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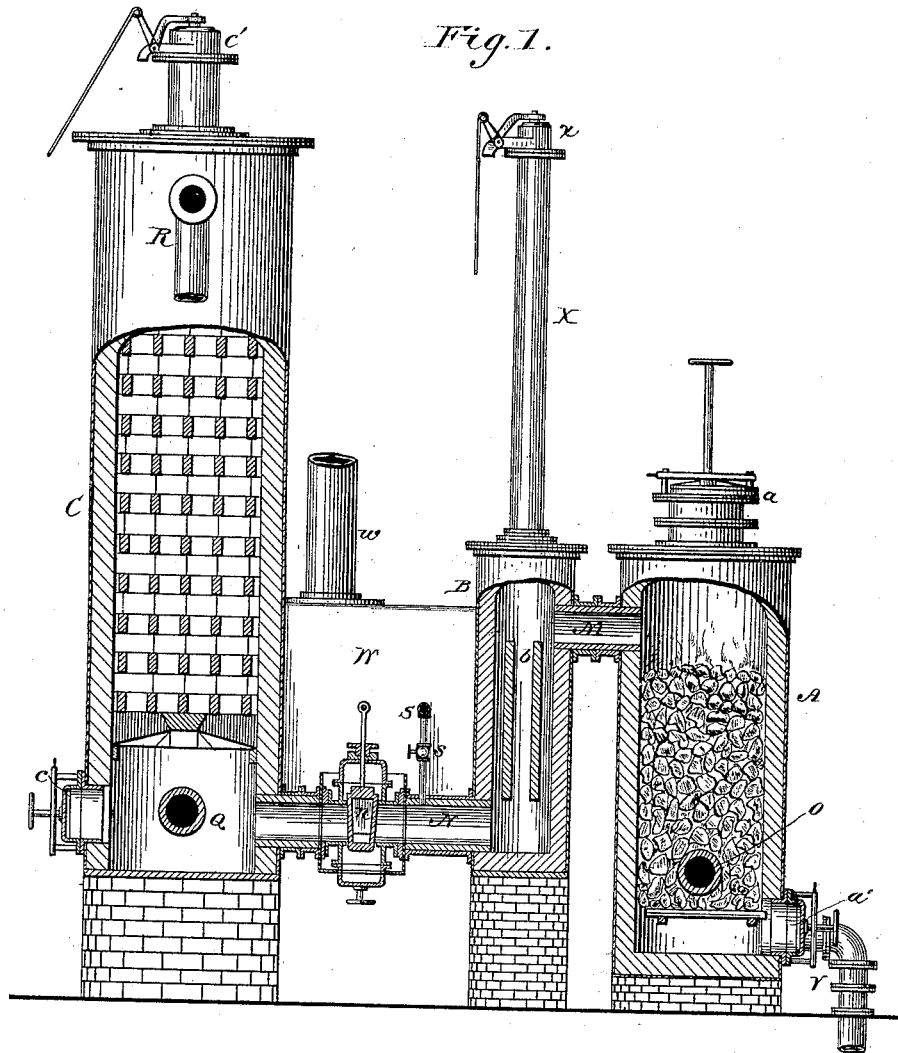
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J. HANLON.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 418,018.

Patented Dec. 24, 1889.



WITNESSES:

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(No Model.)

