

No. 786,694.

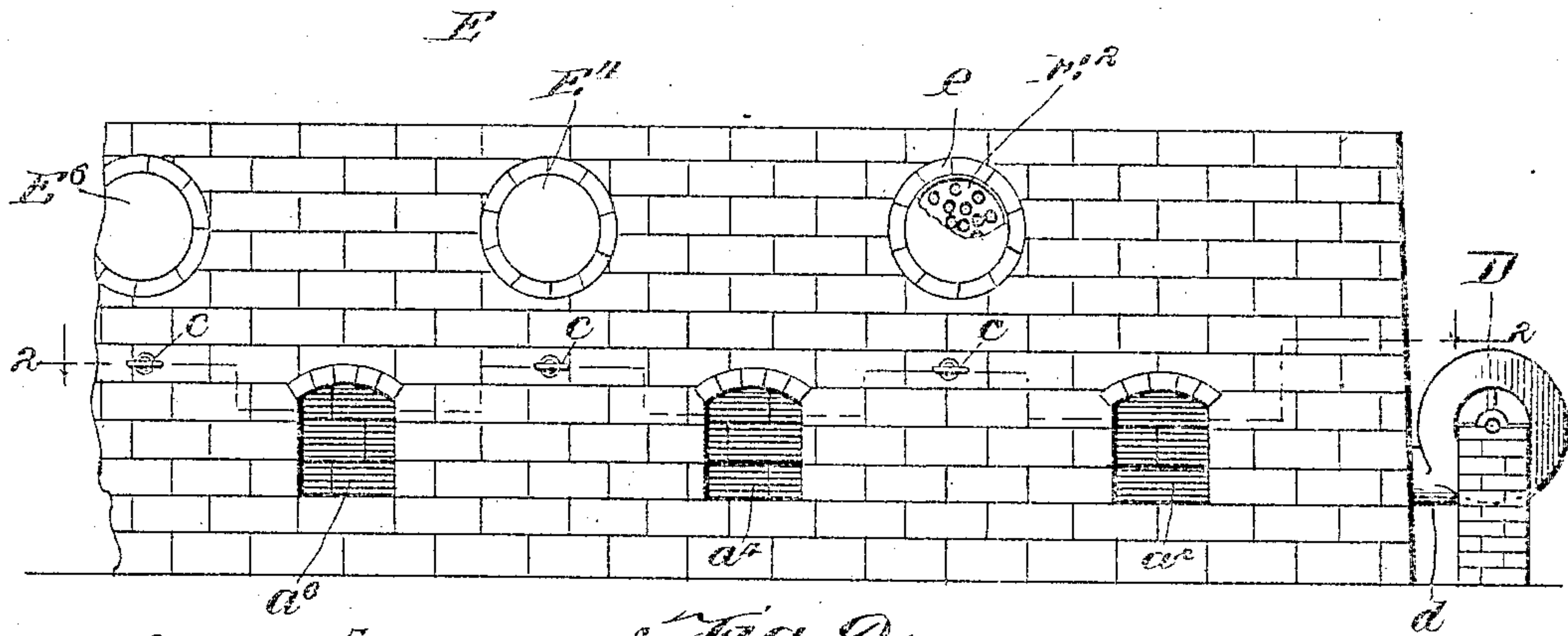
PATENTED APR. 4, 1905.

