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(54) **Radiant tube heater assembly**

(57) A radiant tube heater includes a housing (1), and a blower (6) and a burner (9) in the housing (1) for creating and combusting a fuel/air mixture. A burner tube (2) extends outwardly from the housing (1) for carrying products of combustion therefrom. When less heat is required, unless air from the blower (6) is reduced, there

is too much air for complete combustion of the fuel and excess air mixes with combustion gases causing cooling in the burner tube (2). This problem is solved by providing a short flame tube (15) in the inlet end of the burner tube (2) for receiving the flame (12). Excess air flow around the flame tube (15) is heated. Thus, it is necessary to reduce only the supply of fuel to the burner (9).

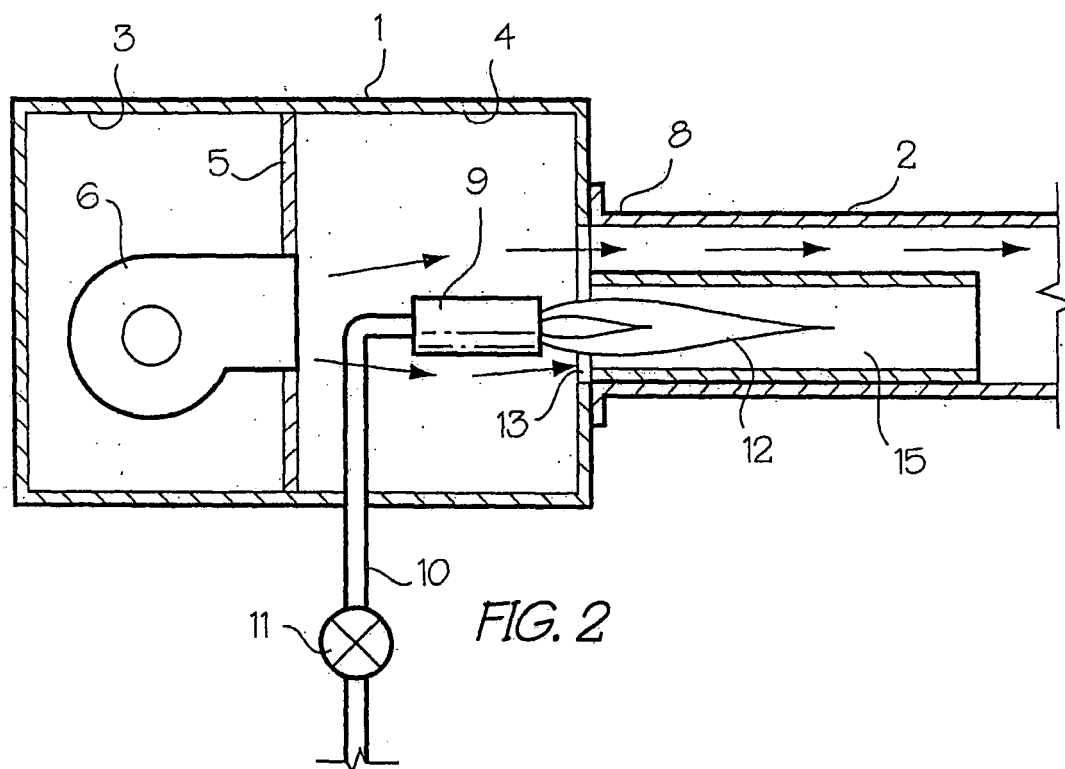


FIG. 2

Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This invention relates to a radiant tube heater assembly.

[0002] The conventional radiant tube heater includes a housing containing a burner, a burner tube extending out of the housing and a reflector connected to the housing and partially surrounding the burner tube. Gas is introduced into the burner for mixing with air from a blower attached to or mounted in the housing. The gas flows into the housing via an inlet line equipped with a valve. It is necessary to control the flow of gas and air in order to ensure complete combustion of the gas. Otherwise, excess air, i.e. air not required for complete combustion of the fuel enters the burner tube with the flame from the burner and cools the combustion gases immediately downstream of the burner. Thus, when the supply of fuel to the burner is reduced, it is also necessary to decrease the blower fan speed so that less air is fed into the housing.

