

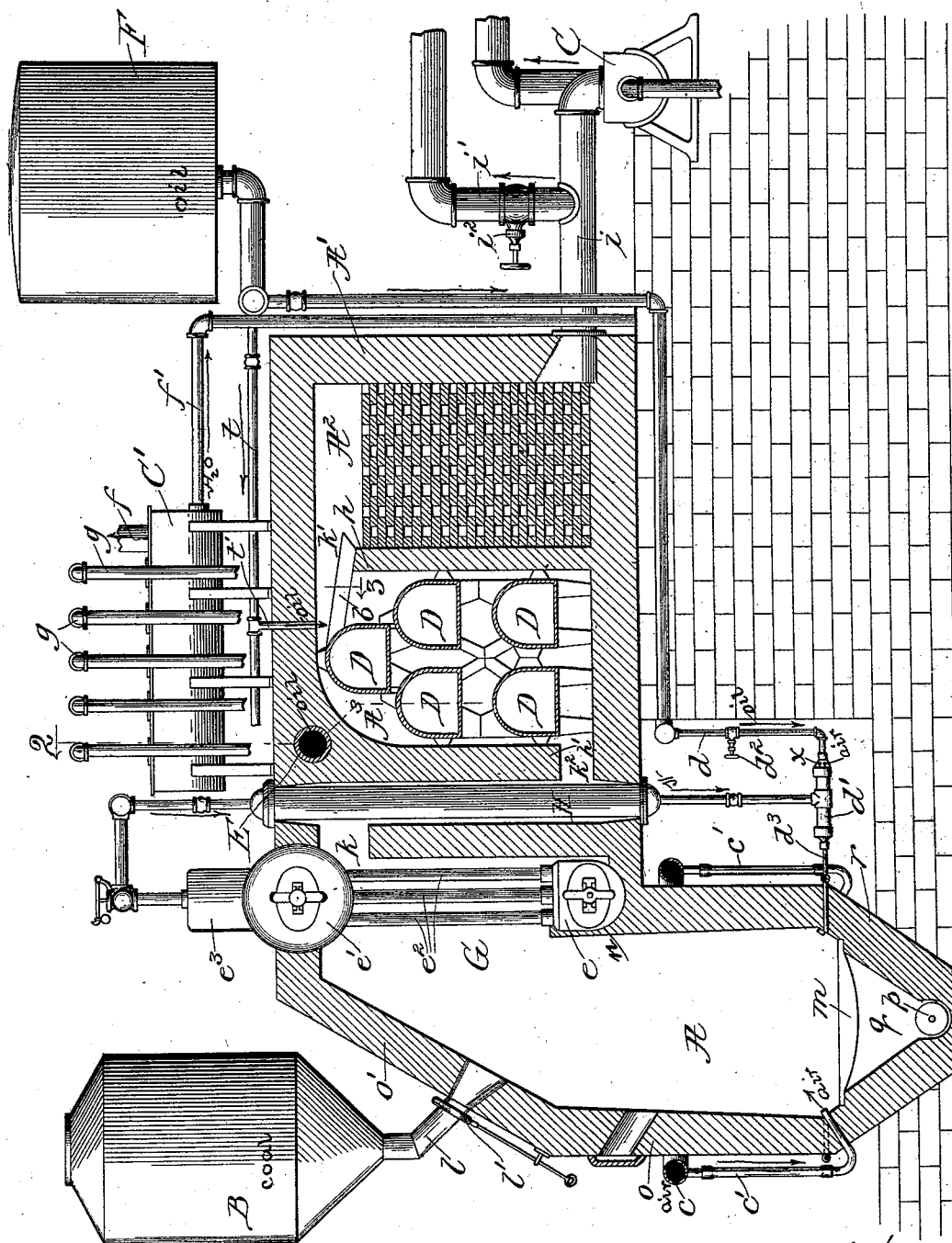
(No Model.)

2 Sheets—Sheet 1.

J. W. KENEVEL.  
GAS MAKING APPARATUS.

No. 522,325.

Patented July 3, 1894.