J. M. SULLIVAN.  
COKING OVEN.

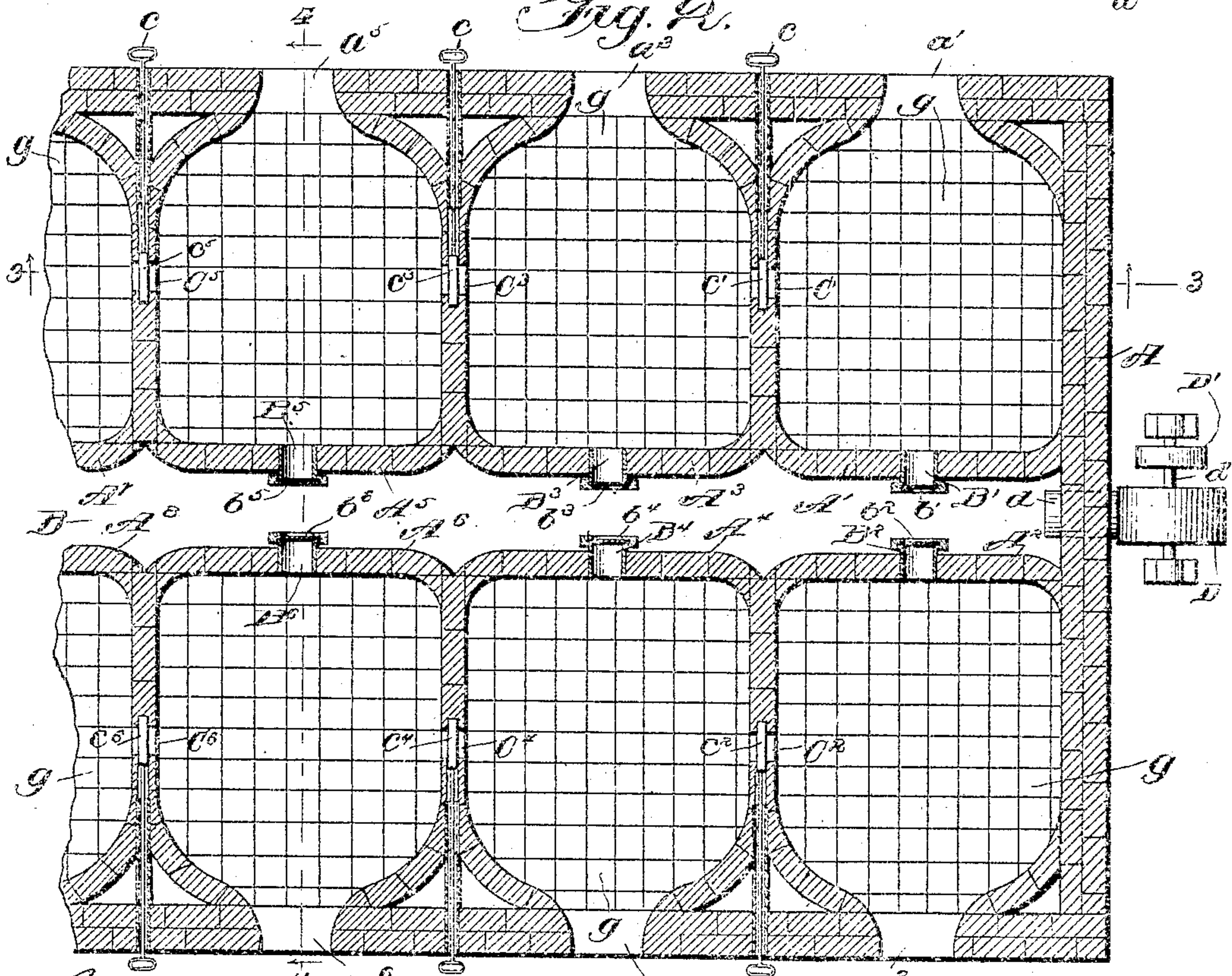
APPLICATION FILED MAR. 20, 1903.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



