controlling valves operated from one end of the block; or the flues may run half the length of the block, there being a corresponding set under each half of the block, in which case there will be two sets of valves operated from each end of the block. In either case the number of valves is small, thus reducing to a minimum the amount of valve leakage and the labor required for their manipulation.

In addition to the advantages incident to providing a continuous flow through the heating flues, and effecting this by means of a simple and easily operated valve system, my invention requires the construction of but one regenerator (or less) for each oven, thus enabling the regenerators to be built of efficient size, whereby less frequent reversals of the regenerators are required. Moreover, since the heated air from half the regenerators is fed in common to the heating flues of all the ovens, and the other half of the regenerators are at the same time heated by the mingled waste gases from all the ovens, a uniformity of operation throughout the block is effected both in the supply of air to the heating flues and in the heating of the regenerators, the advantage of which will be appreciated by those skilled in the art.

In case it is desired at any time to cut any oven out of operation, as for repairs, the corresponding regenerator may be left in operation, being heated by waste gases from and assisting in supplying preheated air to the heating flues of the remaining ovens. Also any individual regenerator may be cut out and the corresponding oven left to be operated, if desired, in connection with the remaining regenerators.

What I claim as new and desire to secure by Letters Patent is:

1. In a coke oven system the combination of a series of ovens having heating flues on the sides thereof, a single regenerator located under each oven, air supply pipes connected the one with one-half the regenerators and the other with the remainder thereof, a main hot air flue connected with the heating flues of all the ovens, two auxiliary

hot air flues arranged to be connected alternately with said main hot air flue and having permanent connections the one with one-half the regenerators and the other with the remainder thereof, a main waste gas flue connected with the heating flues of all the ovens, and two auxiliary waste gas flues arranged to be alternately connected with said main gas flue and having permanent connections the one with one-half of the regenerators and the other with the remainder thereof.

2. In a coke oven system the combination of a series of coke ovens having heating flues on the sides thereof, a regenerator located under each oven, air supply pipes arranged to supply air alternately to a portion of said regenerators, a main hot air flue connected with the heating flues of all the ovens, two auxiliary hot air flues arranged

to be alternately connected with said main hot air flue and having permanent connections the one with a portion of the regenerators and the other with the remainder thereof, a main waste gas flue connected with the heating flues of all the ovens, two auxiliary waste gas flues arranged to be alternately connected with said main gas flue and having permanent connections the one with a portion of the regenerators and the other with the remainder thereof, and discharge waste gas passages from the regenerators.

In testimony whereof, I have hereunto subscribed my name, this 8th day of January, A. D. 1910.

EUGENE W. KING.

Witnesses:

ELIPHALET AUSTIN BARNES,
AZZIE WALTERS FLINN.