

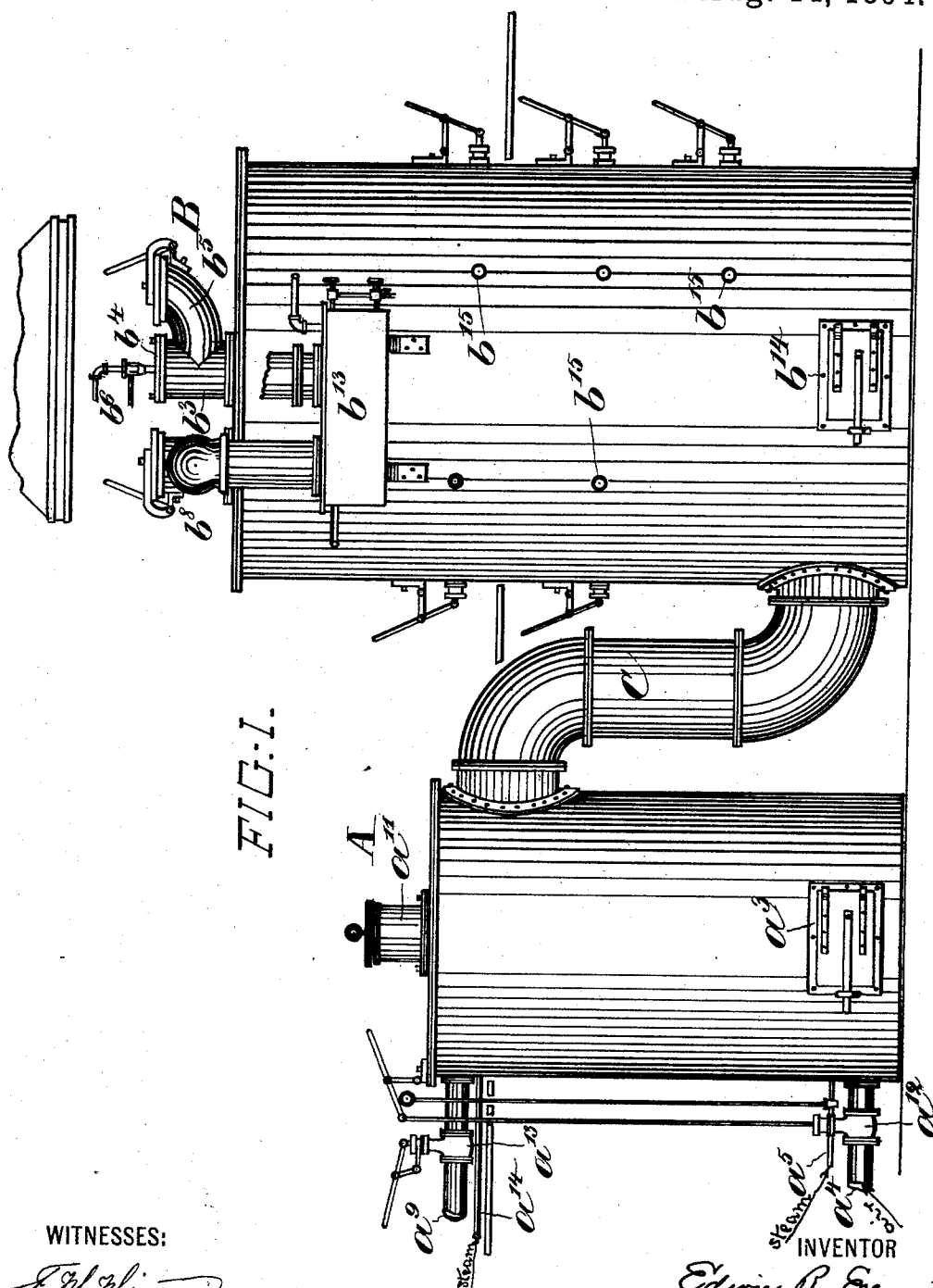
(No Model.)

3 Sheets—Sheet 1.

E. R. ELLSWORTH.
APPARATUS FOR MAKING GAS.

No. 524,544.

