

(No Model.)

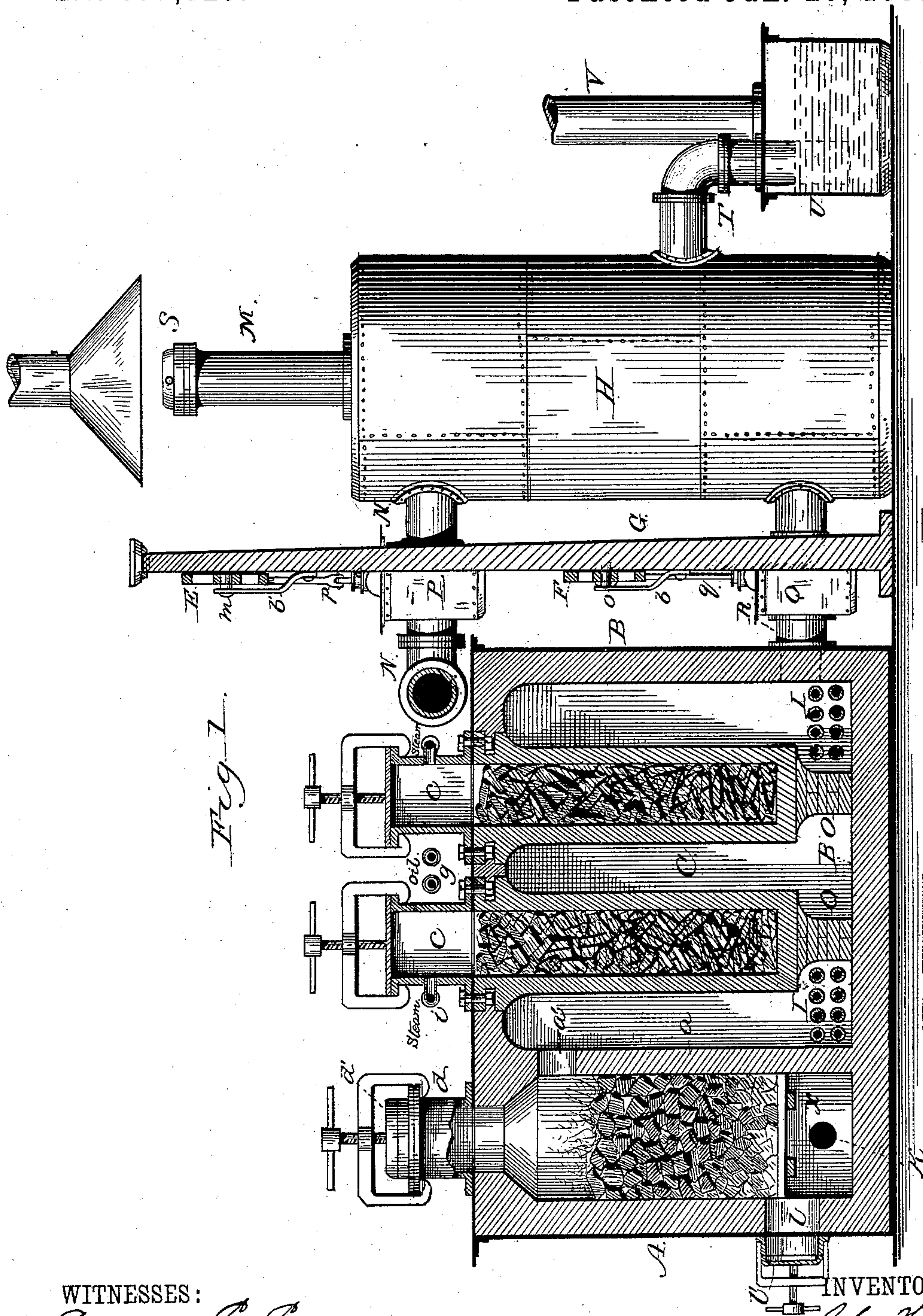
7 Sheets—Sheet 1.

J. HANLON.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

No. 311,125.

Patented Jan. 20, 1885.



WITNESSES:

Edward E. Ellis
J. W. Reynolds.

