

(No Model.)

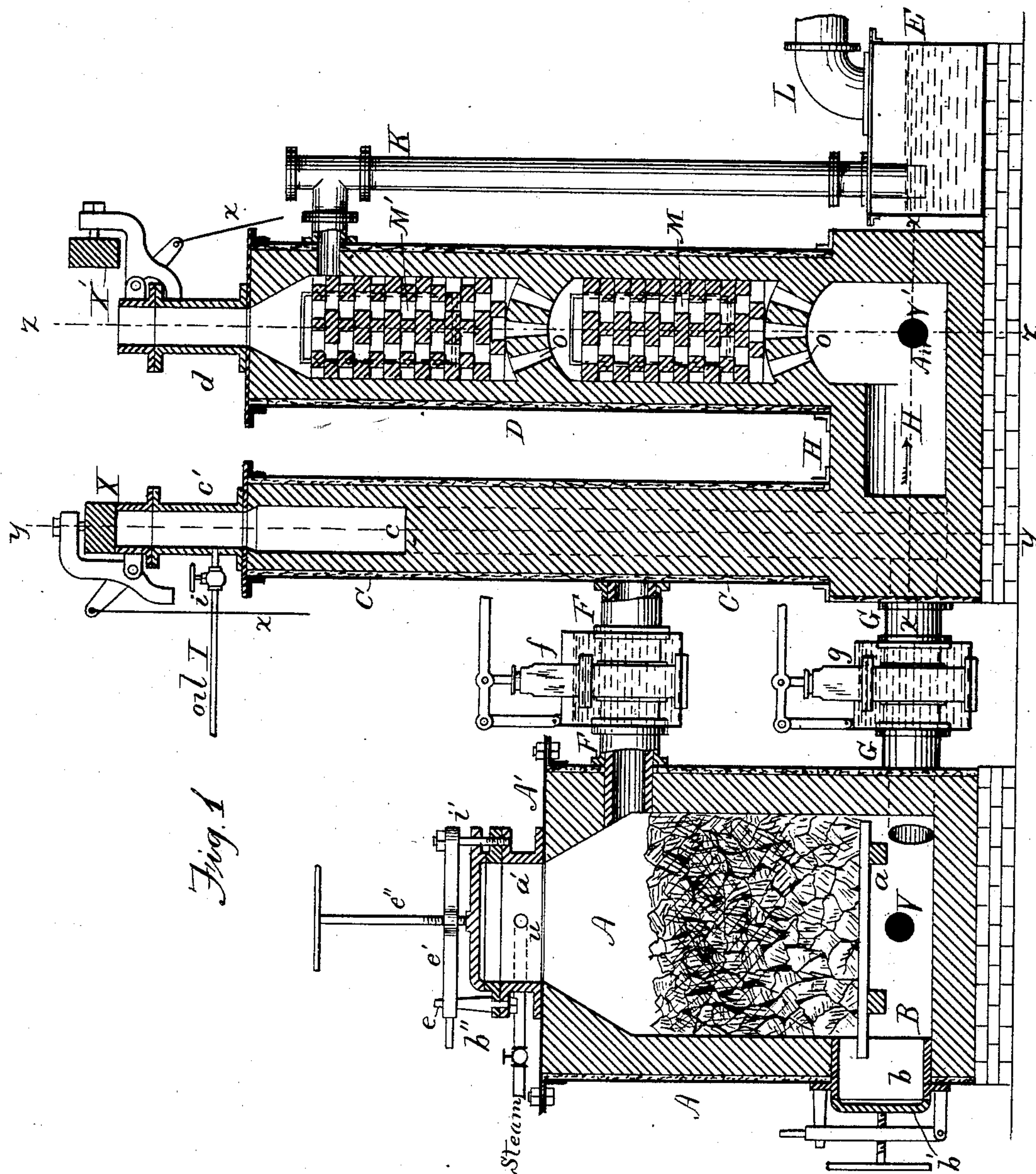
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J. HANLON.

# APPARATUS FOR MANUFACTURING ILLUMINATING AND HEATING GAS.

No. 367,619.

Patented Aug. 2, 1887.



Witnesses  
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(No Model.)

