

S. B. SHELDON.

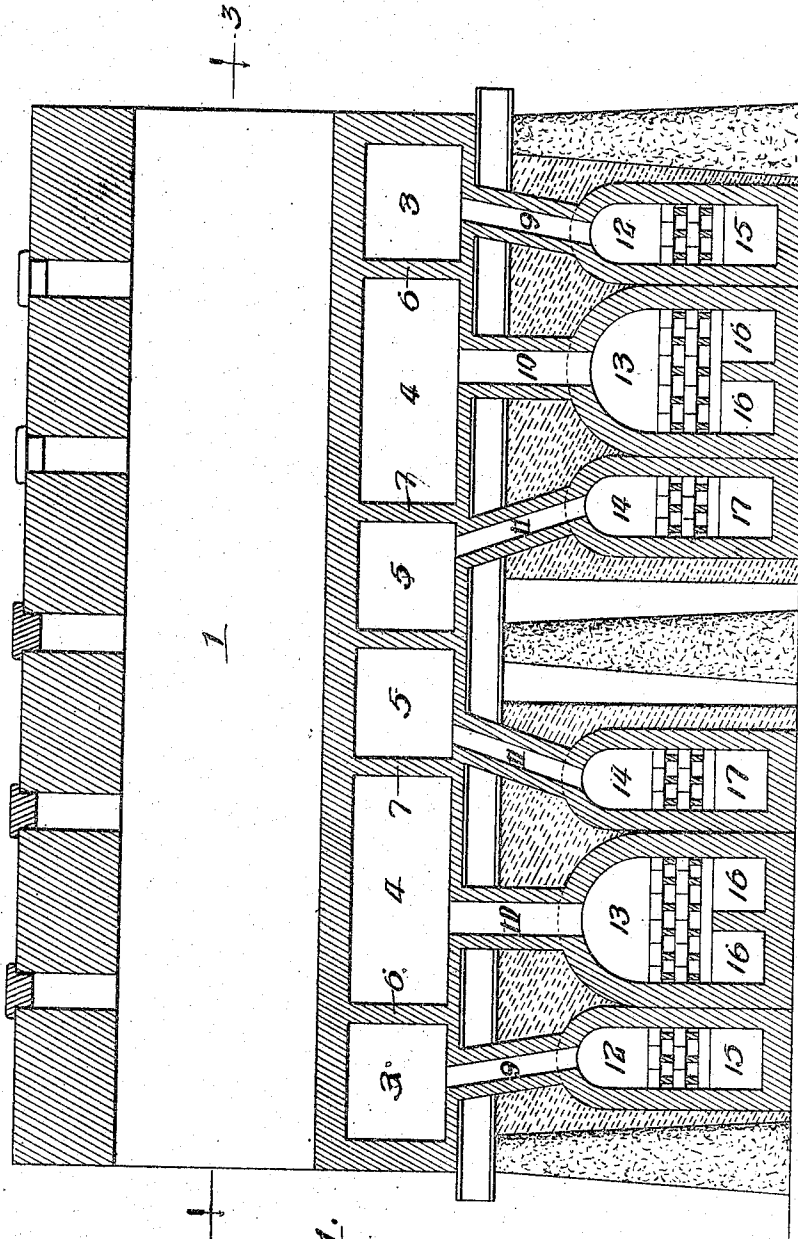
COOKING OVEN.

APPLICATION FILED MAY 7, 1908.

933,349.

Patented Sept. 7, 1909.

4 SHEETS—SHEET 1.



Witnesses:
P. H. Alfreds
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Fig. 1.