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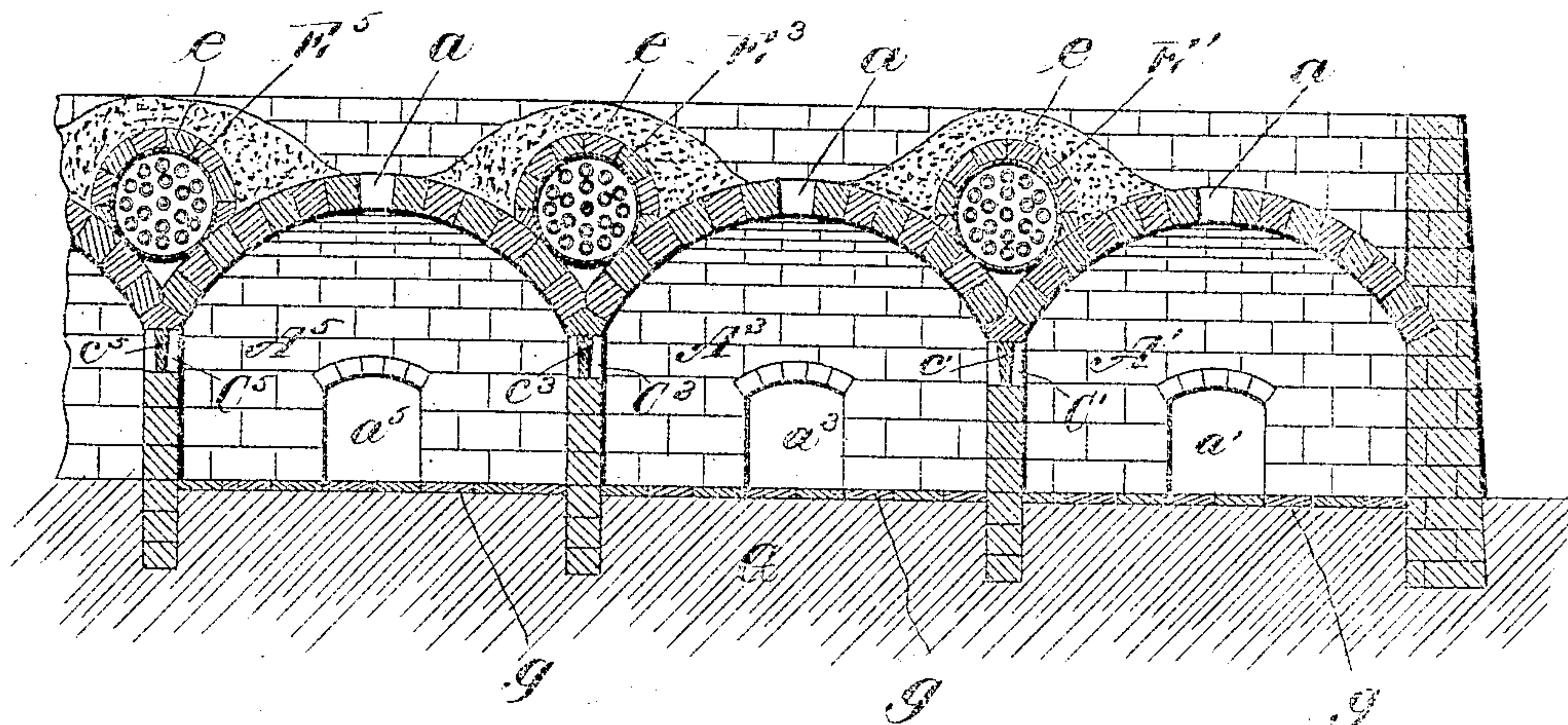
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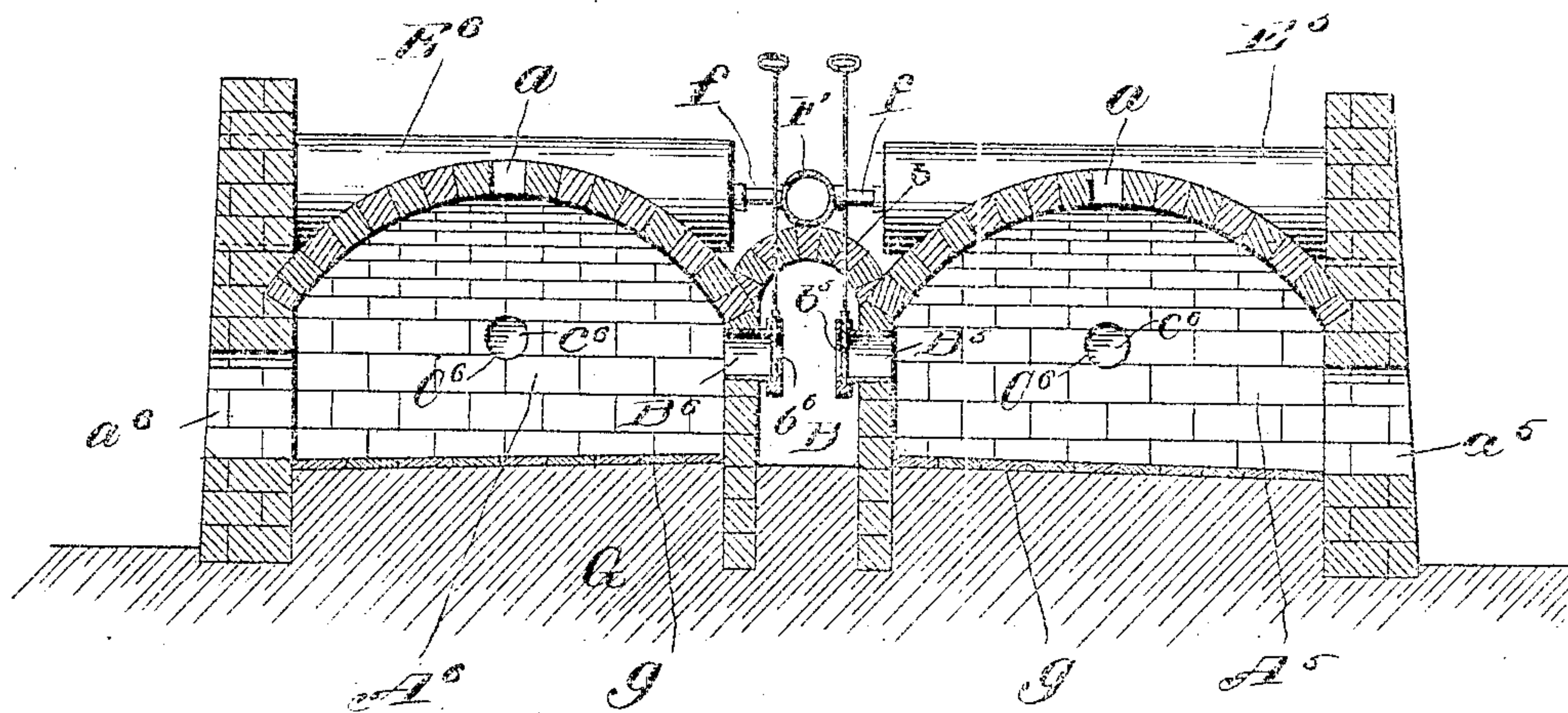
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2 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