Patented Aug. 14, 1894.



WITNESSES:

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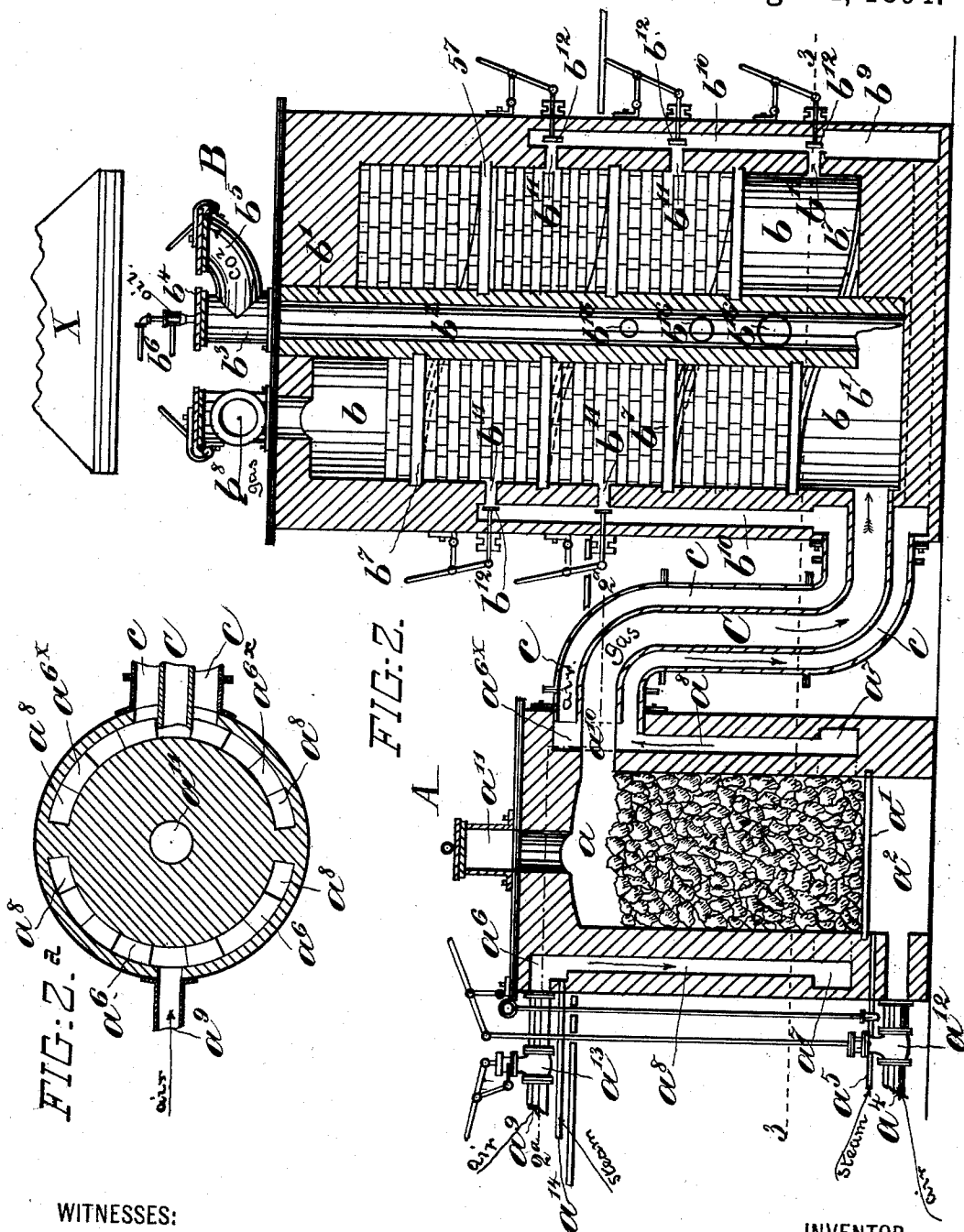
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E. R. ELLSWORTH.
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3 Sheets—Sheet 2.