GENERAL DESCRIPTION OF THE INVENTION

[0003] The object of the present invention is to provide a radiant tube heater assembly, which does not require a reduction in air flow when the heat is turned down, i.e. when the flow of gas into the burner is reduced by partly closing the valve in the gas inlet line or by the reduction of fuel pressure in the gas valve and/or gas regulator assembly.

[0004] In general terms, the above defined object is achieved by adding a short flame tube in the inlet end of the burner tube so that air not required for complete combustion of the gas flows over the flame tube. During passage over the flame tube, the air is heated and then mixes with the combustion gases downstream of the flame tube. Consequently, the combustion gases are not cooled or are cooled less than in existing burner tubes without a flame tube.

[0005] More specifically, the invention relates to a radiant tube heater comprising a housing; an outlet in one end of said housing; a burner tube extending outwardly from said housing around said opening; a burner in said housing; a gas inlet extending into said housing and connected to said burner for introducing fuel into said burner; a blower in said housing for introducing combustion air into the housing for mixing with the fuel and for blowing a flame and the products of combustion into said burner tube; and a flame tube in said burner tube for receiving the flame, whereby air required for efficient combustion of the gas passes through the flame tube, and excess air exiting the housing passes between the burner tube and the flame tube for heating by the flame tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

5 Figure 1 is an isometric view of one end of a radiant tube heater assembly;
Figure 2 is a schematic longitudinal sectional view of the end of the heater assembly of Fig. 1 and a flame tube in accordance with the present invention;
10 Figure 3 is a schematic longitudinal sectional view of one end of a heater assembly containing a flame tube in accordance with a second embodiment of the present invention;
15 Figure 4 is a schematic longitudinal sectional view of one end of a heater assembly containing a flame tube in accordance with a third embodiment of the invention; and
20 Figure 5 is an isometric view of the flame tube of Fig. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0007] Referring to Figs. 1 and 2, a radiant tube heater assembly includes a housing 1 with a burner tube 2 extending outwardly therefrom. A reflector (not shown) is usually provided around the top and sides of the burner tube 2. The interior of the housing 1 is divided into a pair of chambers 3 and 4 by a partition 5. The chamber 3 contains a blower 6 for introducing combustion air into the chamber 4 and the inlet end 8 of the burner tube 2. Gas is fed into a burner 9 in the chamber 4 via an inlet line 10 containing a valve 11.

[0008] In the conventional radiant heater, air from the blower 6 mixes with fuel entering the burner 9 via the tube 10, and the resulting flame 12 projects outwardly through an opening 13 in the housing 1 into the burner tube 8 to heat the latter. When the valve 11 is partially closed to reduce the fuel for combustion which reduces the heat being generated by the radiant heater, it is also necessary to reduce the airflow from the blower 6, i.e. reduce the blower fan speed; otherwise, there is too much air for complete combustion of the fuel. Any excess air entering the inlet end 8 of the burner tube 2 mixes with the combustion gases causing cooling downstream in the burner tube.

[0009] In accordance with the present invention, a short flame tube 15 is mounted in the inlet end 8 of the burner tube 2 for receiving the flame 12. As shown in Fig. 2, the flame tube 15 can be spot welded to one side (in this case the bottom) of the burner tube 2. In this first embodiment of the invention the burner 9 is aligned with the longitudinal axis of the flame tube 15. In a second embodiment of the invention (Fig. 3), the burner 9 is centered with respect to the opening 12 in the housing 1 and the longitudinal axis of the burner tube 2.

[0010] Alternatively, in a third embodiment of the invention shown in Figs. 4 and 5, the flame tube 15 is mounted in the center of, i.e. is concentric with, the burner

tube 2. Short rods 16 are used to connect the flame tube 15 to the burner tube 2. Other rods 17 at the outlet end of the flame tube 15 help to maintain the tube centered in the burner tube 2.

[0011] During normal operation of the radiant heater at a high setting, virtually all of the air from the blower 6 mixes with the fuel to produce a flame 13. When the supply of fuel to the burner 9 is reduced, it is not necessary to reduce the flow of air into the chamber 4 from the blower 6. Excess air, i.e. air not required for complete combustion of the fuel flows around the flame tube 15 and is heated before mixing with the combustion gases downstream of the flame tube. Thus, it is merely necessary to reduce the fuel supply while maintaining a constant flow of air into the chamber 4.

