

Aug. 4, 1925.

1,548,360

D. GOFF

AIR FEEDER FOR FURNACES

Filed Nov. 12, 1924

Fig. 1. ON LINE 1-1
OF FIG. 2:

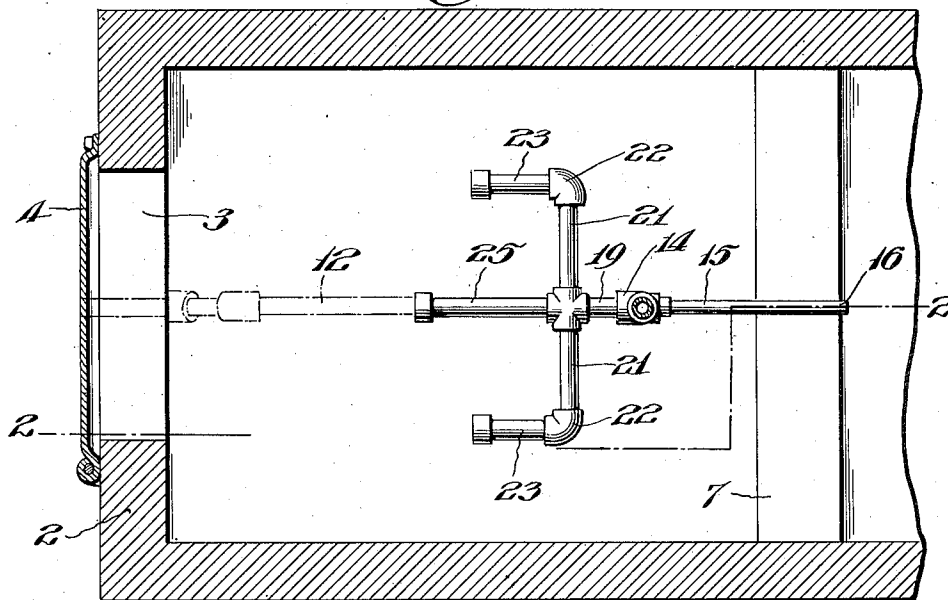
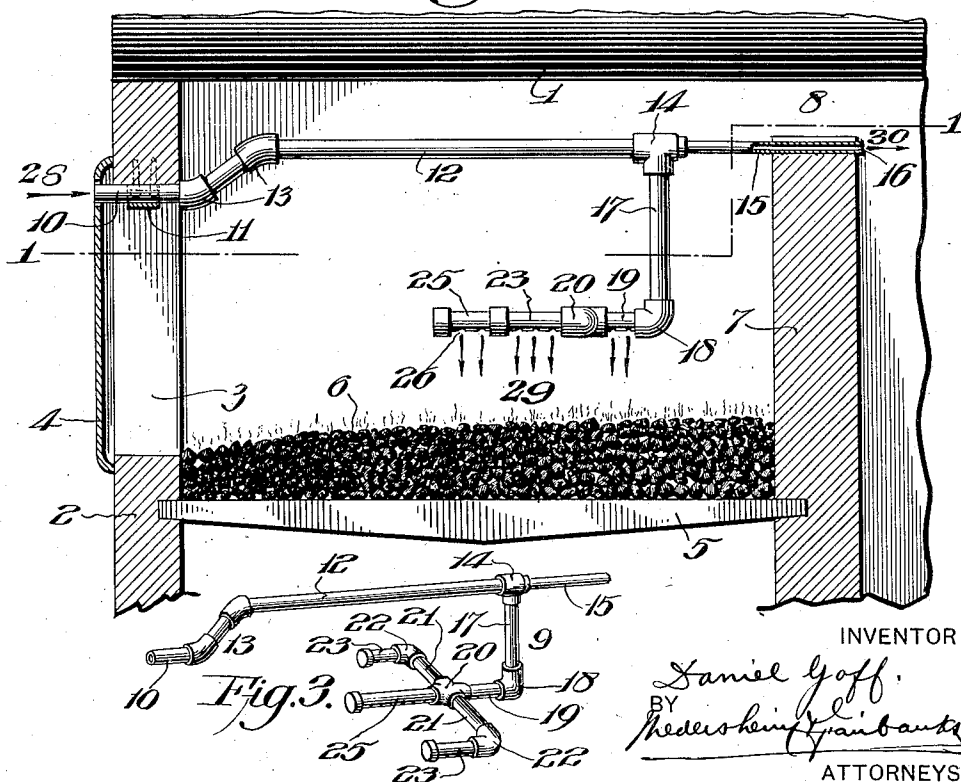


Fig. 2. ON LINE 2-2
OF FIG. 1.



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Patented Aug. 4, 1925.

1,548,360

UNITED STATES PATENT OFFICE.

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AIR FEEDER FOR FURNACES.

Application filed November 12, 1924. Serial No. 749,363.

To all whom it may concern:

Be it known that I, DANIEL GOFF, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Air Feeder for Furnaces, of which the following is a specification.

It is well known that the gases generated by burning coal and other fuels, and particularly the carbon contained in said gases may be completely burned if mixed with a sufficient quantity of hot air, and ignited before said gases are permitted to cool to any appreciable extent.

The present invention provides an improved means for heating and delivering air, and mixing the air with the gases in a region of comparatively high heat in the furnace. The invention also provides an air and gas mixing device which in no way interferes with the stoking and operation of the furnace, and may be easily applied to many standard makes of furnaces which ordinarily have little, if any, provision for completely consuming the gases distilled in such furnaces.

