

(No Model.)

4 Sheets—Sheet 1.

H. STIER.  
COKE OVEN.

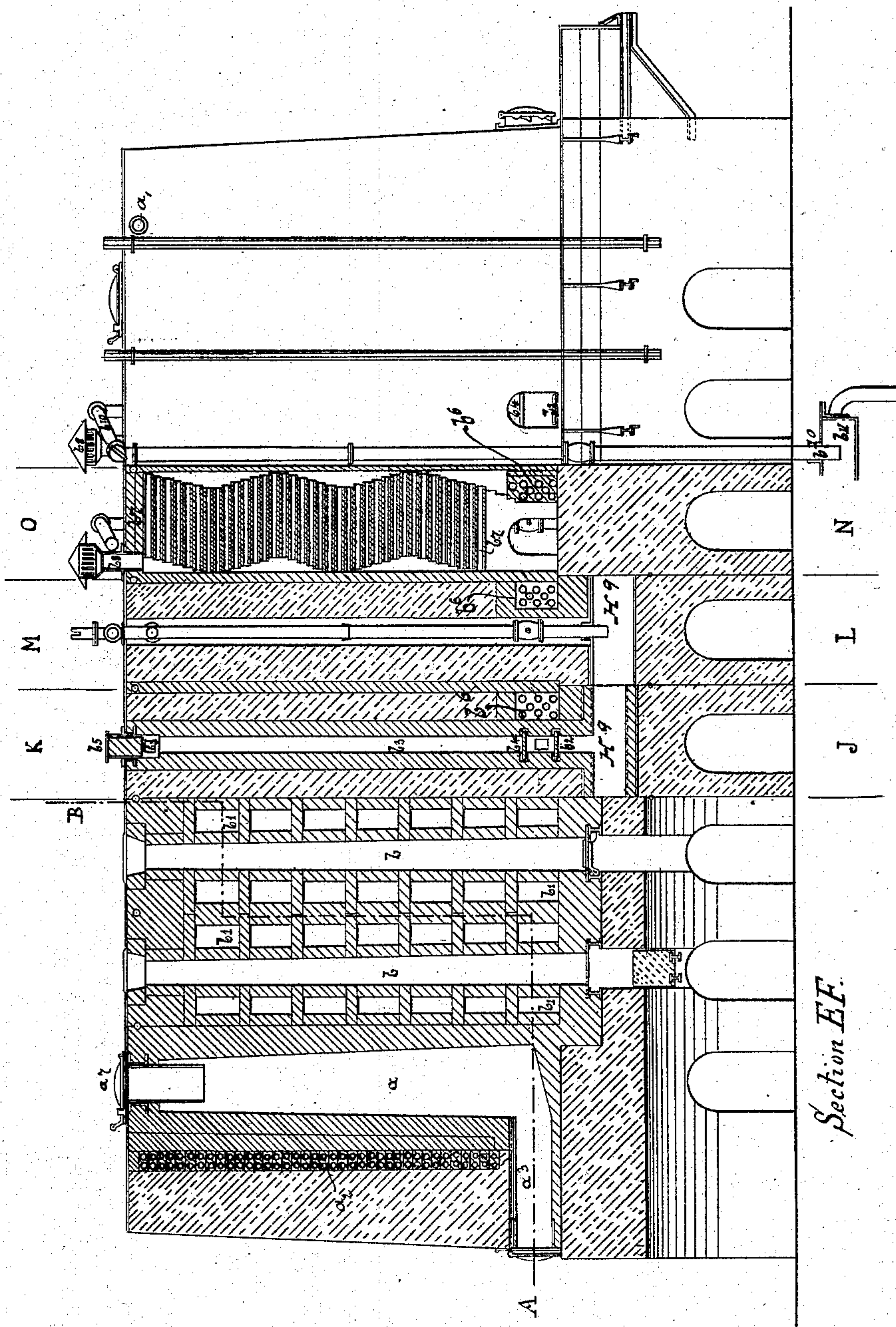
No. 291,422.

Patented Jan. 1, 1884.

Fig. 5.

Fig. 2. Fig. 3 Fig. 4.

Fig. 1.