Witnesses:  
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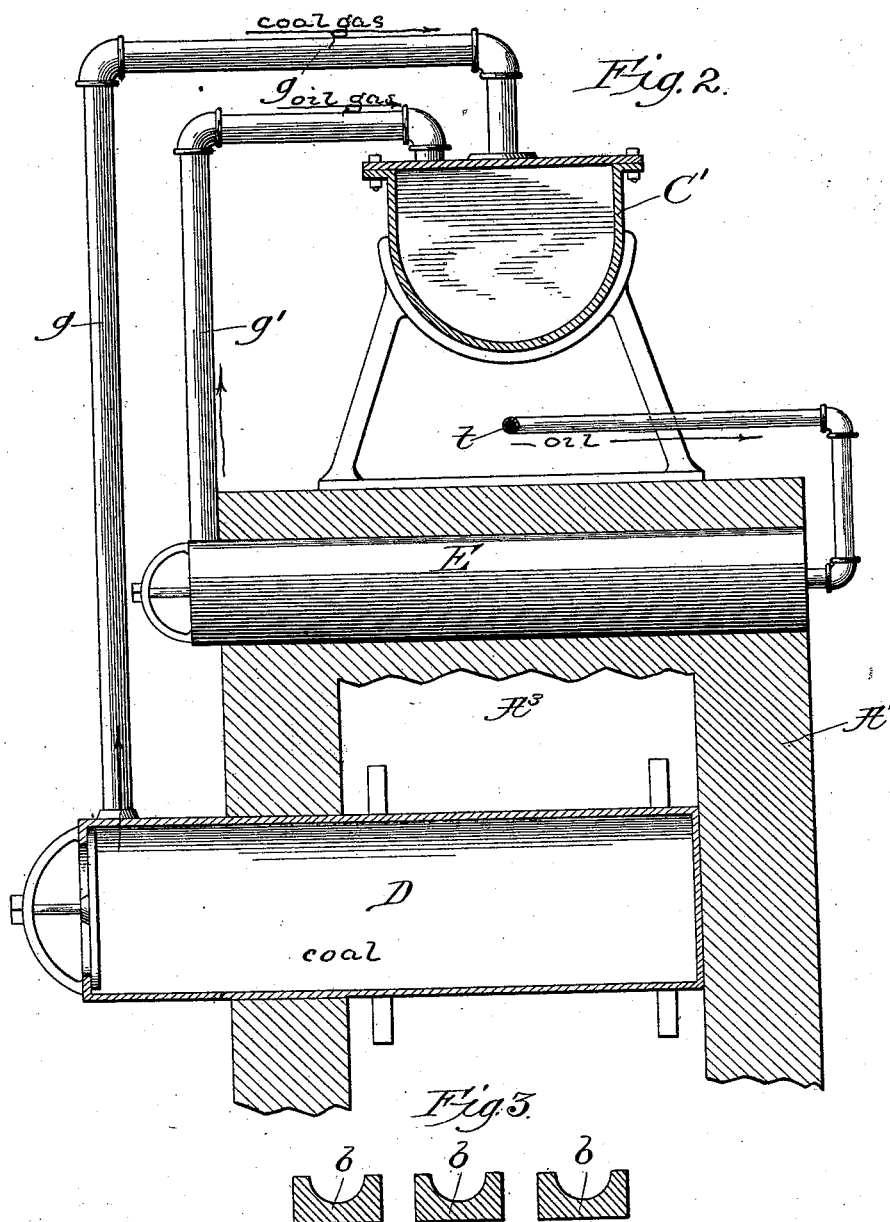
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Witnesses:  
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# UNITED STATES PATENT OFFICE.

JEANNOT W. KENEVEL, OF CHICAGO, ILLINOIS.

## GAS-MAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 522,325, dated July 3, 1894.

Application filed November 14, 1893. Serial No. 490,948. (No model.)

*To all whom it may concern:*

Be it known that I, JEANNOT W. KENEVEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Gas-Making Apparatus, of which the following is a specification.

The object of my invention is to provide a compact structure of apparatus adapted to generate, by a continuous operation in the single apparatus, fuel-gas and employ the heat of the products of combustion to generate steam and superheat it for use in manufacturing the producer-gas, and to distill gas from coal in a retort; and also, to generate gas, for mixture with and enrichment of the retort-gas, from hydro-carbon oil.

My invention consists in the construction and combinations of parts forming my improved apparatus.

In the accompanying drawings, Figure 1 is a view of my improved apparatus, partly broken and in elevation, but mainly in vertical longitudinal section. Fig. 2 is a section of the same taken at the line 2 on Fig. 1 and viewed in the direction of the arrow; and Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow.

A is the producer-gas or fuel-gas generator preferably in the form of structure illustrated in Fig. 1 and comprising a transversely downward-tapering or V-shaped base *r*, containing the ash-pit *q*, in which is provided a rotary conveyer *p*; a rectangular body-portion *o*, slightly inclined backward on the inner side of its front wall and provided with a boiler-seat *n* in an offset of its rear wall, the front wall then inclining upward and backward, as shown at *o'*, to the top of the apparatus.

