

(No Model.)

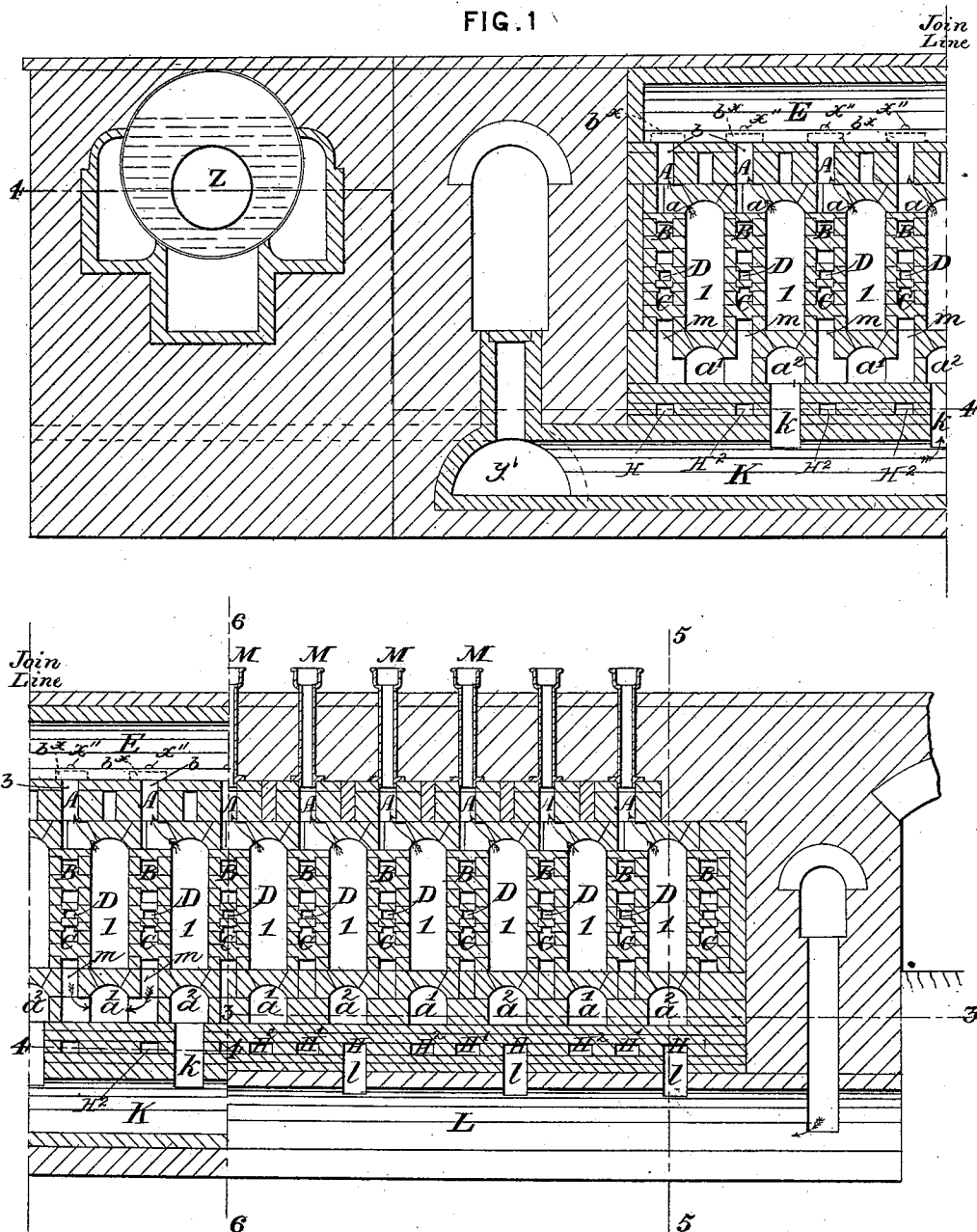
5 Sheets—Sheet 1.

R. DE SOLDENHOFF.  
COKE OVEN.

No. 471,033.

Patented Mar. 15, 1892.

FIG. 1



Attest:  
Geo. E. Cross.  
Edward D. Knight.

