

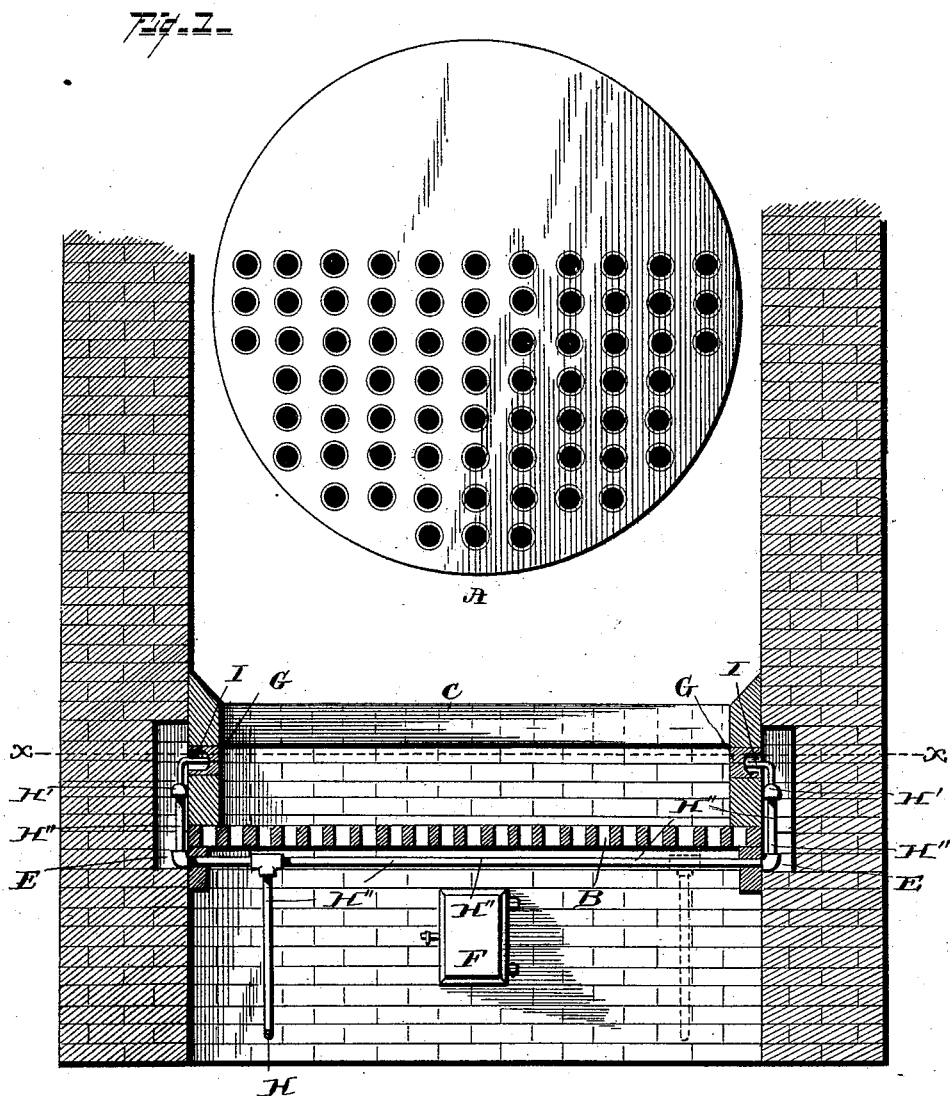
(No Model.)

2 Sheets—Sheet 1.

F. T. ADAMS.  
FURNACE FOR BURNING NATURAL GAS.

No. 422,562.

Patented Mar. 4, 1890.