INVENTOR

John Hanlon

BY

O. E. Quiff
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(No Model.)

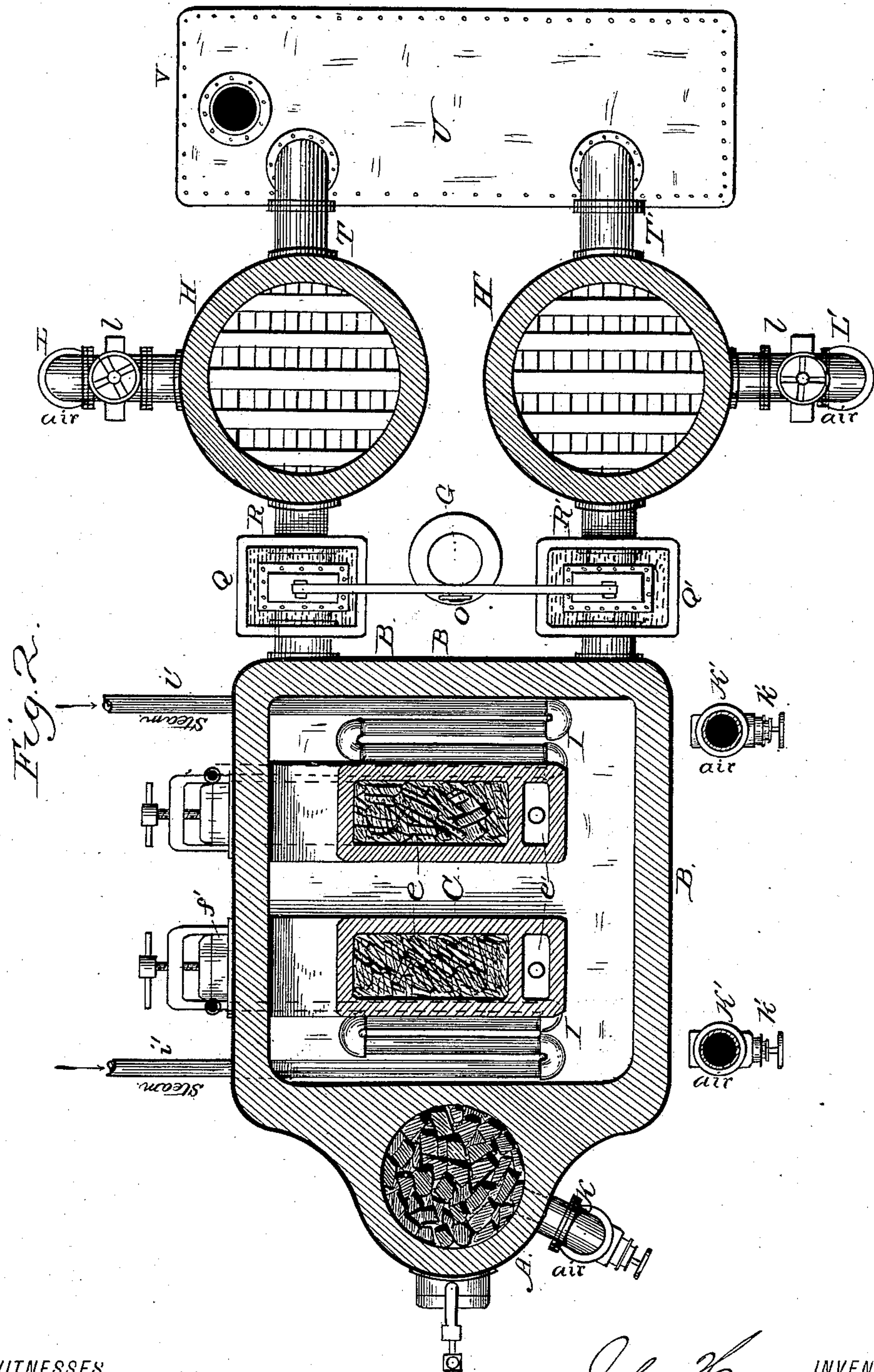
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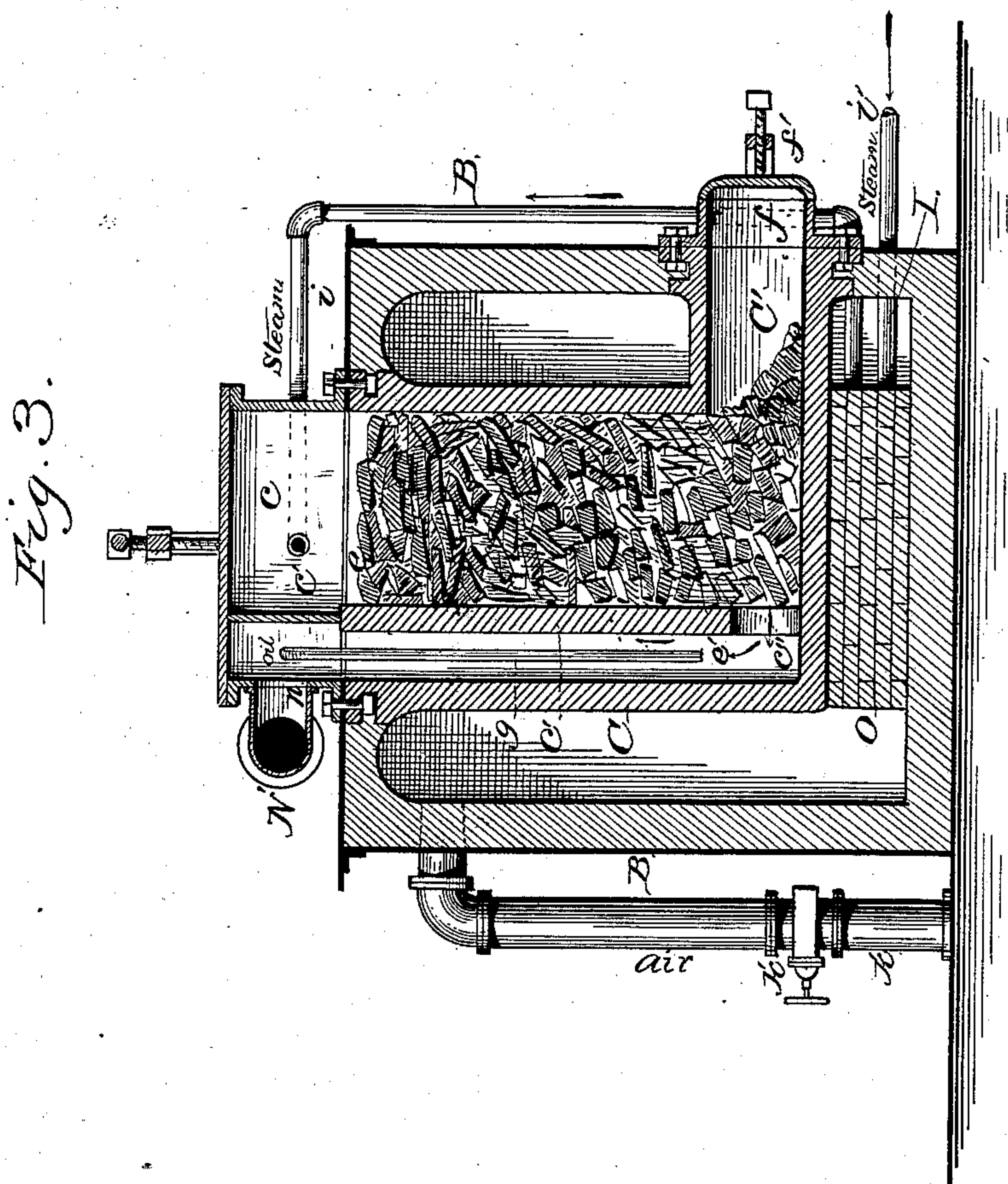
