

**No. 633,317.**

**Patented Sept. 19, 1899.**

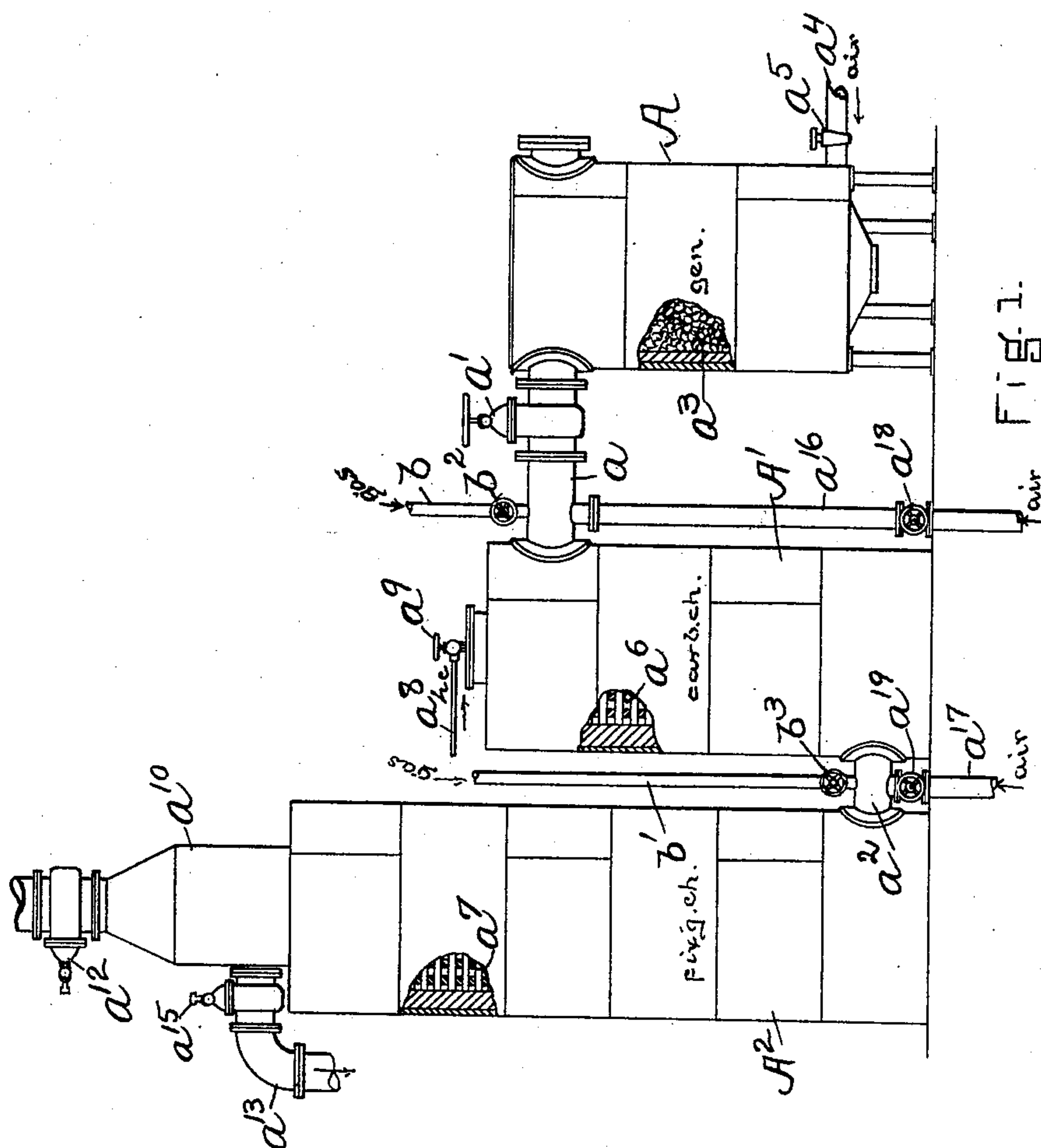
**L. J. HIRT.**

# APPARATUS FOR MANUFACTURING ILLUMINATING GAS.

(Application filed Sept. 13, 1898.)

(No Model.)

**3 Sheets—Sheet 1.**



WITNESSES :

Ed. Hirt  
J. Murphy.

INVENTOR

INVENTOR  
Louis J. Hirt

BY

BY  
Jas. F. Churchill

ATTORNEY.

No. 633,317.

Patented Sept. 19, 1899.

