

(No Model.)

3 Sheets—Sheet 1.

A. D. SHREWSBURY.  
COKE OVEN.

No. 523,602.

Patented July 24, 1894.

Fig. 1.

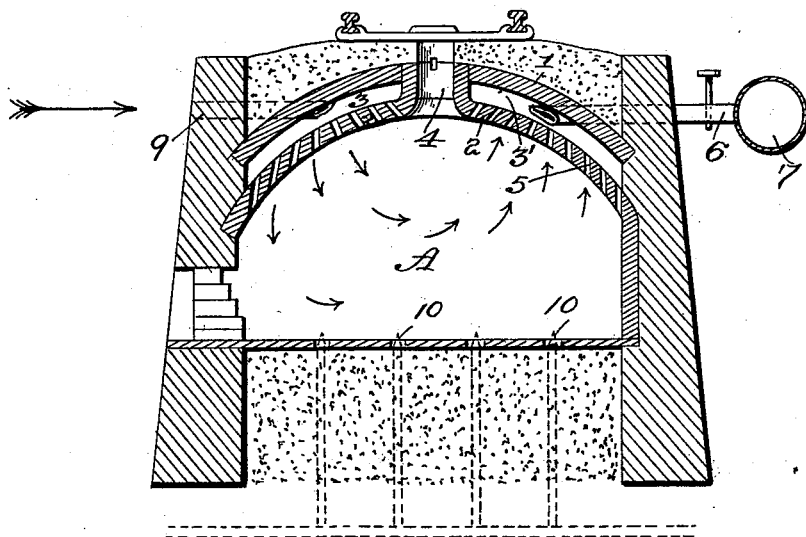
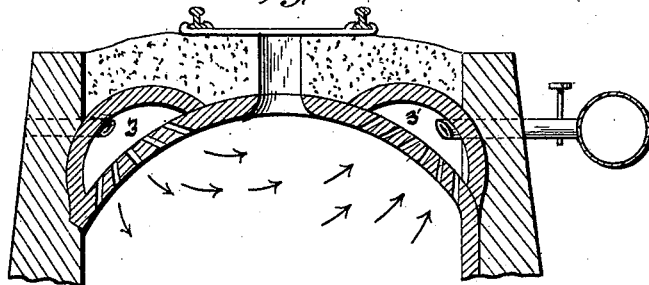


Fig. 2.



Attest  
M. F. Altman

Inventor  
A. D. Shrewsbury  
by Ellis Spear  
Att'y.

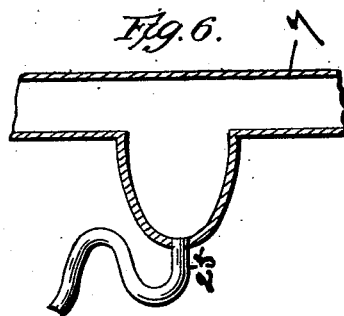
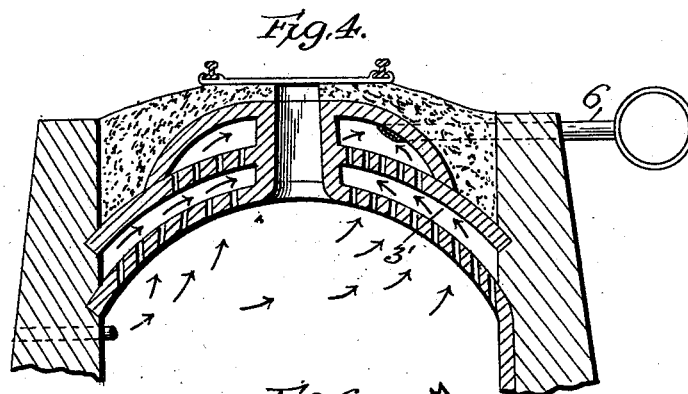
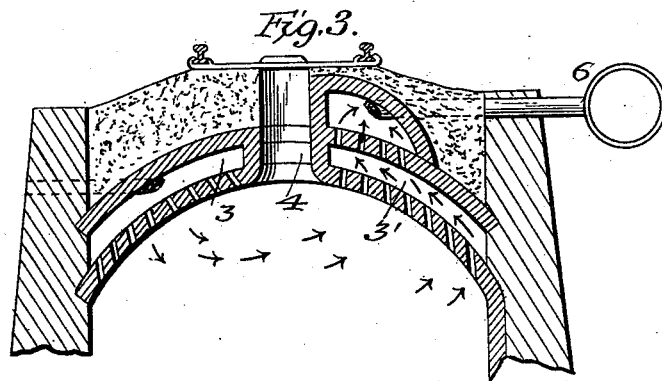
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Attest  
M. F. Altman.