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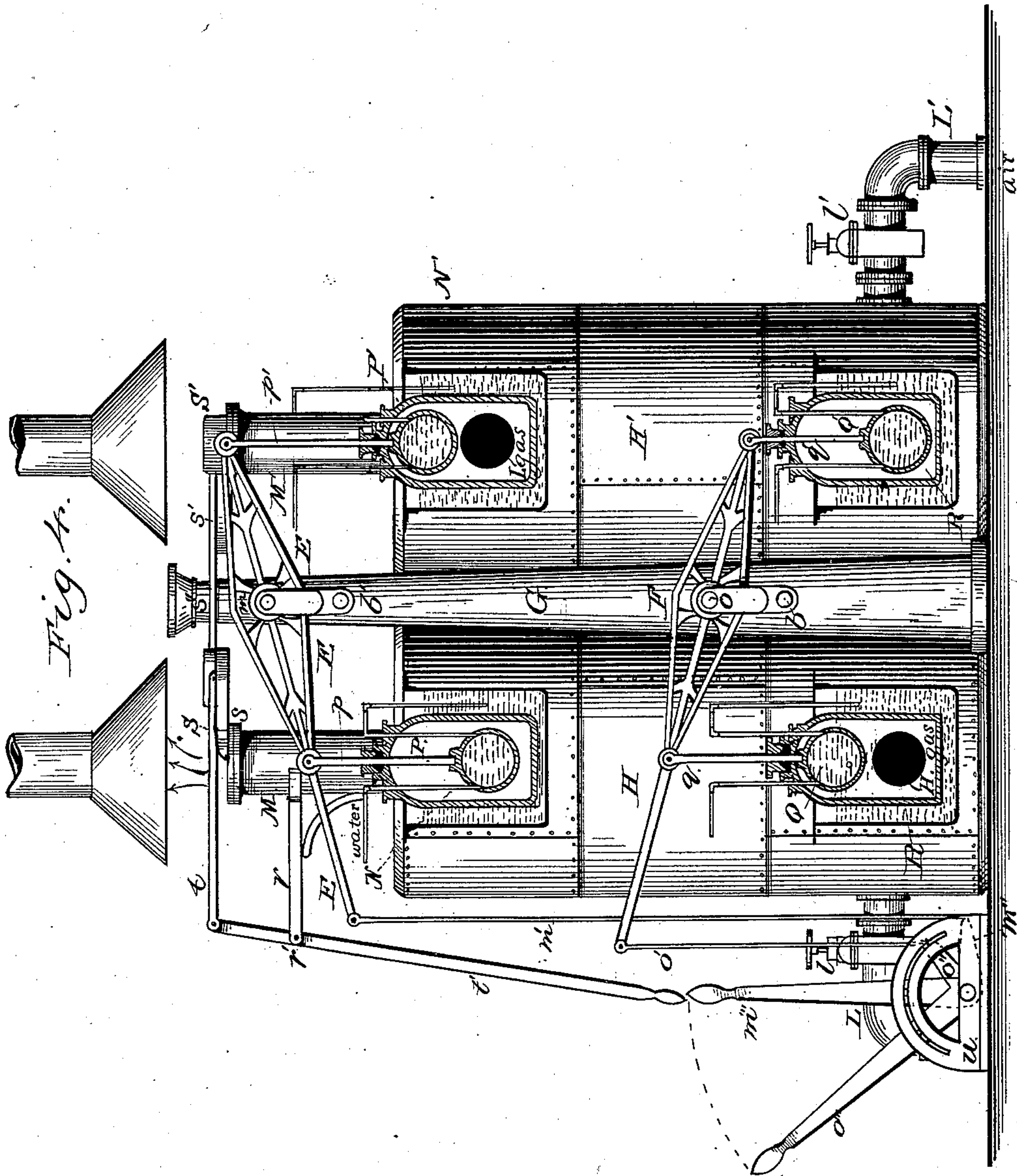
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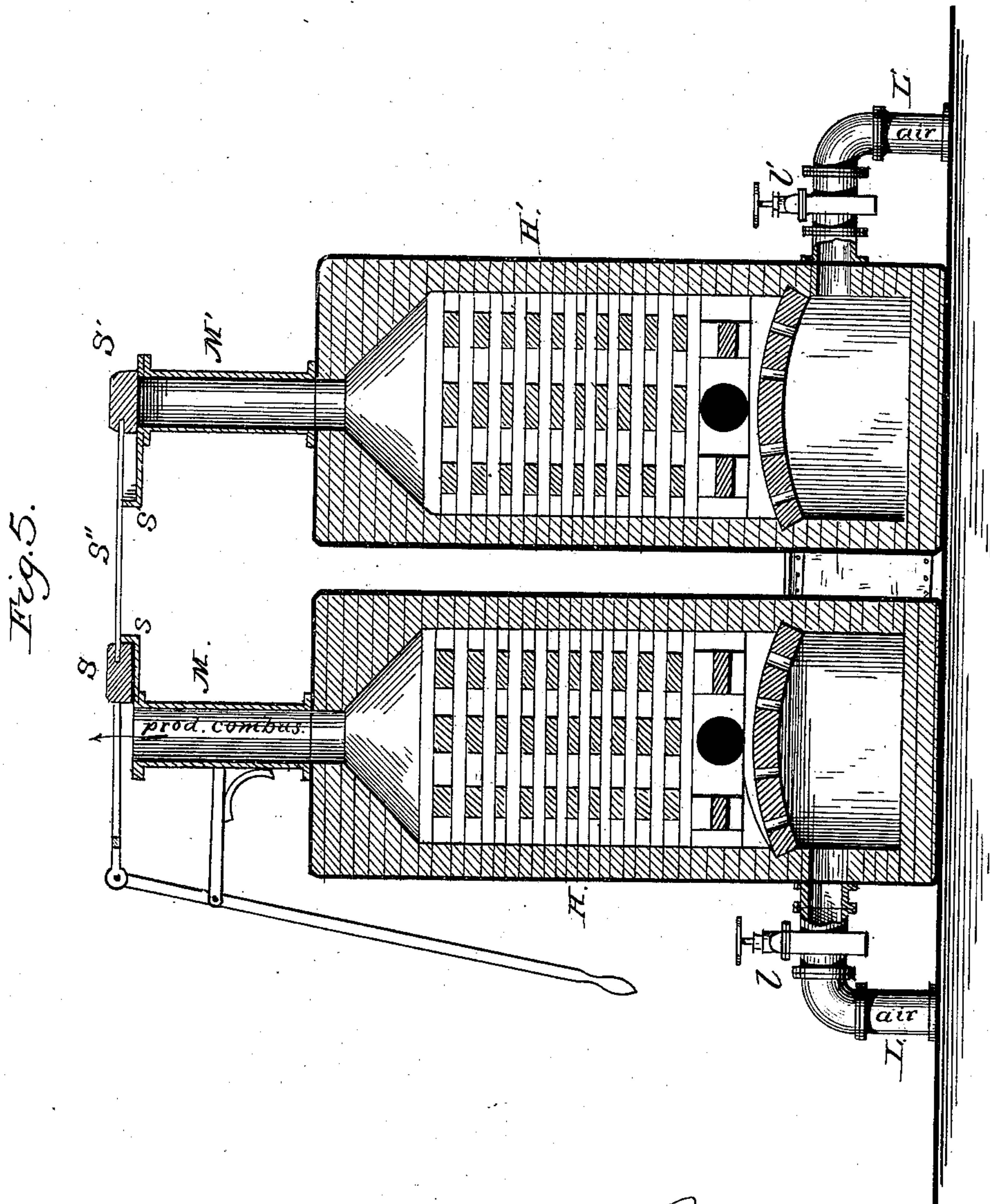
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