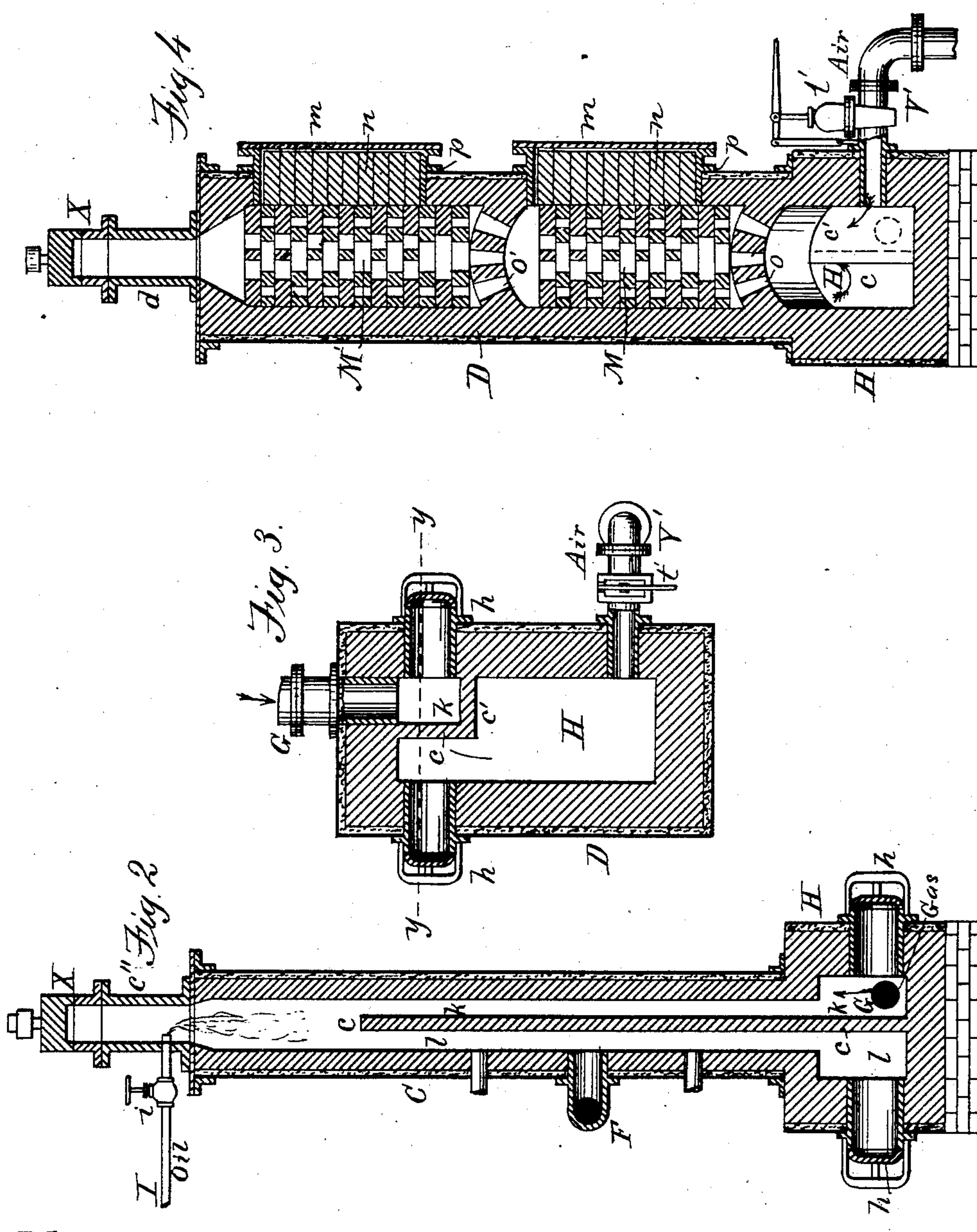
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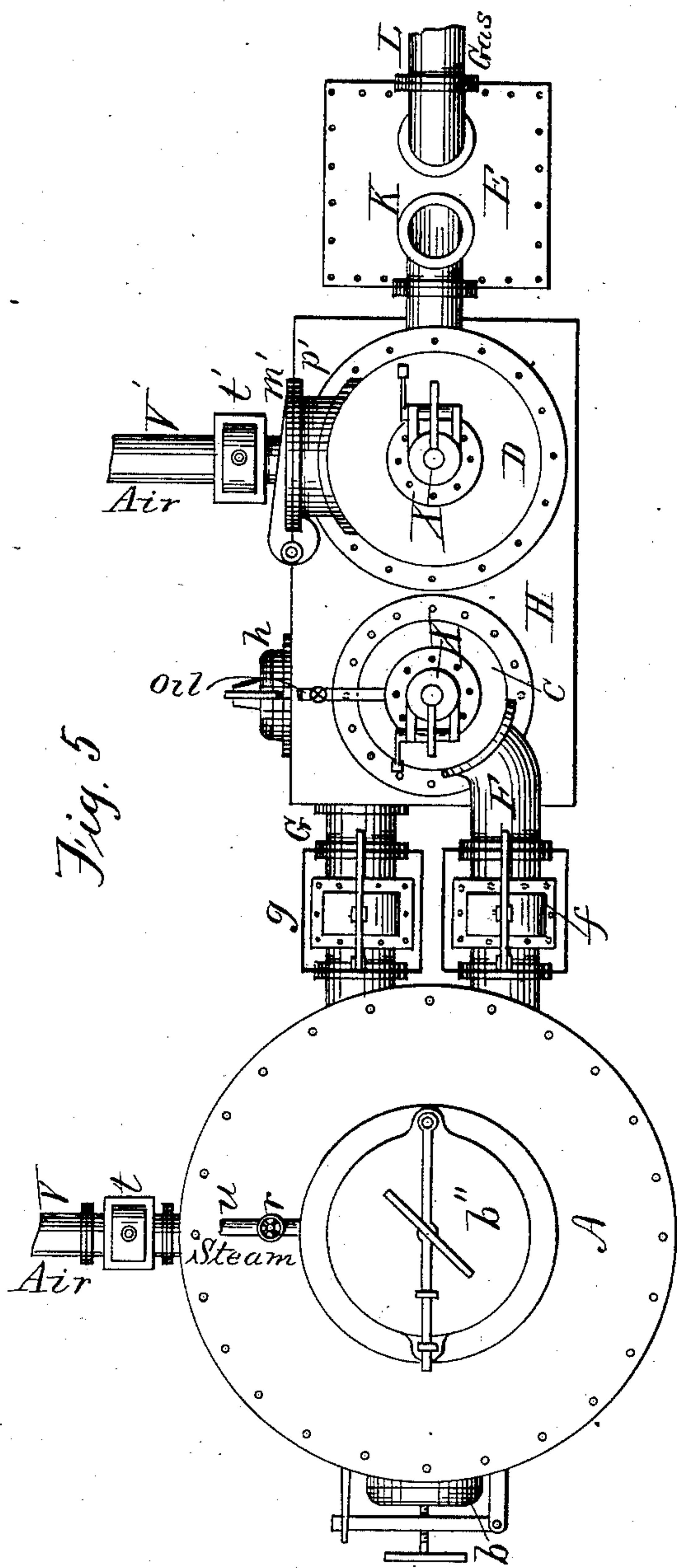
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APPARATUS FOR MANUFACTURING ILLUMINATING AND HEATING GAS.