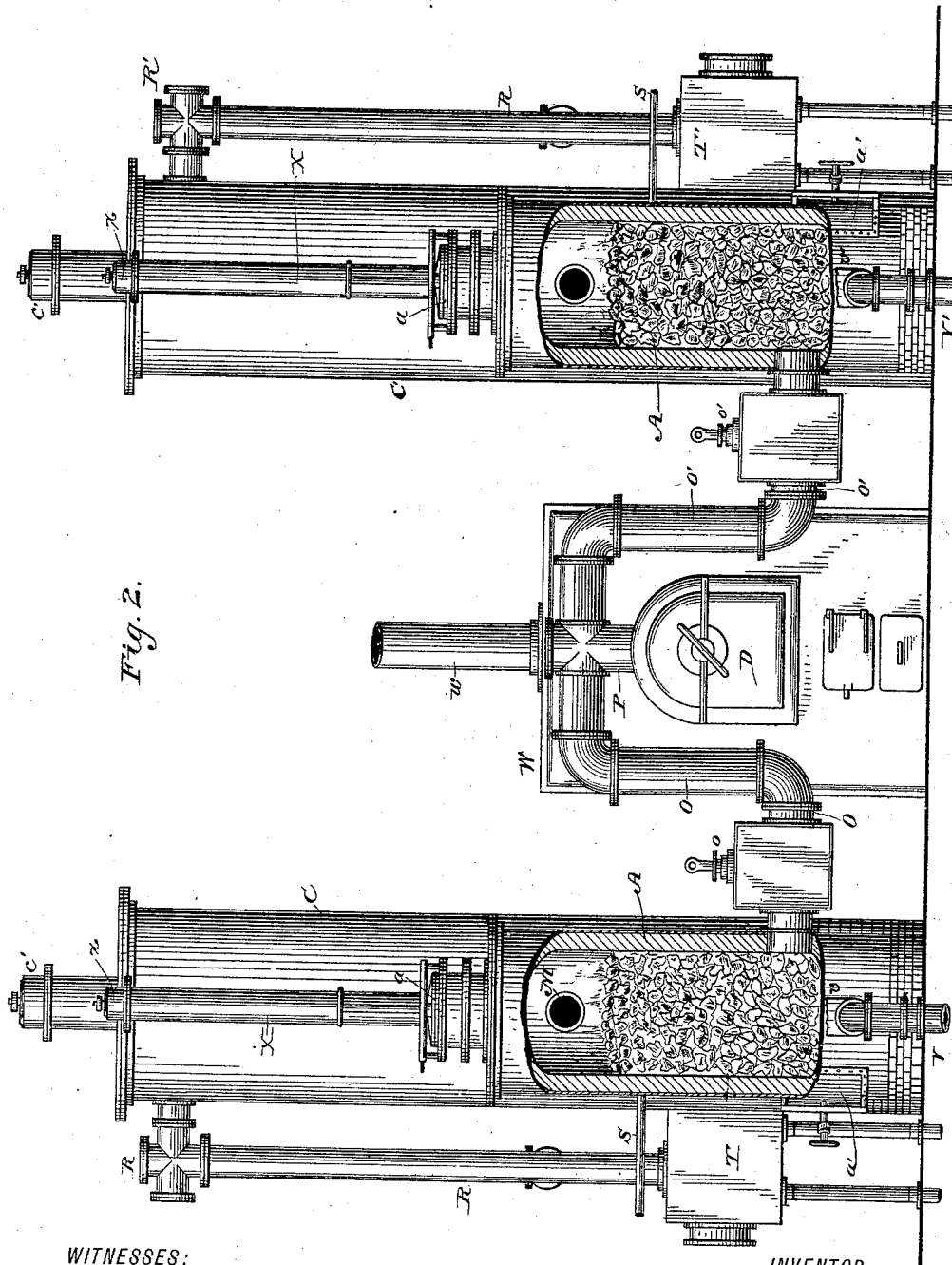
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J. HANLON,

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 418,018.

Patented Dec. 24, 1889.