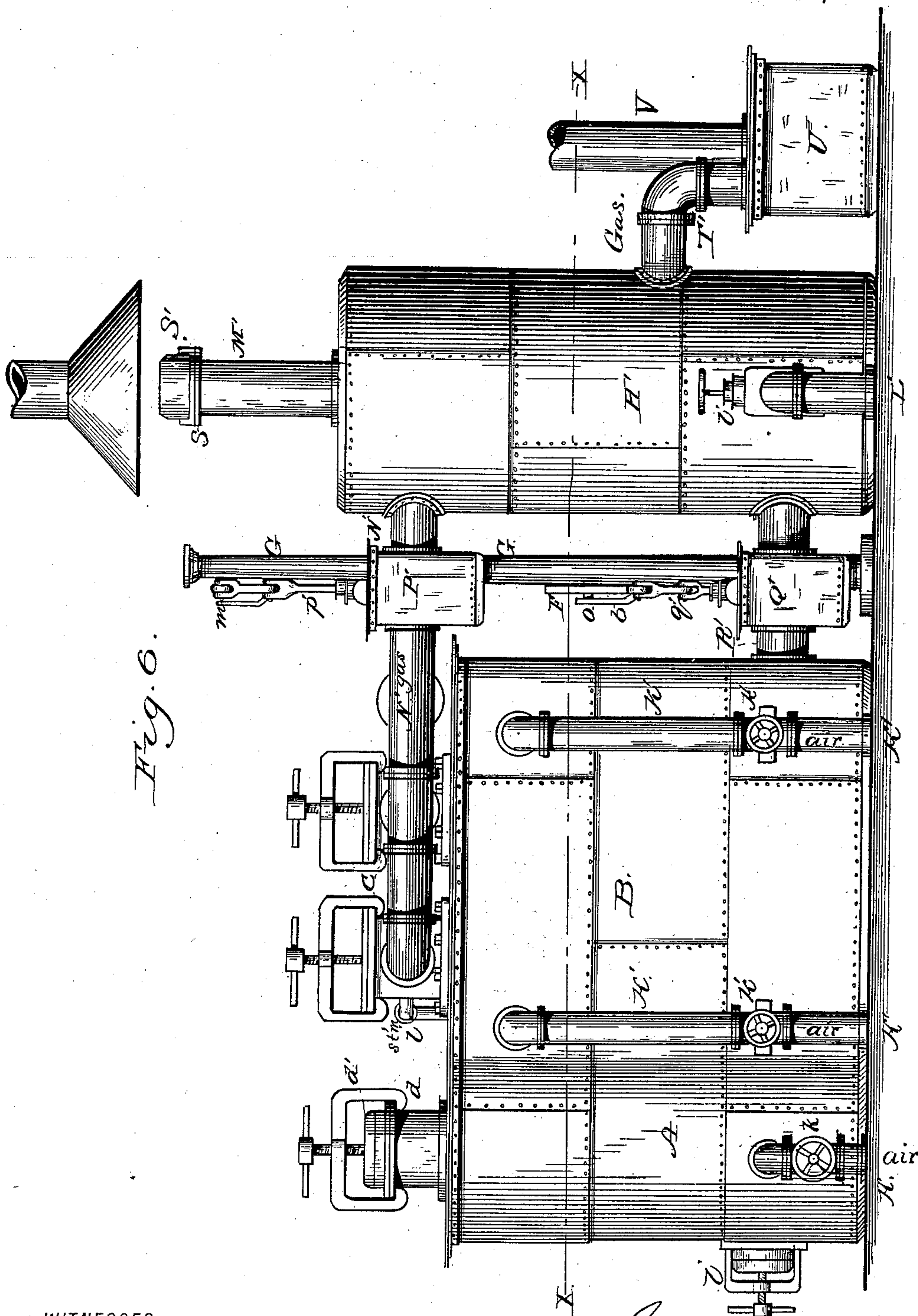
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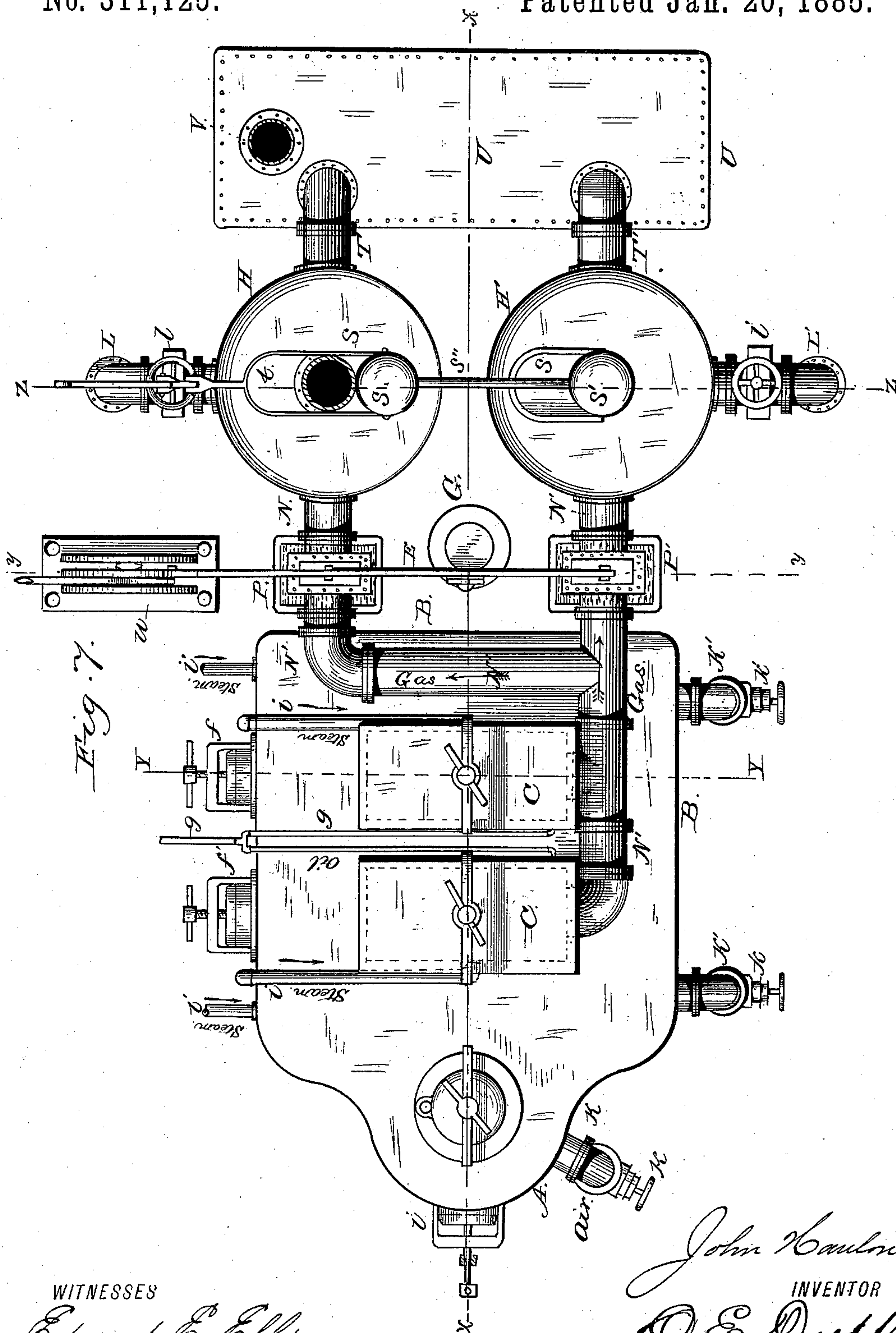
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UNITED STATES PATENT OFFICE.

