

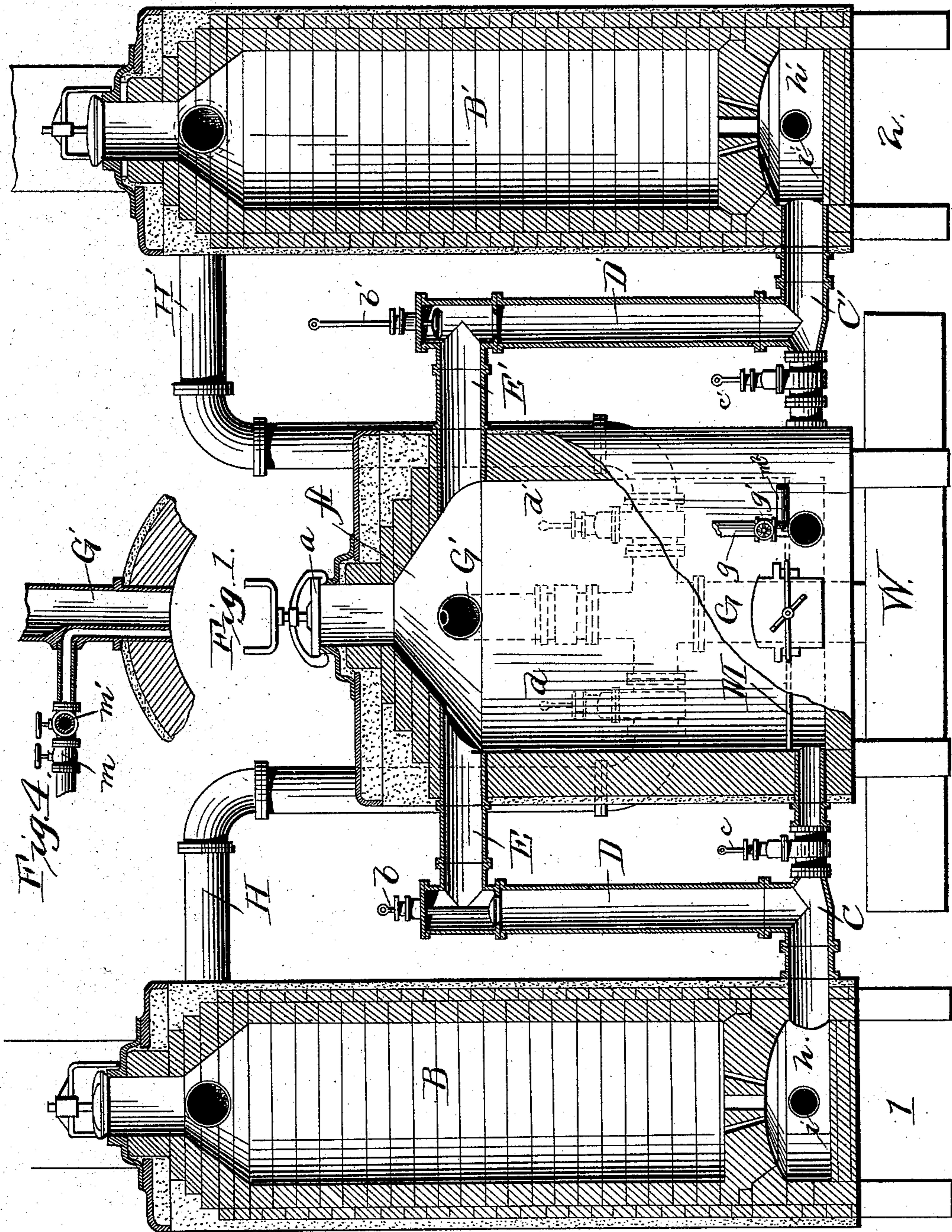
(No Model.)

3 Sheets—Sheet 1.

W. M. COSH.
PROCESS OF MANUFACTURING GAS.

No. 402,146.

Patented Apr. 30, 1889.



