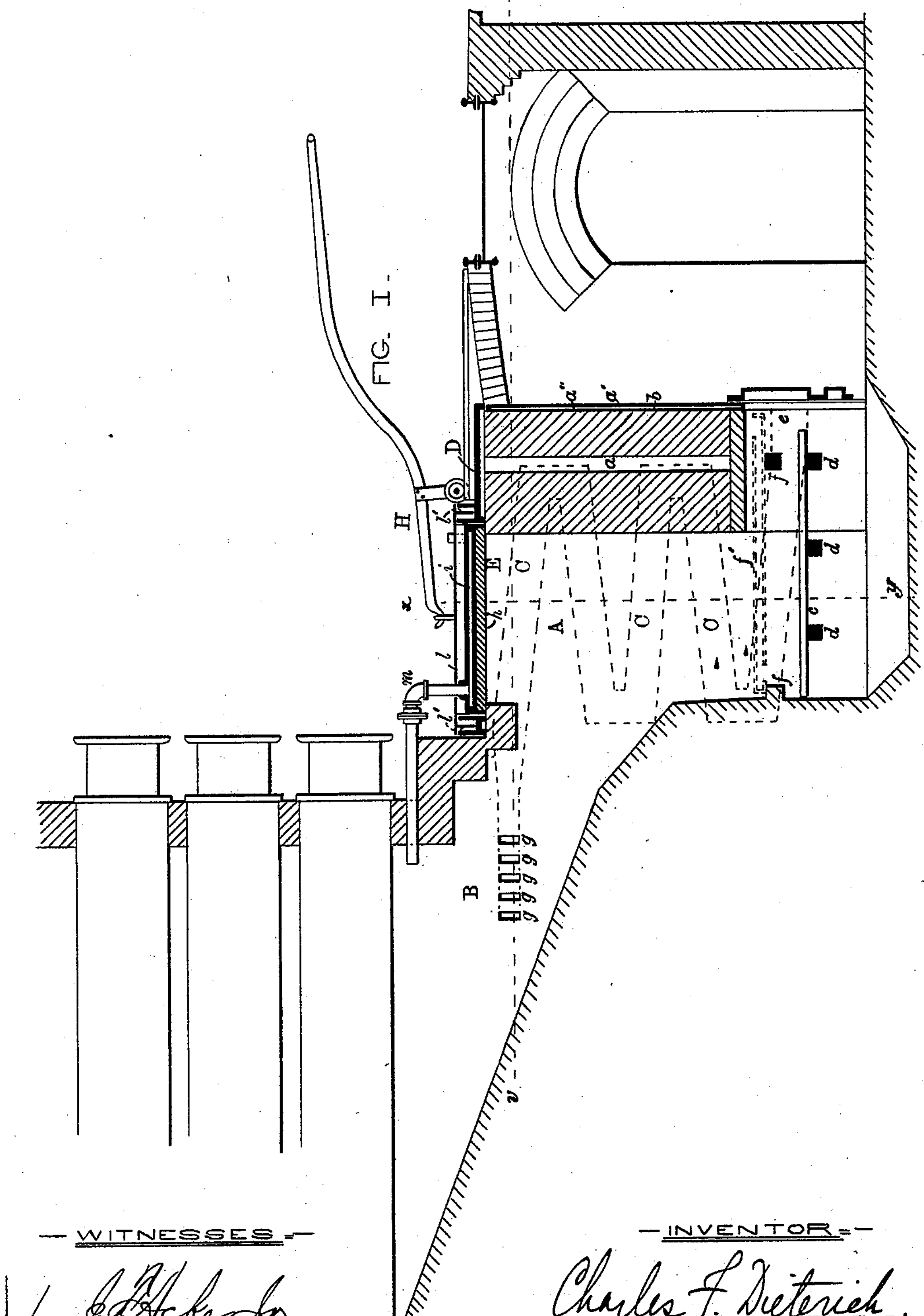
4 Sheets—Sheet 1.

C. F. DIETERICH.

Gas-Generating Furnace.

No. 209,114. Patented Oct. 22, 1878.