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# UNITED STATES PATENT OFFICE.

JOHN HANLON, OF NEW YORK, N. Y.

APPARATUS FOR MANUFACTURING ILLUMINATING AND HEATING GAS.

SPECIFICATION forming part of Letters Patent No. 367,619, dated August 2, 1887.

Application filed September 24, 1886. Serial No. 214,449. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN HANLON, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Manufacturing Illuminating and Heating 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 apparatus for manufacturing illuminating and heating gas wherein steam is decomposed and converted into hydrogen and carbonic oxide by passing it in contact with incandescent fuel in a furnace, hydrocarbon oil vaporized in a separate heated chamber and mixed with such gases for suitably enriching them, and the enriched or carbureted gases finally combined and converted into a homogeneous fixed gas in a separate heated fixing-chamber.

The object of the invention is to provide a simply-constructed and more conveniently-operated apparatus than those in use, and particularly adapted for small works, though suited for works of large dimensions.

Another object is to provide improved means for vaporizing hydrocarbon oil and mixing the resulting vapor with hot water-gas in a separate heated chamber connected with the top and bottom of the generator, and also at its bottom with the combining and fixing chamber.

Another object is to provide for readily removing and replacing the brick checker-work in the combining and fixing chamber, and for conveniently cleaning such chamber; and a further object is to provide for conveniently blasting the fuel from below upward and conducting the hot products into and heating the carbureting and fixing chambers, and then decomposing steam by passing it down through the incandescent fuel and passing the resulting hot gases from the base of the generator into the carbureting-chamber, so as to meet the falling stream of hydrocarbon oil and vaporize it and carry the vapors into the combining and fixing chamber, where conversion into a fixed gas is effected.

The matter constituting my invention herein will be defined in the claims.