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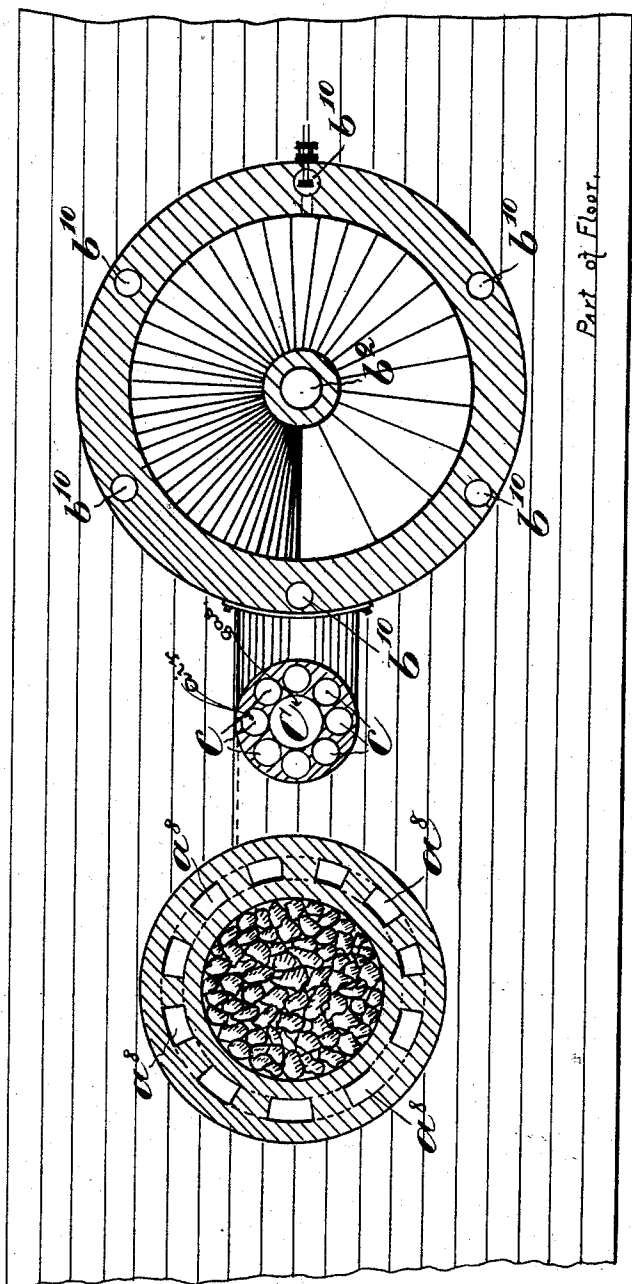
3 Sheets—Sheet 3.

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FIG. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 524,544, dated August 14, 1894.

Application filed November 3, 1893. Serial No. 489,939. (No model.)

To all whom it may concern:

Be it known that I, EDWIN RUTHVEN ELLSWORTH, a citizen of the United States, residing in Brooklyn, Kings county, New York, have invented certain Improvements in Apparatuses for Making Gas, of which the following is a specification.

My invention relates to the class of gas-making apparatuses wherein a generator and superheater are employed, the crude water gas from the generator being carbureted, or combined with an illuminant at some point before being delivered for storage.

The object of the present invention is, in part, to provide means whereby the water gas is combined with the illuminant under conditions which insure that the gas and illuminant shall be of substantially the same temperature, thereby avoiding the precipitation of free carbon or lamp black; and in part to provide means for reducing the temperature of the water gas by means of air flues arranged about the gas conduit, said flues forming a jacket which connects with the air flues employed in "blowing up," as the process of raising the temperature of the superheater is called.

The invention will be fully described hereinafter and its novel features carefully defined in the claims.

In the accompanying drawings which illustrate an embodiment of the invention—Figure 1 is a side elevation of the apparatus. Fig. 2 is a vertical, longitudinal mid-section of the same, and Fig. 2^a is a horizontal section of the generator through the part-annular flues, on line 2^a in Fig. 2. Fig. 3 is a horizontal section in the plane indicated by the line 3, 3, in Fig. 2.