Above the ash-pit is seated a grate *m*; and for feeding the chamber A with coal-slack (which is the material preferably used for my purpose, though it may be coal in any suitable form) I provide a holder B having a hopper-bottom, from which a chute *l* extends through the wall *o'*, and is provided with a valve *l'*.

Behind the chamber A, and communicating therewith through an upper passage *k*, is a chamber A' having at its rear lower end an

outlet *i* for the producer-gas, leading to a water-main C and provided with a branch-pipe *i'*, containing a shut-off valve *i''*, and through which to permit gas from the chamber A' to be directed immediately to the point of consumption, when desired, without passing it through the water-main.

The chamber A' is sub-divided into intercommunicating chambers A<sup>2</sup> and A<sup>3</sup> by the upward extending partition *h* and the depending partition *h'* affording, respectively, the upper and lower passages *k'* and *k''*. The sub-chamber A' contains interstitially disposed fire-brick to render it a checker-chamber, and in the sub-chamber A<sup>2</sup> are supported a number of retorts D, which communicate through pipes *g* with a water-main C' supported on the top of the structure and having an upper gas-outlet *f* and a lower discharge-pipe *f'* for the water.

In the corner of the upper wall of the chamber A', adjacent to the passage *k*, is embedded an oil-holder E communicating through a pipe *t* with a hydrocarbon oil supply-holder F and with the water-main C' through a pipe *g'*.

G is a steam-boiler comprising the reservoirs *e* and *e'* supported, respectively, on the offset at the rear of the chamber A and at the upper end of the chamber, the two being connected by the vertical flues *e''*, whereby the boiler is in the path of the products of combustion to the flue *k*.

Between the rear wall of the chamber A and the depending partition *h'* is supported a vertical steam-super heating drum H, communicating at its upper end with the steam-dome *e''* and from its lower end with a head *d'*, having air-inlet openings *x* in its rear end and into which leads a pipe *d*, containing a valve *d''* and communicating with the oil-tank F; and from the head *d'* proceeds a pipe *d''*, which branches at desired points into the chamber A just above the plane of the grate *m*.

An air-pipe *c*, communicating with an air-blast (not shown, but in a manner well-known) encircles the body *o* of the chamber A and has branches *c'* leading into the chamber adjacent to the branches of the oil-and-steam pipe *d''*.

The operation is as follows: A fire is built on the grate *m* and coal is piled thereon and

blasted with air until it is raised to a condition of incandescence; and the hot products of combustion pass through the flue *k* and passages *k'* and *k''* in the chamber *A'* to the outlet *i*, whence they are directed into the water-main *C* and, if desired, into the branch-pipe *i'*. The heat of the products of combustion is not so materially reduced by expenditure on the boiler *G*, to make steam, and superheater *H*, to superheat the steam, owing to the small surface-areas thereof compared with the size of the generating chamber and volume of the fuel-bed, as to render it inadequate to distill gas from coal in the retorts, heat the wall *h'* and surroundings in the chamber *A'* sufficiently to cause radiation therefrom to vaporize the oil in the holder *E*, and heat the gas-fixing checker-chamber *A''*. When the fire is well under way with the bed of fuel reduced to a glowing mass, and when steam has been generated and superheated to an extent which renders it practically dry steam, the oil and superheated-steam supplies are turned on to be forced into the generating chamber *A* with the air. Thus a large portion of the heat of the products of combustion expended in generating and superheating steam is returned to the bed of fuel to intensify the combustion thereof; and I find that the amount of the heat of products of combustion expended on the comparatively small boiler and superheater, leaves ample heat therein to exert the desired effect on the retorts, oil-vaporizer and checker-chamber. When, however, the heat of the products of combustion becomes, eventually, reduced below the degree at which its required effect in the chamber *A'* is produced, the blast of oil and steam to the generator is shut off, leaving the fuel to be again raised by the air-blast to desired incandescence before again introducing the oil and superheated steam. Thus, as will be seen, the apparatus need not operate continuously as a gas-distiller from the retorts and oil-holder, its continuity in that respect being subject to interruption whenever the intensity of the fire in the generating chamber becomes subdued to an extent requiring it to be blasted with air alone, during which time the product is a mere producer-gas.

The products from the holder *E* and retorts *D* enter the water-main *C'*; and the products of combustion from the generating chamber pass through the gas-fixing checker-chamber *A''*, becoming enriched on the way by taking up hydrocarbon-oil run into the inclined troughs *b* (which should be readily removable for the purpose of cleaning) from branches *l'* of the pipe *l*. The superheated steam meets with the hydrocarbon-oil at the head *d'* and vaporizes and sprays the mixture through the branches of the pipe *d''* into the fuel on the grate *m*, where it also meets the air from the branches *c'*; and, with the apertures *x* open, air is drawn into the head

*d* by the steam, to commingle with it and the oil-vapor injected into the fire.