—WITNESSES—

J. H. Acker Jr
J. Daniels

—INVENTOR—

Charles F. Dieterich,
by his atty

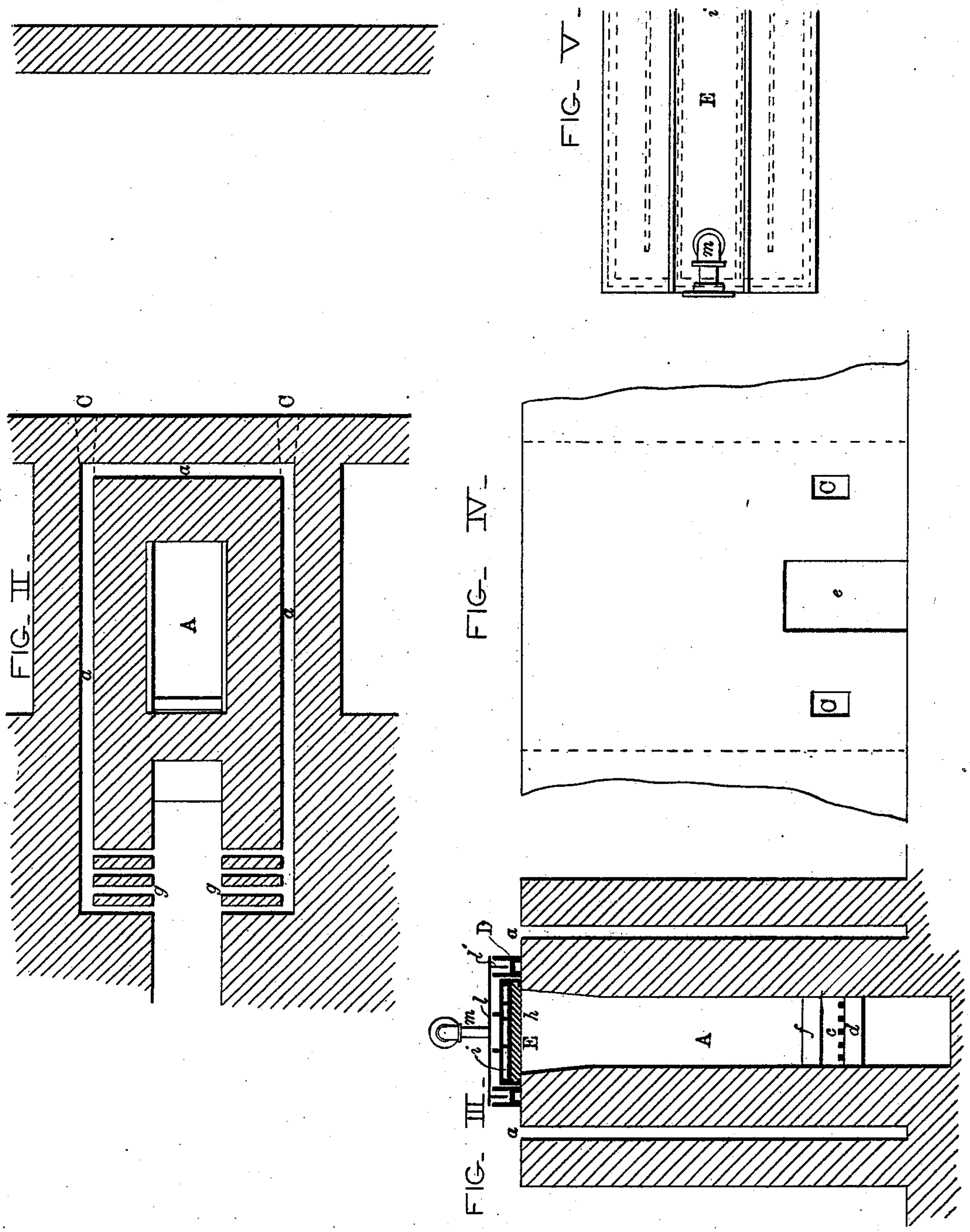
N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

4 Sheets—Sheet 2.

C. F. DIETERICH.

Gas-Generating Furnace.

No. 209,114. **Patented Oct. 22, 1878.**



—WITNESSES:—

J. F. Acker, Jr.
J. Davies

—INVENTOR:—

Charles F. Dieterich,
by J. H. & W. T. Howard
Attys.