Witnesses  
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Otto Hufeland

Inventor  
Heinrich Stier  
by Van Gentrvoord & Hauff  
his att'ys



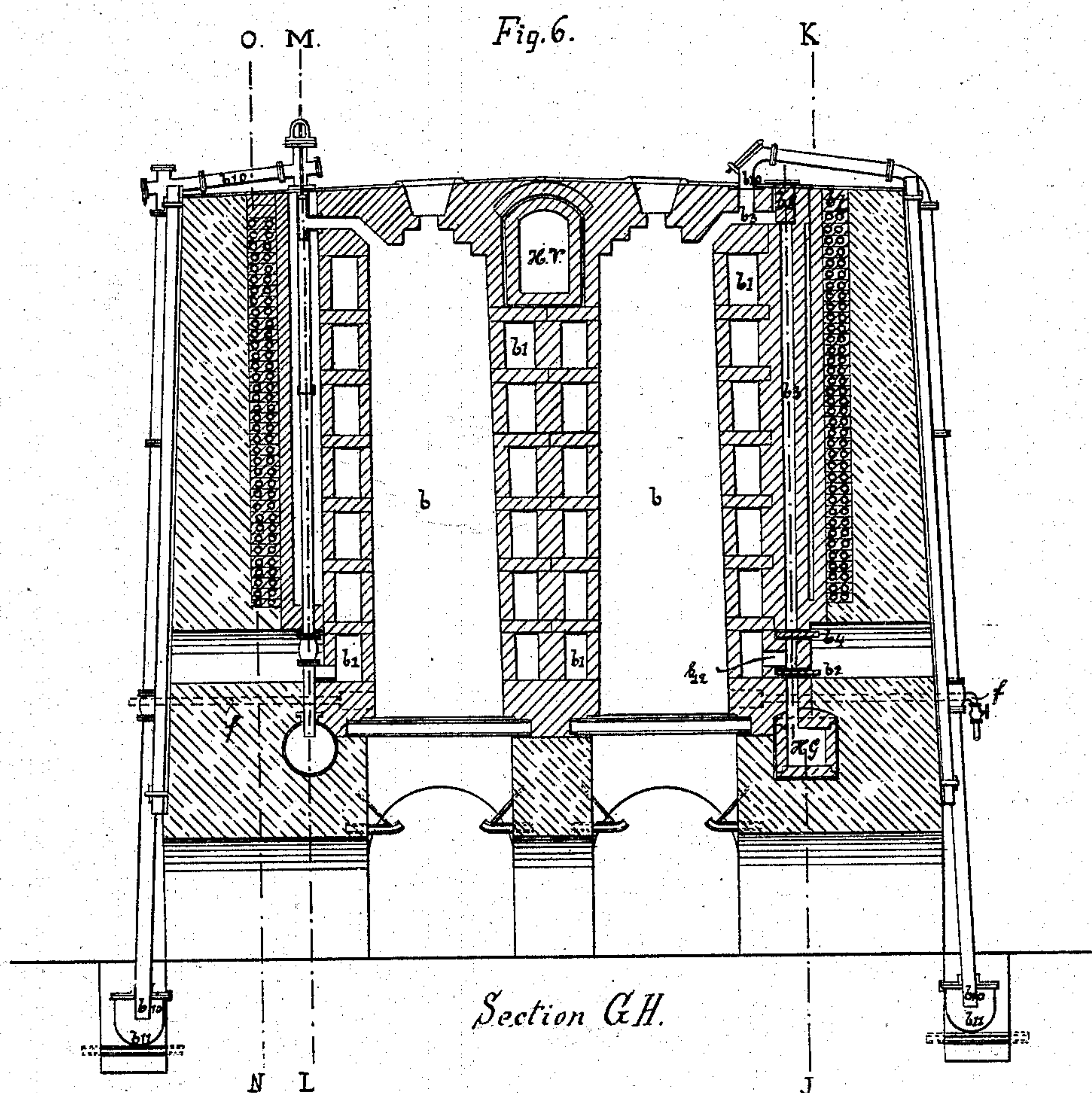
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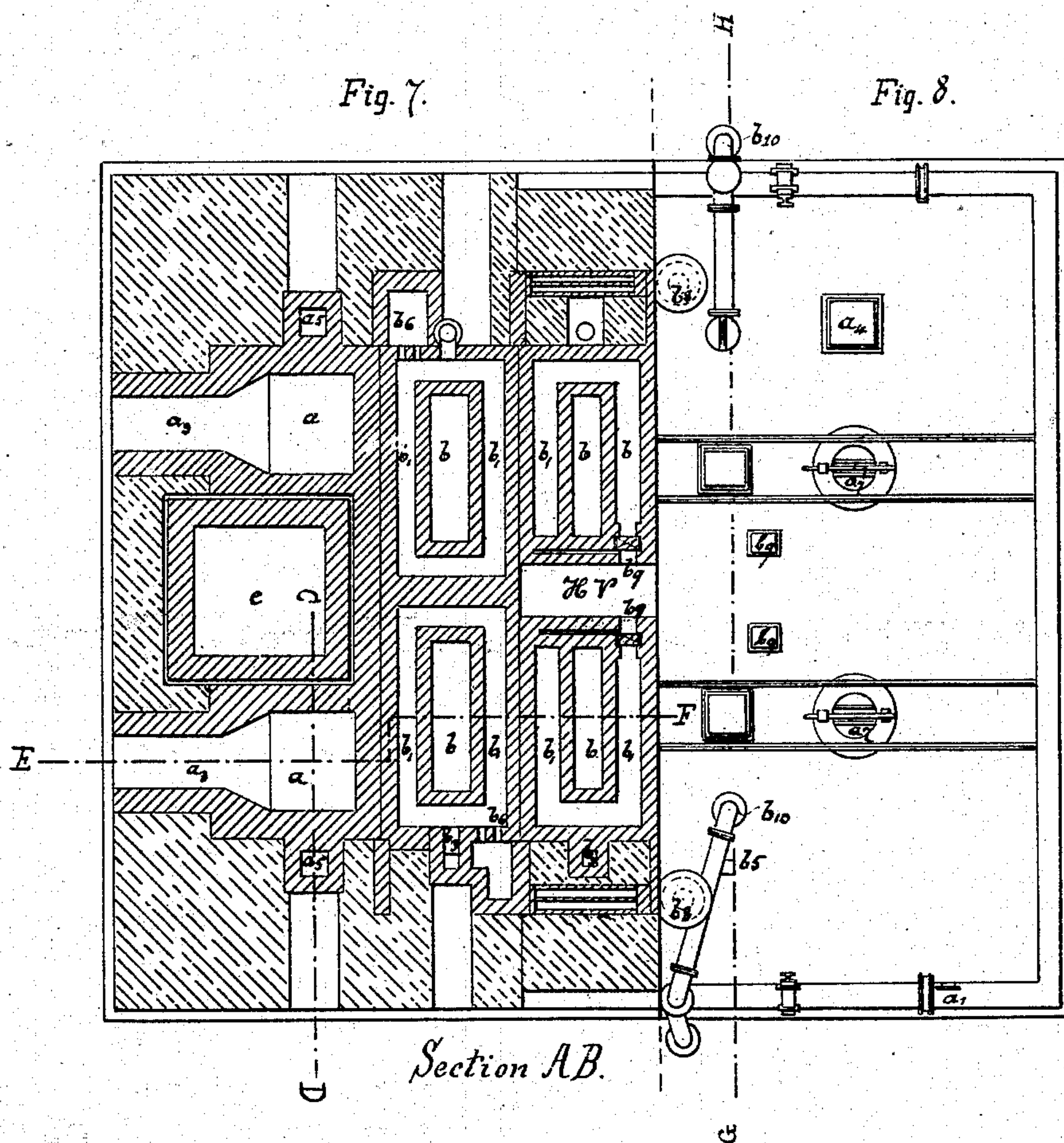