Inventor:  
Richard de Soldenhoff  
by Knight & Cross  
attys

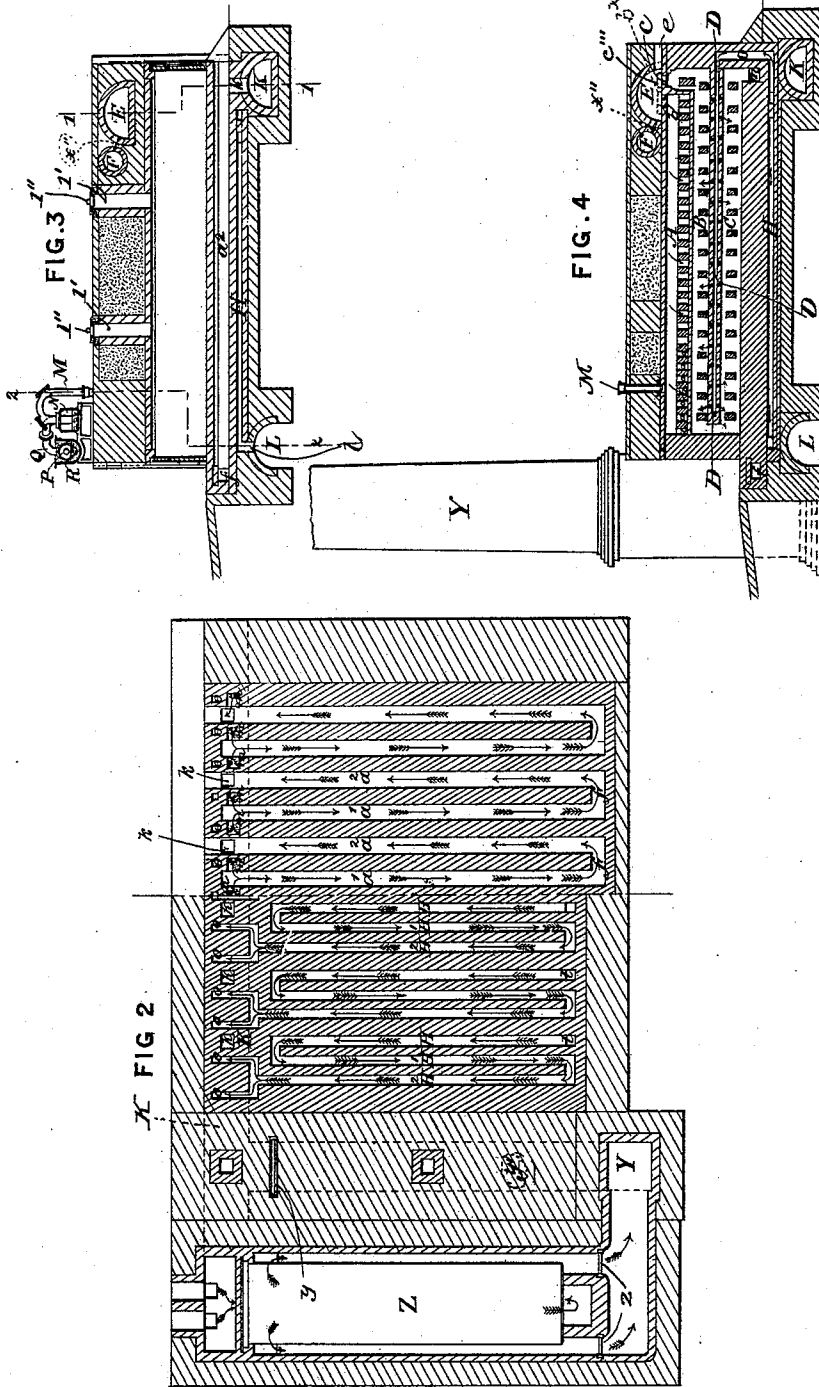
(No Model.)

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R. DE SOLDENHOFF.  
COKE OVEN.

No. 471,033.

Patented Mar. 15, 1892.



Attest:  
Geo. C. Guss,  
Edward De Knight.

Inventor  
Richard de Soldenhoff.  
by *Edward De Knight* atty's

(No Model.)

5 Sheets—Sheet 3.

R. DE SOLDENHOFF.  
COKE OVEN.

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Patented Mar. 15, 1892.

