United States Patent

Perrinet

[15] **3,640,458**

[45] **Feb. 8, 1972**

[54] HOT AIR GENERATOR WITH VARIABLE LENGTH CONDUIT

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[22] Filed: **Apr. 28, 1970**

[21] Appl. No.: **32,545**

[30] **Foreign Application Priority Data**

May 2, 1969 France.....6912362

[52] **U.S. Cl.**.....**237/50**, 237/53, 126/110, 126/111

[51] **Int. Cl.**.....**F24d 5/04**

[58] **Field of Search**.....237/1, 50, 2, 53; 126/109, 126/111

[56] **References Cited**

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[57] **ABSTRACT**

The invention relates to the art of hot air heating system, more particularly of the type having a plurality of interconnected units each including an inner and outer sleeve spaced to define an annular chamber therebetween with a heat generating means associated with the first of said units and having an associated blower or suction fan to draw ambient air into the system and force such air through the passageway defined by the interconnected inner sleeves which form a combustion chamber and through the annular passageway defined by the interconnected annular chambers which form a heat exchanger chamber, the end of the system being closed and having a discharge pipe connected to the adjacent inner sleeve for exhaust of gases, said outer sleeve having a plurality of outlets spaced along the length thereof.

5 Claims, 4 Drawing Figures

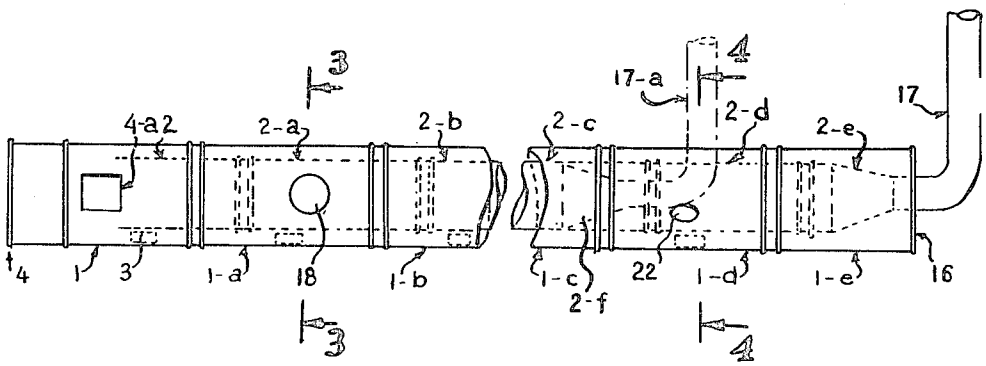


FIG. 1

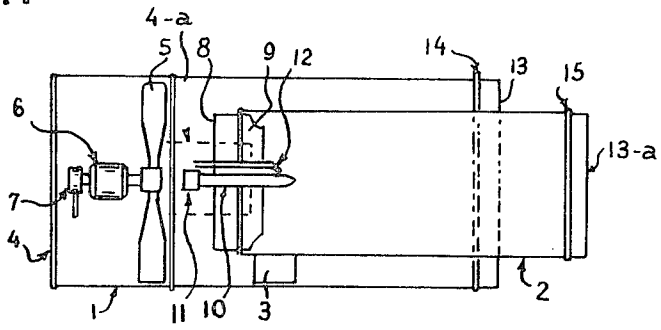


FIG. 2

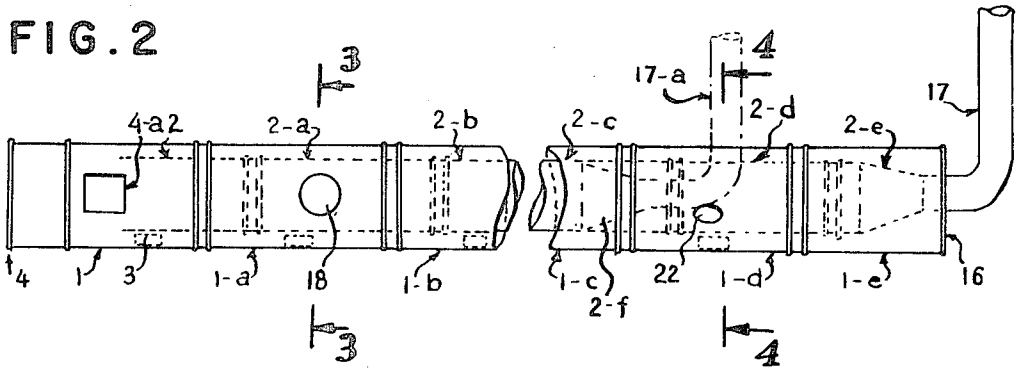


FIG. 3

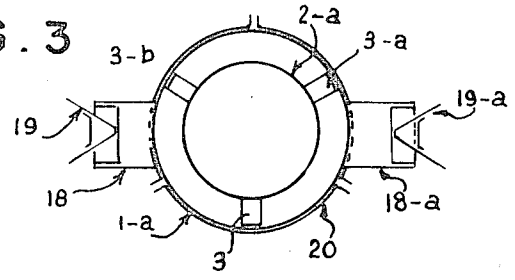
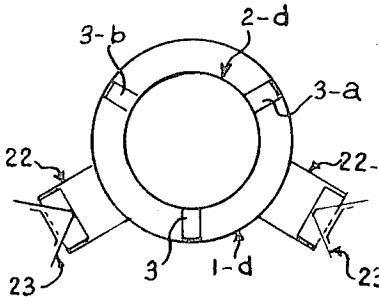


FIG. 4



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HOT AIR GENERATOR WITH VARIABLE LENGTH CONDUIT

As conductive to an understanding of the invention, it is noted that many types of heating systems are employed which have heat generating means which may be fed by gas, oil or electrically energized, with an associated heat exchanger having an outlet for discharge of the hot air.

Depending upon the volume of hot air desired, where such systems comprise a relatively bulky heating means and associated heat exchanger to provide sufficient quantity of hot air to properly heat a large area, if the hot air is directly expelled solely from the region of the system adjacent the heating means the area to be heated will be much hotter near the heating means than at a remote location.

In order to render such an installation more efficient, ducts may be connected to the outlet of the heat exchanger and these ducts can extend to all portions of the area to be heated with the ducts having associated outlets along their length.

Due to the fact that the hot air flows directly through the ducts, unless the ducts are sufficiently insulated, the efficiency of the system is greatly reduced, especially as the distance from the source of heat and the heat exchanger increases.

It is accordingly among the objects of the invention to provide a heating system which is relatively simple in construction, small in size and may readily be adapted to transmit heat to relatively long distances with assurance that the maximum quantity of heat may be provided, even at remote distances from the heat generating means and with a maximum of insulation being required.