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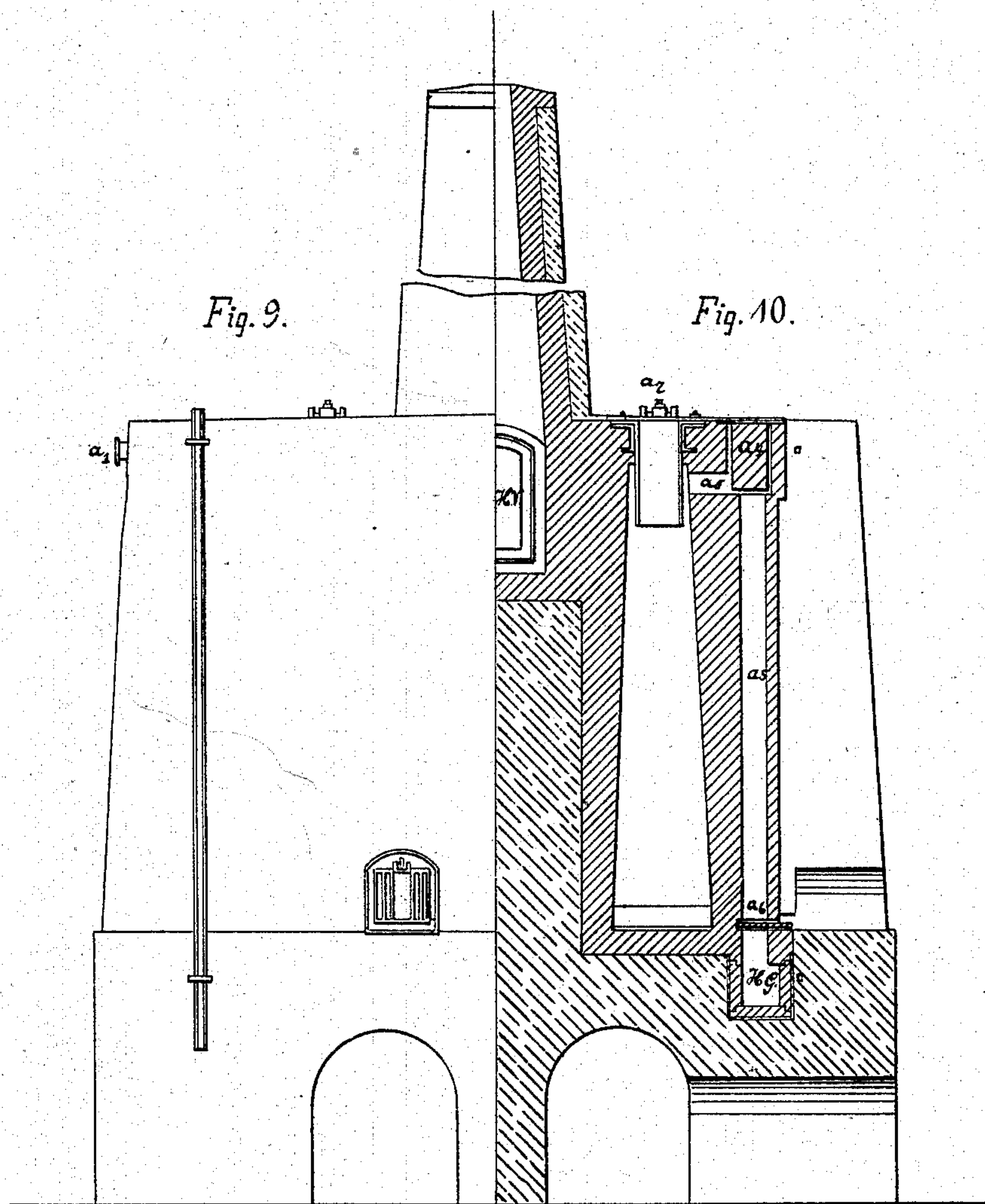
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Section CD.