A represents the generator as a whole and B represents the superheater as a whole.

C represents a conduit connecting the two.

The generator A is circular in plan and is constructed of refractory material inclosed in a jacket or casing of sheet metal. This generator has a decomposing and generating chamber, *a*, a grate, *a'*, at the bottom of said chamber, and an ash-box or pit, *a''*, below the grate. This pit has a door, *a'''*, (see Fig. 1) an inlet, *a⁴*, for a blast of air in "blowing up,"

and a steam inlet pipe, *a⁵*. At the upper part of the generator are two part-annular-flues, *a⁶* and *a^{6x}*, formed in the wall of the generator, as seen in Fig. 2^a, and there is an annular flue, *a⁷*, at the base of the chamber A. Vertical flues, *a⁸*, constructed at intervals in the generator walls, connect the annular flue *a⁷* with the part-annular flues above. The flue *a⁶*, has an inlet, *a⁹*, for a blast of air, situated at one side of the generator and at the opposite side is an outlet from flue *a^{6x}*, for the air so that it may enter a series of tubes, *c*, arranged to form a jacket about the gas conduit C. This latter communicates with the upper part of the chamber *a*, through a passage, *a¹⁰*. In the top of the generator is the fuel inlet, or charging inlet, *a¹¹*, provided with a cover which may be tightly closed.

The superheater B, is also circular in plan; and is composed of refractory material inclosed in a jacket or casing of sheet metal. In the superheater is a fixing chamber, *b*, and in the vertical axis of the same is constructed a cylindrical chimney or column, *b'*, having in it a flue, *b²*, which is open below to the lower part of the chamber *b*, which serves as a receiving chamber for the gases which enter it from the conduit C. At its upper end the flue *b²*, connects with a pipe-outlet, *b³*, which has a closely fitting cover, *b⁴*, and a branch outlet, *b⁵*, for the products of combustion. This outlet also has a closely fitting cover. In the cover or cap *b⁴*, is fitted an atomizer, *b⁶*, for injecting liquid atomized hydrocarbon.

The chamber *b*, is converted into a spiral passage by a spirally arranged floor, *b⁷*, of some refractory material on which may be built or placed the usual checker work, formed of bricks, tiles or blocks of refractory material laid up loosely. At the upper end of the spiral passage is the gas outlet, *b⁸*.

The air which flows toward the superheater from the generator through the tubes or flues *c*, about the conduit C, enters an annular flue, *b⁹*, constructed in the wall of the superheater near its base, and flows thence upwardly through flues, *b¹⁰*, constructed at intervals in the wall of the superheater. The air flows from these flues into the spiral passage form-

ing the fixing chamber through apertures or air inlets, b^{11} , arranged at different levels or heights and provided with valves or dampers, b^{12} , whereby they may be closed or opened as desired from the outside by suitable levers.

In Fig. 1, b^{13} represents the usual water seal through which the gas flows after it emerges from the outlet b^8 . b^{14} is a door to afford access to the fixing chamber, and b^{15} are peep holes to ascertain the temperature of the fixing chamber.