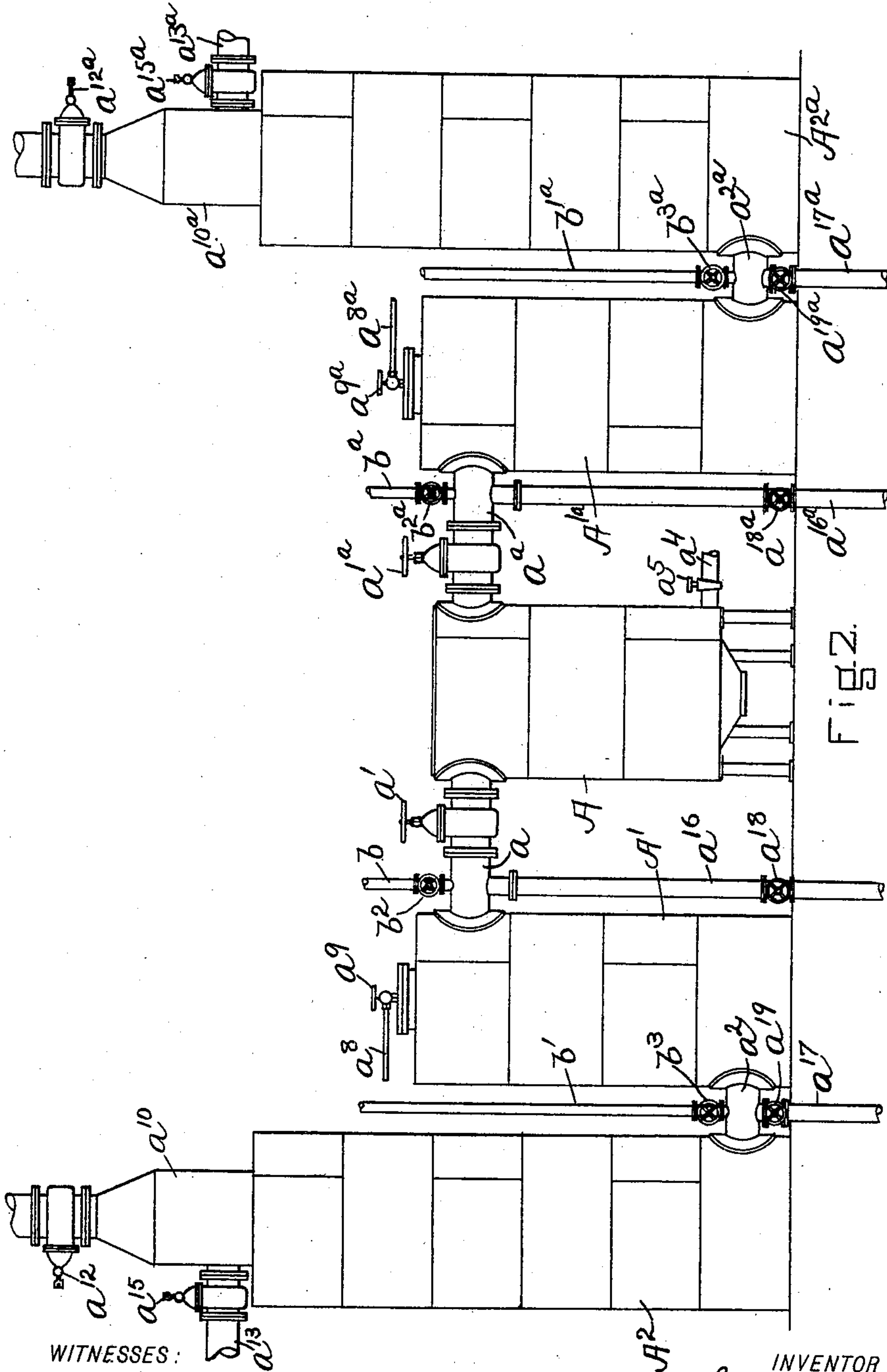
L. J. HIRT.

APPARATUS FOR MANUFACTURING ILLUMINATING GAS.

(Application filed Sept. 18, 1898.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

Ed. Hirt  
J. Murphy.

A2

INVENTOR

Louis J. Hirt

BY

Jas. H. Lechman

ATTORNEY.

No. 633,317.

Patented Sept. 19, 1899.

L. J. HIRT.

APPARATUS FOR MANUFACTURING ILLUMINATING GAS.

(Application filed Sept. 13, 1898.)

(No Model.)