Witnesses.

Walter P. Keene,
J. L. Middleton

Inventor.

W^m. M. Cosh.

By his Attorney Ellis Spear

(No Model.)

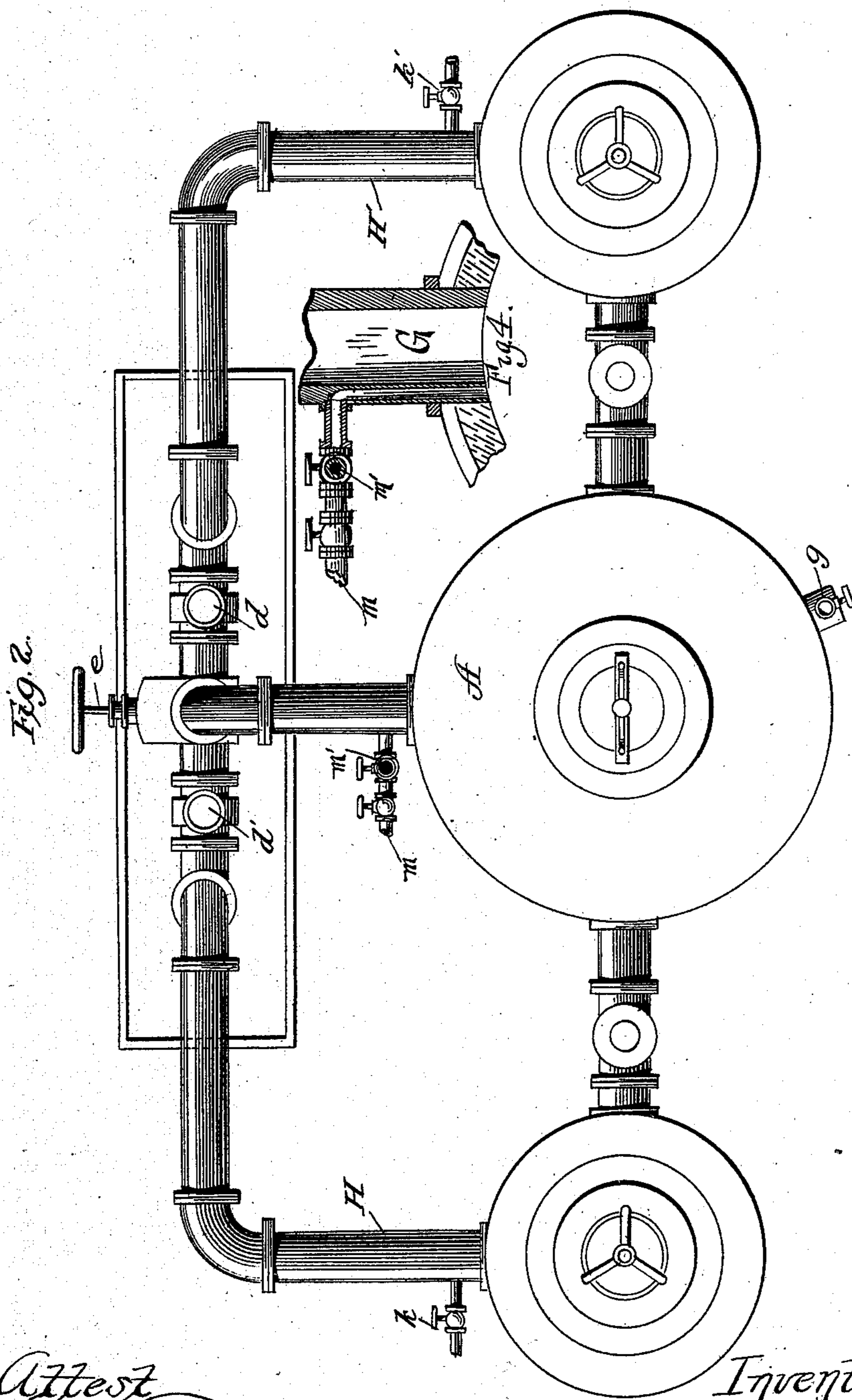
W. M. COSH.

