

(No Model.)

C. J. FAMES.

METHOD OF AND APPARATUS FOR ENRICHING AND BURNING WATER GAS.

No. 311,967.

Patented Feb. 10, 1885.

Fig. 1.

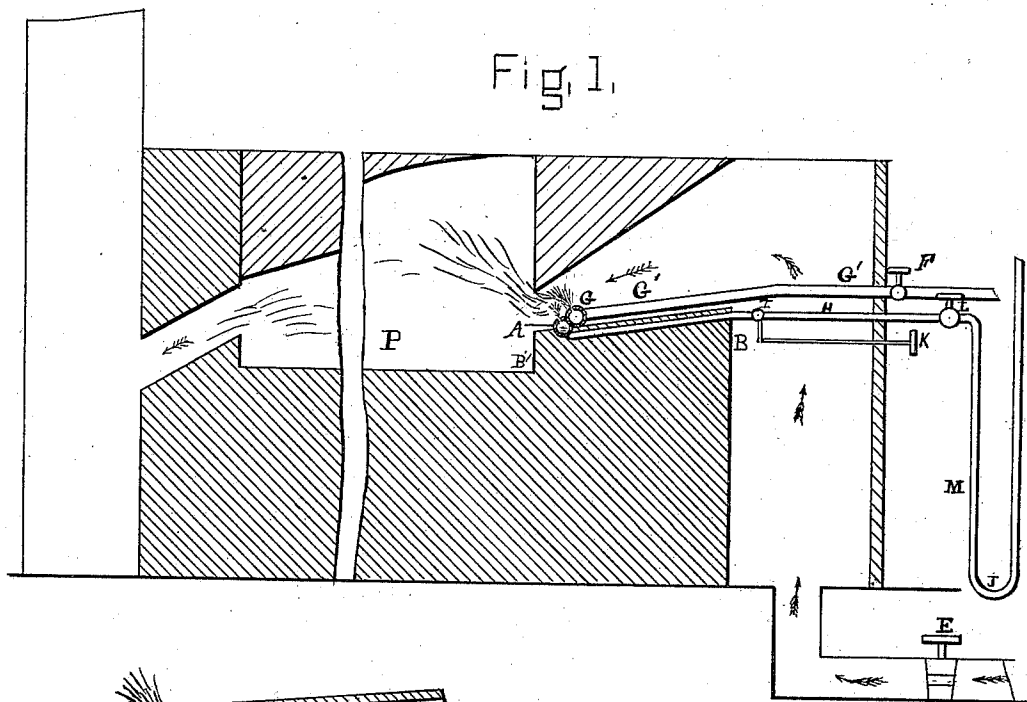


Fig. 2.

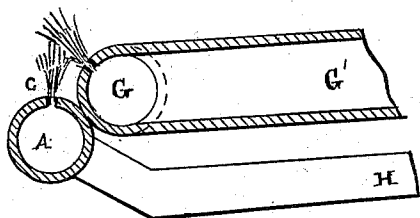


Fig. 4.

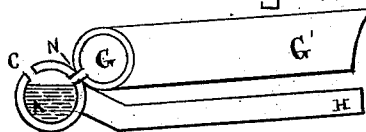
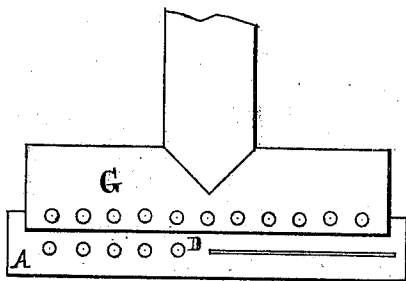


Fig. 2.



Witnesses:-

Wm. B. Lorneboon.

Wm. G. Button

Inventor:—

Charles J. Barnes

UNITED STATES PATENT OFFICE.

CHARLES J. EAMES, OF NEW YORK, N. Y.

METHOD OF AND APPARATUS FOR ENRICHING AND BURNING WATER-GAS.

SPECIFICATION forming part of Letters Patent No. 311,967, dated February 10, 1885.

Application filed January 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. EAMES, a citizen of the United States, residing in the city of New York, county of New York, and State of New York, have invented a new and useful Improvement in Methods of and Apparatus for Enriching and Burning Water-Gas, of which the following is a specification.

My invention relates to apparatus for burning water-gas, in combination with hydrocarbon vapors and air, in furnaces for metallurgical purposes, the combined gas and hydrocarbon vapors and air being mixed in requisite proportions in a chamber before entering the furnace.

In the drawings, Figure 1 is a longitudinal section of a furnace showing my improvement. Fig. 2 is a plan view of the water-gas-supply pipe and oil-vaporizer and oil-supply pipe and burners. Fig. 3 is a section of the gas-supply pipe, an elevation of the oil-supply pipe, and a section of the pipes having the holes, which are the burners, and showing the angle at which they are pierced, which latter feature forms an important part of my invention. Fig. 4 is similar to Fig. 3, but the gas-pipes and oil-pipes are connected by an opening which allows the contents of the two pipes to mingle.

My invention consists in the construction of an oil-vaporizer for enriching water-gas at the point of combustion, when used in my previous invention, of a combustion or mixing chamber, wherein the water-gas and hydrocarbon vapor are mixed with air in the proportion that develops its greatest intensity, and also in proportions that will produce a reducing and also an oxidizing flame, and by aid of valves the combined flow of water-gas and oil-vapor and air can at all times be controlled, and is caused to pass from the mixing-chamber into the hearth or body of the furnace before ignition takes place, and also by vaporizing the oil at the point of combustion by means of the radiated heat of the furnace I thereby cause the oil-vapor to mix with the water-gas before entering the furnace.