3 Sheets—Sheet 3.

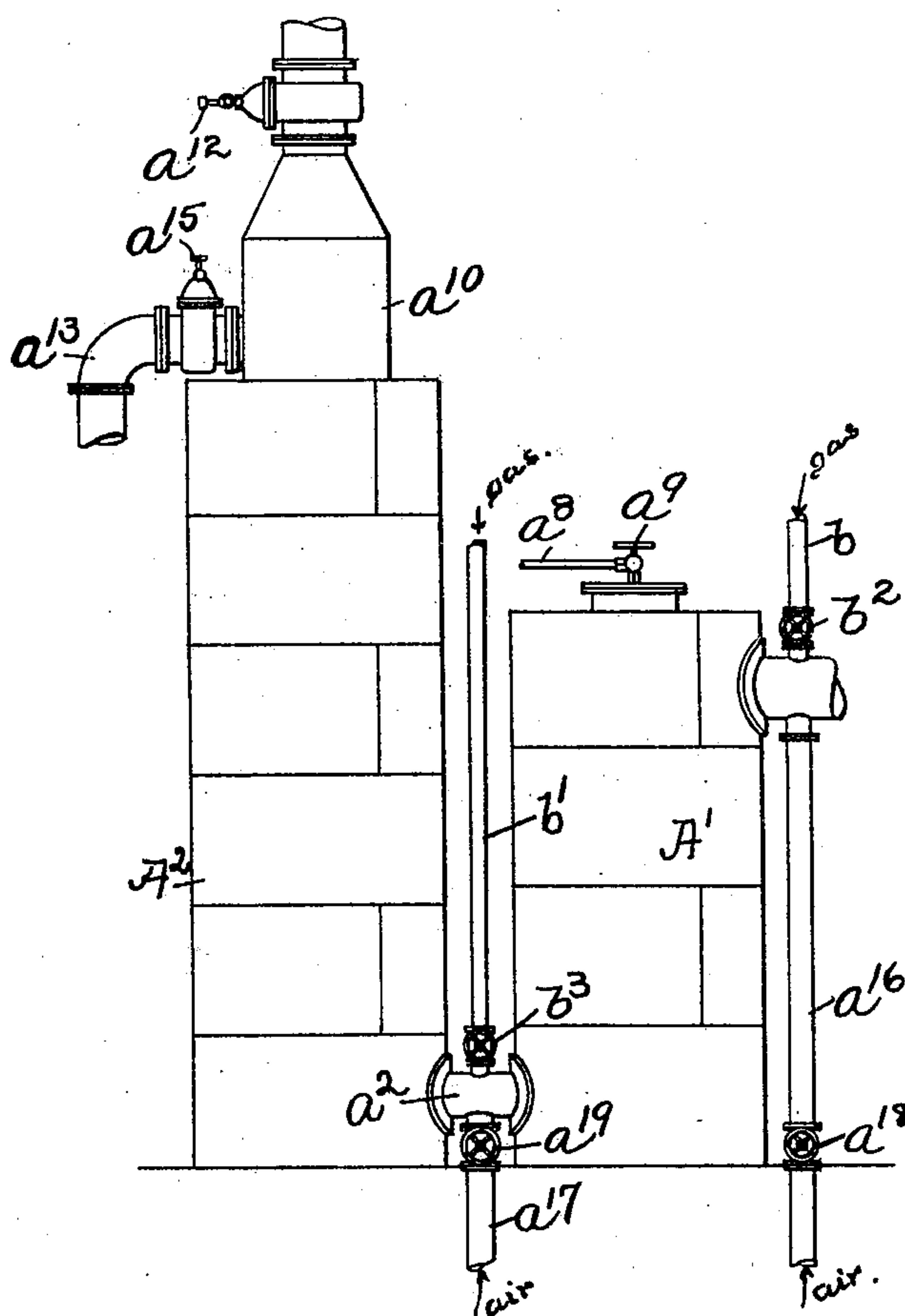


Fig. 3.

WITNESSES:

Ed. Hirt

J. Murphy.

INVENTOR

Louis J. Hirt.

BY

Jos. H. Churchill

ATTORNEY.



# UNITED STATES PATENT OFFICE.

LOUIS J. HIRT, OF BROOKLINE, MASSACHUSETTS.

## APPARATUS FOR MANUFACTURING ILLUMINATING-GAS.

SPECIFICATION forming part of Letters Patent No. 633,317, dated September 19, 1899.

Application filed September 13, 1898. Serial No. 690,856. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS J. HIRT, a citizen of the United States, residing in Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Apparatus for Manufacturing Illuminating-Gas, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an apparatus for manufacturing illuminating-gas, wherein an illuminating-gas of low candle-power is admixed with and enriched by hydrocarbons in the presence of heat previously obtained by the combustion of a gas, which may and preferably will be the illuminating-gas of low candle-power, but which may, if desired, be a different gas—such, for instance, as a producer-gas.