4 Sheets—Sheet 3.

C. F. DIETERICH.

Gas-Generating Furnace.

No. 209,114. **Patented Oct. 22, 1878.**

FIG. VI.

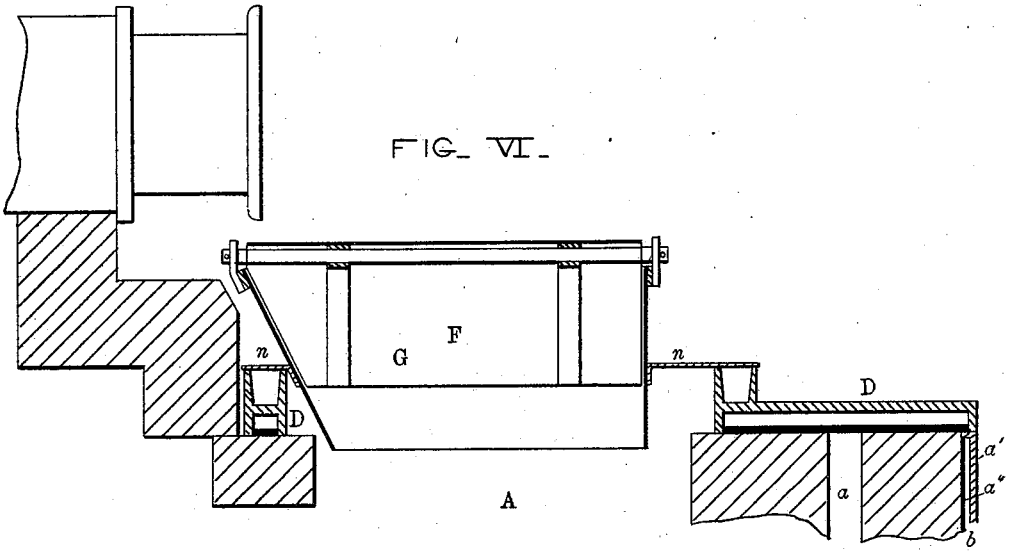
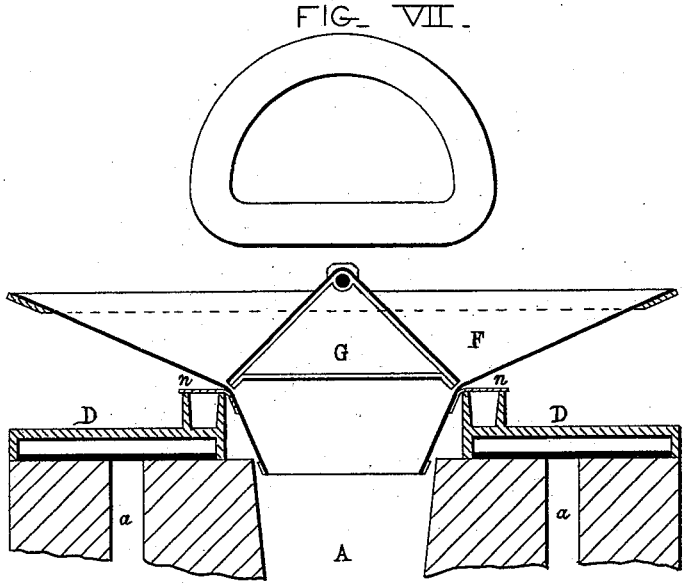


FIG. VII.



WITNESSES:

J. Dickerson Jr.

J. Daniels

INVENTOR:

Charles F. Dieterich,

by Chas. W. J. Howard
atty

4 Sheets—Sheet 4.

C. F. DIETERICH.

Gas-Generating Furnace.

No. 209,114. Patented Oct. 22, 1878.

FIG. VIII.