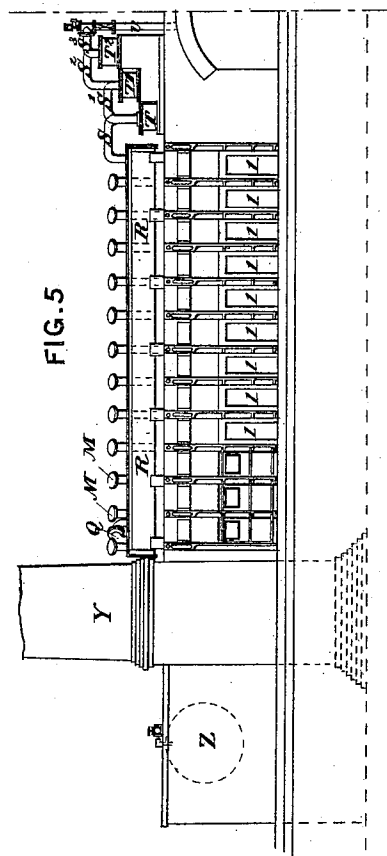


FIG. 5

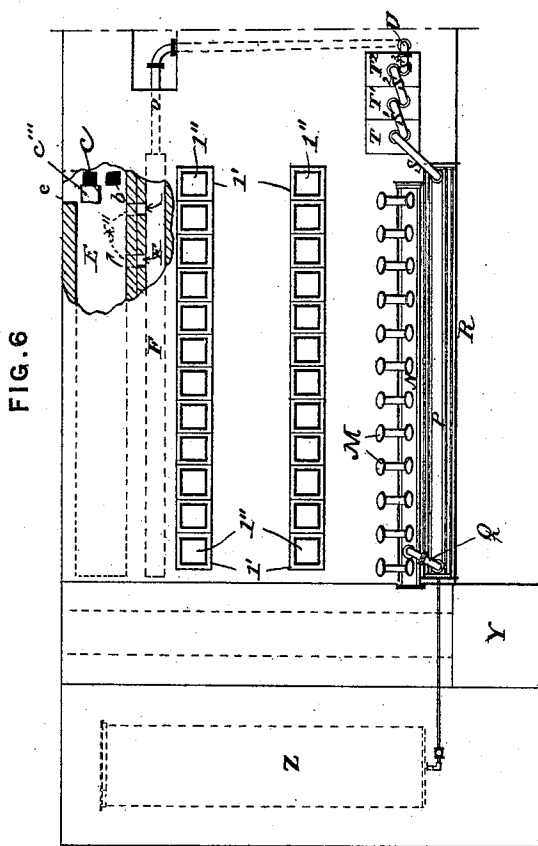


FIG. 6

*Attest:*  
*Geo. C. Cruise*  
*Edward D. Knight*

*Inventor:*  
*Richard de Soldenhoff*  
by *Knight Bros.*  
*attys*

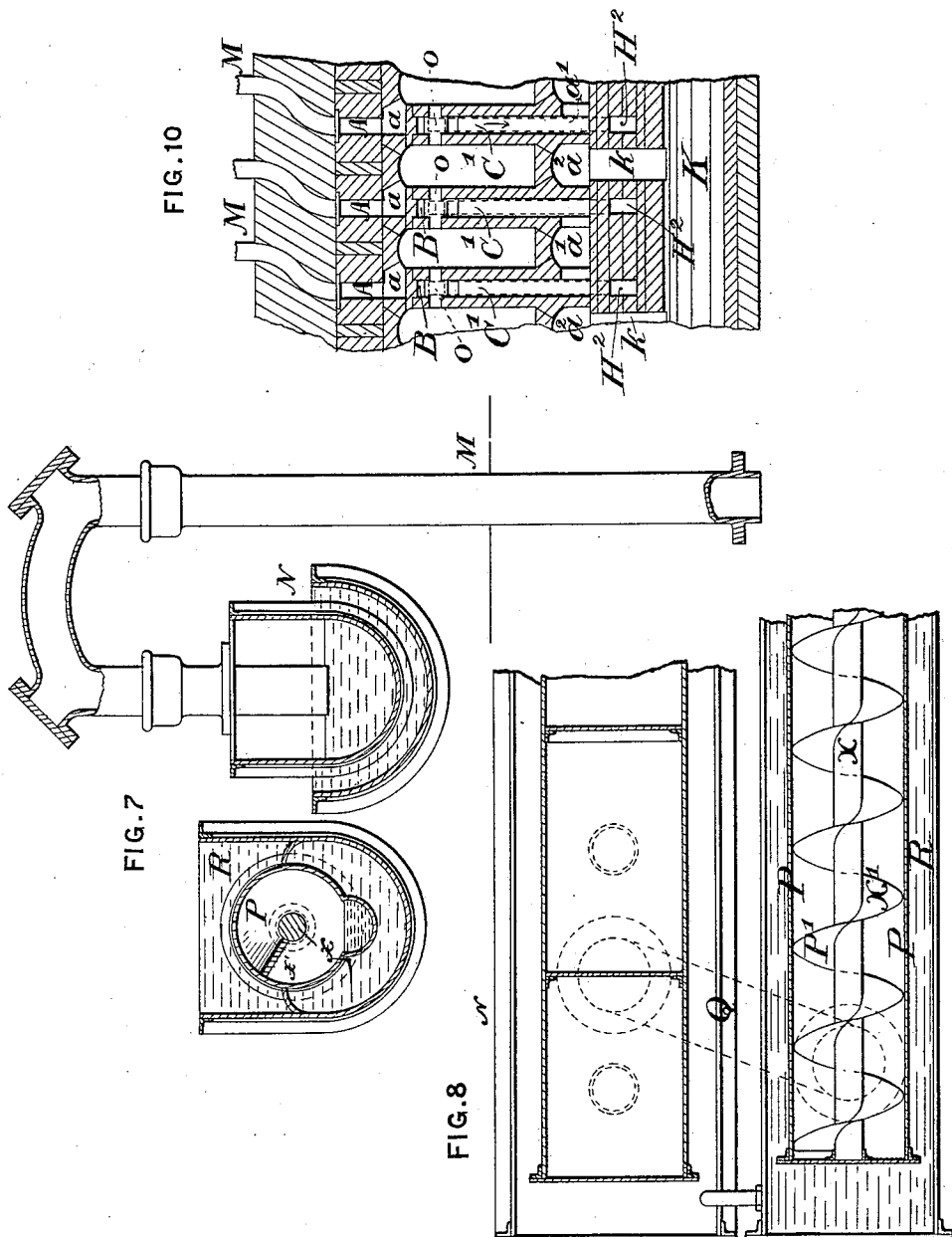
(No Model.)

5 Sheets—Sheet 4.

R. DE SOLDENHOFF.  
COKE OVEN.

No. 471,033.

Patented Mar. 15, 1892.



Attest:  
Geo. C. Claus,  
Edward D. Knight

Inventor:  
Richard de Soldenhoff  
by Knight Bros.  
attys

R. DE SOLDENHOFF.  
COKE OVEN.

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FIG. 9.

