

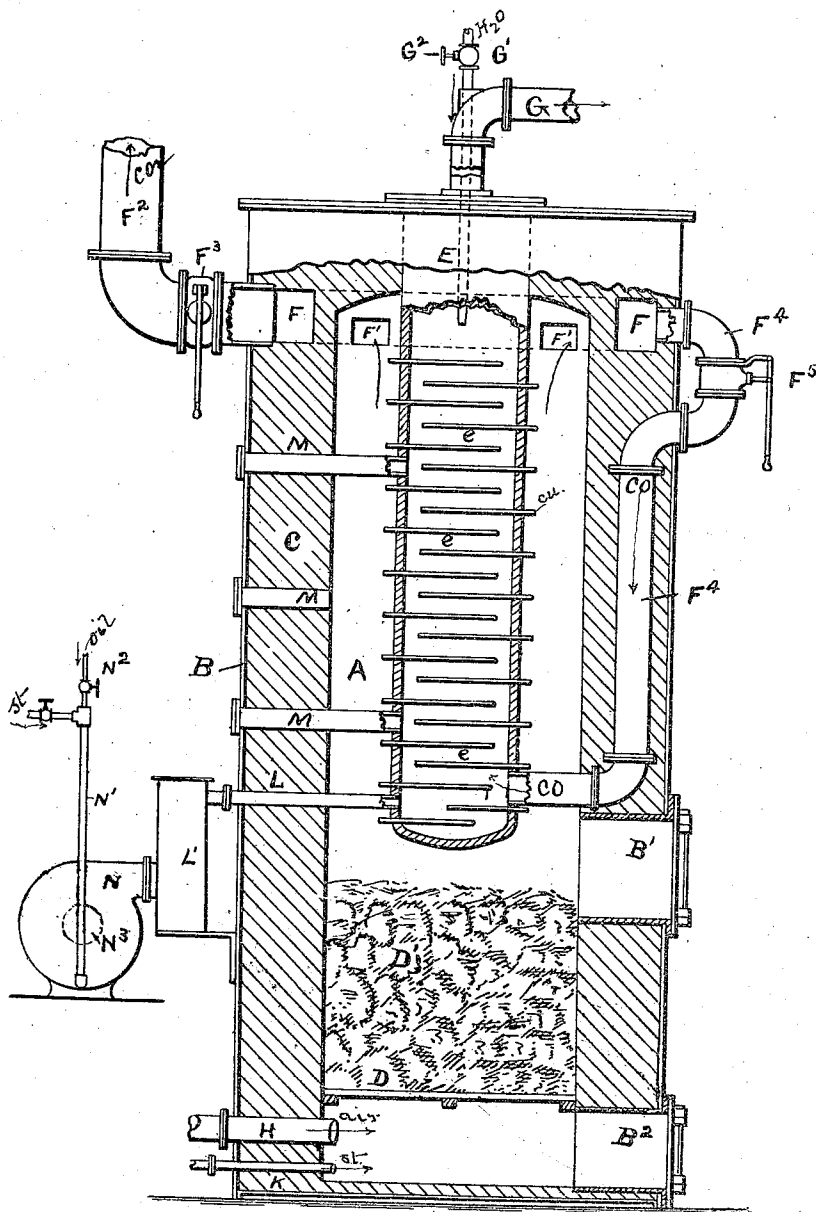
(No Model.)

E. R. ELLSWORTH.

PROCESS OF AND APPARATUS FOR THE MANUFACTURE OF GAS.

No. 506,168.

Patented Oct. 3, 1893.



WITNESSES:

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EDWIN R. ELLSWORTH, OF BROOKLYN, NEW YORK, ASSIGNOR TO CLARENCE O. DOUDEN, OF SAME PLACE.

PROCESS OF AND APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 506,168, dated October 3, 1893.

Application filed January 23, 1893. Serial No. 459,434. (No model.)

To all whom it may concern:

Be it known that I, EDWIN R. ELLSWORTH, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Process of and Apparatus for the Manufacture of Gas, of which the following is a specification.

My invention relates to the manufacture of gas which is wholly or partly formed by passing vapors containing hydrocarbon in a highly divided state through a heated receptacle for the purpose of disorganizing them and recombining them with other of the component parts of the gas, and consists of the process and of the devices and combinations herein-after described and claimed whereby a new and useful gaseous aggregate is produced.

The drawing represents a sectional elevation of my improved apparatus for the manufacture of gas.

Referring to the drawing, my apparatus in which the process of manufacture is carried on consists of a vertically elongated furnace A contained in a cylindrical iron shell B lined with refractory material. It is provided with a firing door B¹ and an ash-pit door B², both capable of being hermetically sealed at will. A grate D serves to support a thick bed of coal or coke D'. The retort E is suspended from the top of the structure so that its lower end is within a few inches of the bed of coal D' and its cylindrical shell is pierced by numerous holes which are threaded to receive a series of copper rods, e, e, e tightly screwed into them and which project into the interior of the retort and nearly to the opposite side of it.