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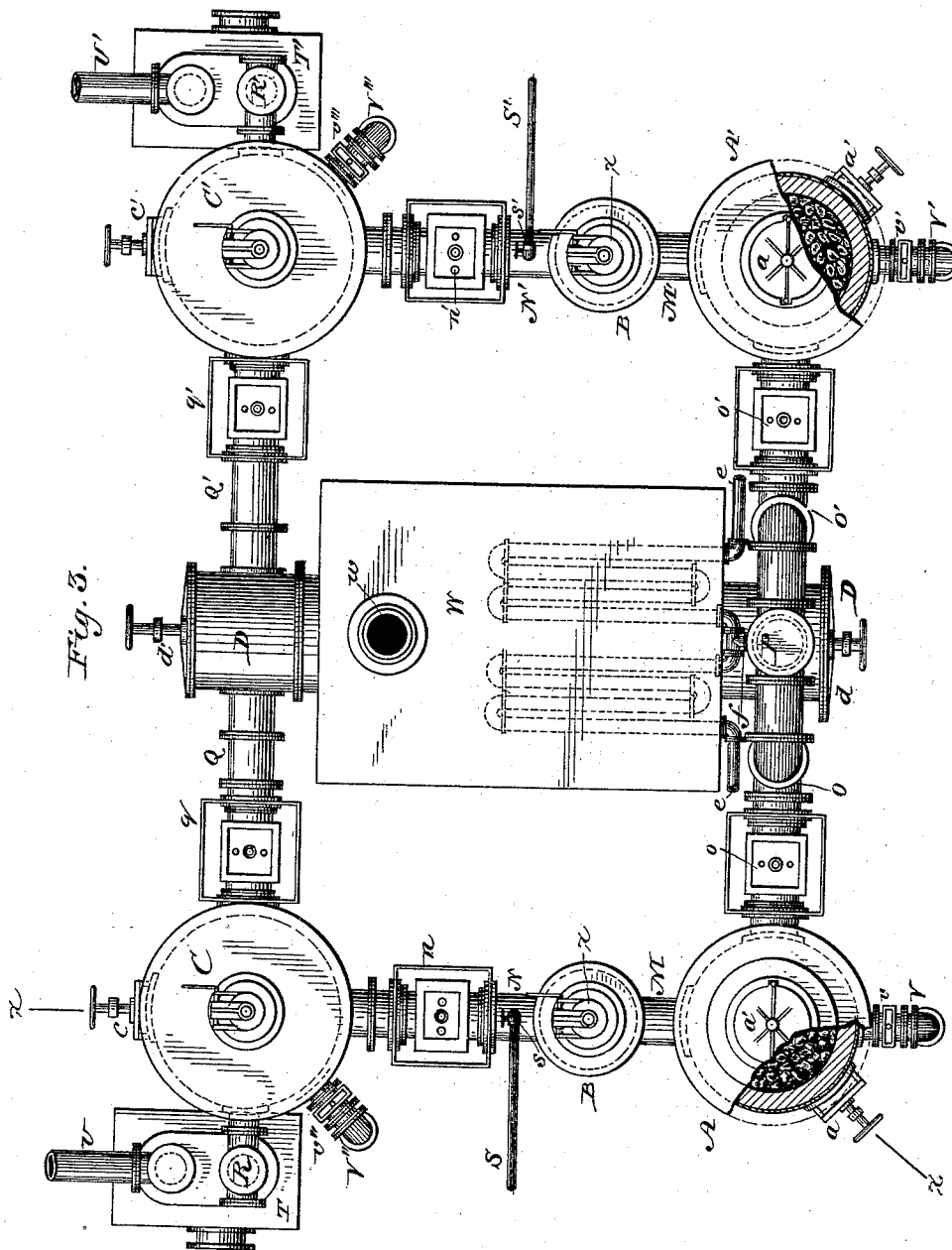
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APPARATUS FOR THE MANUFACTURE OF GAS.

No. 418,018.

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4 Sheets—Sheet 4.

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Fig. 4.

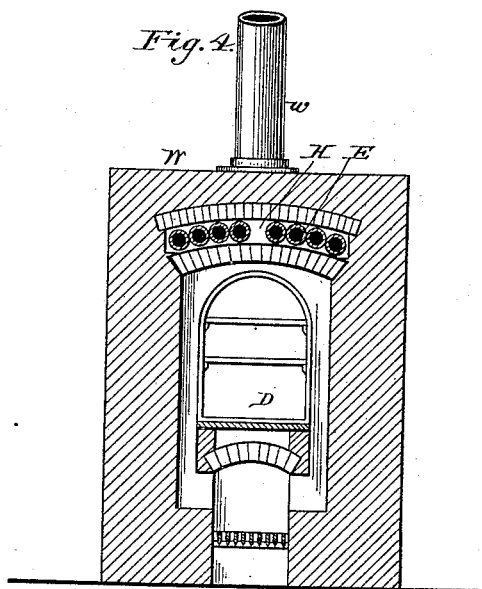
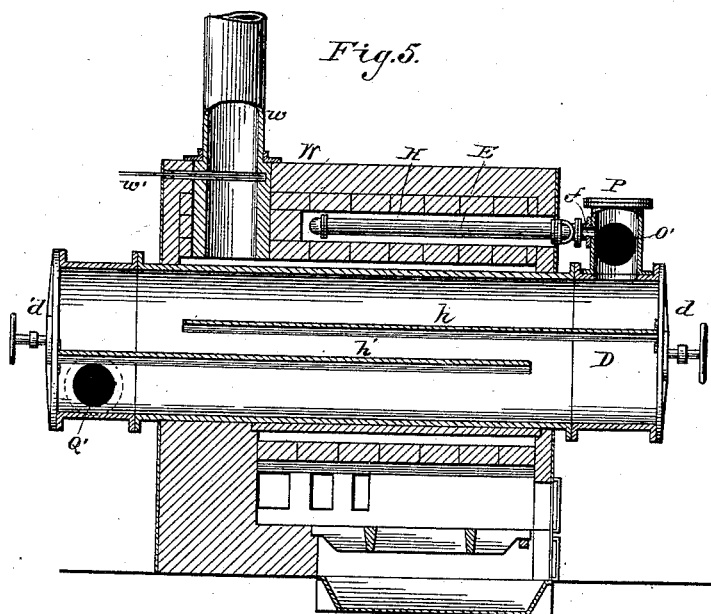