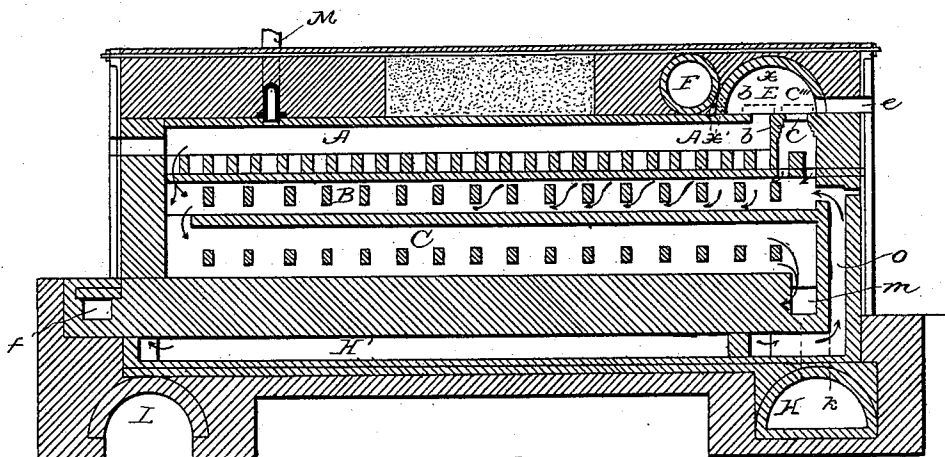


FIG. 9. a

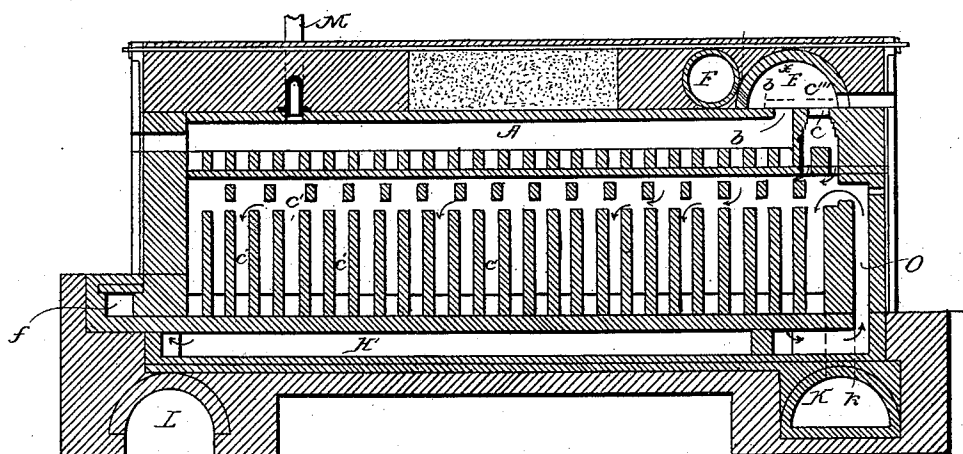
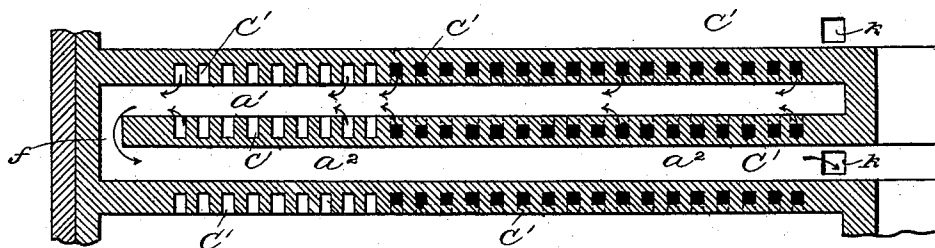


FIG. 11



Attest:  
Jesse Heller  
George E. Sime.

Inventor:  
Richard de Soldenhoff.  
By Knights Bros  
Attys.

# UNITED STATES PATENT OFFICE.

RICHARD DE SOLDENHOFF, OF CARDIFF, ENGLAND.

## COKE-OVEN.

SPECIFICATION forming part of Letters Patent No. 471,033, dated March 15, 1892.

Application filed June 23, 1890. Serial No. 356,437. (No model.) Patented in England September 3, 1884, No. 11,967.

*To all whom it may concern:*

Be it known that I, RICHARD DE SOLDENHOFF, a subject of the Queen of Great Britain, residing at 71 St. Mary Street, Cardiff, in the county of Glamorgan, South Wales, have invented certain new and useful Improvements in Coke-Ovens for the Treatment of Coal in Order to Obtain Coke and By-Products Therefrom, (for which I have received Letters Patent in England, No. 11,967, dated September 3, 1884;) and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The invention has for its object improvements in apparatus employed in the treatment of coal in order to obtain good furnace-coke and valuable by-products therefrom. Apparatus constructed according to my invention is represented in the accompanying drawings, in which—

Figure 1, which is drawn in two parts and to a larger scale than Figs. 2 to 6, represents vertical sections drawn on the lines 1 1 and 2 2 of Fig. 3. Fig. 2 represents horizontal sections drawn on the lines 3 3 and 4 4 of Fig. 1. Fig. 3 represents a vertical section drawn on the line 5 5 of Fig. 1. Fig. 4 represents a vertical section drawn on the line 6 6 of Fig. 1. Fig. 5 is an elevation, and Fig. 6 is a plan. Figs. 7 and 8 are respectively a cross-section and a horizontal section of parts drawn to a larger scale than Figs. 2 to 6. Figs. 9, 9<sup>a</sup>, 10, and 11, drawn to the same scale as Fig. 1, are vertical and horizontal sections representing slight modifications.