Witnesses

*Albert Speiden,*  
*Chas. E. Brock,*

Inventor

*Frederick T. Adams,*  
By *Mayer & Webster,*  
*Associate Attorneys.*

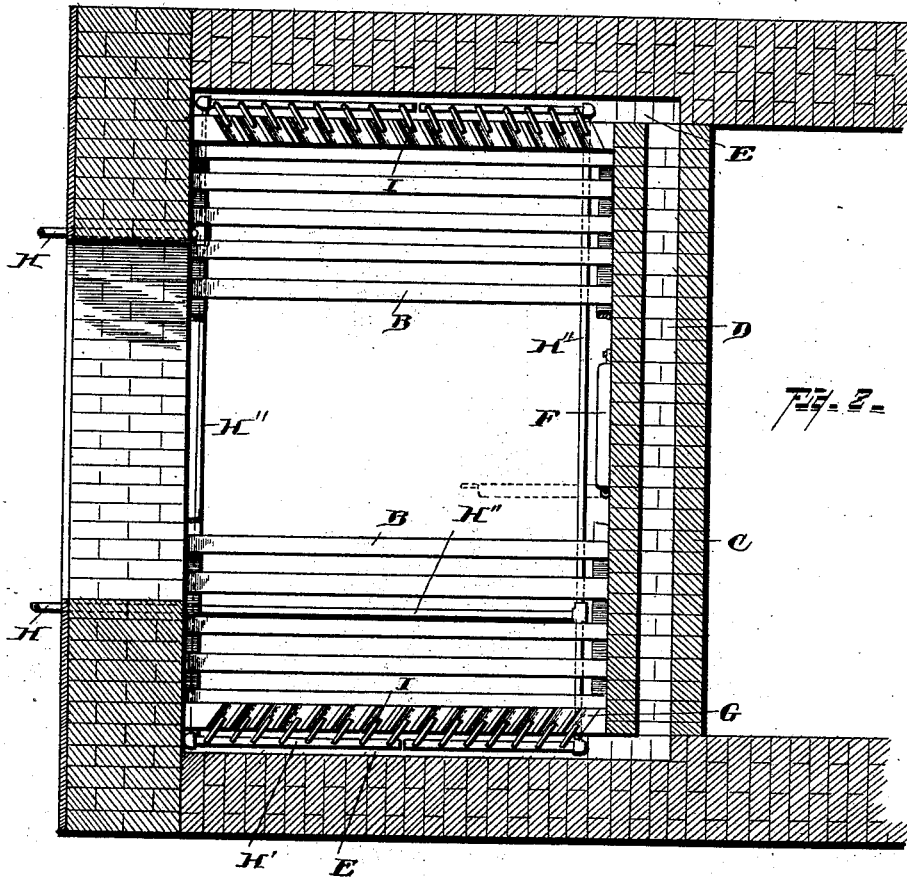
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# UNITED STATES PATENT OFFICE.

FREDRICK T. ADAMS, OF TOLEDO, OHIO.

## FURNACE FOR BURNING NATURAL GAS.

SPECIFICATION forming part of Letters Patent No. 422,562, dated March 4, 1890.

Application filed February 23, 1889. Serial No. 300,966. (No model.)

*To all whom it may concern:*

Be it known that I, FREDRICK T. ADAMS, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in an Auxiliary Attachment for the Combustion of Natural Gas in Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to an auxiliary attachment for the combustion of natural gas in furnaces, and has for its object to provide means whereby a proper amount of atmospheric air to support combustion shall be first heated and afterward united with the gas within a mixer before passing to the point of combustion.

A further object is to locate the air chambers and mixers within the furnace-wall, thereby leaving the combustion-chamber and grate-bars intact for use in the combustion of coal or any preferred fuel in the event of failure of the supply of gas.

A further object is to lead a current of atmospheric air beneath the grate-bars and into a chamber within the bridge-wall, whereby to heat the air, and from thence to chambers upon each side of the furnace, to be finally united with the gas previous to combustion thereof.

A further object is to provide means for supplying the aeriform fluid to either the front or rear of the furnace or along the entire length thereof, as may be desired.

A further object is to project the aeriform fluid into the furnace from each side thereof at an obtuse angle to the side walls of the furnace, thereby centralizing the heat beneath the boiler.

A further object is to form the sections of the mixers interchangeable and reversible.

The invention consists in the parts and combination of parts hereinafter set forth, and pointed out in the claims.

In the drawings, Figure 1 is a transverse

vertical section of the furnace with the front end removed to disclose the mixers and pipe-connections and the longitudinal air-chambers. Fig. 2 is a horizontal section taken on the line *xx* of Fig. 1. Fig. 3 is a plan view of one-half of the mixer, and Fig. 4 is a side view of the same.