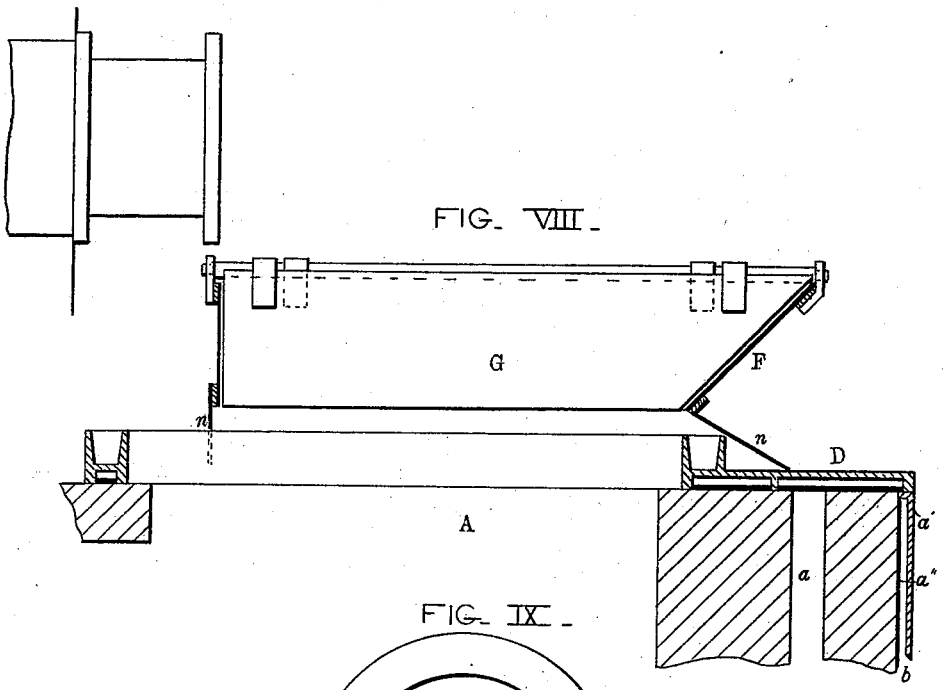
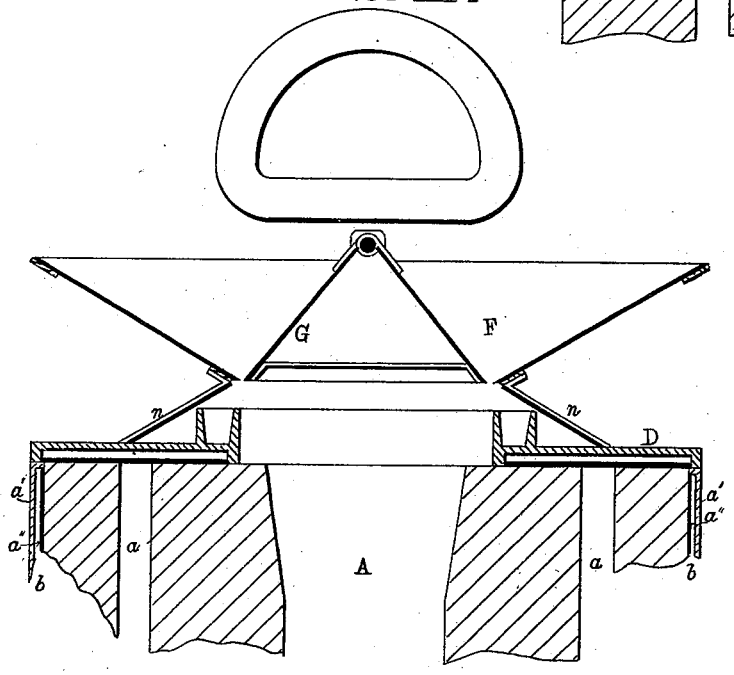


FIG. IX.



WITNESSES.

J. L. Ackerson Jr.

J. Daniels

INVENTOR.

Charles F. Dieterich

by Munn & Co.

Attys.

UNITED STATES PATENT OFFICE.

CHARLES F. DIETERICH, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN GAS-GENERATING FURNACES.

Specification forming part of Letters Patent No. **209,114**, dated October 22, 1878; application filed August 24, 1878.