In all the figures like parts are marked with similar letters of reference.

I will first describe the arrangement of apparatus represented at Figs. 1 to 8.

The coking-ovens, which are shown at 1 1, are of a rectangular shape, having suitable charging openings or hoppers *l'*, provided with lids *l''*. (See Figs. 3 and 6.) All of the ovens are provided on one of their sides and just by the spring of the arch with a number of openings *a*, which lead the gases generated in the oven to a conducting-flue A, situated above the side walls of the ovens and running along the entire length of each oven.

The said conducting-flues A may communicate, according to the requirements of the process, either with a collecting-flue E or with the condensing-plant situated on the top of the ovens through a pipe M from each conducting-flue A. When the conducting-flues A communicate with the collecting-flue E, they are disconnected from the condensing-plant, and this is done in the hydraulic main. The conducting-flues A connect with the collecting-flue E through a suitable opening or openings *b* at one end of each conducting-flue A and which may be open or closed, according to the requirements of the process. This opening *b* will be closed when the conducting-flue A is put in connection with the condensing-plant and will be open when the gases are used to be burned and to heat the flues of the ovens. The openings *b* may be closed by means of any suitable lid or tile *b<sup>x</sup>*, (shown in dotted lines,) which may be inserted through the side openings *e* in the outer wall of the flue E.

The gases travel in the flues in the following manner: From the collecting-flue E, which runs the entire length of the series of ovens and which connects with all the side walls of a given number of ovens, the gases will flow through an opening *c*, which may be provided with any suitable regulating means—such as the tiles or covers *c'''*—into a flue B, formed within the upper part of each side wall and afterward into a flue C, formed within the lower part of each side wall underneath the flue B. From the said lower flues C the gases will pass through flues *m* into flues *a'* *a''*, situated below the floor of each oven. In the first of said flues *a'* the gases from the two adjacent side walls will meet and they will run together to the end of the said flue *a'*, where by a short cross-flue *f* they will pass into the second *a''* of such flues situated under the floor of the next oven. From the said second flue *a''* the gases will be directed through a short flue *k* into the main flue K and from there into the chimney Y, or they may be directed into the furnace of the boiler Z first and into the chimney Y afterward by lowering the damper *y* in the cross-flue *y''*, which connects the flue K with chimney Y, and opening the dampers *z*, so as to permit the current to pass from un-

der the boiler directly up the chimney, as shown in Fig. 2.

To make the description complete I will describe the air-supply required for the combustion of gases in the flues B and C, formed within the side walls. The cold air enters from the outside into a flue L, extending along the entire series of ovens. From this flue it will pass through openings  $l$ , formed in the crown thereof, into flues  $H H' H^2$ , situated below the flues immediately under each oven and arranged in sets of three each (see Fig. 2) and connected together in such a manner as to form one continuous flue. The cold air circulating successively in the flues  $H H' H^2$  of each set will become heated, and when it arrives at the end of the third flue  $H^2$  of each set it will divide into two and will enter flues O, by which it will ascend into a flue D, formed in each side wall between the upper and lower gas-flues B C. The said flue D is so constructed that through its length it is perforated at top and bottom. The hot air consequently will spread into the upper and lower gas-flues B C and cause a perfect combustion of the gases circulating in the said gas-flues. Assuming now that the openings  $b$ , leading the gases from the conducting-flues A to the collecting-flue E, are closed, the gases will then pass out of each conducting-flue A into a pipe M and from there into the hydraulic main N, constructed in a similar way to the hydraulic mains of gas-works. From the hydraulic main N the gases will pass through a pipe Q at one end thereof into the refrigerating-condenser P, which is composed of the following parts:

First, of a condensing-tube P, extending the entire length of the series of ovens, which is provided with a depressed or concave bottom forming a collecting-trough and in which the condensed tarry matters will accumulate, and whence by means of a pipe (not shown) they will be carried outside into a tank.

Second, of a revolving or stationary screw  $P'$ , fixed inside the condensing-tube P, in order to lengthen the journey of the gases traveling in the condensing-tube P. The screw is composed of a wooden shaft  $x$  and of a spiral  $x'$  of card-board or of other material—as, for instance, wood or iron or other material capable of resisting the tarry-matters. The screw is fixed in such a way in the condensing-tube P that it can be taken out when required.