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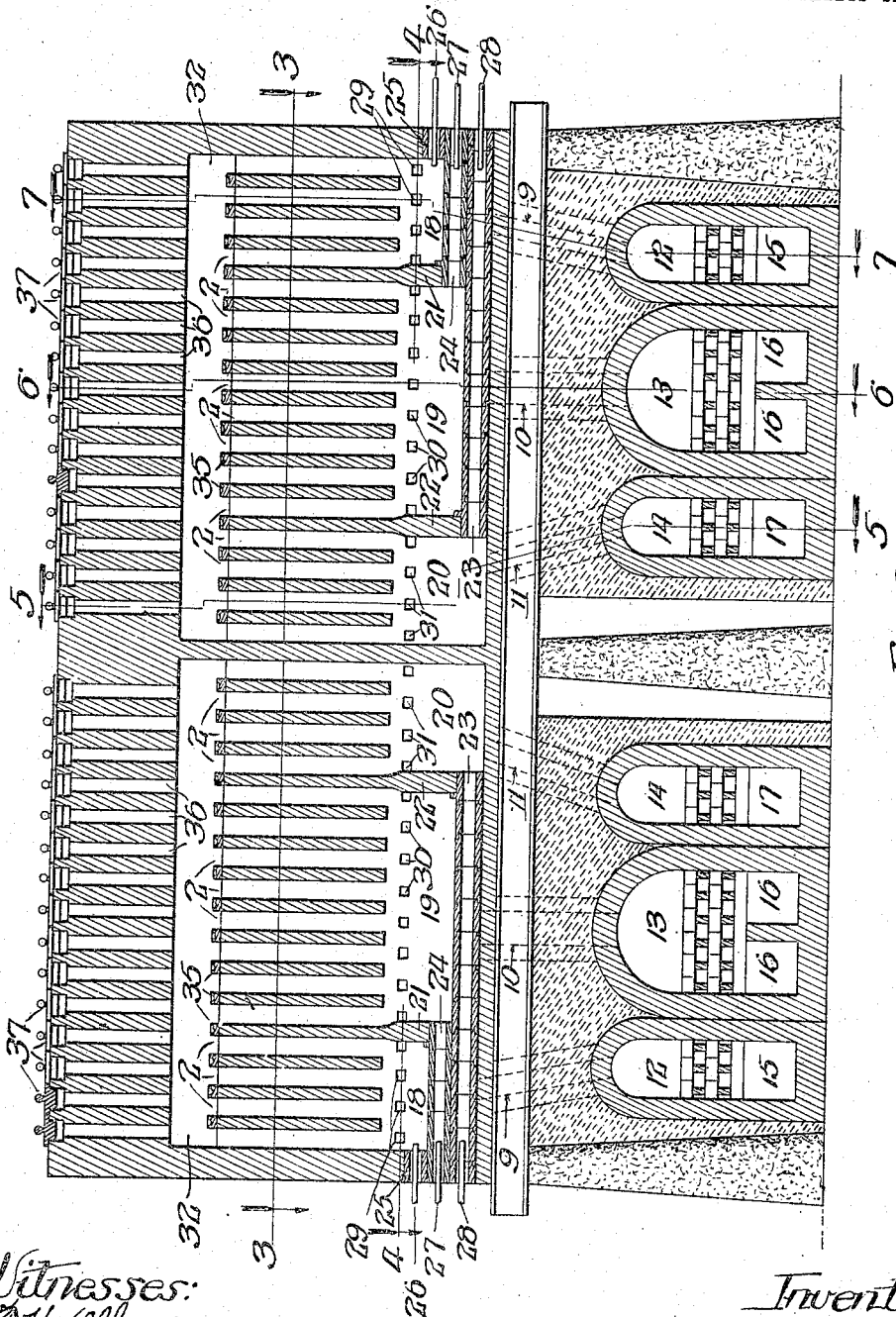


Fig. 2.

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 4 SHEETS—SHEET 3.