To all whom it may concern:

Be it known that I, CHARLES F. DIETERICH, of the city of Baltimore and State of Maryland, have invented certain Improvements in Gas-Generating Furnaces, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being made to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to a generator placed below and in front of a bench of retorts, adjoining the front wall thereof, and having a grate, upon which the coke, in a heated condition, is directly transferred and imperfectly or slowly consumed. A combustion-chamber, forming a part of said generator, and communicating with the bench of retorts, receives the carbonic oxide and other products of incomplete combustion generated from the burning coke in the generator, combustion therein being rendered complete by the admission of atmospheric air, heated to a high temperature by heat radiated from the coke in the generator. The walls of the generator are double, and inclose a dead-air space, whereby radiation of heat from the coke in the generator is reduced. In order to facilitate the removal of ashes or cinder from the coke precipitated to the generator-grate, I provide a secondary grate, which slides over the ordinary grate, being thrust through the mass of coke, whereupon the ordinary grate is removed or withdrawn, carrying with it the ashes, cinders, &c., and leaving a clear or bright fire upon the secondary grate.

Other advantages not above enumerated attending the use of my improved gas-generator are the following: By constructing the generator in front and forward of the bench of retorts, it is practically a separate and independent structure, and is readily reached for repair or otherwise. The direct communication between the generator and combustion-chamber obviates the necessity of using pipes to conduct the products of incomplete combustion from the former to the latter, in which pipes it has been found impossible to prevent explosions.

There are other considerations of importance, such as cheapness and simplicity of construction, which, to the gas-engineer, will, it is thought, be apparent, together with other advantages which are referred to in the following description of the several parts.

The said invention relates, secondly, to certain improvements in the construction of the generator and its attachments, and in the devices employed to receive the heated coke and conduct the same to the generator, as will hereinafter fully appear.

In the description of the improved process and apparatus which follows reference is made to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a longitudinal section of parts of a bench of retorts to which the improved apparatus is applied. Fig. 2 is a sectional plan of the generator and adjacent parts of the bench on the dotted line *v w*. Fig. 3 is a transverse section of the generator and attachments on the dotted line *x y*. Fig. 4 is a front view of the generator. Fig. 5 is a top view of the cover or lid of the generator on an enlarged scale, part being broken away. Figs. 6 and 7 are sections, also on an enlarged scale, of a hopper or funnel to be used in charging the generator with coke from the retorts, together with certain other parts of the apparatus. Figs. 8 and 9 illustrate certain modifications in the hopper or funnel, as hereinafter described.

Similar letters of reference indicate similar parts in all the views.

A is the generator, located below and in front of the bench of retorts, having grate-bars to support the coke, which is introduced to the generator from the top thereof. The front and side walls of the generator are double, the two sections of the same standing apart to form a closed air-space, *a*, and the exterior of the outer front wall is cased with plates *a' a''*, which have an air-space, *b*, between them. The object of the air-spaces *a* and *b* is to reduce the radiation of heat from the fuel in the generator.

The grate-bars before alluded to, and which are represented by *c*, rest upon bearing-bars *d*, and are placed in position from the front of the generator and through an opening, *e*, in the same, closed by a suitable door. Second-

ary bearing-bars *f* are used in connection with grate-bars *f'*, of a construction hereinafter described. B is the combustion-chamber, connecting the generator A with the interior of the bench below the retorts.

Air is admitted to the lower part of the body of coke in the generator through the spaces between the grate-bars, not in sufficient quantities, however, to support complete combustion of the fuel, but merely to effect the generation of inflammable gases and other bodies, which may be subsequently combined with atmospheric air and consumed. The admission of air to the under side of the grate-bars is regulated and controlled by means of doors, dampers, or other equivalent devices.

The means for heating air to be combined with the gases in the combustion-chamber consist of one or more pipes, C, located in the air-space *a* or built in the wall, having their inlet ends provided with regulating doors or dampers and their outlet ends in communication with apertures *g* in the sides of the combustion-chamber. A circuitous passage for the air may, however, be formed by placing partitions in the air-space and connecting the ducts thus formed with the exterior air and the apertures *g*.

The top of the generator is covered by a fixed non-heat-conducting plate, D, and a removable lid, E, constructed in the following manner: A block, *h*, of fire-brick or other heat-retaining substance, is secured within a frame, *i*, provided with a space, through which air is circulated to keep the lid comparatively cool. A plate, *l*, (shown in Figs. 1 and 3 of the drawing,) is secured to ribs extending from the upper side of the frame *i*, and fitted with downwardly-extending flanges *l'*, which, in connection with a sand channel or groove extending around the central opening in the plate D, effects a practically gas-tight joint between the said plate and the lid E. The air circulated through the space in the lid E, which necessarily becomes highly heated, is preferably conducted, by means of a pipe, *m*, to the interior of the combustion-chamber, where it is introduced about centrally of the body of the gas, &c., issuing to the said chamber from the generator. By this means the gases are more thoroughly consumed, and their effectiveness as a heating medium increased. This arrangement of the pipe *m* necessarily requires the same to be provided with a joint capable of being readily made and unmade, as the adjustment and removal of the lid E requires.