Figure 1 represents one form of apparatus embodying this invention; Fig. 2, a modification of the apparatus shown in Fig. 1, and Fig. 3 an elevation of a modified apparatus to be referred to.

Referring to Fig. 1, A represents a generator connected to a chamber A', near its upper end, by a pipe  $a$ , provided with a valve  $a^1$ . The chamber A' is connected to a second chamber A<sup>2</sup>, near its bottom, by a pipe  $a^2$ . The generator A may be of any suitable or desired construction and contains a body of coal or other fuel  $a^3$ , which may be consumed by natural draft or by forced draft admitted through an air-blast pipe  $a^4$ , provided with a valve  $a^5$ . The chamber A', which may be designated the "enriching-chamber," contains baffling material, preferably a checker-work of fire-bricks  $a^6$ , and the chamber A<sup>2</sup>, which may be designated the "fixing-chamber," may be provided with similar baffling or refractory material  $a^7$ . The enriching-chamber A' is adapted to have admitted into it an enriching oil or vapor thereof, which oil may be a light or heavy hydrocarbon oil, such as naphtha or petroleum, and the oil-supply pipe  $a^8$  is provided with a valve  $a^9$  to control the supply. The chamber A<sup>2</sup> is provided with an outlet-pipe  $a^{10}$  for the heating-gases, leading to the chimney and controlled by a valve  $a^{12}$ , and is further provided with an outlet-

pipe  $a^{13}$  for the illuminating-gas of increased candle-power, which pipe may lead to the scrubbers, purifiers, &c., of usual construction and not herein shown. The pipe  $a^{13}$  is provided with a valve  $a^{15}$ . The chamber A' is provided with an air-supply pipe  $a^{16}$ , and preferably the chamber A<sup>2</sup> is also provided with an air-supply pipe  $a^{17}$ , said pipes having controlling-valves  $a^{18}$   $a^{19}$ , respectively.

In accordance with this construction the chamber A' has connected to it a gas-admission pipe  $b$ , which is separate from the generator A and which is connected to a source of supply of illuminating-gas of low candle-power—such, for instance, as a coking-oven—and preferably the fixing-chamber A<sup>2</sup> may also be provided with a supply-pipe  $b'$  for illuminating-gas of low candle-power. The pipes  $b$   $b'$  are provided with suitable valves  $b^2$   $b^3$ .

In operation, with the apparatus shown in Fig. 1, the chambers A' A<sup>2</sup> may be heated to the temperature desired or required to effect the desired enriching of the low candle-power illuminating-gas in the following manner: The valves  $b^2$   $b^3$  in the gas-supply pipes  $b$   $b'$  are closed, the air-blast valves  $a^5$   $a^{18}$   $a^{19}$  opened, the valves  $a^1$   $a^{12}$  opened, and the valve  $a^{15}$  is closed while the chambers A' A<sup>2</sup> are being heated up to the desired temperature. The chambers A' A<sup>2</sup> are heated to the proper temperature by the products of combustion from the generator passing through the pipe  $a$  into the chamber A' and thence through the chamber A<sup>2</sup> to the stack through the pipe  $a^{10}$ . The combustion of the gases from the generator is completed by the air-blast from the pipes  $a^{16}$   $a^{17}$ . When the chambers A' A<sup>2</sup> have been heated to the desired or proper temperature, the air-blast valves  $a^5$   $a^{18}$   $a^{19}$  and the valves  $a^1$   $a^{12}$  are closed, and the following valves are opened—namely, the valve  $a^{15}$ , the gas-supply valves  $b^2$   $b^3$ , and the oil-supply valve  $a^9$ . In this condition of the apparatus the illuminating-gas of low candle-power admitted into the chamber A' meets the enriching-oils and vapors thereof and the candle-power of the said illuminating-gas is increased, and the enriched gas is fixed on its passage through the chambers A' A<sup>2</sup>. The surplus of oil or vapors thereof from the chamber A' is used



to enrich the illuminating-gas supplied by the pipe  $b'$ , and this enriched gas is fixed in the chamber  $A^2$ .