3 Sheets—Sheet 2.

PROCESS OF MANUFACTURING GAS.

No. 402,146.

Patented Apr. 30, 1889.



Attest
Sheldon Donaldson
J. S. Middleton

Inventor
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by Ellis L. Mar
Atty.

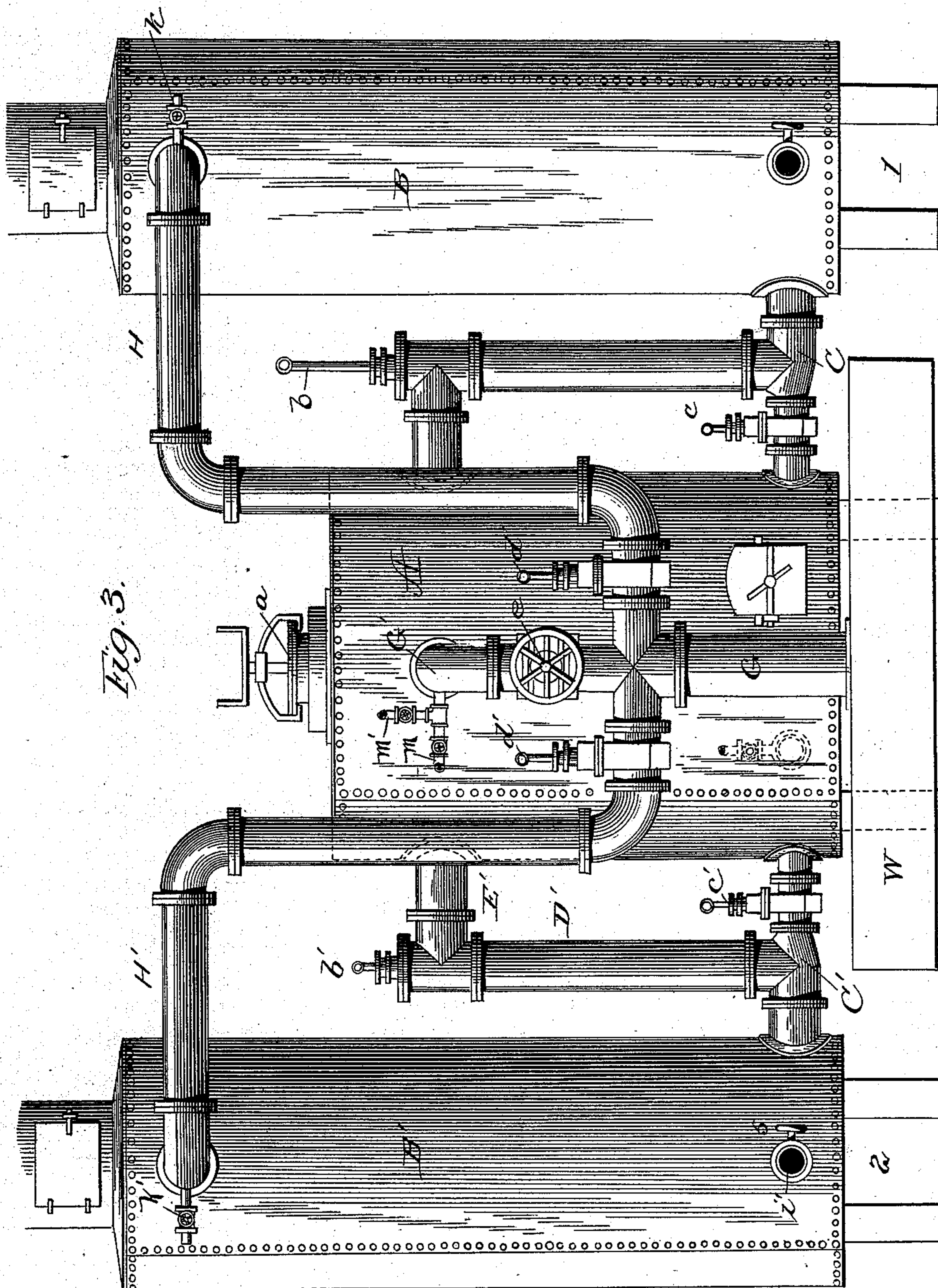
(No Model.)