F is a removable hopper or funnel, (see Figs. 6 and 7,) consisting of a box having supporting-flanges *n*, which rest upon the plate D, and a suspended swinging door, G, covering the opening leading to the interior of the generator. The swinging door G admits of the contents of the hopper being passed to the generator without the introduction thereto of cold air or the escape therefrom of gases and flame. I do not, however, confine myself to the description of swinging door shown herein, as a dumping-door fitted to cover the opening in the hopper, and adapted to open by the weight of the fuel contained in the same, or, indeed, any other design of self-righting or hand-operated door, may be substituted therefor without affecting the nature of my invention.

The hopper shown in Figs. 8 and 9 is slightly modified in construction, but is substantially the same as that shown in Figs. 6 and 7.

H is a device to be used in connection with a fixed or removable track for lifting and removing the lid E; and it consists of a wheeled frame, having a lever attached thereto, one end of which is adapted for connection to a ring on the said lid and the other as a handle.

The temporary grate-bars before alluded to, and which are represented in Fig. 1 of the drawing by *f'*, are hollow to admit of a cooling current of air through them. These bars are only used when it is desired to free the lower portion of the body of coke from cinder and ashes, at which times they are forced through the burning coke and the lower or main bars withdrawn. The main bars are afterward replaced and the temporary ones removed.

To reduce the radiation of heat from the side walls of the generators when two or more generators are used, I extend the front wall along the entire series and fill the space between the generators with sand. I also construct a tunnel in front of the generator, with partition-walls, having doors or openings therein at suitable distances apart, for the convenience of the attendants.

In using the heated coke from the retorts as fuel without the same being quenched or cooled, a large amount of heat is saved that would otherwise be lost. It also reduces labor, as the transportation of the coke to and from the coke yard or shed is obviated.

I am aware that furnaces have been constructed having combustion-chambers leading directly therefrom; and, also, that in gas-engineering it is not new to transfer the coke directly to a generator from the bench of retorts, and hence I do not claim such apparatus or such method as of my invention.

Having thus described my invention, what I claim as new, and wish to secure by Letters Patent of the United States, is—

1. In combination with a bench of retorts, the generator A, placed below and in front of the same, adjoining its front wall, and having grate-bars to support the coke, and also secondary removable grate-bars, and provided with double front and side walls, and plates *a' a''*, having the intervening air-space *b*, substantially as and for the purposes set forth.

2. In combination with a bench of gas-retorts, the generator A, placed below and in front of the retorts adjoining the front wall of the bench, and having its generating-chamber

opening directly into the combustion-chamber B, and the flues or pipes C, placed between the walls of the generator for heating air in its passage through the same to the combustion-chamber, substantially as and for the purposes set forth.

3. The combination, with a bench of retorts, of the generator A, provided with a main and a secondary grate and the combustion-chamber B, the said generator being placed below and in front of the retorts and adjoining the front wall of the same, substantially as specified.

4. In combination with a bench of retorts, the generator A and combustion-chamber B, constructed and arranged substantially in the manner described, a heat-retaining lid or block confined in a frame, said frame being provided with air-spaces, and a detachably-united air-pipe leading to the combustion-chamber or bench of retorts, substantially as and for the purposes specified.

5. In combination with the generator A, having at its mouth a non-heat-conducting plate and a trough for holding sand or other material, the cover E, provided with the plate *l*, having depending flanges *l'*, for resting in the sand or other material contained in said trough, substantially as specified.

6. The combination, with the generator A and plate D, of the removable funnel F, having suitable supports, and the self-righting door G, substantially as set forth.

In testimony whereof I have hereunto subscribed my name this 23d day of July, A. D. 1878.

CHARLES F. DIETERICH.

Witnesses:
WM. T. HOWARD,
THOS. MURDOCH.