This invention relates to the subject of fire boxes for furnaces and the like, and the primary aim of the same is to provide simple, novel and thoroughly practical means for feeding heated air to the fire so that the heated air will commingle with the gases arising from the fire, and thereby produce perfect combustion.

Generally speaking the invention contemplates the delivery of highly heated air, under pressure, to discharge outlets which may be in the form of nozzles, tuyeres and the like, located in the fire box above the fire and relatively positioned so that the air jets meet at the center of the fire and spread in the form of an air film directly over the fire, and cause the gases arising from the fire to commingle and thoroughly mix with the air, and through such commingling and mixing are entirely consumed, the result being that a thorough and perfect combustion is obtained with an increase of heat and the entire elimination of smoke or soot.

I accomplish a thorough heating of the air by the provision of air supply pipe lines disposed longitudinally in the walls of the furnace, and in this connection the invention further contemplates the provision of a novel arrangement whereby an equal dis-

tribution of air pressure is procured in the series of nozzles or tuyeres projecting from said supply pipe lines.

For the purpose of illustrating my invention, I have shown in the accompanying drawings forms thereof which are at present preferred by me, since they will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a horizontal sectional view of an air feeding device for furnaces embodying my invention, the section being taken on line 1—1 Figure 2.

Figure 2 represents a vertical longitudinal section the section being taken on line 2—2 Figure 1.

Figure 3 represents a perspective view of the air preheating and feeding unit in detached position.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—

In carrying out my invention, which is applicable to any house heating furnace, locomotive boiler, stationary boiler, or marine boiler, I position the air preheating and feeding unit above the furnace grate or above the fuel, in such a way that the incoming air is thoroughly heated prior to its egress upon the fuel.

In carrying out my invention I have shown one of the conventional forms of boiler furnaces to which the same is applicable, wherein 1 designates the boiler, 2 the furnace front, 3 the fuel door opening, and 4 the fuel door which can be hinged or supported in any suitable manner. 5 designates the grate upon which the fuel 6 is supported in the customary manner, the grate being supported in any suitable manner, having its rear end if desired, supported upon the bridge wall 7 having the passage 8 over the top thereof, through which pass the products of combustion. 9 designates the air preheating and feeding unit, shown in detached position in Figure 3, which comprises the front portion 10, which is supported above the firing inlet 3 by the bracket 11 or the like. 12 designates a

longitudinally extending tubular section which is connected to the front end member 10 by suitable elbows or fittings 13, the rear end of the pipe 12 entering the tee 14, from the rear of which extends the pipe 15 which is of lesser diameter than the pipe 12, said pipe 15 discharging heated air at the port 16 in the rear of the bridge wall 7.

17 designates a pipe depending from the tee 14, which is connected to the elbow 18 from which extends a pipe 19 into the tee 20, from the sides of which tee 20 extend the branches 21 which engage the elbows 22, from which project the pipes 23 which have ports 24 in their bottom which permit the egress of heated air onto the coal or fuel 6. 25 designates a central pipe which projects from the tee 20, and is centrally disposed with respect to the pipes 23, said pipe 25 being slightly longer than the pipes 23 and having ports 26 in the bottom thereof.

In the operation of a furnace of any common type, there is a considerable decrease in the air pressure within the combustion chamber, above the fire, which is due to either the natural draft created by the stack or chimney, or an induced draft. By virtue of this decrease in pressure or vacuum within the furnace, the air is drawn in through the tube 10 from without, as indicated by the arrow 28 in figure 2, and is discharged under pressure, relative to the interior of the furnace, through the primary distributing tubes 23 and 25 and the opening 26, as indicated by the arrows 29, and also through the auxiliary discharge tube 15 at the opening 16, as indicated by the arrow 30. The tubes 23 and 25 discharge and distribute a primary supply of heated air directly into the path of the highly heated combustible gases above the fuel, while the auxiliary tube 15 supplies a secondary air current into the path of the gases still partly unconsumed, as they pass over the top of the bridge wall 7. Due to the unequal lengths of the distributing tubes 23 and 25, a more uniform distribution and mixing of the air and gases is obtained.

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

1. In a device of the character stated, an outer air supply tube, an air pre-heating tube extending into the furnace and communicating with the supply tube, a pendant tube carried by the end of the pre-heating tube, a plurality of laterally extending air distributing tubes carried by the lower end of the pendant tube in proximity to the burning fuel, the central one of said air distributing tubes being longer and extending farther towards the front of the furnace than the other of said tubes, said tubes being closed at their free ends, and having a number of air discharge openings along the bottom sides thereof.

2. In a device of the character stated, an outer air inlet tube, a horizontally disposed pre-heating tube in communication therewith, a pendant tube communicating with the rear end of said pre-heating tube, and a plurality of laterally extending air distributing tubes carried by and in communication with the lower end of said pendant tube, and a horizontal tube communicating with the rear end of the pre-heating tube and of lesser diameter than said heating tube extending rearwardly over the top of the fire wall of the furnace.

3. In a device of the character stated, an outer air supply tube, an air pre-heating tube extending into the furnace and communicating with the supply tube, a pendant tube carried by the end of the pre-heating tube, a plurality of laterally extending air distributing tubes carried by the lower end of the pendant tube in proximity to the burning fuel, the central one of said air distributing tubes being longer and extending farther towards the front of the furnace than the other of said tubes, said tubes being closed at their free ends, and having a number of air discharge openings along the bottom sides thereof, a secondary air discharge tube of a lesser diameter than said pre-heating tube communicating with the end of the pre-heating tube and extending rearwardly thereof, and passing over and supported by the bridge wall, and having an auxiliary air discharge opening at the rear end thereof.

DANIEL GOFF.