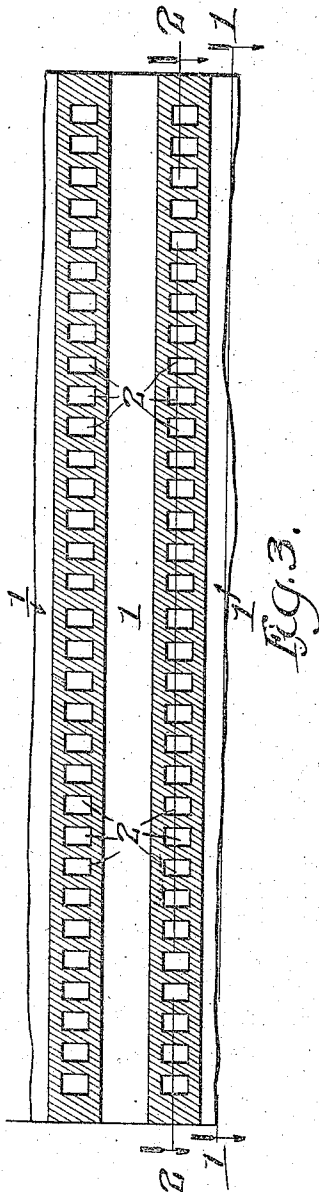


Fig. 3.

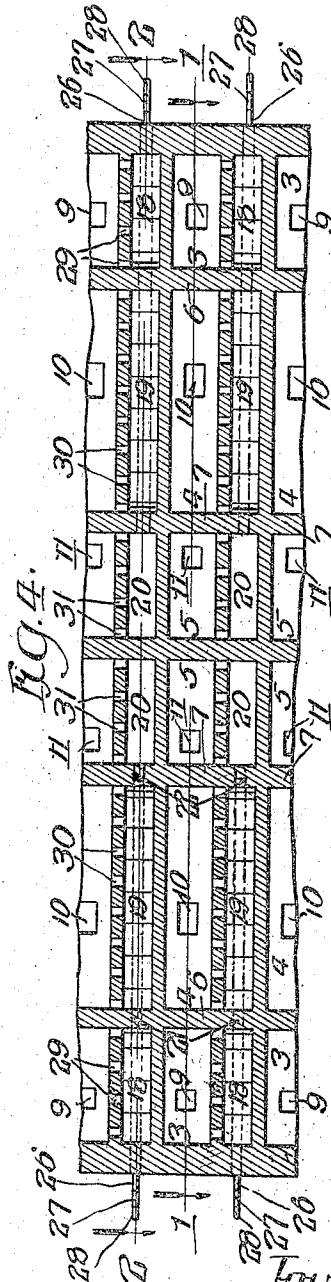


Fig. 4.

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4 SHEETS—SHEET 4.

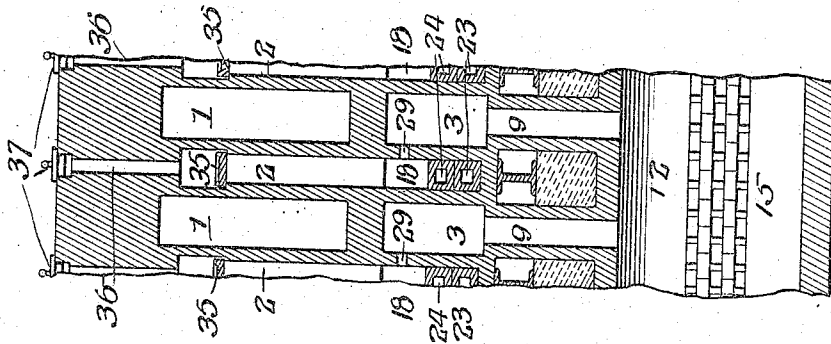


Fig. 7.