The construction of the chamber *A* shown and described, particularly as to the portion above the V-shaped base, is advantageous in the way of presenting, by the backward inclination of the front walls, a directing course for the products of combustion toward the outlet-flue *k* and at the same time tending to confine them and thus the better promote the combustion.

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

1. In a gas-making apparatus, the combination of a generating chamber *A* and a chamber *A'* communicating therewith and containing a retort-containing chamber *A''* and a checker-chamber *A''* provided with the outlet, a steam-boiler and a steam-superheater connected with it, both interposed in the path of the products of combustion to said outlet, and a hydrocarbon-oil supply-holder *F* having an outlet-pipe combined with the steam-superheater outlet and leading thence into said generating chamber, substantially as described.

2. In a gas-making apparatus, the combination of a generating chamber *A* and a chamber *A'* communicating therewith through a flue *k*, and containing partitions *h* and *h'* affording passages *k'* and *k''* and dividing said chamber into sub-chambers *A''* and *A'''* containing, respectively, checker-work and an outlet, and retorts *D*, a steam-boiler in the chamber *A* and a steam-superheater *H* at the entrance to the chamber *A'* and communicating with the dome of the boiler, oil-troughs *b* in the chamber *A'*, and a hydrocarbon-oil supply-holder *F* having an outlet-pipe combined with the steam-superheater outlet and leading thence into the chamber *A*, and having branches leading to the said troughs, substantially as described.

3. In a gas-making apparatus, the combination of a generating chamber *A* and a chamber *A'* communicating therewith and containing a retort-chamber *A''* provided with retorts and a checker-chamber *A''* having an outlet and both being in the path of the products of combustion to said outlet, a steam-boiler and a steam-superheater connected with it, both interposed in the path of the products of combustion, a hydraulic main *C'*, with which the retorts communicate, a hydrocarbon-oil holder *E* embedded in the wall of the structure and communicating with said hydraulic main, and a hydrocarbon-oil supply-holder *F* having an outlet-pipe combined with the steam-superheater outlet and leading thence into the generating chamber, substantially as described.

4. In a gas-making apparatus, the combination of a generating chamber *A* and a chamber *A'* communicating therewith through a flue *k* and containing a retort-chamber *A''* provided with retorts and a chamber *A''* provided with the outlet and containing checker-work,

a steam-boiler G comprising the lower and upper heads *e* and *e'* connected by the tubes *e<sup>2</sup>* and interposed in the path of the products of combustion through said flue, a steam-superheater H at the entrance to the chamber A' and communicating with the steam-dome of the boiler, a hydraulic main C with which the retorts communicate, and a hydrocarbon-oil supply-holder F having an outlet-pipe combined with the steam-superheater outlet and leading thence into the generating chamber, substantially as described.

5. In a gas-making apparatus, the combination of the generating chamber A provided with a flue *k* and formed with a body-portion *o* provided with the inclined inner front wall and the wall *o'* inclining upward and backward toward the said flue, a chamber A' behind the chamber A and subdivided into a chamber A<sup>2</sup> provided with an outlet and containing checker-work, and a chamber A<sup>3</sup> communicating with the checker-chamber and containing retorts D, a hydraulic main C' communicating with the retorts, a steam-boiler and a steam-superheater supported in the structure in the path of the products of combustion, a pipe-connection between the steam-

superheater and chamber A and an air-blast pipe for the said chamber, substantially as described.

6. In a gas-making apparatus, the combination of the generating chamber A provided with a flue *k* and formed with a V-shaped base *r* affording the ash-pit and containing a rotary conveyer *p* and a grate *m*, a body-portion *o* provided with the inclined inner front wall and the wall *o'* inclining upward and backward toward said flue, a chamber A' behind the chamber A and subdivided into a chamber A<sup>2</sup> provided with an outlet and containing checker-work, and a chamber A<sup>3</sup> communicating with the checker-chamber and containing retorts D, a hydraulic main C' communicating with the retorts, a steam-boiler and a steam-superheater supported in the structure in the path of the products of combustion, a pipe-connection between the steam-superheater and chamber A and an air-blast pipe for the said chamber, substantially as described.

JEANNOT W. KENEVEL.

In presence of—

M. J. FROST,

W. N. WILLIAMS.