JOHN HANLON, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 311,125, dated January 20, 1885.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN HANLON, of New York, in the county of New York and State of New York, have invented certain new and
5 useful Improvements in Processes of and Apparatus for Manufacturing Gas; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable other skilled in the art to which it ap-
10 pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention relates to the manufacture
15 of a fixed illuminating-gas of high candle-power, by a continuous process, from hydrocarbon and other oil and a small portion of steam to supply sufficient hydrogen to act as a carrier for the rich carbureted hydrogen,
20 whereby deposits of lamp-black or hard carbon in the gas-producer are prevented and all the oil fed to the apparatus is converted into valuable illuminating-gas, and whereby better combustion and a whiter light are se-
25 cured at the burners.

The object of the invention is to provide a compact, very efficient, easily-operated, and economical apparatus adapted for making a rich gas for factories, hotels, and light-houses,
30 for compression in tanks to supply railway-cars and steamboats, and for towns, &c. The steam-decomposing and oil-vaporizing retorts, the steam-superheaters, and the gas-fixing chambers are heated by the combustion of hot
35 gaseous products from a gas-producer forming part of the apparatus. The retorts and superheaters are heated continuously, and one of two fixing-chamber is always being heated while the other is being used for fixing gas,
40 so that one chamber is always in operation for fixing gas. The fixing-chambers are filled with refractory brick-work loosely laid up in the form of regenerator-furnaces, and are heated by internal combustion. The connect-
45 ing-pipes between the generating-retorts and the fixing-chambers are fitted up with conveniently-operated reciprocating water-cooled valves, whereby illuminating-gas is shut off from No. 1 and admitted to No. 2 chamber,
50 and heating-gas is admitted to the former and shut off from the latter by one movement of a valve-lever for each operation.

