J. C. TIFFANY.

Promoting Combustion in Furnaces.

No. 163,547. Patented May 18, 1875.

Fig. 1.

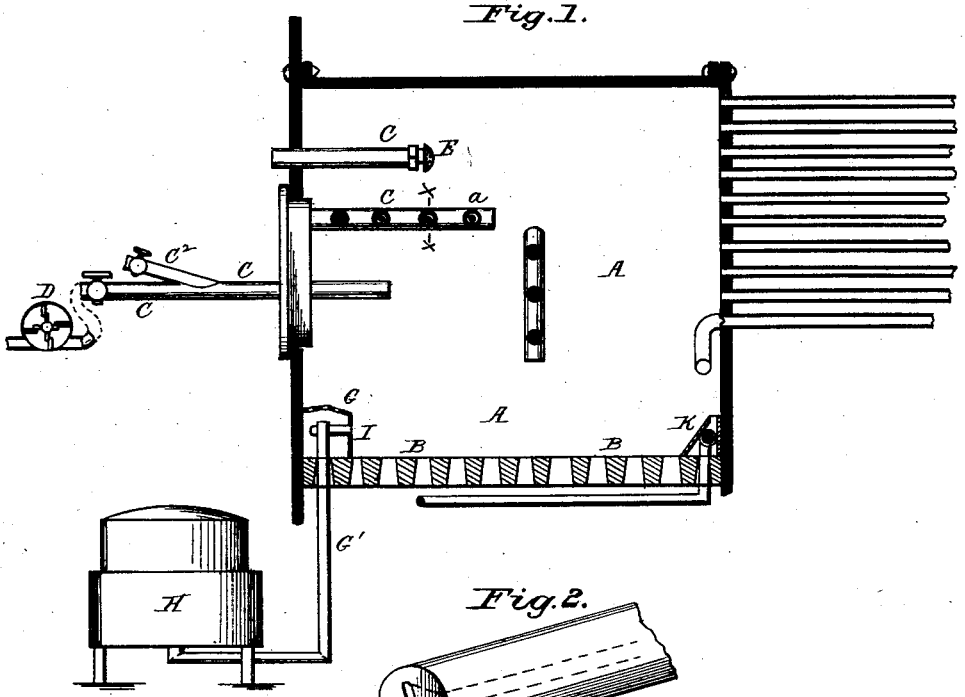


Fig. 2.

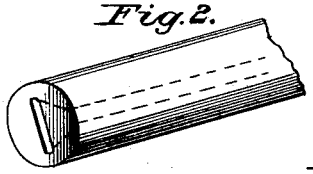


Fig. 3.

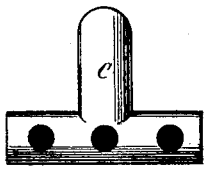


Fig. 4.

Fig 5.

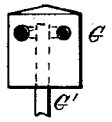
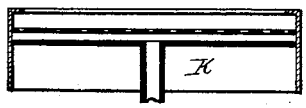


Fig. 6.



Witnesses:
Jos. S. Coombs
A. H. Norris.

Inventor
Joseph Capron Tiffany.
By James L. Norris.
his atty

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JOSEPH CAPRON TIFFANY, OF PORTSMOUTH, NEW HAMPSHIRE.

IMPROVEMENT IN PROMOTING COMBUSTION IN FURNACES.

Specification forming part of Letters Patent No. **163,547**, dated May 18, 1875; application filed May 10, 1875.

To all whom it may concern:

Be it known that I, JOSEPH CAPRON TIFFANY, of Portsmouth, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Promoting Combustion in Furnaces, of which the following is a specification:

This invention relates to a new and improved method of promoting combustion in furnaces, and apparatus for carrying the same into effect, its object being to furnish an effectual means of increasing the combustion of the fuel and intensifying the heat in the furnace.

My invention consists in an improved method of promoting combustion and intensifying the heat in furnaces by admitting to the same, simultaneously, a current of carbonic oxide and hydrogen gas, and heated air or steam, in such manner that the two will commingle and mix as they escape into said furnace, and unite with and consume the products of combustion arising from the burning fuel, as hereinafter more fully described.

In the drawings, Figure 1 represents a sectional view of the fire-box of an ordinary tubular boiler, showing the different forms of my invention. Fig. 2 is a perspective view. Fig. 3, a detached view of one of the double pipes for supplying the gas and air to the furnace; Fig. 4, a transverse sectional view of one of the double pipes; Fig. 5, an elevation of the box or chamber and gas-supply pipes, and Fig. 6 represents a longitudinal section through the triangular box.

The letter A represents the fire-box of the boiler, and B the grate-bars of the same. C represents a double pipe, through the portion *c* of which heated air is forced by means of a fan, D, or other blast apparatus, carbonic oxide, and hydrogen gas, the two being admitted through the branch c^2 of said double pipe. The above-named gases and heated air are in this manner mixed as they escape into the furnace, burning with an intense heat, and consuming the products of combustion arising from the burning fluid.

It is evident that various modifications of the above device may be employed with advantage in connection with the furnace. For instance, the gas-supply pipe may extend entirely through the outer pipe and terminate in a rose-jet, E, just beyond the end of the same in the furnace; or said outer pipe may be formed with a series of apertures at suitable intervals along the same, through which project a series of small pipes from the inner pipe, having an annular opening around said pipes for the escape of the heated air.

Instead of the outer pipe, a chamber or box, G, may be employed, the same being arranged just above the grate-bars, and having an open bottom for the admission of air. A pipe, G′, leading from a gas-holder, H, extends up into said chamber, terminating in branch pipes I, which project through apertures somewhat larger than the same in the upper part of said chamber, in order to carry a current of air along with the gases introduced into the furnace, and the gases and air are mixed as they enter, as before. A modification of this last-mentioned device is represented by the letter K, which consists in a triangular box, with a longitudinal slot along its top, having a perforated pipe extending through the same, and communicating with the gas-holder. Said box has an open bottom for the admission of air to the same. The burning fuel, by heating said box, insures the thorough heating of the air before entering the furnace.

The pipes employed are made of platinum or its alloys, or of other metals, coated or plated with platinum or its alloys, in order to resist the intense heat and the action of the steam and gases. Through the inner pipes a current of hydrogen and carbonic-oxide gas is admitted to the furnace, and through the outer a current of heated air. The inner pipe is made considerably smaller than the outer, leaving an annular space for the passage of the air or steam, and the inner pipe communicates with the furnace through a series of short tubes projecting through apertures somewhat larger in the outer pipe, annular spaces being thus formed around them, through which the heated air can escape into the furnace.

It will be seen that the gases and heated air or steam are thus passed into the products of combustion in the furnace together, and commingled as they escape, insuring the most perfect combustion.

Steam may be admitted through the inner tubes instead of the gases, in which case the

small tubes are made to project somewhat beyond the walls of the outer tube, in order that the steam may become superheated before entering the furnace.

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

The method herein described of promoting combustion and intensifying heat in furnaces, by simultaneously admitting hydrogen and carbonic-oxide gases and heated air to the same, and commingling and mixing the two at the moment they enter the furnace, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand.

JOSEPH CAPRON TIFFANY.

Witnesses:

JAMES L. NORRIS,

A. H. NORRIS.