I may prefer to provide the chamber  $A^2$  with the supply-pipe  $b'$  for illuminating-gas of low candle-power; but I do not desire to limit my invention in this respect, as the said supply-pipe may be omitted and the pipe  $b$  be depended upon to supply the necessary amount of illuminating-gas. The illuminating-gas run through the chambers  $A'$   $A^2$  lowers the temperature of the same, so that at periodic times the enriching process is stopped and the heating process resumed by closing the valves  $a^{15}$   $b^3$   $b^2$   $a^9$  and opening the valves  $a^5$   $a'$   $a^{18}$   $a^{19}$   $a^{12}$ .

During the process of enriching the illuminating-gas with the apparatus shown in Fig. 1, as above described, it will be noticed that the generator  $A$  is idle, and in order to avoid this condition of affairs I prefer to connect to the generator a duplicate set of enriching-chambers and air, oil, and gas supply pipes, as shown in Fig. 2, wherein the second set of chambers and pipes are lettered the same as in Fig. 1, with the affix "a" added. With the apparatus shown in Fig. 2 the generator  $A$  may be in constant use, so as to heat one set of enriching-chambers, as  $A'^a$   $A^{2a}$ , while the other set  $A'$   $A^2$  is being used for enriching the illuminating-gas of low candle-power, and vice versa.

In Figs. 1 and 2 I have described my invention as embodied in an apparatus employing a generator for heating up the enriching-chambers; but I do not desire to limit my invention in this respect, as the generator may be entirely dispensed with and the heating of the enriching-chamber effected by the use of the illuminating-gas of low candle-power, as illustrated in Fig. 3, which apparatus is the same as that shown in Fig. 1 with the generator omitted.

The condition of the heating apparatus shown in Fig. 3 during the heating-up process is as follows: The valves  $a^{15}$   $a^9$  are closed, and the valves  $b^2$   $b^3$   $a^{18}$   $a^{19}$   $a^{12}$  are opened; but, if desired, the valve  $b^3$  may be also closed and the supply of illuminating-gas to the chamber  $A'$  depended upon to heat the chamber  $A^2$ . During the heating-up process the illuminating-gas is consumed in the chambers  $A'$   $A^2$ , air for combustion being supplied by the pipes  $a^{16}$   $a^{17}$ . When the chambers  $A'$   $A^2$  have been heated to the desired or proper temperature, the air-valves  $a^{18}$   $a^{19}$  are closed, the valve  $a^{12}$  closed, and the valves  $a^9$   $a^{15}$  opened, the illuminating-gas valves being left opened; but, if desired, they may be momentarily closed while the change in the other valves is being effected. It will thus be seen that with the arrangement shown in Fig. 3 the illuminating-gas of low candle-power serves as the heating medium for raising the temperature of the chambers  $A'$   $A^2$  during

the heating-up step or process and is thereafter enriched and increased in candle-power by means of this heat in the presence of the enriching-oils or vapors thereof, the heating-up and enriching processes alternating.

The invention herein described is especially applicable for use in connection with coke-producing plants which now produce illuminating-gas of low candle-power, usually about twelve-candle power, and a portion of which illuminating-gas is now used for heating the coking-ovens.

With the apparatus above described the illuminating-gas of low candle-power may be increased to a much higher candle-power, preferably as high as twenty-four-candle power, and thereby is made serviceable for illuminating purposes, and consequently of increased commercial value, which also serves to increase the commercial value of the coking plant, as its waste product—namely, the illuminating-gas of low candle-power—is made more valuable.

With the apparatus shown in Fig. 3 the illuminating-gas may be ignited in any suitable manner when first admitted into the chamber  $A'$ , and thereafter it is maintained ignited by the heat in the said chamber.

I claim—

1. In an apparatus for manufacturing illuminating-gas, the combination of the following instrumentalities, viz: a gas-generator provided with an air-inlet, and with an outlet-pipe for the products of combustion, a valve in said outlet-pipe, a chamber containing baffling material connected to said generator through said gas-outlet pipe, a hydrocarbon-supply pipe communicating with said chamber and provided with a valve, an air-supply pipe connected to said chamber and provided with a valve, and an illuminating-gas-supply pipe connected to said chamber and to a supply of illuminating-gas of low candle-power and provided with a valve, substantially as described.

2. In an apparatus for manufacturing illuminating-gas, the combination of the following instrumentalities, viz: a chamber containing baffling material, a hydrocarbon-supply pipe communicating with said chamber for the admission of hydrocarbons therein, a valve in said supply-pipe, an air-supply for said chamber, means to control said air-supply, and a supply-pipe for illuminating-gas of low candle-power connected to said chamber and provided with a valve, substantially as described.

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

LOUIS J. HIRT.

Witnesses:

JAS. H. CHURCHILL,  
J. MURPHY.