The process of producing gas and the parts and combination of parts constituting my invention will be pointed out in the claims. 55

The apparatus is illustrated in the accompanying drawings, in which Figure 1 represents a vertical longitudinal section of the producer-furnace, the retort-chamber and re-
60 torts, and the fixing-chamber in elevation on line *x x*, Fig. 7. Fig. 2 represents a horizontal section of the apparatus on line *x x*, Fig. 6. Fig. 3 represents a vertical transverse section through one of the retorts on line *Y Y* and looking to the left in Fig. 7. Fig. 4 repre-
65 sents the pair of fixing-chambers in elevation, and a view in cross-section of the water-cooled valve and connecting-pipes on line *y y*, Fig. 7. Fig. 5 represents a transverse vertical section through the fixing-chambers on the
70 line *z z*, Fig. 7. Fig. 6 represents a side elevation of the apparatus. Fig. 7 represents a plan or top view of the apparatus.

In the following description the same letters designate like parts on all figures of the draw-
75 ings.

The gas-producer furnace A, for generating heating-gas used in heating the retorts and fixing-chamber, and the retort-chamber B, are built in one fire-brick structure covered by a
80 tight jacket of boiler-iron, and the connected fixing-chambers H H', containing loosely-laid brick-work, are built as separate structures, each having an iron jacket, as shown; or they may be built in a single structure surrounded
85 by one iron jacket and separated from each other by a brick partition-wall, through which extends a tight iron plate riveted to the top plate of the chamber. This latter construc-
90 tion, it is thought, will often be found preferable, as by it heat will be saved and utilized. The fuel-chamber of producer A is erected upright, as shown, and either round or rect-
95 angular in cross-section, and is separated from retort-chamber B by vertical partition *a*, having passage *a'* in its upper part leading into chamber B. A short stack or mouth-piece, *d*, having a tight-fitting cap, is fitted to the top of chamber A, and the lower end of such
100 chamber is provided with an ash-pit, *x*, having the usual openings, *l*, and tight-fitting door *l'*, and separated from the fuel-chamber by the usual grate-bars. Two retorts, C, as shown, or other desired number, are set ver-