Third, of a tank R, in which the condensing-tube P is immersed and in which cold water constantly circulates. The gases leaving the condensing-tube P enter by passing through the tubes  $S S' S^2$  into a series of scrubbers  $T T' T^2$ , (see Figs. 5 and 6,) similar to those used in gas-works for getting off the ammonia. After this the gases which are not condensed pass by the tubes  $S^3$ , U, and V into a receiving-flue F, situated parallel to the collecting-flue E and communicating with the latter by a series of openings  $x''$ . The gases

from the receiving-flue F, entering into the collecting-flue E, will mix together and inflame, after which they will take the ordinary course of the gases in the flues, as described above.

In the modification represented in Fig. 9 I dispense with the air-flues D and lead the air from the passages O direct into the upper gas-flues B, where the gases inflame, and thence pass into the lower gas-flues C, whence they pass into the flues  $a'$ , and then pursue the course above described with respect to Figs. 1 to 8.

In the modification represented in Figs. 9<sup>a</sup>, 10, and 11 I also dispense with the air-flues D, as above described, and I substitute for the lower horizontal gas-flues C a series of vertical flues  $C'$ , formed in the lower parts of the side walls. The inflamed gases pass from the flues B into the upper ends of the vertical flues  $C'$ , and after traversing such flues they pass from the lower ends thereof into the flues  $a'$ , whence they pursue the course above described with respect to Figs. 1 to 8.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, with the ovens and the collecting-flues A communicating therewith, of gas-flues formed in the side wall of said ovens and having communication with said flues A, the smoke-flue K, gas-flues  $a' a^2$ , arranged under the ovens and communicating with the aforesaid gas-flues and with said smoke-flue, an air-inlet flue L, and the connected flues  $H H' H^2$ , forming one continuous flue, having connection at one end with said flue L and at the other with the gas-flues in the side walls of the ovens and being arranged under the flues  $a' a^2$ , substantially as set forth.

2. The combination, with the ovens and the collecting-flues A connected therewith, of the connected gas-flues  $a' a^2$ , arranged under the ovens, the upper gas-flues B, having connection with said collecting-flues, the lower gas-flues C, connected at one end with flues B and at the other with flues  $a' a^2$ , said flues B C being arranged in the side walls of the ovens, the air-warming flues  $H H' H^2$ , arranged below the flues  $a' a^2$  and connected together, so as to form one continuous flue, the air-flue L, connected to one end of said continuous flue, the flues  $o$ , connecting the other end of said continuous flue with the flue B, and the smoke-flue K, connected to the flues  $a' a^2$ , substantially as set forth.

3. The combination of a series of coking-ovens, a hydraulic main, a condenser and scrubber, flues and pipes communicating between said ovens, hydraulic main, condenser, and scrubber, a collecting-flue communicating with the said ovens, gas-inflaming flues in the side walls between the ovens, connected with said collecting-flue, gas-flues  $a' a^2$  under the ovens, connected with the gas-inflaming flues, a main flue leading to the chimney or

boiler and communicating with said flues  $a'$   
 $a^2$ , a cold-air-inlet flue, and air-warming flues  
under the flues  $a'a^2$ , communicating with said  
cold-air-inlet flues and with the gas-flues in  
the side walls, substantially as shown, and for  
the purpose set forth.

4. The combination of a series of coking-  
ovens and condenser and scrubber, a collect-  
ing-flue having communication with said  
ovens and said scrubber, gas-inflaming flues  
in the side walls between the ovens, connected  
with said collecting-flue, gas-flues  $a'a^2$  under  
the ovens, having communication with said  
gas-inflaming flues, a main flue leading to a

chimney or boiler and communicating with  
said flues  $a'a^2$ , an air-inlet flue, air-warming  
flues under the flues  $a'a^2$ , communicating  
with said air-inlet flue, and air heating and  
distributing flues D in the side walls of the  
ovens, communicating with said air-warming  
flues and with the gas-flues in the side walls,  
substantially as shown, and for the purpose  
set forth.

RICHARD DE SOLDENHOFF.

Witnesses:

DAVID MORGAN EVANS,

JOHN M. PENNEY,

*Both of 71 St. Mary's Street, Cardiff.*