Claims

1. A radiant tube heater comprising a housing (1); an opening (13) in one end of said housing (1); a burner tube (2) extending outwardly from said housing (1) around said opening (13); a burner (9) in said housing (1); a gas inlet (10) extending into said housing (1) and connected to said burner (9) for introducing fuel into said burner (9); a blower (6) in said housing (1) for introducing combustion air into the housing (1) for mixing with the fuel and for blowing a flame (12) and the products of combustion into said burner tube (2); and a flame tube (15) in said burner tube (2) for receiving the flame (12), whereby air required for efficient combustion of the gas passes through the flame tube (15), and excess air exiting the housing (1) passes between the burner tube (2) and the flame tube (15) for heating by the flame tube (15).
2. The radiant tube heater of claim 1, wherein said flame tube (15) is attached to one side of the burner tube (2).
3. The radiant tube heater of claim 2, wherein said flame tube (15) extends along the bottom of the burner tube (2).
4. The radiant tube heater of claim 1, wherein said flame tube (15) is centered in said burner tube (2), whereby excess air passes completely around the flame tube (15).
5. The radiant tube heater of claim 4 including a plurality of rods (16, 17) extending radially between said burner tube (2) and said flame tube (15) for centering and supporting the flame tube (15) in the burner tube (2).

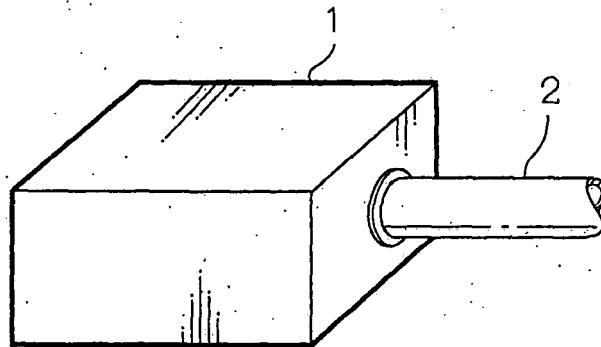


FIG. 1

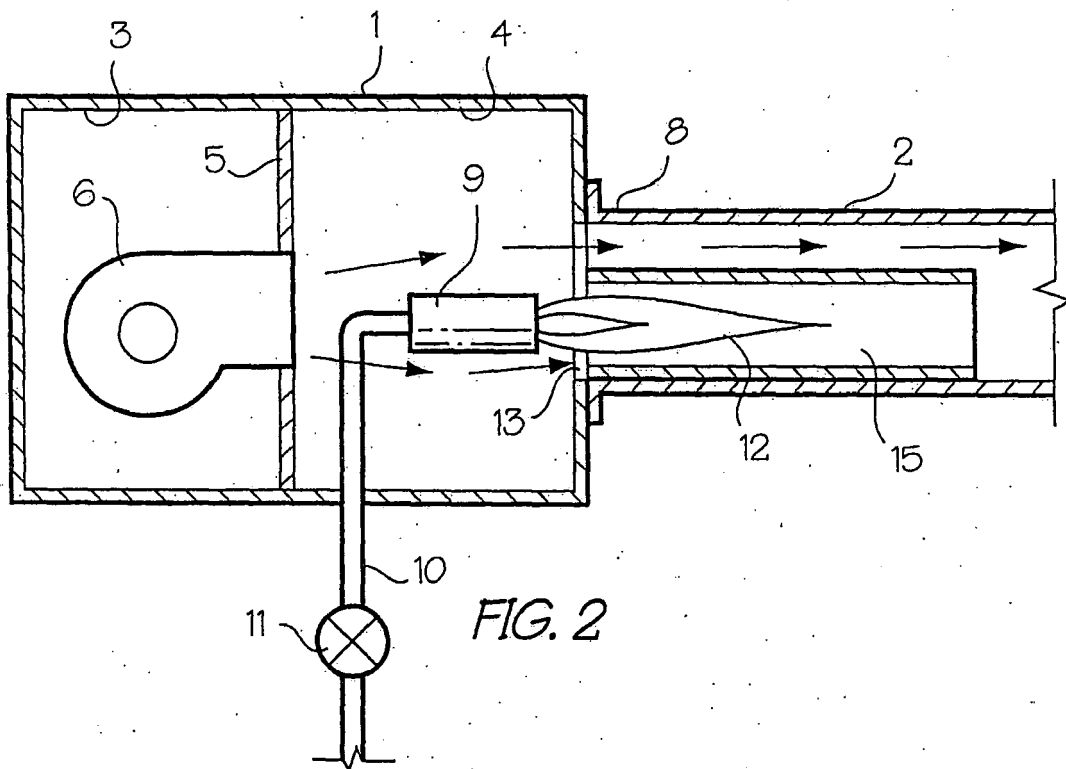


FIG. 2

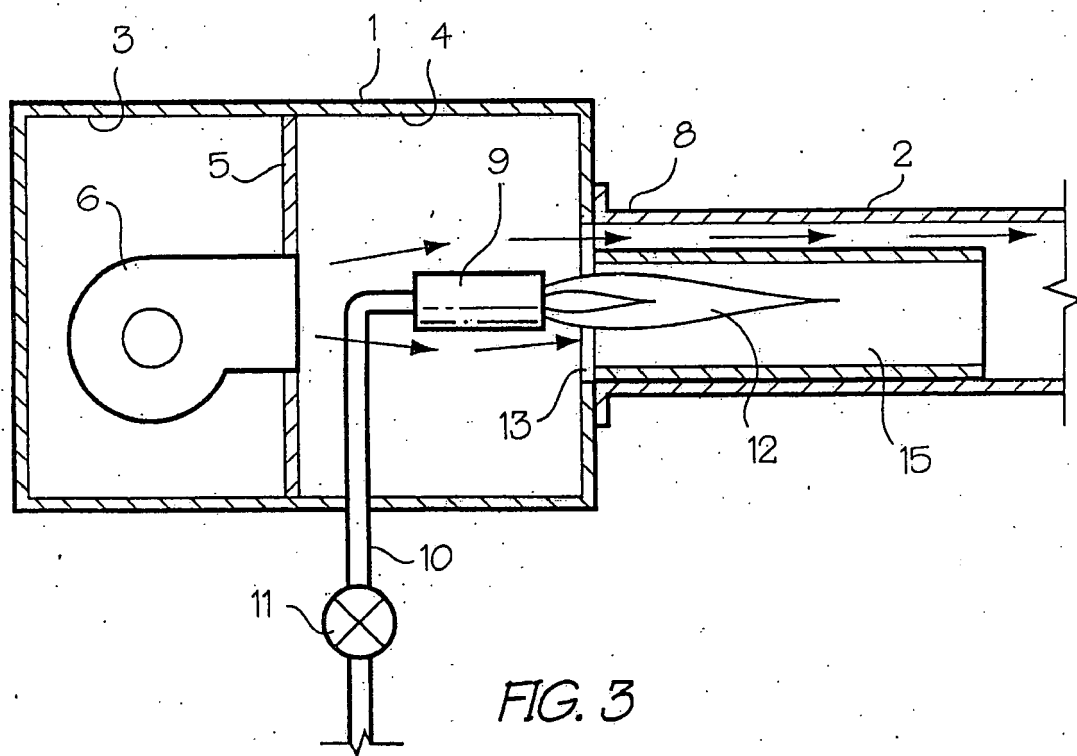
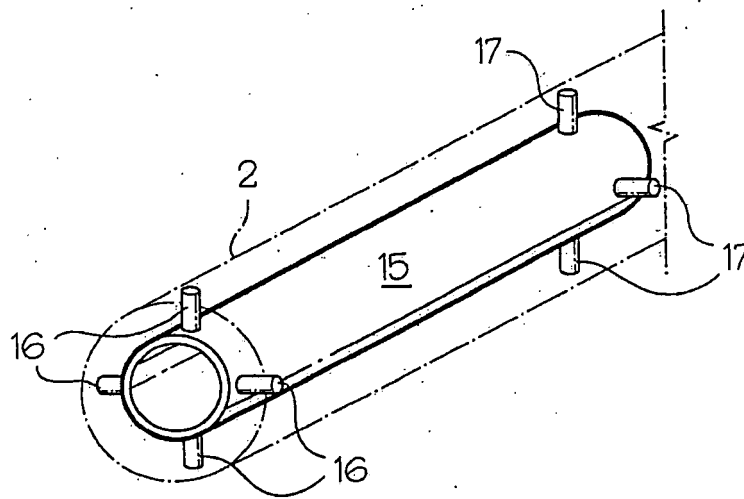
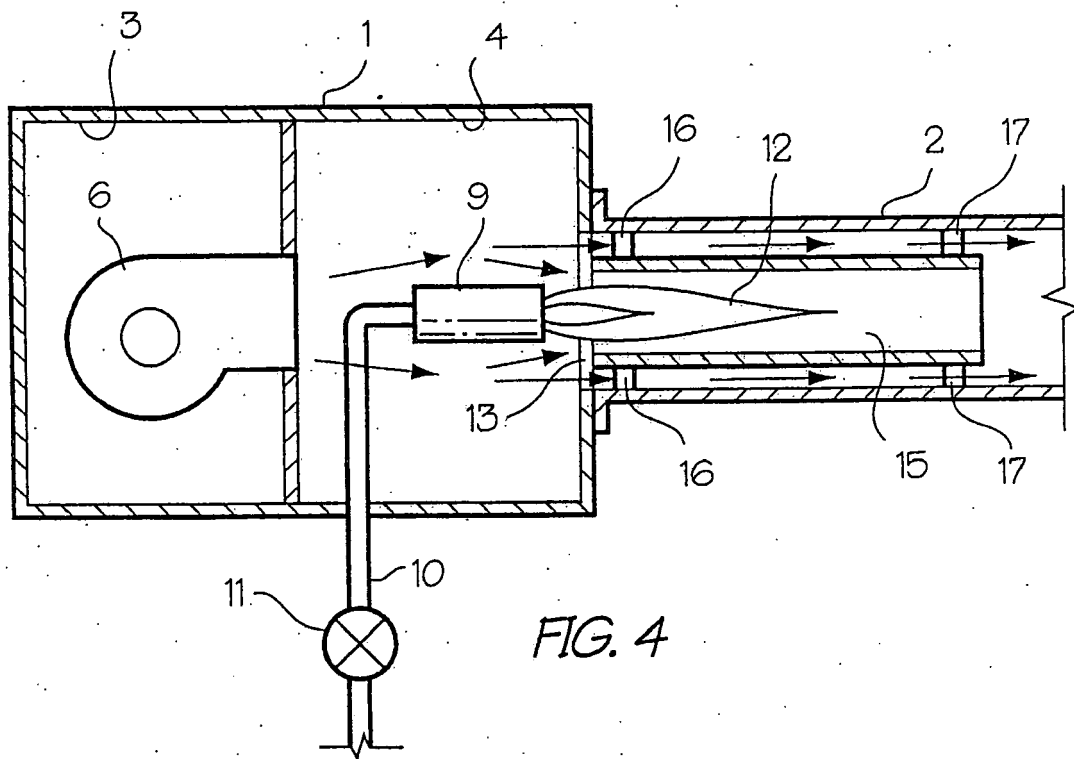


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 08 25 1679

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 318 354 A (MODINE MFG CO [US]) 11 June 2003 (2003-06-11)	1,4	INV. F23C3/00 F23D14/12
Y	* column 4, line 5 - line 30 * * column 5, line 36 - column 6, line 16 * * claim 1; figure 1 *	2,5	
Y	DE 198 17 734 A1 (VIESSMANN WERKE KG [DE]) 4 November 1999 (1999-11-04) * column 2, line 13 - line 21 * * column 2, line 44 - line 53 * * figures 1,3,3A *	2	
Y	CA 2 212 147 A1 (CARRIERE LEO [CA]) 31 January 1999 (1999-01-31) * page 5, line 4 - line 23 * * page 8, line 1 - line 13 * * figure 1 *	5	
A	DE 199 25 276 A1 (RUHRGAS AG [DE]) 7 December 2000 (2000-12-07) * column 2, line 19 - line 28 * * figure 1 *	1	
A	US 2006/081238 A1 (VANCAK JOHN [CA]) 20 April 2006 (2006-04-20) * page 2, paragraph 21 * * figure 1 *	1	TECHNICAL FIELDS SEARCHED (IPC) F23C F23D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 February 2009	Examiner Gavriliu, Costin
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 25 1679

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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19-02-2009

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