Contained in the refractory lining of the furnace near its upper end is the annular flue F, which connects with the interior of the furnace by the openings F', F', and with the chimney by the flue F² which is provided with a valve F³ by which it may be closed; a pipe F⁴, provided with a valve F⁵ connects the flue F with the bottom of the retort E; this pipe is preferably contained in the refractory lining of the furnace as shown.

The retort A is provided at its upper end with an eduction pipe G by which the gas formed is conveyed to a holder; on leaving

the retort this pipe is perpendicular for a certain distance and incloses a smaller pipe G', the purpose of which will be explained later. Below the grate, at the bottom of the structure are placed a pipe H through which compressed air may be forced into the furnace and a pipe K through which steam may be introduced. Entering into the bottom of the retort E is a pipe L which connects with a receiver L' placed outside of the structure. A vacuum blower is connected to the receiver by a pipe entering it at a point about equidistant from its top and its bottom; this blower N has its inlet openings hermetically closed save for a pipe N' connecting with the steam supply, and is driven at a high rate of speed by a belt running on its pulley N³. The pipe N² connects with a tank containing the liquid hydrocarbon, which is placed at such an elevation that the hydrocarbon will descend by gravity to the blower N on the valve being opened. By means of the peep-holes M, M, M., the interior of the furnace and of the retort may be inspected.

The operation of the plant is as follows:—A fire having been built on the grate D, the firepot is filled with coal or coke and compressed air is forced in by the pipe H until the coal is brought to a state of incandescence and the retort E has attained a bright red heat; the valve F³ is then closed and F⁵ opened, the admission of air through the pipe H is stopped and steam is introduced by the pipe K. At the same time the blower N is set in motion and a small quantity of steam is admitted by the pipe N' while hydrocarbon is admitted by the pipe N². By means of the vacuum blower N the hydrocarbon is broken up into an impalpable spray, just enough steam being admitted to the blower to preserve the vacuum. This is an important feature of my process as the presence of any considerable quantity of steam in this vapor, when introduced into the retort will disturb and prevent the chemical reactions desired. A vapor is thus formed containing a very small quantity of steam and a maximum quantity of hydrocarbon; this passes to the hollow, preferably cylindrical receiver L' where any unvaporized particles are removed by gravity and from thence to the retort E by

the pipe L. The steam admitted at K, passing up through the bed of coals D' is decomposed and crude water gas is formed, which passing out of the furnace by the flues E' and F is conducted by the pipe F⁴ to the bottom of the retort E where it mingles with the vapor entering from the pipe L as before described. The valve G² of the pipe G', which is connected with an overhead supply of water, is now opened, and water is allowed to enter the retort E drop by drop, having first been heated by its passage through the lower portion of G' surrounded by the hot pipe G. The water dropping from G' falls into the retort filled with incandescent copper rods and the nascent steam thus formed enters into immediate combination with the already decomposed mixture of crude water-gas and hydrocarbon vapors ascending through the retort, the whole passing on upward over the highly heated copper rods and emerging from the retort at its upper end—a perfectly fixed gas.

In my process the order in which the crude water gas, the hydrocarbon vapor and the nascent steam are brought together as herein stated is highly essential, any deviation from the process as here laid down, materially altering the results obtained. After a certain time, the heat of the apparatus having become reduced, it will be necessary to stop and heat up again; to this end the blower is stopped, N', N² and G' closed, the valve F³ is opened and F⁵ closed, the admission of steam at K is discontinued and air is again admitted at H, more coal is added to the fire if necessary and the apparatus is heated as before.

What I claim as new and of my invention is—

1. The process of manufacturing gas, which consists in heating a retort adjacent to a bed of incandescent coals, passing steam through said bed of coals to produce crude water gas, forming an attenuated vapor containing a

maximum of hydrocarbon, conveying said water gas and said vapor separately into said heated retort and mixing them therein, then adding to said mixture superheated steam formed by admitting water to the heated retort, drop by drop, and finally passing the gaseous mixture through and from the retort, substantially as described.

2. In an apparatus for making gas, the combination of a vertically elongated furnace having a grate in its lower portion and provided at the top with a valved exit flue, means for introducing air and steam below the grate, a vertically elongated retort, suspended from the top of the furnace and provided at its upper end with an exit flue, means for introducing into said retort a vapor of hydrocarbon, a valved pipe for conducting water gas from the interior of the furnace into said retort, and means for dropping a small stream of water into said retort, substantially as described.

3. In an apparatus for making gas, the combination of a retort, a blower communicating with the retort and provided with supply pipes through which said blower is connected with sources of steam and hydrocarbon oil, and a drip pipe connecting the upper end of the retort with a source of water supply, substantially as described.

4. In apparatus for gas making, the combination of a retort provided with one or more copper rods projecting into its interior, a pipe connecting with a supply of hydrocarbon vapor, a pipe connecting with a supply of water-gas and a drip-pipe connecting with a supply of water, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 5th day of January, 1893.

EDWIN R. ELLSWORTH.

Witnesses:

CLARENCE O. DOUDEN,
JOHN H. MILLER.