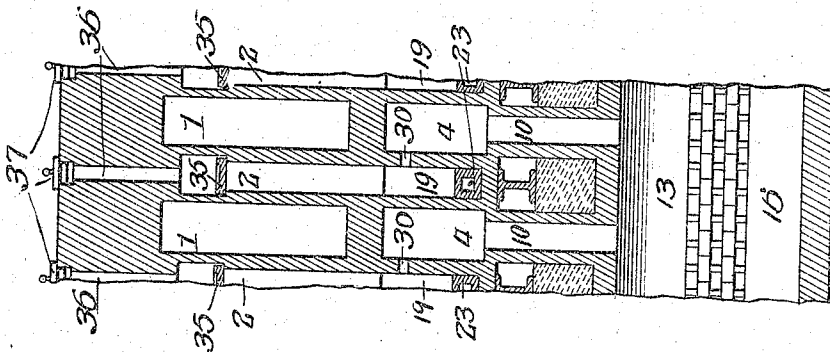


Fig. 6.

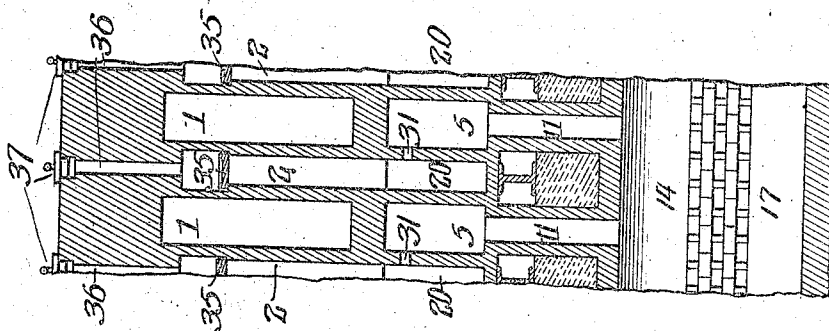


Fig. 5.

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UNITED STATES PATENT OFFICE.

SAMUEL BERTRAM SHELDON, OF BUFFALO, NEW YORK.

COKING-OVEN.

933,349.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed May 7, 1908. Serial No. 431,307.

To all whom it may concern:

Be it known that I, SAMUEL B. SHELDON, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Coking-Ovens; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to improvements in ovens employed for coking or distilling coal for the manufacture of coke and the production of gas, and more particularly to a novel construction and arrangement of the combustion chambers, flues and regenerators, in coking ovens of the type known as an "Otto Hoffman" oven, in which the coal, during the coking operation, is contained within a closed coking chamber and is subjected to the action of the heat transmitted thereto from upright flues in the walls of said chamber and which embraces a plurality of regenerators, by means of which the air furnished to effect combustion of the fuel used for heating the oven is heated preparatory to its introduction into the passages in which combustion of the fuel takes place.

The invention consists in the matters hereinafter described and pointed out in the appended claims.

My invention may be more readily understood by reference to the accompanying drawings, in which,—

Figure 1 is a view in longitudinal vertical cross-section of an apparatus embodying my invention, taken on line 1—1 of Fig. 3. Fig. 2 is a like section taken on a plane passing through the heating flues of the oven, on line 2—2 of Fig. 3. Fig. 3 is a horizontal section taken on line 3—3 of Figs. 1 and 2. Fig. 4 is a horizontal section taken on line 4—4 of Figs. 1 and 2. Fig. 5 is a cross section taken on line 5—5 of Fig. 2. Fig. 6 is a cross section taken on line 6—6 of Fig. 2. Fig. 7 is a cross section taken on line 7—7 of Fig. 2.

The coking oven illustrated in the accompanying drawings, as a whole, consists in effect of two sections arranged end to end, each of which is provided with complete heating means separate from the heating means of the other section so that

the temperature maintained in the two sections may be independently or separately controlled. The said coking oven is provided with a series of coking chambers 1, 1, 1 which are arranged side by side, as common in the construction of "Otto Hoffman" ovens and which extend continuously from end to end of the oven, through both sections thereof. In the walls of the oven which separate the coking chambers from each other are formed vertical flues or heating passages 2, 2, 2 arranged generally in the same manner as the heating flues of such "Otto Hoffman" ovens.

The means for heating the two sections of each coking chamber being alike, the parts or passages for the two sections are numbered alike in the drawings and the same description of said heating means will apply to both sections.