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# UNITED STATES PATENT OFFICE.

HEINRICH STIER, OF ZWICKAU, SAXONY, GERMANY.

## COKE-OVEN.

SPECIFICATION forming part of Letters Patent No. 291,422, dated January 1, 1884.

Application filed June 14, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, HEINRICH STIER, a subject of the King of Saxony, residing at Zwickau, in the Kingdom of Saxony and Empire of Germany, have invented new and useful Improvements in Coke-Ovens, of which the following is a specification.

The object of this invention is to secure a new arrangement in ovens or stoves, which is applicable as well for the preparation of coke as for distillation, so that the heating of the same is accomplished by generator-gases, whereby, in case of interruption in the operation, the generators arranged in front of the coke-shafts may be thrown out and each separate coke-shaft may be utilized as a generator.

In the accompanying drawings, Figures 1 to 4 show longitudinal sections.

Fig. 1 is a section in the plane E F, Fig. 7. Fig. 2 is a section in the plane K I, Fig. 6. Fig. 3 is a section in the plane L M, Fig. 6. Fig. 4 is a section in the plane N O, Fig. 6. Fig. 5 is an exterior view of part of a plant. Fig. 6 is a cross-section in the plane G H, Fig. 8, the connections at each side of the generator-shaft with the principal heating-gas channel being somewhat modified. Fig. 7 is a horizontal section in the plane A B, Fig. 1. Fig. 8 is a plan view of a plant. Fig. 9 is a side view of the same. Fig. 10 is a cross-section in the plane C D, Fig. 7, through one of the generators lying in front of the coke-shafts.

Similar letters indicate corresponding parts.

The coke-shafts *b* are surrounded by the heating-shafts *b'*, so as to isolate the former, and the two are so formed that the vertical walls have horizontal openings, which in the case of the coke-shafts are so arranged that there is only an opening or connection at the top and the bottom, while, in the case of the heating-shafts surrounding the coke-shafts, such heating-shafts are so connected by openings through their walls that the heating-gases may move forward.

The drawings (Figs. 7 and 8) show a battery of six coke-ovens and four generators, *a a*, surrounding the same, the plant being seen in plan view and partly in section. Of course the number of parts may be varied according to desire and according to the quantity of

material to be operated on, if only the relation of parts is observed. The generators *a a* are placed at the outsides of the entire plant and inclose between them the channel *c*, Fig. 7, which carries off the products of combustion.

In front of each of the gas-generators is a perforated stone wall or passage, *a'*, which is arranged in the same manner as the perforated wall *b'* in front of the coke-chambers, which will be hereinafter referred to, and which is shown in Fig. 4 in section. The same consists of earthenware, stones, or bodies provided with horizontal passages going entirely through them, and which are placed one upon the other in a step-shaped manner, so as to leave a passage for the air and to cause the air in passing to take a zigzag and regular motion through the perforated stone wall. The air required for the function of the generator is forced into the passage *a'* through the opening *a'*, Fig. 5, and passes from thence through the furnace *a'* and to the generator *a*. The gases generated in the latter pass, upon the opening of the slides or registers *a'* and *a''*, Fig. 10, through the passage *a'*, into the passage or main-gas channel H G, Figs. 2, 3, 6, and 10, provided for their escape. From these horizontal main gas-channels, which pass along underneath the entire apparatus, the gases pass through the vertical opening *b'*, Fig. 7, into the heating-chambers *b'* about the coke-chambers *b*. These heating-chambers *b'* may be placed in communication with the interior of the coke-chamber *b* by the slides or registers *b'*, Fig. 6, main gas-channel H G, registers or slides *b'* and *b''*, gas-channel *b'*, Figs. 2 and 6, and by the passage *b'*, Figs. 2, 3, and 4, and perforated stone wall *b'*, constructed as already set forth, and the passages of which wall are made to communicate by a ventilating-dome, *b'*, with the outside atmosphere, Figs. 4 and 5. Also, the fire or heating chambers *b'* communicate at their upper ends by registers *b'*, Figs. 7 and 8, with the main exit-channel H V for the products of combustion, Figs. 7 and 10, through which the products of combustion may pass to the chimney *c*, Fig. 7. A pipe or conduit, *b'*, Figs. 5, 6, and 8, is provided for carrying off by-products and depositing them in a receptacle, *b'*, provided for them, which receptacle *b'*, if desired, may



also be placed on top of the apparatus. The section L M and the left-hand side of Fig. 6 show a modified form of conduit  $b^{10}$ .

The function of the apparatus is as follows:

