

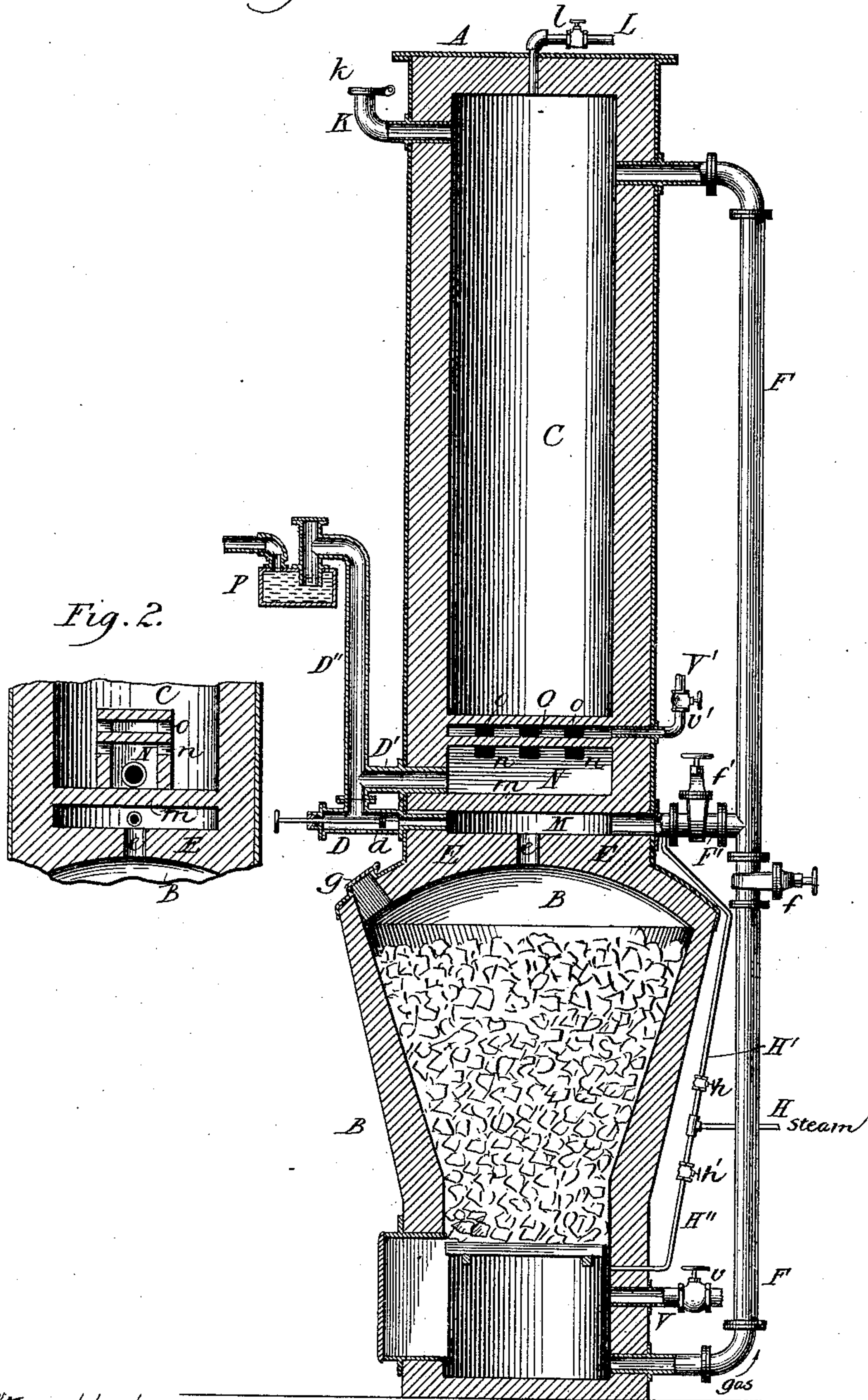
(No Model.)

H. S. BATTIN.
APPARATUS FOR MANUFACTURING GAS.

No. 410,820.

Patented Sept. 10, 1889.

Fig. 1.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY S. BATTIN, OF CHICAGO, ILLINOIS.

APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 410,820, dated September 10, 1889.

Application filed April 2, 1889. Serial No. 305,683. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. BATTIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Manufacturing Gas; and I do hereby 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 appertains to make and use the same.

This invention relates to that kind of gas-generating cupola in which the carbureting and fixing chamber is placed above the fuel-chamber, and in which the water-gas produced by decomposing steam in contact with the incandescent fuel is passed first into the upper and cooler portion of the fixing-chamber near the place where the hydrocarbon oil or vapor is admitted, and in which the water-gas and oil vapor are passed down through successively-hotter portions of the fixing-chamber, and thereby most economically combined and fixed.

The object of my invention is to provide an improved construction of the cupola-furnace and its connecting-pipes by means of which steam may be passed either up or down through the bed of fuel and the resulting water-gas passed off either at top or bottom of the bed of fuel and conducted to the upper portion of the fixing-chamber. In the class of cupola-generator above mentioned I have secured in practice much better results by passing steam in both directions through the fuel, such as a larger yield of gas and a better quality thereof. The process forms no part of my present application, but the peculiar construction and arrangement of parts of the generator as defined in the claims constitute my invention.