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## COKING-OVEN.

SPECIFICATION forming part of Letters Patent No. 786,694, dated April 4, 1905.

Application filed March 20, 1903. Serial No. 148,778.

*To all whom it may concern:*

Be it known that I, JAMES M. SULLIVAN, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have  
5 invented a certain new and useful Improvement in Coking-Ovens; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make  
10 and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates, in general, to coking-ovens, and more particularly to ovens especially designed for coking bituminous coals,  
15 hitherto classified as "non-coking."

The primary object of my invention is to provide an apparatus for eliminating from bituminous, semibituminous, and lignite coals,  
20 such as are ordinarily regarded as non-coking, the volatile ingredients which do not contribute to the value of the coal as a fuel without consuming the original fixed carbon of the coal, thereby converting the coal into a smokeless  
25 fuel possessing a maximum capacity for producing heat.

A further object of my invention is to provide an apparatus for coking coal in which the heat resulting from coal in an advanced  
30 stage of coking is rendered available for promoting the process of coking coal in an initial stage of coking.

My invention has for a final object the production of coking-ovens which will be simple  
35 in construction, comparatively inexpensive to build, and economical and efficient in operation.

The embodiment of my invention herein disclosed consists, generally described, in two  
40 series of ovens, the adjoining ovens in each series being separated by party-walls, through which damper-controlled passages extend, and a flue extending between the two series of ovens having damper-controlled passages communi-  
45 cating with the individual ovens of each series.

My invention further consists in a combined coking and steam-generating plant comprising a battery of cooking-ovens, arranged in

parallel series, boilers supported between the domes of adjacent ovens, and a steam-drum  
50 connected to the several boilers and supported above a flue extending between and communicating with the individual ovens in the series.