Beneath each section of each coking chamber are located three horizontally, longitudinal passages 3, 4 and 5 arranged in line with each other, or end to end, and separated from one another by vertical, transverse partitions 6 and 7; the combined lengths of the passages 3 and 5 being equal to the length of the passage 4 which is located between the said passages 3 and 5. Connected with the said passages 3, 4 and 5 by means of flues 9, 10 and 11 are regenerators 12, 13 and 14, the middle regenerator 13 being of twice the size or capacity as the regenerators 12 and 14. Said regenerators are located below and extend transversely of the coking chamber and are provided with the usual checker work. Connected with the lower parts of the regenerators are passages or flues 15, 16 and 17 which are adapted to be connected either with a stack or chimney or with the air inlet passage, as is common in coking ovens having a plurality of regenerators, as heretofore constructed.

Between the longitudinal chambers or passages 3, 4 and 5 associated with two adjacent coking chambers are located three horizontal, elongated, longitudinally arranged combustion chambers 18, 19 and 20 in which is burned the gaseous fuel used for heating the oven. Said chambers 18, 19 and 20 are arranged in end to end relation and communicate with the lower ends of the upright flues or passages 2, 2, 2. Said combustion chambers are separated from one another by vertical partition walls 21 and 22 which are

joined to the lower ends of two of the partitions between the flues 2, 2, 2, which latter are thereby divided into three sets or groups, corresponding with the three chambers 18, 19 and 20; the flues constituting each group being connected at their lower ends with one of said chambers. Horizontal pipes 23 and 24 extend from the chambers 19 and 20 to the external end wall of the oven, said pipes being made of interlocking tiles or tubes of refractory material. As illustrated, the tiles constituting the pipe 23 rest on the bottoms of the chambers 18 and 19, and the tiles forming the pipe 24 rest on the top of the pipe 23 in the part of the latter which is within the chamber 18. The pipes 23 and 24 open through said end wall, and in the latter above the pipe 24 is a short pipe 25. Gaseous fuel is supplied by pipes 26, 27 and 28 which are connected with the outer ends of the pipes 23, 24 and 25. The passages 3, 4 and 5 are connected, respectively, with the combustion chambers 18, 19 and 20 by means of holes or apertures 29, 30 and 31 in the longitudinal partition walls between said chambers and passages. Air for supporting combustion is supplied to the chambers 18, 19 and 20 from the regenerators, the same entering said chambers 18, 19 and 20 from the passages 3, 4 and 5 through the apertures 29, 30 and 31. The walls separating said passages 2, 2, 2 support loosely at their upper ends blocks or bricks 35, 35, 35 of fire-clay or like material which are adapted to be shifted on the partitions to partially close the said passages 2, 2, 2 and to thereby constitute valves for controlling the passage of combustion products therethrough. For effecting the shifting of the said bricks 35, 35, 35 there are provided in the top wall of the oven, passages 36, 36, 36 through which a poker or like implement can be inserted for moving the said bricks 35, 35, 35. The upper ends of said passages 36, 36, 36 are slightly enlarged to accommodate cylindrical plugs 37, 37, 37 which are inserted to close the said passages and are provided with a lift ring or other suitable means whereby they may be readily removed from the said passages for the insertion of the poker or other implement therethrough.

The operation of the regenerators and associated passages is as follows: Assuming the larger regenerator 13 to be connected with the air inlet and the two smaller regenerators 12 and 14 with the stack or chimney flue, air entering the flues 16, 16 of said regenerator 13 passes upwardly through the checker work therein which has been previously heated, and such air in a heated condition passes through the passage 10 to the horizontal passage 4 from which, through the openings 30, it enters the chamber 19. Fuel gas delivered to said chamber 19 from the pipe 24 is burned therein and the prod-

