

(No Model.)

2 Sheets—Sheet 1.

J. J. JOHNSTON.

METHOD OF MANUFACTURING GAS.

No. 312,730.

Patented Feb. 24, 1885.

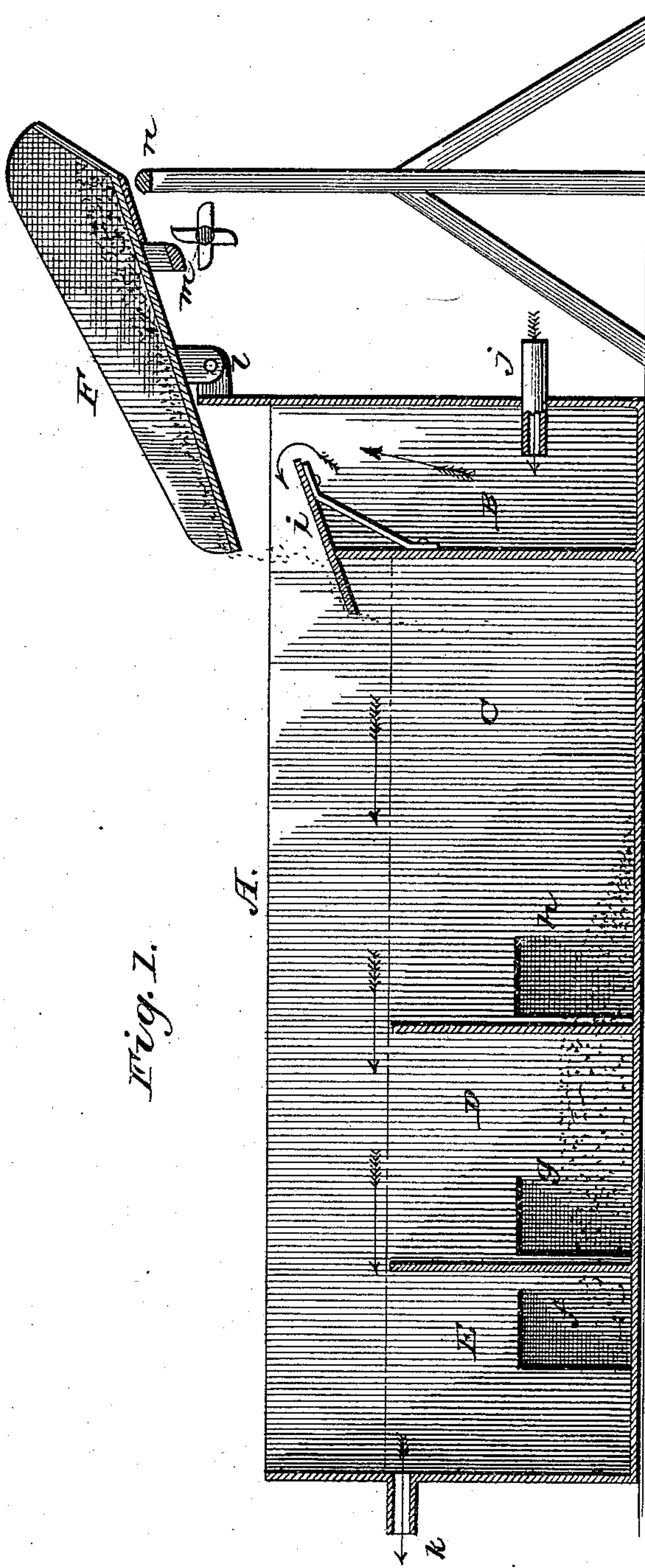


Fig. 1.

WITNESSES:

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W. J. King

INVENTOR.

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(No Model.)