According to the invention, the heating system comprises a plurality of individual units each having an outer sleeve and an inner sleeve coaxial therewith, said inner sleeve being spaced from the outer sleeve to define an annular chamber therebetween through which air may flow substantially unimpeded. The individual units are designed so that they may readily be interconnected to provide two distinct passageways, one formed by the interconnected inner sleeves and the other formed by the interconnected outer sleeves, the outer passageway defining a heat exchanger chamber and the inner passageway defining a combustion chamber. The inlet end of the system is provided with a suction fan which is designed to bring ambient air into the system and to force air through the two passageways. The end of the interconnected inner sleeves adjacent the fan is provided with heating means so that the air passing through such inner sleeve will be heated by the heating means and will heat the air in the outer passageway or heat exchanger chamber, the outer sleeve being provided with suitable outlets along its length in order to discharge hot air into the various regions to be heated.

The remote end of the interconnected units is provided with a closure plate which has a discharge pipe extending therethrough that is connected at its inner end to the adjacent end of the innermost sleeve for venting of the gases therein.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention;

FIG. 1 is a side elevational view partly in cross section of the heat generating end of the system;

FIG. 2 is a side elevational view with parts broken away of the system showing a number of interconnected units;

FIG. 3 is a transverse sectional view showing the positioning tabs and outlets; and

FIG. 4 is a view similar to FIG. 3 taken along line 4—4 of FIG. 2.

Referring now to the drawings, as shown in FIG. 1, reference numeral 1 refers to the outer cylindrical sleeve of the heat generator unit which concentrically receives inner sleeve 2, the latter being located in sleeve 1, illustratively by means of three tabs 3, 3-*a*, 3-*b*, spaced 120° apart.

The sleeve 1 has an air inlet opening 4 at its outer end and an inspection port 4-*a* is also provided in sleeve 4 adjacent the air inlet end 4 to permit adjustment of the heating means which may be a fuel burner 10.

The air inlet system comprises a suction fan 5, actuated by an electric motor 6, to which is connected, at the other end of its shaft, a fuel feed pump 7.

The end of sleeve 2 adjacent the air inlet opening 4 carries a plate provided with passages 8 associated with a Venturi device 9. At the center of the passages 8 and of Venturi 9 is the burner 10, provided with an electrovalve 11, at the end of the burner adjacent the fan 5. An ignition electrode 12 of known type is provided for burner 10. A flange 14 is provided on sleeve 1 adjacent end 13 thereof for mounting the next unit. A flange 15 is provided adjacent the end 13-*a* of sleeve 2 for mounting of the inner sleeve 2 of the next unit.