I will now more particularly describe my invention by reference to the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section of my improved apparatus. Fig. 2 represents a vertical transverse section of the carbureting and mixing chamber on the line *y y*, Figs. 1 and 3, and as seen looking toward the generator in Fig. 1. Fig. 3 represents a horizontal section through the base of the carbureting and fixing chambers on line *x x*, Fig. 1. Fig. 4 represents a vertical transverse section of the combining and fixing chamber on the line *z z*, Fig. 1. Fig. 5 represents a top plan view of the apparatus.

The generator A is built up of brick inclosed in a tight iron jacket, as usual, and is provided with grate *a* at bottom, ash-pit B, ash and clinker opening *b*, having a tight lid or door, *b'*, and blast-pipe V, having valve *t*, as shown in Fig. 5. An iron plate, A', is bolted to the surrounding jacket at top of the furnace, and is provided with an opening for the neck or mouth-piece *a'*, which is bolted to such plate. The mouth-piece *a'* forms the charging opening or passage, and is closed by a lid, *b''*, which, together with its bar *e'*, are pivotally secured to post *i'*, so as to be swung thereon, the bar being held in place by a nut on the post and being secured at its swinging end by a latch, *e*. The lid is forced to its seat by screw *e''*, which may be attached to the lid by a loose joint. By this construction the lid, bar, and screw can be readily swung to one side or quickly closed when desired. A steam supply-pipe, *u*, having valve *r*, connects with mouth-piece *a'*. The oil vaporizing and mixing chamber C and the combining and fixing chamber D are built of brick in separate iron shells and mounted upon a connecting base-chamber, H. Chamber C is divided by a vertical fire-clay partition, *c*, and, in case of a large chamber a number of such division-plates may be used for giving a greater heating-surface. As shown in Fig. 3, the inlet-compartment *k* for gas is formed by tall partition *c* and by the short partition *c'*, extending only the height of chamber H, while the outer wall of chamber C incloses the compartment above. Chamber C is provided at the top with a neck, *c'*, and a cap, X, having suitable operating devices. A hydrocarbon-



oil-supply pipe, I, having valve *i*, connects with neck *c'*. The combining and fixing chamber D is provided at its base with a perforated arch, *o*, which serves to support the brick checker-work in the lower compartment, M, and a second perforated arch, *o'*, supports the brick checker-work in the upper compartment, M', of chamber D. In case of a large high chamber several additional arches may be used. Each compartment M M' is provided with a large opening in one of its side walls, (see Fig. 4,) into which is fitted the flanged door-frame *p*, extending nearly the whole height and width of the compartment, and to this frame is hinged a door, *m'*, Fig. 5, which may be secured to its seat by bolts or other clamping device. Inside of the door the frame is filled with removable brick, *n*, for retaining the heat and protecting the iron frame and door from injury by heat.

The supporting-arches separating the fixing-chamber into compartments are advantageous, since the brick checker-work may thus be removed and replaced in section without having to disturb the whole body in the chamber, and as one portion of the brick-work often requires repair while the rest needs no attention, the work can thus be performed much more quickly and at less expense than in those structures where the brick checker-work is all laid up in one body. The large side doors and removable brick in the door-frames are very advantageous in affording ready and convenient access for cleaning and repairing the brick checker-work. The arches forming compartments, together with the large side doors, are important features of my invention.

A short stack or neck, *d*, extends from the top of chamber D, and is provided with a closing-cap, X', having connected operating devices. The gas-take-off pipe K leads from near the top of chamber D and connects with the seal and wash box E, from which pipe L leads to the condenser or purifier connecting with the holder, or to a place of immediate use, particularly if intended for heating purposes. Pipe K dips down into the water or other sealing-fluid in box E, so as to prevent the return of gas by back-pressure.

An air blast-pipe, V', having valve *t'*, connects with chamber H below chamber D, as shown in Figs. 3 and 4, for supplying the necessary air to cause complete combustion of gaseous products when heating up the apparatus. One or more air-supply pipes V'', having valves *t''* also connect with chamber C, for a like purpose. Openings having closing-caps *h* are formed in chamber H at the base of chamber C, to afford access for cleaning such chambers. The generator A is connected at the top by pipe F, having water-cooled valve *f*, with compartment *l* of the carbureting-chamber C, and the generator is also connected at its bottom by pipe G, having water-cooled valve *g*, with the base of compartment *k* of chamber C. The water-cooled valves are provided with sur-

rounding water-boxes and operating devices, as covered by former Letters Patent granted to me.