tically in chamber B, resting at their lower
 ends on brick supports O, and secured by
 flanges and screw-bolts to the mouth-pieces *c*
 and top plate of the chamber at their upper
 5 ends. The mouth-pieces are closed by tight-
 fitting lids secured by yokes and screws. At
 the lower end of the retort a horizontal pas-
 sage, *C'*, projects through the front wall of
 chamber B, where to its flanged end is secured,
 10 by screw-bolts, mouth-piece *f*, closed by a tight-
 fitting lid, *f'*. The main body of the retort is
 divided by partition *c'* into two chambers,
 Figs. 2 and 3—a large fuel and steam-decom-
 posing chamber, *e*, for containing charcoal, and
 15 a small oil-vaporizing chamber, *e'*, into which
 extends oil-supply pipe *g*. The partition *c'*
 has an opening, *c''*, in its lower end, forming a
 communicating passage from one chamber to
 the other. An iron plate forms the extension
 20 of partition *c'* through mouth-piece *c*. Steam-
 superheating coils of pipe I I are located in
 the base of chamber B, as shown, or in other
 convenient part thereof, and receive steam
 from a boiler through inlet-pipe *i'*, and dis-
 25 charge superheated steam through pipes *i*,
 which connect with the upper end of fuel-
 chambers *e* of the retorts, preferably entering
 the mouth-pieces, as shown. Partitions may
 be placed in chamber B, for suitably deflecting
 30 the hot gases and products of combustion, so
 as to uniformly heat the retorts. An air-
 blast pipe, K, having valve *k*, connects with
 the base of gas-producer A, and air-blast
 pipes K', having valves *k'*, connect with the
 35 upper part of retort-chamber B, for support-
 ing combustion of hot gases from the pro-
 ducer. To the outlet *n*, at top of oil-vap-
 orizing chamber *e* of each retort, the gas-
 eduction pipe N' connects, and extends to fix-
 40 ing-chamber H', and a branch pipe, N, con-
 nects with chamber H. Each pipe has a wa-
 ter-cooled gate-valve, P P'. Pipes R R', for
 products of combustion, connect with the base
 of chamber B and the base of fixing-chambers
 45 H H', and each has a water-cooled gate-valve,
 Q Q'. These two sets of valves are operated
 in pairs, and each pair is connected so as to
 reciprocate. Valves P P' are pivotally con-
 nected by rods *p p'* to lever or beam E, which
 50 is pivoted at *m* to standard G and its bracket
b'. The extended end of beam E has pivot-
 ally connected to it the pendent rod *m'*, which
 is linked to arm *m''* of crank-lever *m'''*, piv-
 oted in frame *u*. Valves Q Q' are in like man-
 55 ner pivotally connected by rods *q q'* to beam
 F, which is pivoted at *o* to standard G and its
 bracket *b*, and the extended end of the beam
 has pivotally connected or linked to it the
 pendent rod *o'*, which is linked to arm *o''* of
 60 crank-lever *o'''*, also pivoted in frame *u*. The
 water-cooled valve here shown has proved
 very efficient in practical operation, and forms
 the subject of a patent granted me June 17,
 1884, No. 300,602. Fixing-chambers H H'
 65 are filled with fire-brick loosely laid in the
 form of regenerator-furnaces. They are pro-
 vided with short stacks M M', opening below

smoke-funnels above. Stacks M M' are pro-
 vided with a pair of reciprocating weight
 valves or stoppers, S S', having ground faces
 70 and sliding on guides *s s'*, the stoppers being
 connected by bars *s''*. The gate and rod *t* are
 pivotally connected to stopper S and to lever
t', which latter is pivoted at *r'* to bracket *r*,
 forming the mechanism for operating stop-
 75 pers S. Blast-pipes L L', having valves *l l'*,
 connect, respectively, with the bases of super-
 heaters H H', for supplying air to support
 combustion of gaseous products when heating
 up the chambers. Gas-eduction pipes T T'
 80 connect the bases of chambers H H' with the
 hydraulic seal box or main U, and pipe V
 leads from such box to the service-pipe, or first
 to a washer, if desired.

Having described the construction of my
 improved gas apparatus, I will now describe
 its operation as follows: A fire is first kindled
 in gas-producer A, and when a sufficient bed
 of fuel is formed the valves Q Q' on pipes
 connecting with the bases of the superheater
 90 and stoppers S S' on the stacks are opened
 as far as possible, and the air-blast is admitted
 to chamber A by pipe K for making heating-
 gas, and such gas, containing a large per cent.
 of carbonic oxide, is partially burned in re-
 95 tort-chamber B by admission of air-blast
 through pipes K' K', and the combustion of
 such gas is completed in the fixing-chambers
 H H' by air-blasts admitted through pipes L
 L'. As the heating up proceeds valve Q' and
 100 stopper S' are closed and valve Q and stop-
 per S are fully opened, as shown in Figs. 4
 and 5, and valve *l'* on air-blast pipe L is closed,
 and the combustion of heating-gas is con-
 105 tinued in chamber H till it is heated to the
 proper temperature for fixing gas to be gen-
 erated in the retort. As soon as the retorts
 and steam-superheating coils are heated to
 the proper temperature the generating of illu-
 110 minating-gas is commenced, and at the same
 time valves P P' and Q Q' and stoppers S S'
 are reversed by the proper movement of the
 connecting-levers, so that valve P on pipe N,
 conducting illuminating-gas to chamber H,
 shall be open, and valve Q and stopper S on
 115 connections of said chamber H shall be closed,
 and so that valve P' shall be closed, and valve
 Q', admitting heating-gas to chamber H', and
 the stopper S' in the stack of chamber H'
 shall be open. At the same time air-valve *l*
 120 is closed and air-valve *l'* is open.