2 Sheets—Sheet 3.

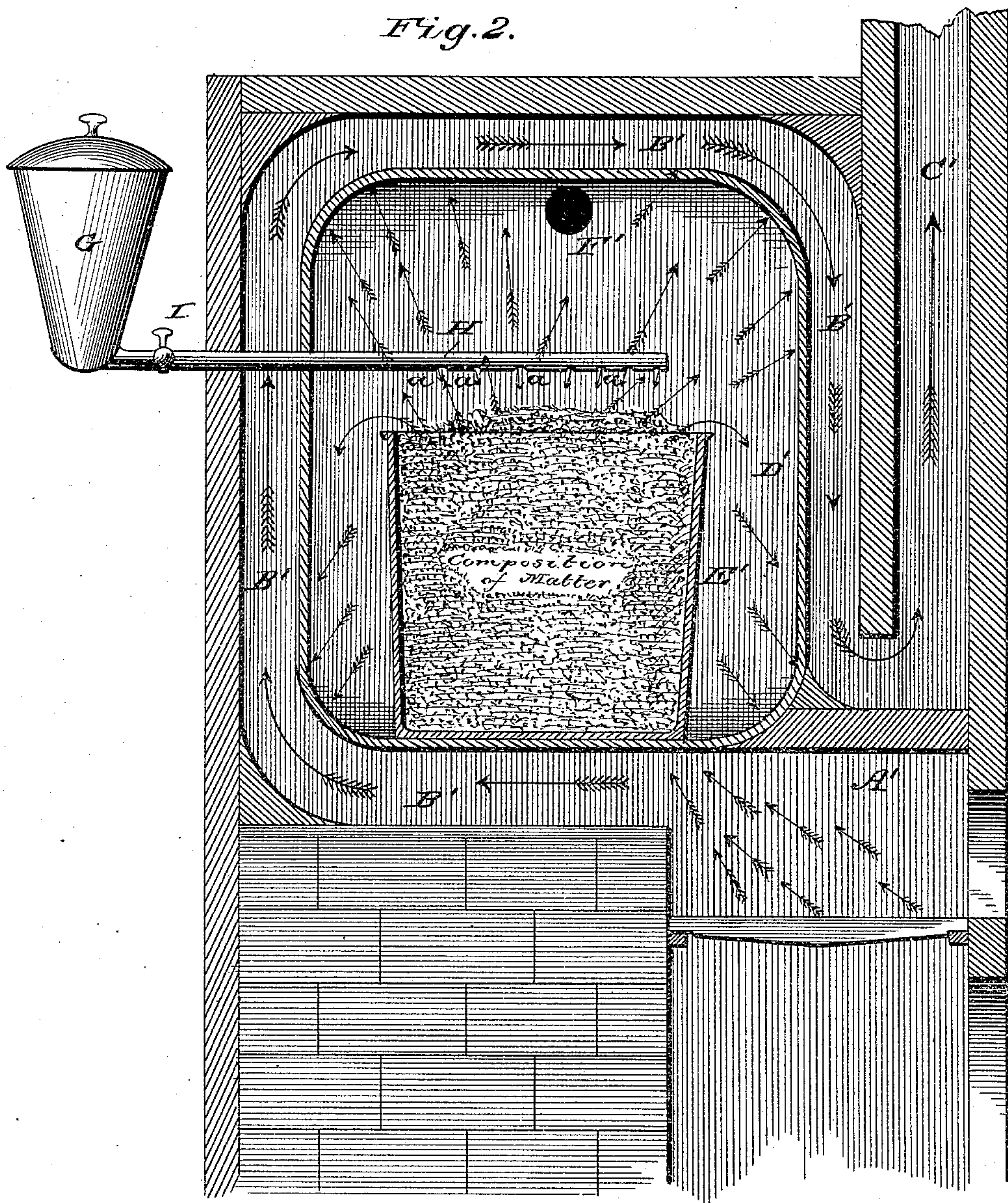
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Fig. 2.



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JAMES J. JOHNSTON, OF COLUMBIANA, OHIO, ASSIGNOR TO THE LIGHT AND FUEL COMPANY, OF SAME PLACE.

METHOD OF MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 312,730, dated February 24, 1885.

Application filed July 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. JOHNSTON, of Columbiana, in the county of Columbiana and State of Ohio, have invented a new and useful Improvement in Methods of Manufacturing Gas; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improvement in the method of manufacturing gas for purposes of light and heat; and it consists in pulverizing bituminous coal, mechanically separating the sulphur therefrom, and then drying said coal, then adding oleaginous matter and water thereto, and subsequently evolving gas therefrom in an open retort placed in a heating-chamber of much greater capacity than said retort, as will hereinafter be more fully described.

To enable others skilled in the art with which my invention is most nearly connected to make and use it, I will proceed to describe it in detail, reference being had to the accompanying drawings, and to the letters of reference marked thereon, said drawings forming part of this specification.

It is a well-ascertained fact that the presence of sulphur in coal vitiates the gas evolved from it; and it is also a well-known fact that the first action of heat upon the coal charged into a retort, in the operation of making gas, results only in the disintegration of the coal, and that this disintegrating process must take place before any considerable quantity of gas in the coal can be evolved from the coal. It is also well known that perfect disintegration of the coal does not take place in the retort by the action of the heat in the ordinary process of making gas. This is demonstrated by the presence of coke in lumps in the retort after the operation of evolving the gas from the charged coal. It is a demonstrable fact (and may be said to be self-evident) that, when perfect disintegration of the coal in the retort does not take place, loss of gas is sure to occur. It is also a well-known fact that all bituminous coals do not yield up or give off the same quantity and quality of gas, which fact is due to a lack of oleaginous matter and bitumen in the coal.