ucts of combustion rise through the vertical passages 2, 2 above the chamber 19 and passing horizontally to the right and left along the passage 32 descends through the flues 2, 2 above the chambers 18 and 20 into the latter chambers from whence they pass through the openings 29 and 31 to the horizontal passages 3 and 5 and thence through the flues 9 and 11 to the regenerators 12 and 14 and out through the flues 15 and 17 to the stack. After the checker work in the regenerator 13 has become cooled and that in the regenerators 12 and 14 heated by the passage therethrough of the outgoing products of combustion, the regenerator 13 is connected with the stack and the regenerators 12 and 14 with the air supply duct. Combustion then takes place in the chambers 18 and 20 and the products of combustion pass from said chambers through the flues 2, 2 into the chamber 19 and thence out through the horizontal passage 4 and the regenerator 13 to the stack.

An oven made as described, with three regenerators and with the upright heating flues 2, 2, 2, divided into three groups, of which the central or intermediate group contains twice as many flues as the end groups, has the advantage of affording a more equal or uniform distribution of heat throughout the length of the coking chambers than is possible in an oven of the "Otto Hoffman" type, as heretofore constructed, in which two regenerators of equal capacity and two groups only of upright flues are employed. In such an oven of the "Otto Hoffman" type the heated products of combustion passing upwardly through one set of upright flues into the horizontal passages at the top of the same, tends to take the shortest possible path in its course from one of the regenerators to the other and are, therefore, able to pass upwardly and downwardly through the upright flues nearest the partition which divides the two sets of flues so that the end portions of the coking chamber are liable to receive little heat. This inequality in heating is liable to be especially evident when a strong wind is blowing against one end of the oven, with the effect of cooling the same, inasmuch as the rising heated products of combustion will pass more readily through the more highly heated flues located midway between the ends of the oven, than through the cooler flues at either end thereof. In an oven embodying my invention, the heated products of combustion, either when rising through the central group, or through the end groups of flues, will be forced to the end portions of the sections of the oven, because necessarily confined to the smaller groups of flues adjacent to the ends thereof. As, for instance, in an "Otto Hoffman" oven having the same number of upright flues as that illustrated, divided into

two groups, the rising or descending current of products of combustion may, under some conditions, pass through the three or four flues nearest the central dividing wall between the groups, and the four external flues, corresponding with one of applicant's smaller groups, would have little or no heating effect. In applicant's construction illustrated on the contrary, approximately one-half of such rising or descending current will be compelled to pass through the group of four flues located adjacent to each end of each section of the oven.

It will be understood that the general features of construction hereinbefore described will be relied upon as the principal means for securing uniform distribution of heat in the oven, and that the movable tiles 35, 35, 35 need be used to control the flow of the products of combustion under unusual circumstances only, as, for instance, when it is found desirable to constantly direct a larger proportion of the heated products of combustion to one end of the oven, or of one of the sections thereof, when two separate sets of regenerators and heating flues are employed, as in the instance illustrated.

I claim as my invention:—

1. A coking oven provided with upright heating flues arranged in three groups, a horizontal passage at the top of the oven with which the flues of all of said groups communicate at their upper ends, three combustion chambers connected each with the lower ends of the flues of one of the groups and three regenerators severally connected

with said combustion chambers; the flues of the intermediate group of flues being substantially equal in area to the combined areas of both of the external groups and the capacity of the regenerator associated with said central group of flues being substantially equal to the combined capacities of the other two regenerators.

2. A coking oven provided with upright heating flues arranged in three groups, a horizontal passage at the top of the oven with which the flues of all of said groups communicate at their upper ends, three combustion chambers connected each with the lower ends of the flues of one of the groups, and three regenerators severally connected with said combustion chambers, the flues of the intermediate group of flues being substantially equal in area to the combined areas of both of the external groups and the capacity of the regenerator associated with said central group of flues being substantially equal to the combined capacities of the other two regenerators and with valves at the upper ends of said upright flues for controlling the passage of combustion products therethrough.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 30th day of April A. D. 1908.

SAMUEL BERTRAM SHELDON.

Witnesses:

A. C. BYAM,
W. J. BRYAN.