I have found that when water-gas is used in combination with a blast of air in some metallurgical operations the products of the perfect combustion of this gas is deleterious. In the manufacture of glass there is no deleteri-

ous effect produced by contact with the products of perfect and rapid combustion of water-gas; but in the manufacture of iron and steel these products are so injurious as to prevent welding of either of these metals; hence it is necessary that water-gas should be enriched with carbon in an economical and convenient form. It is obvious that a high calorific power can be obtained from water-gas combined with a blast of air. Results have shown that iron and steel cannot be manipulated in a furnace where this combination is used. When water-gas is combined with hydrocarbon vapor and mixed with an air-blast at the point of combustion, a much higher temperature is reached with greater rapidity and economy, and can be used in the manufacture of iron and steel and the reduction of all metals.

The object of enriching water-gas is to increase its efficiency, and for the purpose of economy, the mixture produced being far more efficient, as well as cheaper, than the water-gas used alone. The process which I will describe requires about two and a half gallons of oil to one thousand feet of gas.

To enable others skilled to make and use my invention, I will proceed to describe it, reference being had to the accompanying drawings.

Fig. 1 is a longitudinal section of a furnace built of fire-brick, showing my hydrocarbon-vaporizer A placed in front of water-gas burner G.

A is the hydrocarbon or oil vaporizer, placed on bridge-wall B in front of water-gas burner. This vaporizer is made of iron pipe about one and a half inches in diameter, having a slot or opening, C, on top, about three-eighths of an inch wide, or is sometimes drilled with holes D, about same size. The length of vaporizer and slot or number of holes depends upon the width of bridge-wall, and this vaporizer is so placed that the vapor of oil will pass out at its top, and so mix with the water-gas before it enters the furnace P.

E is the air-valve used to regulate the quality and nature of the flame.

F is the valve to regulate the flow of water-gas to pipe G' and burners G lying on bridge-wall B.

H is the oil-pipe connected to vaporizer A.

I is the valve used to regulate the flow of oil from trap J to vaporizer A, and is placed near enough to the oil-vaporizer to insure all the oil remaining in the pipe becoming vaporized when the valve I is shut off.

K is the lever or handle, carried outside of the furnace, from valve I.

L is the valve to regulate the flow of oil to valve I, and is connected with pipe M.

M is the oil-pipe, connected with reservoir of oil, and is formed into a trap or seal, J, to prevent back-pressure from vaporizer A.

The manner of operating my water-gas enricher or hydrocarbon vaporizer when attached to a reverberating or other furnace is as follows: The valve F, attached to pipe G', is partially turned on, so that the water-gas will issue in a small stream from the holes or burners G. A lighted match is applied and the water-gas ignited; then the valve is opened still wider, so that the flame will pass into the furnace. At this time the air-valve E is also opened partially, and both the gas and air valves are gradually opened until the air mixes with the gas and forces it into the body of the furnace P, and when the surrounding walls of the furnace have become sufficiently heated then partially open the valves I and L, when the oil will vaporize and pass out at the top or opening of the vaporizer A and mix with the already issuing water-gas. The temperature of the furnace is controlled by opening to a greater or less extent the water-gas valve and the oil-valve and the air-valve.

I sometimes construct the water-gas burner so that it will pass the gas into the oil-vaporizer, and both water-gas and oil-vapor issue from the same opening and pass into the combustion or mixing chamber. This is shown in Fig. 4 at N.

Wherever herein I use the term "water-gas" I wish to be understood as designating a true water-gas produced by passing steam through incandescent coal, and preferably by the addition of pulverized coal-dust, so as to decompose some of the products, as in the "Strong" process, and obtain carbonic oxide with the hydrogen.

I am aware that it has been proposed to use air and either steam or "decomposed" steam to atomize hydrocarbon oils, and then to either burn the mixture or to retort it to obtain a fixed illuminating-gas, and do not herein claim

the same, first, because if steam be used the aqueous vapors would imperfectly fulfill the object I have in view, and decomposed steam would give a hydrogen gas, and not a true water-gas. Furthermore, the atomization of the hydrocarbons differs materially from my method of vaporizing by direct or radiated heat, and it would not be practical to control the flame, as hereinbefore specified, which is an essential of metallurgical processes.

I am aware that gases have been carburized by heat at or near the burner or point of combustion for illuminating purposes, and do not herein claim the same; but I am not aware that a working-flame of water-gas has been controllably carburized in order to regulate the character and quality of the metal operated on; therefore

What I claim, and desire to secure by Letters Patent, is—

1. The method herein described for producing a flame for metallurgic purposes and controlling the character of the same, which consists in combining with water-gas a regulated quantity of a hydrocarbon, said hydrocarbon being vaporized at or near its point of union with the water-gas, and where the working-flame is utilized, whereby the quality of the flame can be controlled at the will of the operator, substantially as and for the purposes specified.

2. In a metallurgical furnace, the combination of an oil-vaporizer provided with a slot or perforations, and a water-gas pipe and burner provided with perforations, and an air-pipe entering a chamber, in combination with a bridge-wall of a furnace, substantially as and for the purpose specified.

3. In a metallurgical furnace, an air-pipe having a valve, and a water-gas pipe and perforated burner provided with a valve, and an oil-vaporizer provided with valves, a trap or seal in combination with a mixing-chamber on the bridge-wall of a furnace, as shown, and for the purpose set forth.

In testimony whereof I affix my signature, in presence of two witnesses, this 24th day of January, 1883.

CHARLES J. EAMES.

Witnesses:

J. W. RITTER, Jr.,
H. B. MOULTON.