5 The heating or combustible gases from the generators mingle at the openings  $b^6$ , Figs. 2, 3, and 4, with the air entering through the perforated wall  $d^7$ , Fig. 4; then pass through the fire or heating chambers  $b'$ , about the coke-chambers  $b$ ; and finally reach the escape-channel H V, provided for the products of combustion, Figs. 6 and 10. The vapors and products of distillation developed in the interior of the coke-chambers  $b$  pass off through  
10 opening  $b^{10}$ , communicating with a tube, into the condenser and apparatus provided for their reception, while in the continuation of the process the lighter non-condensable gases formed later on pass, upon the proper placing of the slides or registers  $b^5 b^4 b^2 b^9$ , into the main gas-channel H G, from whence they may again be utilized for heating the coke-chambers  $b$ , or for other purposes. If any disturbance occurs in the operation of a generator,  $a$ , each such  
20 generator can be thrown out by closing the air-inlet  $a'$ , by any suitable valve which may be provided for that purpose, as also by closing the slides or registers  $a^4$  and  $a^6$ , Fig. 10, to secure a double and secure closing. If one  
30 of the coke-chambers  $b$  is to be used as a generator, a slide or register in the tube  $d^{10}$  is closed, the slides or registers  $b^5 b^4 b^2$ , which lead to the main gas-channel H G, are opened, the slide or register, which leads to the escape channel or chimney H V, for the products of  
35 combustion, is closed, and the bottom of the coke-chamber  $b$  is opened to allow ashes and the like to fall out, and to allow air to pass through the glowing coke. If the bottom of the coke-chamber is to remain closed, air may  
40 be allowed to enter through a tube or tubes,  $f$ , which, becoming transformed into heating-gas, mingles with that coming from the other generators, and may be used for the operation of other coke-chambers, or for other purposes.  
45 The non-condensable gases resulting from the products of distillation are utilized, either alone or together with the gases generated in the generators  $a$  or in the coke-chamber  $b$ , when worked as generators for the heating of air-heaters, blast-cupola, heating, puddling, lime, or other technical furnaces, in such a manner that the conduit leading to the respective furnaces is directly or indirectly in connection  
55 with the air-pump or forcing-tube, which draws the respective gases from the coke-shafts  $b$ . If a higher pressure of the gases is desired, a suitable motor may be conveniently applied for this purpose. Should it be desired to force  
60 in the air required for combustion, which now flows in through the opening  $a'$  and the perforated wall  $a^2$ , a system of tubes may be arranged on the roof of the furnace to utilize the radiating heat as thoroughly as possible, in  
65 which case the ventilator-domes  $b^8$  would be

replaced by slides, or regulators, or conical valves. In place of the perforated wall  $a^2$ , a system of tubes may also be employed.

The regular operation of the apparatus, as shown in the drawings, will be readily understood. The air for the generator  $a$  flows through the perforated wall  $a^2$ , where it becomes warmed, and is then transformed in the generator  $a$  into heating or combustible gas, and flows thence into the heating shafts or chambers  $b'$ , where  
75 it meets the air, which has entered through a dome or ventilator,  $b^8$ , through the perforated wall  $b^7$ , where it is warmed, and through the passages  $b^6$  into the heating-chambers  $b'$ . The result is that the combustible gases are consumed in the heating-chambers  $b'$  about the coke-shafts  $b$ , subjecting them to intense heat. From the heating-chambers  $b'$  the products of combustion pass, as already described, to the escape-channel H V, and thence they may be  
85 led directly out to the chimney. In case any one coke-shaft,  $b$ , and its surrounding series of heating-chambers,  $b'$ , is to be thrown out of use for repairing or other purposes, it can be done by simply closing the slide  $b^9$ , and the easy accessibility from above and below allows each shaft or chamber by itself to be easily repaired.

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

1. The combination, with a generator,  $a$ , and coke-shafts  $b$ , of channels  $a^2$  and  $b^7$ , arranged in front of and surrounding said generator and coke-shafts, said channels being composed of layers of perforated stone, or its described equivalent, for heating the gas or air used for  
100 combustion, substantially as described.

2. In an oven adapted for the production of coke or distillates, the combination, with a generator,  $a$ , and coke-shaft  $b$ , of perforated walls  $a^2 b^7$ , constructed and arranged substantially  
105 as and for the purpose set forth.

3. The combination of the movable slides or registers  $a^4$ ,  $a^6$ ,  $b^5$ ,  $b^4$ , and  $b^2$ , with the entrance and exit channels of the coke-chambers, said slides being arranged substantially as shown,  
110 whereby, by their proper adjustment, each coke-chamber may be utilized as such, or by closing the passage for the outflowing products of distillation and connecting the coke-chamber with the main gas-channel, each coke-chamber  
115 may be utilized as a generator, as set forth.

4. The combination, with the escape-channel for the non-condensable products of distillation, of a heating apparatus, consisting of perforated walls or channels  $a^2 b^7$  in the surrounding or inclosing walls of the generator  
120 and coke-shafts for the preliminary heating of the gases, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH STIER. [L. S.]

Witnesses:

MARC M. ROSSEN,  
WILHELM BEESE.