My invention will be more fully described hereinafter with reference to the accompanying  
55 drawings, in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is a front elevational view; Fig. 2, a sectional plan view taken on line 2 2, Fig. 1; 60  
Fig. 3, a longitudinal sectional elevation taken on line 3 3, Fig. 2; and Fig. 4, a transverse sectional elevation taken on line 4 4, Fig. 2.

The same reference characters are used to designate the same parts in the several figures  
65 of the drawings.

The plurality of ovens are shown as of the usual beehive type, and are arranged in two parallel series, one series comprising the ovens  
70  $A^1$ ,  $A^3$ ,  $A^5$ , and  $A^7$ , while the other series comprises the ovens  $A^2$ ,  $A^4$ ,  $A^6$ , and  $A^8$ . The individual ovens are provided with the usual doors, through which the coal when coked is withdrawn, such doors being designated at  $a'$   
75  $a^2$   $a^3$ , &c. A trunnel-hole  $a$  is provided through the dome of each oven. A flue  $B$  extends between the series of ovens and is inclosed by the inner-end walls of the ovens in the two series and by an arched top  $b$ . Any  
80 suitable material may be used in the construction of the walls of the ovens capable of withstanding the heat incident to the process of manufacturing coke from bituminous coal. A  
85 passage-way is provided between the flue  $B$  and each individual oven in the two series, such passages being indicated as  $B^1$   $B^2$   $B^3$ , &c. Dampers  $b^1$   $b^2$   $b^3$ , &c., are provided for controlling the openings through the passages  
90  $B^1$ , &c., and are actuated by any suitable means—such, for instance, as rods extending upwardly above the ovens, as shown in Fig. 4. The adjoining ovens of each series are separated by party-walls, through which extend passages, such passages being indicated  
95 by reference characters  $C^1$   $C^2$   $C^3$ , &c. These passages are controlled by dampers  $c^1$   $c^2$   $c^3$ ,



&c., preferably constructed of fire-brick and provided with rods *c*, extending to the exterior of the walls of the ovens, where they may be readily actuated.

5 In order to establish a draft through the flue B, a fan D or similar device is placed in communication with the flue by the short conduit *d*. The fan D may be mounted in any suitable manner—such, for instance, as upon  
10 a shaft *d'*, which may be rotated by a wheel D', to which rotary motion may be communicated by suitable power connections.

In order that the heat generated during the coking process may be utilized, I provide a series of boilers E' E<sup>2</sup> E<sup>3</sup>, &c., which are supported between the arched domes on adjacent  
15 ovens. These boilers are located within cylinders *e*, formed of fire-brick and extending from the outside walls of each series of ovens to points adjacent to the wall *b* at the top of the flue B. A steam-drum F is supported longitudinally above the flue B and is connected by pipes *f* with the several boilers. The  
20 steam may be delivered from the drum F to any points where it is desired to use the same for heating or power purposes.

The floors of the several ovens are preferably covered by fire-brick *g*, supported upon the ground G at a level with the doors *a'* *a''* *a'''*, &c. The separate boilers are preferably  
30 covered with loam or other material to prevent the radiation of heat therefrom.

The operation of my invention is as follows: Alternate ovens in each series are charged simultaneously, and the coking process of the  
35 coal initiated therein. If, for instance, the ovens A' and A<sup>5</sup> in one series and the ovens A<sup>2</sup> and A<sup>6</sup> in the other series are simultaneously charged, the dampers controlling the passages in the side walls are closed and those communicating with the flue B are open, so that  
40 a draft may be established from the flue through the trunnel-holes *a* in each of the ovens so charged. After the process of coking in the  
45 ovens first charged has progressed a predetermined degree the heat generated is utilized to promote the coking in the intermediate ovens A<sup>3</sup> and A<sup>7</sup> in one series and A<sup>4</sup> and A<sup>8</sup> in the other series which have been charged ready  
50 for the initial stage of coking. In order to thus utilize the heat from the ovens where the coking process is in an advanced stage to expedite the initial coking in the adjacent ovens, the dampers *b''* and *b'''* are closed, as well as  
55 the trunnel-holes through the domes of the ovens A', A<sup>5</sup>, A<sup>2</sup>, and A<sup>6</sup>, while the dampers *b'*, *b<sup>5</sup>*, *b<sup>2</sup>*, and *b<sup>6</sup>* remain open and the dampers C' C<sup>5</sup> C<sup>2</sup> and C<sup>6</sup>, C<sup>3</sup>, and C<sup>4</sup> are opened. This arrangement of the dampers results in drafts  
60 being established from the flue B through the dampers *b'* and *b<sup>5</sup>*, thence through the ovens A' and A<sup>5</sup>, thence through the passages C' and C<sup>5</sup> into the oven A<sup>3</sup> and through the trunnel-hole in the dome thereof, thereby expediting  
65 the coking in the oven A<sup>3</sup>. In a similar man-