3 Sheets—Sheet 3.

W. M. COSH.
PROCESS OF MANUFACTURING GAS.

No. 402,146.

Patented Apr. 30, 1889.



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UNITED STATES PATENT OFFICE.

WILLIAM M. COSH, OF BALTIMORE, MARYLAND.

PROCESS OF MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 402,146, dated April 30, 1889.

Application filed October 19, 1888. Serial No. 288,603. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. COSH, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in the Process of Manufacturing Gas; and I do hereby declare that the following is a full, clear, and exact description of the same.

The invention set forth hereinafter is an improved method of making gas for heating or illuminating purposes. It includes the special mode of using an apparatus shown in an application filed by me in the United States Patent Office on the 12th day of January, 1888, and numbered 260,505, whereby the steam is used to form the hydrogen gas, which, with hydrocarbon vapor, is made a heating or an illuminating gas.

The apparatus is necessary for the carrying out of the method hereinafter claimed, although capable of use in other ways. It is shown in the accompanying drawings, in which—

Figure 1 represents the apparatus partly in section, taken centrally and vertically from side to side, and partly in side elevation. Fig. 2 is a plan view of the apparatus, and Fig. 3 a rear view. Fig. 4 is a detail view.

In the figures, A represents a generator, provided with a cover, *a*, and adapted to receive a charge of coal. Below the grate M is a pipe, *f*, to admit the air-blast, with a steam-supply, *g*, connected therewith, having a stop-cock, *g'*. On each side of the generator is placed a chamber adapted to act as a fixing-chamber or as a superheater, one being marked B and the other B'. These are to be filled with pieces of brick or any suitable refractory material, through which the steam may freely pass and be heated in its passage. These superheaters have each a combustion-chamber, *h*, in the base, with passages therefrom to the superheating and fixing chamber above, and with an air-supply pipe, *i*, having a suitable valve (not shown) for regulating or cutting off the supply of air. These superheaters or fixing-chambers have suitable covers on the tops. The combustion-chambers underneath are connected by the pipes C C' directly with the space in the generator beneath the grate M, and these pipes are provided with valves *c c'*. From the pipes C C' vertical pipes D D' extend to branches E E', which connect them

with the upper part of the generator. In the upper ends of the pipes D D' are valves *b b'*, by means of which communication between the upper part of the generator and the combustion-chambers of the superheaters can be obstructed, while the valves *c c'* serve to cut off connection between the lower part of the generator and the combustion-chambers. Another set of pipes connect the upper part of the superheaters and the generator with the wash-box W. Of these pipes H H' are exit-pipes from the superheaters. They extend from the upper parts of the superheaters and are turned to meet in a pipe, G, which is the exit from the generator, and extends down, therefore, to the wash-box W, the entrance to the generator being shown at G'. The pipes H H' have valves *d* and *d'*, respectively, by means of which communication may be shut off between the upper part of the superheaters and the wash-box or upper part of the generator. A valve, *e*, in the upper extension of the pipe G above its junction with the pipes H and H' closes this passage when the valves *d* and *d'* are open. In addition to the steam-supply pipe *g*, there is a second, *k*, and a third, *k'*, in the pipes H and H', respectively, and a fourth, *m*, in the upper extension of the pipe G above the valve *e*. These steam-pipes all have stop-cocks and suitable connections with a steam-generator. (Not shown.) In addition to these pipes is a passage, *m'*, entering the pipe *m*, as shown, for supplying naphtha or other liquid hydrocarbon. The passage of the steam tends to force the naphtha into the upper part of the generator, preferably through a passage formed in the wall of the pipe G, as shown in detail, Fig. 4; but the pipe *m*, if desired, may enter directly into the interior of the pipe G. In the same way a hydrocarbon-supply pipe, *m²*, is joined to the steam-pipe *g'*, leading to the bottom of the generator, so that hydrocarbon may be supplied either above or below the coal.