For generating illuminating-gas, super-
 heated steam is admitted in small quantities
 into the tops of the retorts and passed down
 through the heated charcoal, where it is de-
 125 composed, and the resulting gas is passed
 through opening *c''* into chamber *e'*, where it
 mixes with and carries forward the hydro-
 carbon vapor generated from oil admitted by
 pipe *g*, the mixed gases being passed into the
 130 heated fixing-chamber H, where a fixed gas is
 produced, which is passed to the main by pipe
 T. While gas is being fixed in chamber H
 the chamber H' is being heated up by the

combustion of heating-gas therein, as above described, and as soon as chamber H is reduced too low in temperature to properly fix the gas the valves and stoppers are again reversed, so that illuminating-gas is passed into chamber H' to be fixed, and heating-gas is passed into chamber H for heating it up. Gas is generated continuously in the retorts and continuously fixed in one or other of the fixing-chambers, and the fixing-chambers are readily heated by gaseous products from the retort-chamber, which would otherwise be wasted. The air-blasts are applied continuously to producer A and retort-chamber B.

The use of charcoal in the decomposing-retorts is advantageous, for the reason that the gas produced with it is not contaminated with sulphur impurities, and therefore requires little or no purification by lime. The waste ash and cinders are removed through passage C' by removal of lid *f* at the base of retort C. Oil is supplied to the vaporizing-chamber through pipe *g* from an elevated tank, or from a tank below, by air or water pressure, and inlet-pipe *g* is projected into chamber *e* a greater or less distance, as required for vaporizing the oil. The superheated steam, by being passed down through the charcoal, is better spread out through the entire area of the retorts and brought into contact with all the carbon surfaces, whereby it is thoroughly decomposed, and the resulting hydrogen mixes with and carries forward the oil-vapors, preventing formation of soot or hard carbon. The illuminating-gas, also being passed down through the fixing chambers, is better brought in contact with heated brick, and therefore uniformly and completely fixed. The handles of the valve-levers are brought together in a convenient position on one side of the fixing-chambers, as shown in Fig. 4, so that the valves may be quickly shifted.

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

1. The process of manufacturing illuminating-gas which consists in continuously heating the generating-retorts, and by means of the waste or partially-burned gaseous products alternately heating internally two fixing-chambers, first one and then the other, generating gas continuously in the retorts and fixing it continuously in the fixing-chambers, alternating the heating up of one chamber with fixing gas in the other chamber, as described.

2. The process of generating gas continuously which consists in superheating steam, passing it down through a body of charcoal continuously maintained at a decomposing temperature, where it is decomposed, passing the resulting gas up through the vaporizing-chamber, into which oil is admitted, thereby intimately mingling gas and oil-vapor and carrying the latter from the retort, and then forming a fixed gas by passing the mixture of gas and vapor through a heated chamber.

3. The combination of the producer A and the connected retort-chamber, built in one structure, the dividing-wall between them having a passage near its top, an air-blast pipe connecting with the top of the retort-chamber, an escape-pipe for products of combustion, connecting near the bottom thereof, and the contained vertical retorts.

4. The combination of the heating-gas producer, the connected retort-chamber and retorts, an air-blast pipe connected with such chamber, a gas-fixing chamber, a pipe for products of combustion connecting the bases of the retort-chamber and fixing-chamber, and a pipe connecting the retorts with the top of such fixing-chamber, whereby gas to be fixed may be passed down through the fixing-chamber.

5. The combination of the retort-chamber and contained retorts, means for heating them, a fixing-chamber connected both with the retort-chamber and the retorts, and a valve on each connecting-pipe, whereby hot gaseous products may be passed from the retort-chamber to the fixing-chamber for heating the latter, and when such products are shut off illuminating-gas may be passed into such chamber to be fixed, as described.

6. The combination of the retort-chamber and one or more contained retorts with two fixing-chambers, connecting-pipes from the retort-chamber and from the retorts to both fixing-chambers, and reciprocating valves on all the pipes, whereby heating-gas may be conducted to one chamber, while illuminating-gas to be fixed may be conducted to the other chamber, and the flow of each kind of gas changed from one chamber to the other, as desired.

7. In combination with a continuous gas-generator, two fixing-chambers, and pipes having connected reciprocating valves connecting the generator with such chambers, and means for admitting heating-gas to each fixing-chamber.

8. In combination with a continuous gas-generator, two fixing-chambers, and pipes having valves connecting the generator with such chambers, and means for admitting heating-gas to each fixing-chamber, whereby the chambers may be used alternately for fixing gas, one chamber being heated up while gas is being fixed in the other chamber, as described.

9. In combination with the two fixing-chambers, two inlet-pipes for heating-gas connecting with the bottom thereof, and having a pair of connected reciprocating valves, two inlet-pipes for illuminating-gas connecting near the top of such chamber, also having a pair of connected reciprocating gas-outlet pipes connecting near the bottoms of the fixing-chamber, and valves or stoppers in the stacks of such chambers.

10. In combination with two fixing-chambers, two inlet-pipes for heating-gas, having a pair of connected reciprocating valves, two

inlet-pipes for illuminating-gas, also having a pair of connected reciprocating valves, and a pair of connected stopper-valves in the stacks, for the purpose described.

5 11. The vertical retort having an opening and lid at each end, a vertical partition having an opening, a steam-inlet pipe connecting with one chamber, an oil-inlet pipe connecting with the other chamber, and a gas-outlet
to pipe leading from the oil-vaporizing chamber.

12. The vertical retort having an opening and lid at each end, a vertical partition having an opening at its lower end, a steam-inlet

pipe connecting with the top of the decomposing-chamber, an oil-supply pipe extending 15 into the vaporizing-chamber, and a gas-outlet pipe leading from the top of such vaporizing-chamber, for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two 20 witnesses.

JOHN HANLON.

Witnesses:

JOHN C. PENNIE,
F. O. McCLEARY.