ner a draft is established from the flue B through the ovens A<sup>2</sup> and A<sup>6</sup> into the oven A<sup>4</sup> and through the trunnel-hole therein.

It is obvious that the system is capable of almost indefinite extension, it being merely  
70 necessary to first charge alternate ovens in each series and subsequently establish drafts through them into the adjoining ovens, in which the coking process is at an initial stage. The heat resulting from the coking process  
75 in the several ovens is communicated to the boilers supported between the curved domes on the ovens, and the steam which is generated therein passes to the common steam-drum F, from which it may be delivered to any de-  
80 sired points.

While the use of ovens embodying my invention will not eliminate all extraneous matters—such as sulfur, ash, &c.—inherent in certain grades of bituminous coal, and conse-  
85 quently is incapable of producing metallurgical coke from such grades of coal, nevertheless a domestic coke may be readily produced constituting an ideal smokeless domestic fuel. Prior to introducing some grades  
90 of bituminous coal into the ovens better results may be effected by washing the coal by any well-known method, thereby removing extraneous matter. When higher grades of  
95 bituminous coal, or coals from which the extraneous matters can be washed, are introduced in the ovens, it is possible by merely prolonging the period of burning to make a metallurgical coke equal in efficiency to coke made in the ordinary beehive-oven from high-grade  
100 coking-coals.

From the foregoing description it will be observed that I have invented an improved coking-oven in which the heat resulting from the coking of coal when the process is in an  
105 advanced stage is rendered available for promoting the coking of coal in other ovens in which the process is in an initial stage.

While I have described more or less precisely the details of construction, I do not wish  
110 to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents as circumstances may suggest or render expedient without departing from the spirit  
115 of my invention.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for coking coal, the combination with a plurality of ovens arranged in parallel series, of party-walls separating adjoining ovens through which passages extend, a flue extending between the series of ovens having passages communicating with the individual ovens in each series, and dampers controlling said passages in the walls and in the flue whereby alternate ovens in each series may communicate with said flue through the adjoining ovens.



2. In an apparatus for coking coal, the combination with a plurality of ovens arranged in parallel series, of party-walls separating adjoining ovens through which passages extend, a flue extending between the series of ovens having passages communicating with the individual ovens in each series, dampers controlling said passages in the walls and in the flue whereby alternate ovens in each series may communicate with said flue through the adjoining ovens, and means for forcing air through said flue thereby promoting the draft through the ovens.

3. In an apparatus for coking coal, the combination with a plurality of ovens of beehive type arranged in parallel series, of party-walls interposed between adjoining ovens in each series through which passages extend, individual dampers controlling said passages, a flue extending between said series of ovens having passages communicating with the ovens in each

series, individual dampers controlling said passages whereby the ovens in said series may be connected with said flue through adjoining ovens.

4. In an apparatus for coking coal, the combination with a plurality of ovens arranged in a series, of party-walls separating adjoining ovens through which passages extend, a flue extending adjacent to the series of ovens having passages communicating with the individual ovens, and dampers controlling said passages in the walls and in the flue whereby predetermined ovens may communicate with said flue through the adjoining ovens.

In testimony whereof I sign this specification in the presence of two witnesses.

JAMES M. SULLIVAN.

Witnesses:

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