In the accompanying drawings, Figure 1 represents a vertical section of the cupola-furnace. Fig. 2 represents a sectional detail thereof.

The cupola is built of brick inclosed within a tight iron jacket in the usual manner, and is divided by the perforated arch E and the solid horizontal plate *m* into the fuel and decomposing chamber B at the base and the combining and fixing chamber C above. The

fuel-chamber is provided with the usual grate, ash-pit, and door at the bottom. The fuel-charging doors *g* are placed in the laterally-projecting portion at the top of chamber B. An air-supply pipe V, having valve *v*, connects with the ash-pit. A second air-supply pipe V', having valve *v'*, connects with the air-distributing chamber O near the base of the fixing-chamber. A steam-supply pipe H connects by pipe H' with the top of the fuel-chamber, preferably through medium of pipe F', chamber M, and opening *e* in the arch, and a second steam-pipe H'', having valve *h'*, leads down into the ash-pit or the lower part of the fuel-chamber. Above the perforated arch E, I construct a solid horizontal partition *m*, so as to form a small gas-chamber M. Above chamber M, I construct a perforated gas-distributing chamber N, and above such chamber I provide a similar air-distributing chamber O. These chambers are rectangular and arranged transversely across the base of fixing-chamber C. They are separated by a horizontal partition, and are provided, respectively, with ports *n* and *o* for distributing the gas and air which are burned in fixing-chamber C. Pipes D, D', and D'' connect chambers M and N, and pipe D'' leads from pipe D' to the seal-box P for taking off illuminating-gas from chamber C. A valve *d*, of any suitable construction, is provided in pipe D for controlling the flow of gaseous products from the fuel-chamber to the combustion-chamber at the base of chamber C. Pipe F, having valve *f*, connects with the ash-pit and also with the top of the fixing-chamber. The branch pipe F', having valve *f'*, connects the gas-chamber M with pipe F. These pipes serve to conduct water-gas either from the bottom or top of the fuel-chamber into the top or upper portion of the fixing-chamber. A supply-pipe L, having valve *l*, for hydrocarbon oil or vapor, connects with the top of chamber C. A short smoke-stack K, having a lid *k*, connects with the top of chamber C. In practice chamber C is filled with refractory tile or brick-work set in the usual manner.

The operation is conducted as follows: Lid *k* and valve *d* being open, a fire is kindled on the grate and the fuel gradually fed in and the air-blast admitted till a deep bed of in-

candescant fuel is formed. The gaseous products containing a valuable percentage of carbonic oxide are conducted through pipes D D' into the distributing-chamber N, from which they escape through ports *n*. Streams of air pass through port *o* and mingle with the streams of gas on each side of the chambers N and O, causing uniform and perfect combustion. The resulting gaseous products finally escape by a stack-pipe K. The fuel-chamber having been heated to the proper temperature, well known to those skilled in the art, the valve *d* and lid *k* are closed. Steam is now admitted into the fuel-chamber either at the top or bottom thereof. If first admitted at the bottom, it is decomposed by passage up through the fuel, and the resulting water-gas is passed off through pipe F', the valve *f'* of which is open, and is passed thence through pipe F into upper portion of fixing-chamber, where it is carbureted, combined, and fixed, and the resulting illuminating-gas passes by way of ports *n*, chamber M, and pipes D' D'' to the seal-box. After steam has been passed up through the fuel the desired length of time, valve *f'* is closed, valve *f* opened, and the steam passed by pipe H' into pipe F', connecting with the top of the fuel-chamber; or the steam may be passed directly through the wall of the furnace. The course of the steam, either up or down through the fuel, may be reversed either during a gas-making run or during successive runs, according to the state of the fuel.

The apparatus is periodically heated up by blasts of air, as well understood in the art. In practice I have been able to much better control and utilize the heat of my bed of fuel by passing the steam both up and down through it as required. By means of my perforated gas and air distributing chambers N and O, arranged as above described, I have

been able to produce a much more uniform and complete combustion of the gaseous products in the fixing-chamber.

I am aware that it is not broadly new to pass steam both up and down through a bed of fuel, and I do not claim such process.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with a cupola gas-generating furnace having a fuel-chamber at the base and a fixing-chamber above, a valved water-gas pipe leading from the base of the fuel-chamber to the upper portion of the fixing-chamber, a valved branch pipe connecting the top of the fuel-chamber with such water-gas pipe, a valved pipe for gaseous products, connecting the top of the fuel-chamber with the bottom of the fixing-chamber, and valved steam-supply pipes connecting with both the bottom and top of the fuel-chamber, as and for the purpose described.

2. In combination with the fuel-chamber of a cupola gas-generator, the perforated arch E, the solid horizontal division-plate *m*, forming gas-chamber M, and the pipes F F', having valves *f f'*, connecting with the base of the fuel-chamber, gas-chamber M, and the upper portion of the fixing-chamber, as and for the purpose described.

3. In combination with the fuel-chamber and fixing-chamber of the cupola, the gas-distributing chamber N, having ports *n*, air-distributing chamber O, having ports *o*, and the connecting-pipes, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY S. BATTIN.

Witnesses:

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LYNN I. HARRIS.