

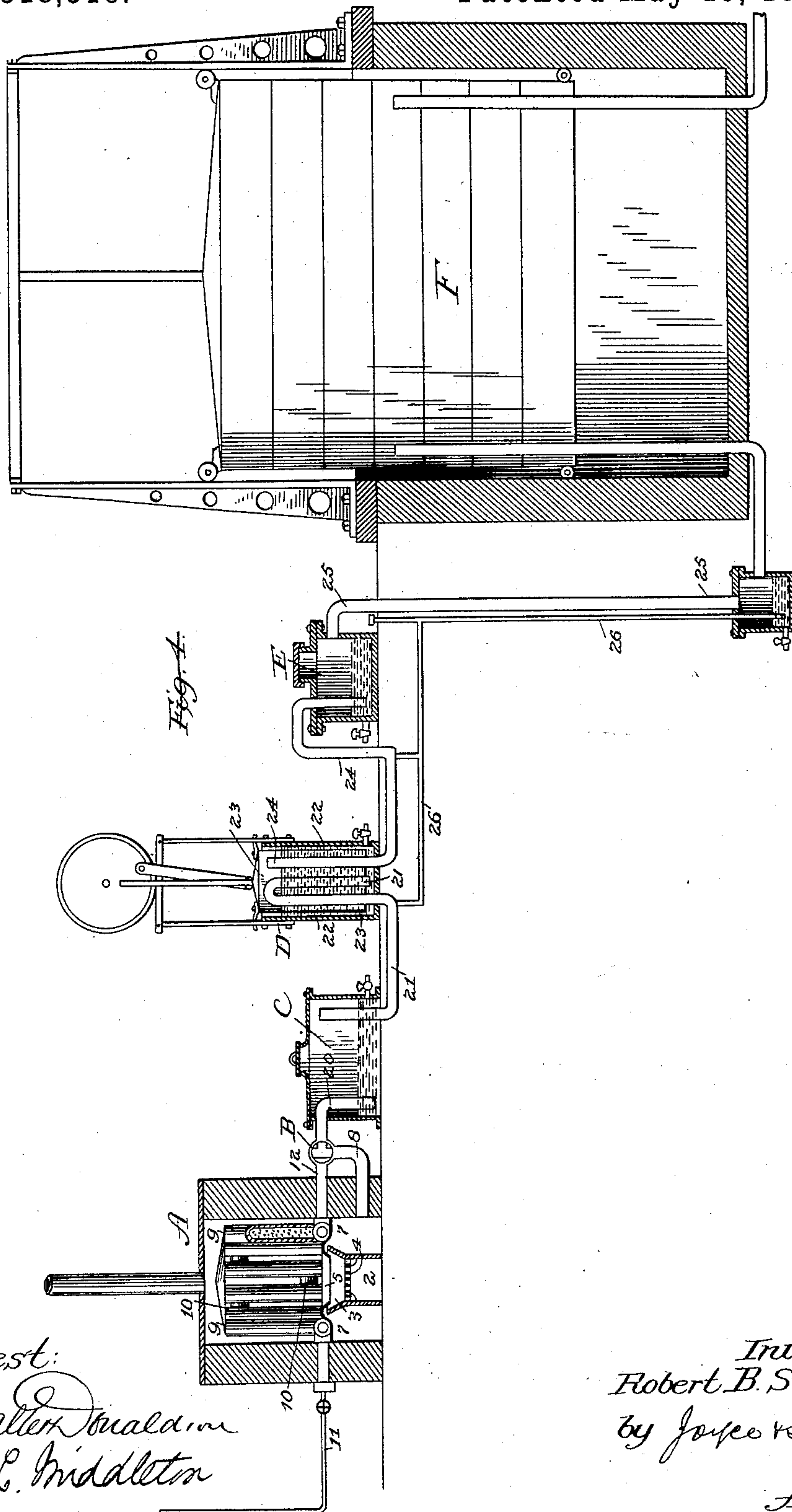
(No Model.)

R. B. STAPP.

## PROCESS OF MANUFACTURING GAS.

No. 318,318.

Patented May 19, 1885.



Attest:  
Walter Baldwin  
F. L. Middleton

Inventor  
Robert B. Stapp.  
by Joyce & Spear  
Att'ys.



# UNITED STATES PATENT OFFICE.

ROBERT B. STAPP, OF DENVER, COLORADO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE UNITED STATES CARBONOUS OXIDE ILLUMINATING GAS COMPANY, OF SAME PLACE.

## PROCESS OF MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 318,318, dated May 19, 1885.

Application filed April 11, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT B. STAPP, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Process of Manufacturing Gas; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to the manufacture of illuminating-gas.

The principal objects of my invention are to produce cheap illuminating-gas of excellent quality, and to avoid the use of oxygen, whereby the gas is rendered explosive.

Heretofore gases have been made in many ways out of air, superheated steam, and the products of combustion, combined with vapors of hydrocarbon taken up by these gases, the whole being converted into a fixed gas, and thereby rendered fit for use or burned as a vapor either for heating or illumination.

My invention is designed to be carried out in the apparatus hereinafter described. I make no claim for this apparatus, however, herein, as it is the subject-matter of a separate application filed in the United States Patent Office on the 25th day of February, 1885. This apparatus I have shown in the accompanying drawing, in which the figure represents in section the generator and receiver and intermediate parts.