In FIG. 2 is shown the outer sleeves 1-*a*, 1-*b*, 1-*c*, 1-*d* and 1-*e* of a plurality of interconnected units, the sleeve 1-*a* being connected to the sleeve 1 of the first unit shown in FIG. 1. The end of sleeve 1-*e* at the termination of the system is closed by a plate 16.

Also shown in FIG. 2 are the inner sleeves 2-*a*, 2-*b*, 2-*c*, 2-*d* and 2-*e* of the plurality of interconnected units, the sleeve 2-*a* being connected to sleeve 2 of the first unit shown in FIG. 1. The end of sleeve 1-*e* at the termination of the system is frustoconical in shape, its small diameter end being secured to a discharge tube 17 which extends through a central opening in plate 16.

As shown in FIG. 3, the outer sleeve 1-*a* has radial outlets 18, 18-*a* for distribution of hot air. The outlets 18, 18-*a* which are in the form of sleeves positioned in a horizontal plane, are provided respectively with deflectors 19 and 19-*a*. Suspension collars 20 are provided encompassing sleeve 1-*a*.

As shown in FIG. 4, the outer sleeve 1-*d* has radial outlets 22, 22-*a* for distribution of hot air. The outlets 22, 22-*a* are also in the form of downwardly directed sleeves whose axes form an angle of 120° and are provided respectively with deflectors 23 and 23-*a*.

The outer sleeves between sleeves 1 and 1-*e* have at one end a mounting flange identical to the flange 14 of sleeve 1. Similarly, the inner sleeves between sleeves 2 and 2-*e* have at one end a flange identical to flange 15 on sleeve 2, and each has at its other end a groove for the said flanges on adjoining units to permit ready coupling. It is clear that the number of intermediate sleeves is a function of the length of the room to be heated. The position and the direction of the axes of the distribution outlets is dependent on the conditions of the air conditioning to be obtained. Moreover, the volume of hot air to be expelled can be adjusted with the air of the corresponding deflectors which preferable are adjustable.

The annular space between the inner and outer sleeves 1 and 2 forms the chamber of the heat exchanger.

The burned gasses in the combustion chamber formed by the sleeves 2 escape through the pipe 17 and conventional automatic controls stop and restart devices are provided following a predetermined temperature programming, while an electrovalve regulates the flow or cuts off the arrival of the fuel, as well as the operation of the feed pump for the fuel. As such controls are conventional, they are not shown.

It is within the scope of the invention to reduce the number of inner sleeves 2. In this case, the frustoconical sleeve 2-*e* could appear as at 2-*f* in dotted lines, the discharge tube 17-*a* passing through the outside sleeve 1-*d*.

The heating system above described has great flexibility in that it is very simple to add, as desired, any reasonable number of heating units dependent upon the size of the area to be heated. By reason of the fact that the combustion chamber extends the entire length of the system, there will be a maximum transfer of hot air through the entire system with resultant high efficiency of the system.

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

1. A heat generating system comprising a plurality of interconnected units each unit comprising an outer sleeve, an inner sleeve positioned in said outer sleeve coaxial therewith and spaced from said outer sleeve to define an annular chamber therebetween, a blower positioned in the outer sleeve adjacent

one end of the system and designed to suck ambient air into the system and to force such ambient air through the interconnected inner sleeves which defines a combustion chamber and outer sleeve which defines a heat exchanger chamber, heating means positioned in the end of the inner sleeve adjacent the fan, a closure plate at the other end of the system, a discharge pipe extending through said closure plate and connected at its inner end to the adjacent end of the inner sleeve, said outer sleeve having a plurality of discharge outlets spaced along the length thereof.

2. The combination set forth in claim 1 in which the inner sleeve has one end located inwardly of the adjacent end of the outer sleeve and its other end extending beyond the adjacent end of the outer sleeve, means being provided at the ends of each of said inner and outer sleeves for connection thereto of the end of the inner and outer sleeve of a juxtaposed heating unit to form a continuous combustion chamber passageway and a continuous heat exchanger passageway respectively.

3. The combination set forth in claim 1 in which the end of the innermost sleeve adjacent the closure plate is frustoconical, the smaller diameter end being connected to the inner end of the discharge pipe.

4. The combination set forth in claim 1 in which the end of the sleeve in which the heating means is positioned has a Venturi member positioned therein, said Venturi member being of smaller diameter at its inner end, said heating means being centrally located in said Venturi member.

5. The combination set forth in claim 4 in which said heating means is a fluid type burner and an ignition element is associated with said burner, said outer sleeve having a port therethrough to provide access to said burner for adjustment thereof.

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