A designates the furnace, which may be of any preferred construction, the grate-bars B and bridge-wall C being arranged in the usual manner, the object of my invention being to provide an auxiliary attachment for the combustion of natural gas or other aeriform fluids without disarranging the furnace proper, this arrangement being imperatively necessary wherever natural gas is used, as the varying pressure, as well as the expansion and contraction of the pipes through which the gas is led, causes frequent breakage and severance of the same, thereby obliging the consumer to resort to coal or wood as fuel.

By the arrangement herein described delay and expense are obviated and the furnace is left intact while gas is used as a fuel, and the auxiliary attachment for the combustion of gas is left in place when coal or other fuel is used upon the grates.

D designates a chamber formed in the bridge-wall and communicating with longitudinal chambers E upon each side of the furnace, these chambers extending from the front of the furnace to the bridge-wall, as shown in Fig. 2.

F designates a door to the opening in the bridge-wall, (shown in full lines, Fig. 2, as closed and in dotted lines as opened,) this door being designed to exclude the air from the chamber when the furnace is used in the combustion of coal or wood, and to permit air to enter therein when gas is being used.

G designates mixers set in the inner walls of the longitudinal air-chambers and preferably extending the entire length thereof. These mixers are preferably each formed of two sections, the sections being duplicates one of the other, thereby rendering them interchangeable. Each section is formed with semicircular grooves G', the grooves being formed at an oblique angle to the sides, whereby when the two sections are assembled and in place within the side of the furnace the

gas is projected into the furnace from either side and toward the bridge-wall with the effect of spreading the flame the entire length of the furnace and causing the rising products of combustion to traverse a greater area of the boiler-surface than would be the effect were the gas projected directly beneath the boiler.

H designates a piping leading from the main supply-pipe to the mixers, and comprises a series of horizontal pipes H' in communication with the service-pipe H'', the horizontal pipes being within the longitudinal air-chamber E and communicating with the perforations in the mixers by means of branch pipes I, arranged at an angle to enter the perforations, as shown in Fig. 2. This piping is preferably formed of two sections, as shown in Fig. 2, whereby when but a moderate fire is desired but one section is used, or both may be used when greater heat is desired. For this purpose the sections are formed separate and separate pipes lead thereto. The sections being alike, the same letters of reference are employed to designate the parts.

In operation when it is desired to use gas as a fuel no preparation of the grate-bars is necessary, and any ashes, cinders, or coal that may rest thereon may be permitted to remain. The door F is opened, the gas is permitted to flow through the pipes and into the mixers, and is ignited within the combustion-chamber. Atmospheric air passes through the opening in the bridge-wall into the longitudinal chambers E, and from thence into the openings in the mixer, where it unites with the gas as it flows from pipes I, and the two fluids unite in combustion. The products of combustion passing over the bridge-wall soon heat the chamber therein, and as a consequence the air passing therethrough becomes heated to a high temperature prior to its admixture with the gas.

To adapt the furnace to the use of coal or wood it is only necessary to cut off the flow of gas and close door F of the bridge-wall.

It will be seen that the auxiliary attachment can be arranged in furnaces while in course of construction without involving additional expense only as relates to the piping, and that it can be adapted to furnaces already constructed with but slight expense.

What I claim is—

1. In an auxiliary attachment for the combustion of natural gas, the longitudinal chambers formed in the side walls of the furnace and communicating with the outer air by means of a chamber formed in the bridge-wall, the longitudinal chambers being provided with a series of perforations communicating with the interior of the furnace, said perforations being formed by two interchangeable plates having registering oblique semicircular grooves, gas-burners located in the oblique openings, whereby the gaseous fuel is injected at an angle toward the center of the combustion-chamber, substantially as and for the purpose described.

2. In an auxiliary attachment for the combustion of natural gas, the combination, with a bridge-wall having a chamber and provided with a door for the admission of air, of longitudinal chambers formed in the side walls of the furnace and communicating with the outer air by means of the chamber in the bridge-wall, the longitudinal chambers being provided with a series of perforations formed by two interchangeable plates having oblique registering semicircular grooves, gas-pipes arranged within the side chambers, branch pipes attached to the said pipes and extending into the oblique perforations, and the supply-pipes, all arranged and adapted to operate substantially as shown and described.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

FREDRICK T. ADAMS.

Witnesses:

WILLIAM WEBSTER,  
CARROLL J. WEBSTER.