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN HANLON, OF NEW YORK, N. Y.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 418,018, dated December 24, 1889.

Application filed April 13, 1889. Serial No. 307,160. (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 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-gas by generating water-gas in a bed of incandescent fuel, and at the same time vaporizing heavy hydrocarbon oil and, by means of the resulting vapor carbureting and enriching the water-gas in a heated retort or retorts, and then combining and fixing the mixed gas and vapor in a heated fixing-chamber which has been previously heated by waste gaseous products from the water-gas generator, whereby a fixed gas of high candle-power is produced.

The object of my invention is to provide a simple operating apparatus by means of which heavy hydrocarbon oil can be economically vaporized and converted into gas and combined with water-gas to form an illuminating-gas of the required quality and candle-power. I provide duplicate water-gas-generating furnaces and fixing-chambers, so that water-gas may be generated continuously and passed with a continuous stream of oil-vapor into a carbureting and mixing retort or retorts, and so that the carbureted water-gas may be passed continuously through a fixing-chamber, one of the fixing-chambers being constantly in use for fixing the gas. One water-gas-generating furnace and one fixing-chamber are heated up while the other water-gas-generating furnace and fixing-chamber are being used for generating water-gas and for fixing the carbureted water-gas. The hydrocarbon oil is continuously vaporized by passage through a heated coil of pipe arranged in the furnace of the carbureting-retort, and the vapor is continuously supplied to the carbureting-retort together with a continuous stream of water-gas from either one or the other of the water-gas-generating

furnaces. I am thus enabled to generate illuminating-gas very rapidly.

Any heavy hydrocarbon oil—such as crude petroleum—by being vaporized according to my invention and supplied to a carbureting-retort with water-gas, can be successfully used in manufacturing illuminating-gas.

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

My invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section through one of the water-gas-generating furnaces and fixing-chambers. Fig. 2 represents a front elevation of the apparatus with the generating-chambers partly in section. Fig. 3 represents a general plan view of the apparatus with parts of the generating-furnaces broken away. Fig. 4 represents a vertical transverse section of the retort-furnace, retort, and vaporizing-coils. Fig. 5 represents a vertical longitudinal section of the same parts shown in Fig. 4.

As shown in the drawings, Figs. 2 and 3, I provide two water-gas-generating furnaces A A' and two fixing-chambers C C', and between these parts I connect the carbureting and mixing retort D, properly connected at the front end on each side with the generating-furnaces and at the rear end on each side with the fixing-chambers, so that water-gas can be conveniently conducted from either generating-chamber into the carbureting-retort, and so that the carbureted water-gas can be conveniently conducted from the carbureting-retort into either fixing-chamber. The generating and fixing chambers and the connecting steam-superheating chambers are constructed of brick and are covered with tight iron jackets in the usual manner. Each generating-chamber is provided with a grate and ash-pit at the bottom, and each has the usual fuel-opening closed by a lid *a* at the top, and the usual ash-opening closed by a door *a'* at the bottom. Both sets of generating-chambers and fixing-chambers are connected alike, and I will now describe the parts and their connections as shown in Fig. 1.

The generating-furnace A is connected at the top by pipe M with the upper portion of

the vertical steam-superheating and connecting chamber B, and this latter chamber is connected at the base with the base of fixing-chamber C by pipe N. Pipe N is provided with a water-cooled valve *n*. A smoke-stack X extends from the top of chamber B and has at its top a closing lid or cap *x*. Cap *x* acts as a relief-valve, and may be opened when starting a fire in generator A. In chamber B, I arrange a number of vertical tiles *b*, for absorbing heat from the gaseous products to be subsequently utilized in superheating steam. A steam-supply pipe S, having valve *s*, connects with each of the pipes N and N'. The fixing-chamber C is provided at the base with an opening closed by lid *c*, and at the top with a short stack or neck closed by lid *c'*. Chamber C is also provided near the bottom with an open brick arch for supporting the usual brick checker-work above. Air-blast pipes V and V', having valves *v* and *v'*, connect with the base of each fuel and generating chamber, and similar air-blast pipes V'' and V''', having valves *v''* and *v'''*, connect with the bases of the fixing-chambers. Gas-escape pipes R and R' lead from the tops of fixing-chambers C and C' into the seal-boxes T and T', as shown in Figs. 2 and 3, and pipes U and U' conduct gas from such seal-boxes to the washer or scrubber.