Having described the construction of my apparatus, its operation can now be readily understood as follows: A fire is first kindled in generator A and allowed to burn by open draft, and fuel is supplied till a sufficient body thereof is made incandescent, then the generator is closed tight, valve *g* is closed, and valve *f* and caps X X' are left open. The air-blast is now admitted by pipe V to the ash-pit of generator A, and the gaseous products, containing combustible carbonic oxide and free carbon, are conducted into chamber C, where a new supply of air is admitted, if required, for heating such chamber; but usually little or no combustion will be required in this chamber, and its cap X may therefore be closed and the hot gaseous products passed directly through compartment *l* into base-chamber H, where an air-blast is admitted by pipe V', causing combustion of such products which pass up and heat the brick checker-work in chamber D. As soon as chamber C is suitably heated, the air-blast is shut off from it and the products simply passed through it to be burned beyond. A comparatively low temperature only is required in chamber C, since it is designed simply to gradually vaporize the hydrocarbon oil and permit the resulting vapors to mingle uniformly with the water-gas when the latter is being made.

The body of fuel having been raised to the proper state of incandescence and the carbureting and fixing chambers respectively heated to the desired temperature, the air-blasts are shut off, the valve *g* in gas-pipe G is opened, and valve *f* and caps X X' are closed. Steam, superheated or otherwise, is now admitted by pipe *u* at top of the generator and passed down into the incandescent body of fuel, where it is decomposed into hydrogen and carbonic oxide or water-gas, and this gas is passed by pipe G into compartment *k* of chamber C, (see Fig. 2,) into which it rises. Hydrocarbon oil at the same time is admitted in a small stream by pipe I, and falling in chamber C is caught by the rising current of hot gas and quickly vaporized. The mixed gas and vapor pass down compartment *l*, through chamber H, and up into the combining and fixing chamber, where they are combined and converted into a homogeneous fixed gas suitable for illuminating or heating purposes, which is conducted by pipe K to seal-box E, and from thence to the condenser, purifiers, and holders, in the usual manner. A gas-take-off pipe may also lead from compartment M of chamber D, and the two pipes provided with valves and used at different periods during a run for passing off the gas, if desired.

The gas-making operation is continued till the temperature is too much lowered, when the steam and oil are shut off and the apparatus is again heated as before and gas is again manufactured as just described.



A steam-pipe may also be connected with the base of the generator or ash-pit and used for driving out gas before air is admitted, and for admitting steam to pass upward through the fuel for making gas, if desired. In this case valve *g* would be closed and valve *f* opened during the generation of gas. It is preferable, however, to generate gas by passing steam down through the incandescent fuel, especially when the gas is to be carbureted in chamber C and converted into illuminating-gas.

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

1. The generating-furnace having an air-blast pipe connecting with its bottom and a steam-supply pipe connecting with its top, in combination with the separate carbureting-chamber, a valved pipe connecting the generator at top with the upper portion of the carbureting-chamber, and a valved pipe connecting the generator at bottom with the base of the carbureting-chamber, whereby products of combustion may be passed from the top of the generator into the upper portion of the carbureting-chamber for heating it and water-gas may be passed from the bottom of the generator into the base of the carbureter to be enriched with oil-vapor.

2. The generating-furnace having an air-blast pipe at its bottom and a steam-supply pipe connecting with its top, in combination with the carbureting-chamber having a vertical partition open at top, and valved pipes connecting the top and bottom of the generator, re-

spectively, with separate compartments on each side of such partition of the carbureting-chamber, for the purpose described.

3. The carbureting and mixing chamber having a vertical partition open at top and a hydrocarbon-oil-supply pipe connecting with its top, in combination with the generating-furnace, a gas-supply pipe connecting the base of the latter with the base of the carbureting-chamber on one side of the partition, and a gas-outlet flue leading from the opposite side of the partition, for the purpose described.

4. The carbureting-chamber and the combining and fixing chamber connected with each other at the base by chamber H, in combination with a gas-generating furnace connected with the carbureting-chamber by pipes at top and bottom, for the purpose described.

5. The generating-furnace having connected air-blast and steam-supply pipes, in combination with the carbureting-chamber having a vertical partition open at the top, valved pipes connecting the top and bottom of the generator, respectively, with separate compartments of the carbureting-chamber, and the separate combining and fixing chamber connecting with the base of the carbureting-chamber, for the purpose described.

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

JOHN HANLON.

Witnesses:

C. K. LEONARD,

GEO. D. STINEBAUGH.