Inventor  
A. D. Shrewsbury  
by Miss Spear  
Att'y

(No Model.)

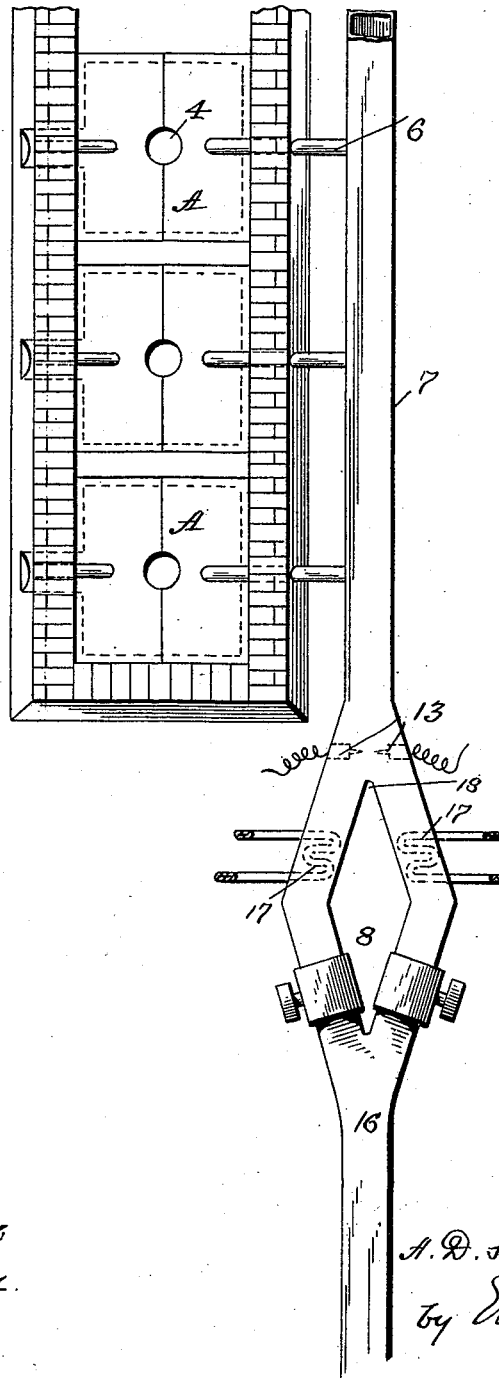
A. D. SHREWSBURY.  
COKE OVEN.

3 Sheets—Sheet 3.

No. 523,602.

Patented July 24, 1894.

Fig. 5.



Attest  
Patented  
Th. F. Allen.

Inventor  
A. D. Shrewsbury  
by Ellis Spear  
Att.

# UNITED STATES PATENT OFFICE.

ALBERT DICKINSON SHREWSBURY, OF CHARLESTON, WEST VIRGINIA,  
ASSIGNOR TO THE AMERICAN BY-PRODUCT AND COKE OVEN COM-  
PANY, OF SAME PLACE.

## COKE-OVEN.

SPECIFICATION forming part of Letters Patent No. 523,602, dated July 24, 1894.