In the drawing, A represents a gas-generator. This gas-generator consists of brick or iron, containing walls with a suitable covering, and with a flue for the escape of the smoke. Within this wall is an iron casting, preferably cylindrical, forming the ash-pit, indicated at 2. Above this is a flaring fire-pot, 3, and between the two is an ordinary grate, 4.

On the top of the fire-pot 3 is supported a beveled ring, 5, the lower edge of which dips down into the center of the fire-pot, an annular space being left between the ring and the upper edge of the fire-pot. The ring supports a series of vertical iron retorts, 9, arranged around near the walls of the furnace, substantially air-tight, between the upper part of the furnace in which the retorts are located and the lower annular space, 7, between the outer

walls and the casting 2, excepting the inner annular space between the outer edge of the fire-pot and the inner bevel edge of the ring 5. Suitable provision is made for the introduction of air into the ash-pit within the casting 2. Vertical retorts in the chamber above the fire-pot are supported on the ring, and are connected alternately at top and bottom by short transverse pipes 10, and on one side the oil-pipe is connected to the bottom of one of the retorts.

A passage on the other side (marked 12) is provided from the bottom of the retort, connecting it with three-way cock B. The pipe 8 connects the annular chamber 7 also with the three-way cock. The pipe 11 leads to an elevated tank containing a light hydrocarbon, preferably of 110°. Within the retorts 9 is placed coke or other suitable material adapted to be raised to a sufficient degree of heat without decomposition to convert the hydrocarbon vapor into a gas.

C represents a tar-trap, adapted to contain water, and a pipe, 20, leads from the three-way cock B into the upper part of this trap and extends down to near the bottom. The exit-pipe 21 enters the bottom of the trap and extends upward near the cover. This pipe extends to the pump and washer D, entering the bottom and passing up to or near the top of the tank, then bending over and extending down near to the bottom.

The outer tank or case of the pump and washer is shown at 22. It is adapted to contain water, and is opened at the top. An inverted vessel, 23, fitted into this tank 22, is caused to reciprocate vertically by means of a pitman and guiding-rod, connecting it to the driving wheel or crank. An open pipe, 24, extends from near the top of the tank down through the bottom and into the oil-trap E, which is similar to the tar-trap. It is provided with a pipe, 25, extending down into a water-tank, into which extends, also, the drip-pipe 26. From the drip-water tank the water-pipe leads up into the holder F, which is of ordinary construction.

Instead of having the retorts in a vertical position, I may have them inclined. In this



case the retorts 9 are made to extend through the walls of the furnace, and to project on the outside thereof, and are provided with plugs. They are connected in the manner above described by the pipes 10, and have also the pipe-connections 11 and 12, the pipe 8 in this case extending into the furnace above the grate.

In operating the apparatus the fire-pot 3 is filled with coal and a suitable amount of air is permitted to flow into the ash-pit. The pump, which is nearly filled with water, is then operated, the three-way cock being turned in the position shown to open connection between the annular space 7 and the tar-trap. The operation of the pump creates a vacuum in the inlet-pipe and tar-trap, and causes the air to be drawn from the space 7. By air passing through the coal in the fire-pot carbonic-oxide gas is generated, which is drawn and forced by the pump through traps into the holder. This operation is carried on as long as may be deemed advisable, and then the pump is stopped and the three-way cock is turned to shut off the pipe 8 and bring the pipe 12 in connection with the tar-trap. In the meantime the retorts have become heated, and oil is passed through the pipe 11 into these retorts. Under the heat of the retort it is converted into gas and its own pressure forces it forward through the pump D (which now becomes a washer) and into the holder, where it mingles with the carbonic-oxide gas previously introduced. By this mixing the carbonic-oxide gas, which is nearly colorless when burning, is made an illuminating gas.

The operation can be repeated at intervals, which may be found necessary or advisable, the retorts being heated during the production of the carbonic-oxide gas, and the heat exhausted in the conversion of the hydrocarbon oil into gas. The proportion or mixture of the two gases may be varied at will by varying the relative length of operation of the two processes.

I am aware that it is not new to produce an illuminating-gas by causing carbonic oxide

produced by partial combustion of carbonaceous fuel to vaporize and carry over to a fixing-retort hydrocarbon oils; and I am also aware that hydrogen and gases from partial combustion of carbonaceous fuel have been heretofore designed for mixing with gas from hydrocarbon oils with which they were to be fixed; also, that side retorts have been heated by the combustion which produces the carbonic-oxide and water gas, and then the carbonic-oxide and water gas introduced with oil to these heated side retorts.

Having thus described my invention, what I claim is—

1. The method hereinbefore described of operating the described apparatus, consisting in, first, generating carbonic-oxide gas and passing the same to the reservoir, heating the retorts by the same operation; then shutting off the carbonic-oxide gas and admitting hydrocarbon oil to the retorts, generating therefrom a gas; and, finally, mixing the same with the carbonic-oxide gas, all substantially as described.

2. The method hereinbefore described of operating the described apparatus, consisting in first opening the pipes leading from the lower chamber and supplying air to the fuel for the combustion, and in operating the pump to draw the carbonic-oxide gas and force it to the receiver; secondly, in allowing the pump to remain at rest to act as a washer, admitting the hydrocarbon oil to the retorts while the carbonic-oxide gas is shut off and the passage is open between the retorts and the pump; and, finally, in passing the hydrocarbon gas to the holder and mixing it with the carbonic oxide, substantially as described.

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

ROBERT B. STAPP.

Witnesses:

G. E. BURLESON,  
HENRY A. DAVIS.