The operation of the apparatus is as follows: The covers of the outlets b^5 and b^8 , are removed and a fire kindled on the grate of the generator. The chamber a , of the generator is then charged with coal or coke and a regulated blast of air is admitted at the air inlet a^4 , under the grate. The products of combustion pass off through the conduit C, to the superheater B, and pass up through the chamber b , and flue b^2 , therein to the outlets over which are arranged a chimney hood, X. A blast of air will be admitted to the chamber b , of the superheater from the inlet a^9 , of the generator, in order to promote perfect combustion, such air being heated by its passage through the several flues. The air enters the flue a^6 , passes down to the annular flue a^7 , through certain of the flues a^8 , thence up certain other flues a^8 , to the flue a^{6x} , thence to and through flues c , and thence through flues b^9 and b^{10} . Valves a^{12} and a^{13} , in the respective air inlet pipes at the generator enable the amount of air admitted to be very carefully regulated. After the process of "blowing up" is finished, a jet of steam is admitted to the air-flues from a pipe, a^{14} , which enters the part-annular flue a^6 . This steam jet serves to blow the air out of the passages and the chambers of the superheater so as to remove the nitrogen which would otherwise dilute the gas. The covers of the outlets b^5 and b^8 , are now closed, the air blast below the grate of the generator and that at the inlet a^9 , are shut off. The steam is also shut off at the steam inlet a^{14} . Steam is now admitted under the grate of the generator at inlet a^5 , and this steam, in passing upward through the incandescent fuel in the chamber a , is decomposed its constituent oxygen combining with carbon from the fuel to form carbon monoxide, which joins the hydrogen to form crude water gas. This gas passes to the superheater through the conduit C, wherein its temperature is lowered somewhat by the radiation of heat to the jacket of tubes or flues c . When the "run" is started the atomizer b^6 , is set to work and atomized liquid hydrocarbon is injected into the top of the flue b^2 , through which hot gases have passed during the "blowing up." Descending through this flue the vaporized hydrocarbon meets the crude water gas entering the lower part of the chamber b , and mingles therewith. By the ordinary methods of carbureting the water gas the latter is at a much higher tem-

perature than the hydrocarbon vapor when they meet and mingle and as a result of this inequality much free carbon or lamp black is precipitated. My construction obviates this by causing the two to mix when at substantially the same temperature. After the gas and vapor mix they pass upwardly through the spiral chamber filled with checker work and are thus thoroughly united and fixed by the heat. The fixed illuminating gas thus formed passes off at the outlet b^8 , and through the seal b^{13} , to the holder for storage or use.

As the hydrocarbon vapor, in descending the flue b^2 , gradually reaches a higher and higher temperature, it breaks up into constituents of different densities; the heavier constituents descend into the lower part of chamber b , but the lighter will pass off at different levels, according to their respective volatilities, into the spiral passage through apertures, b^{16} , in the wall of the flue b^2 , said apertures being arranged at different levels, as seen in Fig. 2.

After the "run" has continued until the temperature of the superheater falls too low to produce the best results, the "run" is stopped and the operation of blowing up repeated.

Having thus described my invention, I claim—

1. An apparatus for making gas, comprising a generator, a superheater provided with an atomizer for atomizing liquid hydrocarbon, a conduit connecting the decomposing chamber of the generator with the chamber in the superheater, and a jacket about and inclosing said conduit throughout its length, said jacket connecting at one end with air-flues in the generator and at the other end with air-flues in the superheater, substantially as and for the purposes set forth.

2. In an apparatus for making gas, the combination with a generator having air-flues in its walls and an inlet thereto for a blast of air, a superheater having also air-flues in its walls which communicate with the fixing chamber therein, pipes connecting the flues in the generator with those in the superheater, and a conduit for gas connecting the generator and superheater, substantially as set forth.

3. In an apparatus for making gas, the combination with a superheater and a conduit leading thereto from a generator, of the said generator, having a part-annular flue a^6 , and a part-annular flue a^{6x} , at its upper part, an inlet a^9 , for a blast of air to said flue a^6 , an annular flue a^7 , at its lower part, upright flues connecting the flue a^7 , with the upper flues a^6 and a^{6x} , and a series of air pipes or flues c , embracing the conduit and forming a jacket therefor, said flues c , connecting with flues in the superheater, substantially as set forth.

4. In a gas making apparatus, the combination with a superheater having air flues in its

walls, a conduit leading from the generator
to the superheater, and air flues c, connect-
ing the air flues in the superheater with air
flues in the generator walls, of the generator,
5 and a steam inlet pipe communicating with
the air flues in the generator for expelling the
air therefrom after "blowing up," substan-
tially as and for the purposes set forth.

In witness whereof I have hereunto signed
my name in the presence of two subscribing to
witnesses.

E. R. ELLSWORTH.

Witnesses:

DANIEL ROTHSTEIN,
HENRY J. MOORE.