Application filed April 10, 1894. Serial No. 507,049. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT DICKINSON SHREWSBURY, a citizen of the United States of America, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented certain new and useful Improvements in Coke-Ovens, of which the following is a specification.

The main object of my invention is to provide for an even and uniform distribution of the air over the surface of the coal, in a coke oven, and, at the same time to heat the air before introducing it to the surface of the coal.

The other objects and details of construction of all the parts are fully described hereinafter.

For carrying out the first part of my invention I provide a second dome forming thereby an intermediate chamber, communication with the oven itself or coking chamber being brought about by holes at certain and equal distances apart, and uniformly distributed in the second, or inner dome. This chamber is divided in such a manner as to allow the air to be admitted, necessary for combustion, into one half of the chamber, and from the second half of this intermediate chamber, leads a branch pipe which is connected with the main conduit into which the gases formed during combustion, are drawn off by an exhaustor and condensed, forming thereby the several by-products which exist in the manufacture of coke.

My invention also includes means for cooling and condensing the gases in the conduit thereby forming the by-products.

In the drawings:—Figure 1, is a vertical sectional view of my improved coke oven. Figs. 2, 3, and 4 show modifications. Fig. 5, is a plan view. Fig. 6, is a view of a detail.

The oven A may be of any desired form, either round, rectangular or square, and has an upper or outside dome and a lower or inner dome, marked 2, forming suction chambers 3 and 3' between them.

In order to charge the oven, the opening 4 is carried down the space going through the suction chamber and into the oven similarly lined with fire bricks as is the oven itself. The usual means for charging the oven and stopping up the door may be employed.

The inner dome is perforated throughout its extent, and the holes 5 must be at regular distances apart, and so arranged that through all of them a uniform draft can be obtained, at one and the same time. This intermediate chamber, in Figs. 1, and 3 is divided equally into two parts 3, 3' by a central wall in line with the opening 4. The air is admitted on one side and is thence drawn down through the holes, as indicated by arrows, into the combustion chamber and there mixes with the gases and is drawn off through holes in the other half of the dome into the other half of the chamber 3' by an exhaustor and passes out by a branch pipe 6, and thence into the main gas flue 7, connected with the exhaustor 8, from which the flue leads to a condensation plant of any desired form. The air passing through the intermediate chamber and into the oven, as described, becomes heated before entering the combustion chamber and by this means the oven does not become cooled down by cold air entering.

It is of great importance that the outlet branch pipe 6 should be of a larger diameter than the inlet 9 to allow for the expansion of gases. In this branch pipe or outlet 6 is placed a damper in order to regulate the draft or to shut off the draft entirely, thereby not interfering with the exhaustor that would be required for other ovens in blast at the same time. By this arrangement the suction draft is uniform throughout the entire area of the coal bed, and the coal being coked gives the gas from one part of the oven an equal opportunity to escape as from any other part. This results in a uniform action throughout the oven during the entire process of the conversion of the coal into coke, and brings about a uniform grade of coke, in color, weight and density, and prevents the oven from becoming hotter in one part than it is in another. It is a well accepted fact that through the inability to obtain a uniform heat in ovens now in use, coal is imperfectly coked and when an oven is drawn, a portion of the coke may come out black, showing a want of regular heat throughout the oven. This black coke, or badly coked coal must be thrown on one side, and becomes so much loss, for it can be all used only when the coking process is perfect, and the coke is drawn from the oven all

alike. The process of coking cannot be continued beyond a certain length of time in order to make up for this imperfectly coked coal, but must be drawn out to produce a certain grade of coke, for if this continuation  
5 be allowed, that which is already coked would begin to burn away, the carbon being consumed; hence the necessity of a uniform heat for the process of coking and which in my invention I am able to bring about.