The retort-furnace W is preferably arranged, as shown, between the two generating-furnaces. It is constructed with the usual grate, fire-box, and flues around the retort, and is provided with a double arch, forming a chamber H. The vaporizing-coil E, having supply-pipes *e*, is arranged in chamber H, and connects at the front, by short pipe *f*, with pipe P, opening into the retort. The usual smoke-stack *w* rises from the rear of the furnace and is provided with a damper *w'*. Openings controlled by dampers may lead from the combustion-chamber into chamber H for passing hot products around the oil-vaporizing coil, if desired. One or more flues may also lead from chamber H into the chimney. Either the inlet or outlet flues of chamber H may be provided with controlling-dampers.

The retort D, provided with mouth-piece and a closing-lid *d d'* at each end, is set in the furnace in the usual manner. The retort is provided with a horizontal partition *h*, extending from its front end above its middle back to near its rear end; also with a similar partition *h'*, extending from its rear end forward a short distance below partition *h*, so as to form a circuitous passage, as shown in Fig. 5. A large pipe P extends a short distance from the top of the retort, and has connecting with it on each side the pipes O O', leading from the base of the two fuel and generating chambers A A', as shown in Figs. 2 and 3. Pipes O O' are provided with water-cooled valves *o o'*. The rear end of retort D connects on each side, by means of pipes Q Q', having water-cooled valves *q q'*, with the

base of each fixing-chamber C C', as shown in Figs. 1 and 3.

Instead of using one large retort, as shown, I may use two or more retorts, in practice, sufficient to properly take care of the water-gas that is generated in the chambers A A'.

The oil-supply pipes *e* in practice connect with an elevated oil-reservoir, and suitable pressure-gages and regulating devices are used to feed a uniform stream of oil into the vaporizing-coil.

The operation is conducted as follows: Fires are kindled in both generating-furnaces and also in the retort-furnace. After the fuel is well ignited in the generating-chambers the air-blasts are admitted and fuel gradually fed in till deep bodies thereof are heated to incandescence. Before starting fires in the generators valves *n n'* in pipes N N' and caps *c'* at the top of chambers C C' are opened. Caps *x* may also be opened at first to permit the fires to burn better by natural draft. When combustible gaseous products are given off from the beds of fuel, caps *x* are closed, and such gaseous products are conducted into the fixing-chambers, and are there burned by blasts of air admitted through pipes V'' V''', resulting in heating up such fixing-chambers to the desired temperature for subsequently fixing the carbureted gas. When first heating up the apparatus, one generating-chamber and one fixing-chamber may be more rapidly heated than the other set, as chambers A and C, and as soon as the fuel is heated to the proper incandescence and the fixing-chambers properly heated the air-blasts are shut off, valve *n* and cap *c'* are closed, valves *o* and *q* are opened, and the manufacture of gas may now be commenced. Steam is admitted by pipe *s* and passed through chamber B, where it is superheated, thence through pipe M into the top of chamber A, where it is decomposed by passage down through the fuel, and the resulting water-gas passes by pipe O and pipe P into retort D. Immediately after the admission of steam, as described, oil is admitted into the vaporizing-coil E, where it is vaporized, and the resulting vapor escapes through pipe *f* into pipe P, where it meets the inflowing water-gas and is carried thereby into retort D. The heated water-gas and oil-vapors are intimately mixed together and combined by passage back and forth through the retort in contact with the partition-plates. They are highly heated and expanded, so that when passed into the fixing-chamber they are quickly converted into fixed gas. The carbureted water-gas flows from retort D, through pipe Q, into the base of the fixing-chamber C. (See Fig. 1.) In passing up through fixing-chamber C the hydrocarbon vapor or gas and water-gas are thoroughly converted into a fixed gas. The operation is thus conducted till the heat of the fuel in chamber A is too much lowered to properly decompose steam, and then the supply of steam is shut off. Valve *n* and cap *c'* are opened, and valves *o* and *q* are