The foregoing statement of facts will aid

much in making apparent the novelty and advantage of my method of making gas. I take any quality of bituminous coal, and by means of suitable mechanism pulverize it to a powdered condition and then mechanically separate the sulphur from it by means of the apparatus represented in Figure 1 of the accompanying drawings, the operation of which is as follows: The pulverized coal is placed in or is allowed to fall from the pulverizing-machine into the hopper F, which is agitated by means of the cam-shaft *m*, the hopper being pivoted at *l*, and after each lift of it by the cams or wings upon the shaft *m* it falls on the upper end of the post *n*, thereby causing a jarring of the hopper, which will cause the pulverized coal to be gradually and evenly discharged from the lower end of the hopper upon an inclined chute, *i*, supported upon the first of a series of partitions dividing the tank into separate compartments B C D E. A current of water supplied from any suitable source enters the compartment B through the pipe *j*, and having filled said compartment flows over the chute *i* into the compartment C, and thence over the dividing-partitions into the remaining compartments, finally escaping through the exit-pipe *k*. When the several compartments are filled with water and a constant current of the water is flowing in the tank A, the agitation of the hopper F is commenced, which causes the pulverized coal to be evenly distributed over the surface of the water as it flows down the chute *i* into the compartment C. The specific gravity of the sulphur in the coal being greater than that of the coal, the former is precipitated down through the water upon the bottom of the compartment C, and the coal passes over into the compartments D E, by which time it becomes saturated with water and sinks to the bottom of said compartments D E, from which compartments the washed and purified coal is removed through the doors *f g*, and then dried and heated to about 90° Fahrenheit. To each one hundred (100) pounds avoirdupois of the coal thus treated is added about sixteen pounds, avoirdupois, of water by spreading the coal and sprinkling the water over it, and then thoroughly stirring the coal; then in like manner is added about ten (10) pounds,

avoirdupois, petroleum-oil or other oleaginous matter. These three ingredients being so united as to form a homogeneous mass, the desired quantity of it is charged into an open
 5 retort—such as is shown in Fig. 2 at E—which retort is placed in a chamber D', which is then sealed up, and which is made of much greater capacity than said retort for the purpose of
 10 acting upon the gas as it is evolved from the composition of matter in the retort E'. The lighter part of the gas is forced against the heated walls of the chamber D', and thereby converted into a fixed gas, which passes off
 15 from the chamber D' through the opening F' into the "hydraulic main," and is then treated and manipulated in the ordinary manner and by the usual means. The furnace A', with its flue or flues B' B' B' B', is so constructed
 20 that the heat shall pass entirely around the chamber D' before passing off through the furnace-stack C'.

In the making of gas it often occurs that the gas is too rich in carbon, which results in the
 25 gas (when ignited) burning with a dark dull flame. To remedy this defect in the gas the charge in the retort D' is supplied with water and petroleum-oil through the medium of the pipes H, having perforations *a a a a* and valves
 30 I, and communicating with the reservoirs G, which may be supplied with said oil and water. The oil and water should be added to the charge in the retort D slowly and in small

quantities, for reasons that will be apparent to the skilled operator without further description. This adding of oil and water to the
 35 charge in the retort D should be continued until the gas in the holder is in condition for burning with a clear white light.

The composition of matter and the apparatus herein described, and shown in the accompanying drawings, I do not claim herein, they being the subjects of other applications
 40 for Letters Patent filed simultaneously herewith, bearing serial numbers 138,881 and 138,882, and marked Case A and Case B, respectively.

Having thus described my improvement, what I claim as of my invention is—

The method hereinbefore described of manufacturing gas, consisting in pulverizing bituminous coal, mechanically separating the sulphur therefrom, adding to said coal oleaginous matter and water, thereby forming a
 50 homogeneous composition of matter, subjecting the said composition to conducted heat, and permitting the resulting gases to expand and come in direct contact with the heat-conducting medium, thereby fixing them, substantially as described.
 55 60

In testimony whereof I have hereunto set my hand this 21st day of June, A. D. 1884.

JAMES J. JOHNSTON.

Witnesses:

A. C. JOHNSTON,
 A. C. ELLIS.