In Fig. 2, I have shown modifications of Fig. 1, the intermediate chamber being formed by separate arches. Also in Figs. 3 and 4, I have shown supplemental chambers, formed  
15 by arches or domes above the intermediate chambers and communicating therewith through a series of holes. These still further modify and regulate the draft.

In Fig. 3 the supplemental chamber is shown on the exhaust side only, and Fig. 4, shows how it may be applied on both sides when the exhaust is through an undivided intermediate chamber.

In Fig. 6 a part of the exhaust pipe 7 is shown in section showing the trap 25 and the cooling coil.

Steam pipes 10 lead to the bottom of the oven and these have nozzles for introducing steam jets into and through the coal bed.  
30 All bituminous coals contain more or less sulphur in the form of sulphide of iron, or iron pyrites, and this moistening of the coal by steam, eliminates more readily the sulphur, and forming thereby sulphureted hydrogen  
35 gas, and practically produces a coke free of sulphur; it is not used for the purpose of combustion. Within the oven at proper points I arrange electro positive and electro negative elements connected with suitable  
40 circuit wires. The purpose of these elements is to secure a galvanic action within the oven to so act on the gases that they may be purified in such a manner that the chemical combination, arising from the decomposition  
45 of the various elements during the process of coking, may be brought about more readily, and increase the amount of ammonia.

Other electro positive and electro negative elements are arranged in the main flue as at  
50 13, near the cooling device where all the gases pass after leaving the oven and a further extraction of the by-products takes place, uniting in a chemical action gases that might have passed out of the oven in a free state and so  
55 on into the main conduit.

The exhaustor is indicated at 8 and the pipe 16 leading therefrom to the condensation plant, not shown, I have provided means for cooling the gas in the main flue just before it  
60 reaches the exhaustor in order to condense the ammonia and tar contained therein. This cooling means consists of a coil or series of ammonia or brine pipes 17, intersecting the main gas flue in front of the exhaustor and  
65 any suitable form of trap (Fig. 6) may be used, or catch pan arranged for collecting any of the by products drawn from the gas.

I do not wish to limit myself to any particular coil of pipes nor to any particular series or form of trap, the essential principle being  
70 that the cooling device be arranged at a point in front of the exhaustor. Two sets of cooling and condensing apparatus and traps may be employed so that one may be cleaned while the other is in operation. For this purpose, the conduit 7 is divided at 18 and each  
75 branch has a separate cooling coil and separate exhaustor; both branches reunite at 16 to the pipe leading to the condensation plant. It will be understood also, that the trap is in  
80 each branch and that a suitable valve is located at the junction of the branches, to admit the current to one or the other of the branches.

By this apparatus the maximum effect is secured both in the production of coke and in the recovery of the by-products for it will be clear that the uniform draft secured by the arrangement of the two domes and the suction chamber will secure an even distribution of the draft and a complete coking operation, while the action of the electro positive and electro negative elements together with the cooling apparatus effects the complete recovery of the by-products.

I do not need to use two exhaustors as by providing a suitable valve at 18 and an exhaustor in the pipe, 16, the gas may be drawn through either branch while the other is being cleaned.

The exhaustor mentioned herein is also a draft controller as by it the draft through the oven is made more or less.

I claim—

1. In a coke oven, an intermediate chamber in the upper part of said oven, a division therein forming two parts, an air passage from the outside opening into one part of said chamber, an exhaust opening into the other part of said chamber and a series of passages between said oven and both parts of the intermediate chamber, substantially as described.

2. In a coke oven, an intermediate chamber in the upper part of said oven having communication with the interior of said oven, through a series of evenly distributed holes, a supplemental chamber communicating with the intermediate chamber, through a series of holes, an exhaust passage communicating with the supplemental chamber, and an air supply pipe, all substantially as described.

3. In combination, with a coking oven, a main gas flue having branches both connected with the exhaust, and a cooling device and a trap in each branch, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT DICKINSON SHREWSBURY.

Witnesses:

HENRY E. COOPER,  
MARGARET V. COOPER.