closed, thus shutting off generator A and fixing-chamber C from the retort. The fuel in generator A and the fixing-chamber are now heated up by the admission of blasts of air for the combustion of fuel and the gaseous products, as before described. As soon as steam is shut off from generator A the valves and caps of generator A' and fixing-chamber C' are properly adjusted for making water-gas, and steam is admitted into the superheater B', and thence passed into the top of generator A', where it is decomposed, as previously described with reference to generator A. Of course when using generator A' valve *n'* is closed and the valves *o'* and *p'* are opened. Water-gas is thus supplied to the retort D, where it is carbureted, as before explained, and the resulting carbureted gas is passed by pipe Q' into chamber C', where it is combined and fixed, as before described with reference to chamber C. In practice the valves will be so manipulated and the operation so conducted that as soon as the flow of water-gas from one generator is stopped it is started from the other generator, so that there shall be a continuous stream of water-gas flowing into the carbureting-retort D, whereby a uniform temperature may be readily maintained in the retort, the constant flow of gas through it maintained, and a uniform product produced.

From the foregoing it will be understood that the water-gas generator and fixing-chamber are alternately heated up and used for generating and fixing gas, and are so operated that a continuous stream of water-gas is being passed into carbureting-retort D. Retort D is maintained only at a moderate temperature, so that the hydrocarbon vapor and water-gas may be thoroughly mixed without danger of being burned before entering the fixing-chamber. The fixing-chambers will be heated to the proper temperature for thoroughly fixing the carbureted gas. If desired, a regulating-holder may be used for the water-gas which is supplied to retort D.

Where only a small apparatus is desired, the carbureting-retort may be used, as described, with one generating-furnace and one fixing-chamber, and the generation of gas could be then conducted intermittently. A pipe for carbureted water-gas may lead directly from the retort to a place of use.

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

1. In combination with a water-gas-generating furnace, the steam-superheating chamber and fixing-chamber, connecting, as described, the carbureting-retort, having means for supplying it with hydrocarbon vapor, a valved pipe connecting such retort with the

water-gas generator, and a valved pipe connecting such retort with the base of the fixing-chamber, as and for the purpose described. 65

2. The water-gas-generating furnace, the steam-superheating chamber and the gas-fixing chamber, a pipe connecting the top of the generating-furnace with the top of the superheating-chamber, and a valved pipe connecting the base of the superheating-chamber with the base of the fixing-chamber, and a steam-supply pipe connecting with the base of the superheating-chamber, in combination with the carbureting-retort set in the furnace and having hydrocarbon-supply pipe and a water-gas-supply pipe connecting the base of the generating-furnace with such carbureting-retort, as and for the purpose described. 70 75

3. The carbureting and mixing retort suitably set in a furnace, and an oil-vaporizing coil arranged in the arch of the furnace and connecting with a short gas-pipe leading into the retort, in combination with a water-gas-generating furnace, and a valved pipe connecting such furnace with the short gas-pipe of the retort near the connection of the oil-vaporizing coil, whereby hot water-gas and oil-vapor may be passed together into the carbureting-retort, as described. 80 85 90

4. In a gas-generating apparatus, a carbureting-retort set in a furnace and having a supply-pipe for water-gas and hydrocarbon vapor at one end and an outlet-pipe at the other end, in combination with an oil-vaporizing coil set in the arch of the furnace and connecting with the retort, as and for the purpose described. 95

5. The combination of two water-gas-generating furnaces, two fixing-chambers, carbureting and mixing retorts, valved pipes connecting the generating-furnaces with the fixing-chambers, valved pipes connecting both of the generating-furnaces with the retorts, and valved pipes connecting both of the fixing-chambers with such retorts, whereby water-gas may be continuously generated, carbureted, and fixed, as described. 100 105

6. In combination with two water-gas-generating furnaces, the carbureting-retort set in a furnace, an oil-vaporizing coil also arranged in the furnace and connecting with the inlet gas-pipe of the retort, and valved gas-supply pipes connecting the two generating-furnaces with said inlet-pipe of the retort near the vapor-supply pipe, whereby a continuous stream of hot water-gas and oil-vapor may be conducted into the heated retort, as described. 110 115

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

JOHN HANLON.

Witnesses:

FRANKLIN A. STEMMLER,
F. W. SEMKEN.