Supposing the generator be charged with coal and the cover of the generator be secured in place and the covers of the superheaters be removed, the valves *b b'* are opened and the valves *c c'* and *d d'* and *e* are closed. The valve of the blast-pipe *f* is opened and the air admitted at the bottom of the generator and to the combustion-chambers *h* and *h'*. While

this access of air is bringing the mass of coal
 in the generator to an incandescent condition
 the carbonic oxide and unconsumed carbon
 in the products of combustion are carried
 5 through the pipes E E', D D', and C C' to the
 combustion-chamber *h h'*, where they meet an
 additional supply of air and undergo com-
 plete combustion, the products thereof pass-
 ing through among the refractory contents of
 10 the superheaters. This brings the refractory
 material within the superheaters up to an in-
 tense heat. When the coal within the gener-
 ator has been brought to a state of thorough
 incandescence, the covers of the superheaters
 15 (if both are used) are secured in place, the
 air is cut off at the bottom of the generator
 and superheater, the valves *d d'* in the outlet-
 pipes are open, and steam without the hydro-
 carbon is admitted at the bottom of the gen-
 20 erator. This passes through the body of in-
 candescent coal, and by removal of its oxygen
 is converted to a hydrogen gas, which takes
 up the hydrocarbon introduced at the top,
 and the whole passes through the pipes E E'
 25 and their connections to the bottom of the
 superheaters, through the superheaters, act-
 ing then as fixing-chambers, and thence to the
 wash-box. The direction of the current in
 this method may be reversed and the steam
 30 without the hydrocarbon is introduced at the
 top of the generator. This forces its way
 down through the coal, acting on the upper
 surface most forcibly, instead of the lower, as
 before. In its passage it is converted into
 35 hydrogen gas, as before, takes up the hydro-
 carbon introduced below, and passes through
 the pipes C C' to the fixing-chambers, when
 the action is the same as above described.
 This requires, manifestly, the closing of the
 40 pipes E E' D D' and the opening of C C'.

This apparatus may be made to operate in
 two directions in a single heat for the pro-

duction of hydrocarbon gas, or the direction
 of the current may be reversed in the man-
 ner above described as many times as may 45
 be desired, as after the supply of coal has been
 exhausted it may be renewed and brought to
 a proper condition, as at first described.

The general plan of passing the hydrogen
 gas through incandescent coal and then add- 50
 ing hydrocarbon vapor, and afterward fixing
 this gas and vapor, is not new and not my
 invention. It is also obvious that hydrocar-
 bon may be introduced at other points, as into
 the pipes leading from the generator to the 55
 superheaters. Nor do I broadly claim the
 method of using steam in reverse directions
 in connection with incandescent coal, this in
 other connections being shown in the patent
 of Wilkinson, granted by the United States 60
 Patent Office, August 24, 1886, No. 348,178.

I claim as my invention—

The hereinbefore-described method of pro-
 ducing gas at a single heat, consisting in first
 passing steam through a superheater, and 65
 thence directly through an incandescent mass
 of coal, then causing the resultant gases to
 take up hydrocarbon vapor, and subsequently
 passing the gases and vapor through a fixing-
 chamber, then reversing the current of steam 70
 and passing it through the chamber first used
 as a fixing-chamber, then through the incan-
 descent coal in a direction opposite to that
 first mentioned, then causing it to take up
 hydrocarbon, and, finally, passing the gases 75
 and vapor through the chamber first used as
 a superheater, all as set forth.

In testimony whereof I have signed my name
 to this specification in the presence of two sub-
 scribing witnesses.

WILLIAM M. COSH.

Witnesses:

THOS. KELL BRADFORD,
 H. E. LOANE.